Chapter IV: Environmental Consequences

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A. Introduction

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

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

Impact analyses and conclusions are based on interdisciplinary team knowledge of the resources and the planning area, information provided by experts in the BLM or in other agencies, and information contained in pertinent existing literature. The baseline used for the impact analysis is the current condition or situation described in Chapter III, Affected Environment. Analysis assumptions have also been developed to help guide the determination of effects. These assumptions are outlined beginning on page 4-5. Since the Proposed RMP/Final EIS provides a broad management framework, the analysis in this chapter represents best estimates of impacts since exact locations of development or management are often unknown. Impacts are quantified to the extent practical with available data. In the absence of quantitative data, best professional judgment provides the basis for the impact analysis.

1. How to Read this Chapter

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

- Introduction
- Resources
- Resource Uses
- Special Designations
- Social and Economic
- Cumulative Impacts
- Irreversible or Irretrievable Commitment of Resources
- Unavoidable Adverse Impacts
- Short-term Use vs. Long-term Productivity

The Introduction section includes analysis assumptions, defines the types of effects that will be projected throughout the impact sections, discusses the availability of data, and identifies the BLM's Critical Elements.

The Resources, Resource Uses, Special Designations, and Social and Economic sections contain detailed analyses of impacts by alternatives. The order of these sections does not reflect their level of importance.

The sub-section under each heading entitled Impacts Common to All Alternatives describes impacts that will not vary by alternative. This information is presented to avoid repetition in the Impacts by Alternative section. Some sections may also include another section entitled Impacts Common to All Action Alternatives (Alternatives B, C, and D); again, inclusion of such a section is to avoid repetition. Impacts that are included in either of these two sections will not be repeated later. In some instances, a discussion of the environmental consequences for a given subject may be addressed completely under a description of Impacts Common to All Alternatives, in which case there will be no further enumeration. Where there are impacts that vary between alternatives, these are broken down by alternative. Only those impacts that are applicable to that alternative are discussed; conversely, if there are no impacts to a given resource, there will be no heading or discussion for that subject. Where the resulting impacts from several programs are very similar, they may be grouped under a single subheading (e.g., the Air Quality and Soil and Water Resources section).

During impact analysis, each resource specialist considered management activities resulting from the following programs: Air, Soil, Water, Vegetation, Fish and Wildlife, Special Status Species, Fire Management and Ecology, Cultural Resources, Paleontological Resources, Visual Resources, Wilderness Characteristics, Forest Products, Livestock Grazing, Minerals, Recreation, Travel Management, Renewable Energy, Lands and Realty Actions, Special Designations (including Areas of Critical Environmental Concern, Iditarod National Historic Trail, and Wild and Scenic Rivers), Public Safety, Social and Economic Conditions, and Subsistence. If no impacts were identified either by the resource specialist or by the public during scoping, the programs are not discussed further. In cases where impacts may potentially occur, the impacting resource or resource use is discussed in more detail.

Standard operating procedures resulting from Federal laws, regulations, and policies would continue to be followed under all alternatives. These standard operating procedures constitute day-to-day implementation of policy and management, and may result in certain projects being mitigated, redesigned, or dropped from consideration. Associated limitations or complications they may present to programs (e.g., increased processing times or costs) are not considered impacts and are not discussed further in this document. Since ROPs and Oil and Gas Leasing Stips have been included in Alternatives B, C, and D as design features, many impacts are reduced or eliminated up front.

Separate sections at the end of this chapter describe Special Designations (beginning on page 4-245), Social and Economic (beginning on page 4-240), Cumulative Impacts (beginning on page 4-209), Irreversible or Irretrievable Commitment of Resources (beginning on page 4-236), and Unavoidable Adverse Impacts (beginning on page 4-241) and Short-term Use vs. Long-term Productivity (beginning on page 4-246).

2. Analysis Assumptions

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

a) General Assumptions

- Sufficient funding and personnel would be available for implementation of the final RMP decision.
- Implementation of actions from any alternative would be in compliance with valid existing rights, Federal regulations, bureau policies, and other requirements.
- Appropriate maintenance would be carried out to maintain the functional capability of all developments.
- The discussion of impacts is based on best available knowledge. Knowledge of the planning area and professional judgment, based on observation and analysis of conditions and responses in similar areas, are used to predict environmental impacts where data is limited.
- Acreage figures and other numbers used in analysis are approximate projections for comparison and analytic purposes only. Readers should not infer that the acreage figures reflect exact measurements or precise calculations.
- State and Native entitlements will be met sometime during the life of the plan, reducing the amount of BLM-managed land in the planning area by as much as 6.6 million acres (11.9 million acres are currently managed by BLM).
- The life of the RMP will be 15 to 20 years.
- Climate change is occurring and may affect surface resources in the planning area. Some changes resulting from climate change will likely not occur during the life of the plan.
- State-selected and Native-selected lands are segregated from mineral entry. These lands will become available for mineral entry or leasing only when they either are conveyed out of Federal ownership or are returned upon rejection of land selection.

b) Resources Assumptions

(1) Air Quality and Soil and Water Resources

(a) Air Quality

Air quality throughout the planning area is pristine or nearly so, except for seasonal influences such as smoke, wind-blown dust, and Arctic haze. During the summer, smoke from wildland fires may occasionally exceed EPA limits for airborne particulates; smoke can originate from as far away as Canada or Siberia. Another factor that affects seasonal air quality is airborne particulates from outside Alaska. During the winter and spring, winds transport pollutants from industrial Europe and Asia across the Arctic Ocean to Alaska causing a phenomenon known as

Arctic haze. Despite this seasonal long-distance transport of pollutants into the Arctic and smoke from summer fires, the planning area is still considered an attainment area because it meets the standards of the Clean Air Act. It is assumed that there will be no non-attainment areas within the planning area during the life of the plan.

(b) Soil Resources

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

(c) Water Resources

Demand for water (both quantity and quality), in the planning area's springs and spring-fed streams and rivers, will increase as a result of increasing recreation use, increasing population in the planning area, and increasing mineral exploration and development. Water quality could be impacted by thermokarst resulting from global warming. Water quality requirements will be achieved through the use of ROPs.

(2) Vegetation

Healthy forests and woodlands will become increasingly more important for productive wildlife habitat, as will maintenance of healthy upland communities to support watershed health and support sustainable production of forest products such as firewood and house logs. Subsistence uses associated with these vegetation types may increase slightly. These uses include personal firewood and house log gathering, berry-picking, collection of greens, and collection of plant materials such as grasses, birch bark, and diamond willow for arts and crafts.

Climate change will continue, with potential for significant changes in Arctic and sub-Arctic vegetation over time. Warming has the potential to cause land cover changes in high latitude regions through both vegetation replacement and increasing frequency of disturbance.

The riparian vegetation in the planning area is primarily in a natural state, healthy plant communities are present in various seral stages from early succession to climax, showing adaptation to natural disturbances.

Inventory efforts will be initiated to identify specific occurrence of noxious and invasive plants. The number and type of noxious and invasive plants will increase during the life of the plan, but will be concentrated around areas of human activity. The demand for control of noxious and invasive plants will increase as public knowledge of the detriments of these plants increases.

(3) Fish and Wildlife

(a) Fish

The demand for fisheries resources from sport, subsistence, and commercial fishing will increase during the life of the plan, resulting in increased pressure on fish populations in the planning area. There is a direct correlation between the amount of quality habitat and fish populations. Potential impacts to habitat quality will increase during the life of the plan. The

BLM will continue to manage fish habitat to protect important spawning, rearing, overwintering, and migratory habitat for resident and anadromous fish species.

(b) 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 as species specific needs are often very site-specific. Habitat may be only seasonally available due to elevation, aspect, type of vegetation present, and proximity of human disturbance. Habitat conditions will vary due to natural processes, even if human-caused influences are reduced or eliminated. Climate change will result in increased stress on some species of wildlife. Habitat quality or availability may decrease slightly for some species. Other species may see an increase in availability of habitat due to changes in the vegetation associated with climate change.

Management actions intending to benefit a specific habitat for a given species will influence any other species occurring in that same habitat. Impacts to wildlife populations and habitat are not discrete since actions may benefit one species while having an adverse, or beneficial, impact on another. Maintaining high quality habitat conditions can influence 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.

Because wildlife are not aware of administrative boundaries and move freely between BLM land and land owned by others, impacts on wildlife may also occur on non-BLM lands, particularly with migratory species. Population level impacts would affect the population regardless of whose land they are on. Disturbance effects may cause animals to move off of BLM-managed land and onto land managed by others.

Demand for the improved health of wildlife habitat will increase during the life of the plan given the increase in demand for hunting and subsistence opportunities within the planning area.

(4) Special Status Species

Continuing inventory will identify additional Special Status Species on BLM-managed lands, and will likely include the expansion of known ranges and numbers of populations of species on the BLM-Alaska Sensitive Status Species list. Nationally, demand for the protection of species listed under the Endangered Species Act, as well as for species not yet listed but of concern, will likely increase. There are two threatened species, one proposed species, one candidate species, and numerous sensitive species known or suspected to occur in the planning area. Demand for protection of these species will increase as inventory indicates specific habitat niches or requirements, and as increased visitor use or development places demands on associated habitats.

(5) Fire Management and Ecology

Cooperative interagency fire planning and suppression will continue. Fire will continue to be recognized as a critical natural process on a landscape scale and across agency boundaries. The circumstances under which a fire occurs, and the likely consequences on firefighter and public safety and welfare, natural and cultural resources, and values to be protected, will continue to dictate the appropriate response to the fire. The full range of fire management

activities will be used to achieve ecosystem sustainability including its interrelated ecological, economic, and social components. Fire suppression efforts will continue in areas of urban interface and where wildland fire would produce undesirable effects. Management option designations will change over time to respond to specific resource or urban-interface concerns. Fuels management projects may be implemented occasionally to achieve desired ecological conditions or to meet land use and hazard fuels reduction objectives. Rehabilitation will follow the guidelines in 620 DM 3 and the Emergency Stabilization and Rehabilitation Handbook. Prevention and education programs will be initiated as warranted and as funding allows. Climate change may result in changes in fire frequency or severity.

(6) Cultural Resources

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

New cultural resources will continue to be found and evaluated for eligibility to the National Register of Historic Places as additional inventories are completed. Eligible cultural resources will continue to be treated similarly and equally in terms of type, composition, and importance, but many will continue to deteriorate through natural agents, unauthorized public use, and vandalism. The BLM will consult with Native and village corporations on traditional cultural properties and values that are of concern to them.

All archaeological resources will be assessed according to BLM use categories. The demand for uses of lands on which cultural resources occur may increase slightly during the life of the plan.

(7) Paleontological Resources

Federal undertakings and unauthorized uses have the potential to cause irreversible disturbance and damage to non-renewable paleontological resources. The BLM will mitigate impacts to significant paleontological resources from authorized uses through avoidance and specimen recovery. Geologic formations with exposures containing vertebrate and non-vertebrate fossils will continue to be impacted from natural agents, unauthorized public use, and vandalism. The demand for use of both vertebrate and non-vertebrate fossils may increase slightly during the life of the plan.

(8) Visual Resources

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

(9) Wilderness Characteristics

Wilderness characteristics of naturalness, solitude, and primitive and unconfined recreation is expected to remain in demand from local residents and those visitors who want to experience the primitive and unspoiled nature of the local landscape. Businesses that depend on natural landscapes for their excursions (e.g. ecotourism, guided hunting, and fishing) will favor an area that possesses wilderness characteristics. Recreationists who depend on a backcountry experience for their endeavors will pursue lands that have wilderness characteristics.

(10) Resource Management Activities

The following table shows anticipated levels of activities related to wildlife and fish management, vegetation management, cultural resource management, and recreation.

Table 4-1. Anticipated Levels of Activity for Resource Management

Activity	Alternative			
	A	B	C	D
Aircraft Use (fixed wing and helicopters) This use does not include flights directly associated with oil and gas development, mineral exploration or development, or special recreation use permits.				
Point-to-Point	Occasional	Regular, but not daily	Occasional	Common
Wildlife Survey	10 days during March	21 days during March and June	10 days during March	15 days during March and June
Fire detection flights	June-August 5-6 flights/month	June-August 5-6 flights/month	June-August 5-6 flights/month	June-August 5-6 flights/month
Other Aerial Surveys	5-7 days June-August	14-21 days June-August	5-7 days June-August	14-21 days June-August
Ground Activities These camps support inventory, monitoring, and clearance work for permitted activities. Large camps are more than 10 people.				
Small Camps	6 weeks	12 weeks	6 weeks	6-12 weeks
Large Camps	0	4 weeks	0	4 weeks
Recreation Special Recreation Use Permits (SRPs)				
Hunting and Guiding SRPs	12-14	14-16	10-12	12-14
OHV and Sled Dog Race SRPs	3	3-5	3-5	3-5

c) Resource Uses Assumptions

(1) Forest Products

Insects and disease will continue to affect forest resources in the planning area. Climate change, including the current trend to warmer, drier growing season conditions in the planning area, has increased the proportion of standing dead timber (beetle-killed trees), and may contribute to more severe wildland fires. Treeline advances could also be expected due to climate warming, although during the 15-20 year life span of the RMP, these changes may be difficult to detect. Due to the inaccessibility of the area, a large commercial sale would be unlikely to occur during the life of the plan. Forest product sales would be small and the level would be similar to that which has occurred over the past 15 years. Authorized use of forest products in the planning area over the last 14 years has totaled less than 10 free use permits and one small sales vegetative contract for the entire period. Access has been restricted to winter with a minimum snow cover of 6-12 inches, using snowmachines, sleds, and chainsaws to harvest. Areas were selectively cut to target larger diameter trees and standing dead timber. In one case, access was by ski-equipped bush plane. Typically, 25 acres or less have been disturbed (stumps and scattered piles of slash) per permit.

(2) Livestock Grazing

The demand for livestock forage will follow market trends and conditions, and will increase somewhat during the life of the plan. An increase in reindeer is inversely related to the number of caribou. A decline in the caribou population would make the conditions to support industry growth more favorable, but would not result in an immediate increase in the number of reindeer.

Although some alternatives allow for reindeer grazing outside of the Seward Peninsula, grazing would be unlikely to be authorized because of the presence of caribou throughout the remainder of the planning area. If bison grazing were permitted, the bison would be authorized only within existing grazing areas on the Seward Peninsula. The numbers in the following table show assumed grazing activity on BLM, State, and National Park Service land. Not all of the activity described below would occur on BLM-managed lands.

Table 4-2. Livestock Grazing Assumptions

Alternative	Type of Grazing	
	Reindeer	Bison
A	Existing situation: 7,500 reindeer and 5 active herders; # of reindeer could increase by 50% during life of plan; # active herders would increase	None authorized
B	Same as A	3 small herds, each < 50 bison; no more than 100 bison total during life of plan
C	# reindeer could increase by 10% over existing level; # herders might increase but not as much as under A	None authorized
D	Same as A	None authorized

(3) Minerals

(a) Leasable Minerals

1. Oil and Gas

For all alternatives, development would be preceded by geophysical exploration. A reasonable foreseeable development (RFD) scenario was developed to project long-term oil and gas related activity in the planning area (BLM 2005j). BLM's policy regarding reasonable foreseeable development of fluid mineral resources in frontier areas requires that a minimum level of exploration and development activity be projected for the purpose of impact analysis. For these areas, and for areas of low development potential, an assumption is made that a baseline discovery will involve certain exploration activity leading up to discovery and subsequent development of oil and gas. The timing of discovery and subsequent development within the planning area is difficult to predict. However, it is not likely to occur during the life of this plan. The high potential area in the northern quarter of the planning area is the only area likely to receive interest from industry. The following assumptions should be considered for Alternatives B and D only.

In Alternative C, only seismic exploration could occur, but would be unlikely, as high potential lands would be closed to leasing. If geophysical exploration activities were to occur, it would be within the same timeframe as outlined in Alternatives B and D. Additionally, fewer miles would be shot because high potential lands closed to leasing would also be closed to exploration.

Ideally, field development would include the following phases; exploration, development, production, and abandonment. Exploration drilling would occur after the issuance of a lease. If a discovery was made, construction of oil and gas facilities would come subsequent to the announcement. A discovery could be announced at any time within a 10-year period (assumed primary lease term) following the lease sale. Delineation and development activities usually take 3 to 6 years after a discovery. Production operations would continue year-round for 10 to 30 years, depending on field size and field characteristics. Field abandonment, including well plugging and site restoration, can take from 2 to 5 years after production ends.

2. Exploration

Seismic survey work is likely to precede exploratory drilling for oil and gas. Onshore seismic acquisition on the North Slope occurs during the winter months after the federal, state and local governments issue permits authorizing tundra travel. Specialized low-impact tundra travel vehicles weighing more than 10 tons are used. However, the tracks are long and wide, spreading the pressure over a large area to protect the tundra from damage. Travel speed in overland vehicles such as a Tucker (1.2 psi) or Rollogon (2-5 psi) range from 6 to 12 mph.

Land-based seismic surveys are typically conducted using truck-mounted vibrators or helicopters for remote operations. The method involves sending energy into the earth using an explosive charge or other energy wave-generating device, such as Vibroseis. Vibroseis generates energy waves of continuously varying frequency using metal plates lowered to the ground from beneath each vehicle. With the entire weight of the truck resting on the plate, a hydraulic system vibrates the plate which transfers the energy into the ground. Depending on rock density, waves bounce back from the various formation layers and are received by listening devices called geophones arrayed along the line of survey. Two to eight trucks are used in

tandem. Unless the topography is relatively flat and open, the trucks are restricted to existing roads and trails. An instrument truck equipped with a seismograph records the seismic information on a computer which is subsequently processed and displayed in the form of a seismic reflection profile. The Vibroseis technique works best on a hard surface, as a spongy surface does not transmit the output energy very well.

It is assumed that seismic exploration within the planning area would range from 150 to 800 seismic (2-D) line-miles every four years over the life of the plan. This range is based on a four-year, 600 line-mile seismic exploration program that led to the discovery of the Alpine field, and on historic seismic exploration in the NPR-A from 1972 to 2000. During that period, about 21,000 line-miles were shot over an area of about 23 million acres. If an area proved geologically interesting, 3-D surveys would be conducted to help establish a drilling location. In either 2-D or 3-D seismic events, aircraft would be used as support for supplies and crew changes. Aircraft would also be used as the primary transportation mode in the summer. During the exploration phase, ground and aircraft activity would be greatest during the winter months after tundra travel has been opened. Additionally, overland vehicles and aircraft use would be the lightest of the three phases (exploration, development, and production).

After seismic surveys are completed and an area has been secured by a lease, the lessee may conduct exploration in the form of drilling. Ice pads and ice roads would be constructed where feasible. Air traffic would increase during this time. Transport of the drill rig could take anywhere from 50 to 150 flights using a C-130, depending on the type of rig. Pre-drilling site preparation and rig set up for a 10,000 foot well takes one to four weeks. Drilling the well could take three to four weeks due to the lack of specific subsurface knowledge regarding the stratigraphic succession. If there are favorable oil and/or gas indicators, testing and additional sidetracking for coring and sampling can take another month.

Permanent airstrips and staging areas could be constructed to accommodate supplies and major equipment. This is much more likely in areas where water is not readily available or the terrain is too steep for building ice pads or roads. The mining of gravel would take place during the winter months to reduce impacts. Permanent airstrips and staging areas could also be constructed if a discovery were made from exploratory drilling and the oil company decided to pursue development. Permanent staging areas act as a remote base camp that can be used year-round and typically consist of facilities housed on gravel. These camps contain storage tanks for fuel, warehouses for supplies, housing for personnel, and permanent airstrips capable of handling large capacity aircraft, such as the Hercules C-130. With the lack of infrastructure, any permanent facility would provide a concentrated aircraft destination for other resource activities, in addition to oil and gas activities. Air traffic support associated with winter drilling would be limited to several aircraft flights per week. Size of aircraft would be large enough to accommodate crew changes and haul supplies.

Once drilling concluded for the season, extra personnel would be needed to break down the camp and drill rig. This could be accomplished with a couple extra flights per week. The drill rig would not necessarily need to be transported back to Deadhorse if the company was willing to pay to keep it over-summer. If not, than an additional 50 to 150 C-130 flights would be made. Subsequent to winter drilling, aircraft activity in the summer would be limited to smaller aircraft and helicopters, not necessarily associated with oil and gas operations. Overall aircraft activity would be light in the summer until the operation moved into the development phase. Frequency of use would be substantially less than that associated with winter drilling, possibly as little as several flights per month.

Approximately 6.3 million acres of high occurrence potential lands within the planning area would be made available for leasing on the North Slope. The RFD projects 710,000 total acres leased. Development is not likely within the life of the plan. However, if industry showed interest in the area, 43 to 55 exploration wells are projected to be drilled during winter months using ice roads, ice pads, and low-impact vehicles.

3. Development

If an economically viable field were discovered, which is unlikely during the life of the plan, up to 186 development wells totaling 417 acres of disturbance are projected. Development following a discovery would require more logistical support over a longer period of time. Under the RFD scenario, assuming a 1 billion barrel field with 500 million recoverable, it is assumed 23 delineation wells (330 acres of short-term disturbance) would be drilled. One or two additional drill rigs (depending on availability) would be needed to accommodate the number of holes needed for development. Transport of the rigs could take anywhere from 50 to 150 flights per rig using a C-130. Extra equipment and personnel would be transported by aircraft as well. Once on the ground, the rig modules and other equipment would be redistributed to the proper pads by ice or gravel road. The roads would need to be at least 32 feet wide to accommodate wide-loads such as a drill rig or modules. The delineation wells would require the construction of 6 acre pads. Typically, after analyses of the data and subsequent geotechnical description of the reservoir, exploration wells are not used for production purposes. Following test completions, wells are plugged with cement to seal off zones capable of flowing hydrocarbons or formation waters. The rig and its support constructions are then moved to the next location.

Aircraft traffic would increase as development progressed. Supplies would be needed for the construction of gathering lines and constructing a central processing facility (CPF). A total of 36 miles of gathering lines for produced fluids (327 acres of short-term disturbance) would be needed. Gathering lines would range from 3 to 12 inches in diameter, and run from a remote satellite pad to the central processing facility. The CPF is the long-term operational hub facility. It consists of oil production equipment comprising three phase separators (oil, gas, water). It also contains gas-conditioning equipment which separates/strips natural gas from the liquid stream, and the pipeline gathering and monitoring system which maintain pressure regulation and well monitoring and control systems. Equipment supplies and support of the CPF would be accomplished through the use of larger aircraft (C-130s or DC-6). Once constructed, gathering lines and access roads would be monitored by helicopter or vehicle on a scheduled routine. During the development phase, flights could average one or more per day with occasional spikes for drill rig or large equipment moves.

Gravel extraction needed to support development is projected to be approximately 1,000,000 cubic yards of material. Acreage disturbance is difficult to determine based on a number of qualifiers that need to be factored including the amount of material available, the source of the material, and the depth at which the material is located. Three gravel pits would be utilized to support the six separate pads and connecting roads. Resulting in approximately 50-100 acres of disturbance with most occurring at surficial deposits. River beds or beach gravels would have a higher surface acreage disturbance than a gravel pit.

4. Production

Production would be spread out from 10 to 30 years, the RFD assumes a production life of 25 years. During the production phase, aircraft traffic would be used for hauling pipe for a 24” pipeline and vertical support members (VSM) that would connect to existing infrastructure at Alpine (350 miles of pipeline and 4,322 acres of short-term disturbance). The pipeline would be

constructed during the winter. Overland vehicles, helicopters, and medium sized aircraft for transporting crews would be necessary to build the pipeline. The pipeline would be elevated 7 feet off the ground with a VSM spaced every 50 to 70 feet apart. Approximately 50-75 miles of pipeline would be within the planning area.

Satellite fields would be connected by constructing gravel roads. The satellite fields are expected to be contained within 25 miles of the main pad/CPF. The discovery of each satellite field is assumed to require three exploration wells and two delineation wells, and contain 10 production wells and 7 injection wells. Each field would have a production life of 10 years. No permanent camp facilities would be required for development of the satellite fields. The main pad/CPF would be upgraded to accommodate the increase in workers necessary to operate the additional satellites. However, temporary camps would be used during construction. Once drilling operations has been completed, approximately 2 round trips per day, per roaded production pad would be accomplished by truck. In addition, there would be intermittent heavy equipment traffic associated with maintenance and supply (BLM 2004e). Workers would continue to be shuttled by fixed-wing aircraft.

Aircraft traffic would be heaviest during the time it overlaps with production. Once production phase is completed and the pipeline is functional, aircraft support would decrease. The use of larger aircraft would be less frequent. However, the amount of smaller fixed-wing and helicopter traffic would remain the same. Unscheduled helicopter traffic, mostly in summer, would likely occur. This traffic would largely be associated with scientific studies and monitoring of development. The frequency of this traffic and the areas in which it would take place are unpredictable (Arco Alaska Inc. et al. 1997).

5. Abandonment

Abandonment can occur at any point after a well has been drilled. Reclamation of a pad would involve a slight amount of increased activity over a short period of time. Cement would be brought in by aircraft and transported by ground vehicle to the well site. Personnel would be needed to set the cement plugs at the various zones throughout the hole and pour cement. The use of heavy equipment would be needed to reclaim or recontour the gravel. The abandonment process could take from 2 to 5 years per well.

6. Oil Spills

Under Alternatives B and D, one large oil spill, 220 small refined product spills and 89 small crude oil spills could occur in conjunction with oil and gas development (BLM 2006). A large spill is defined as 500-900 barrels (bbl). The analysis of the effects of large spills are based on the following assumptions:

- All the oil reaches the environment and the gravel pad absorbs no oil.
- The spill starts at the gravel pad or along a pipeline.
- There is no cleanup or containment.
- The oil chemistry is similar to that of Alpine Field oil.
- The spill could occur at any time of year.
- A spill under lake ice does not move substantially until the ice breaks up.
- Spill locations and dates used in the analysis are those that would result in the greatest impact.

Small spills are defined as less than 500 bbl in size. Onshore or offshore refined-oil spills can occur along ice roads, from barges, from helicopters and airplanes, from gravel pad facilities, or

from trucks along the road system. Most refined-oil spills are contained and cleaned up. Typical refined products spilled are aviation fuel, diesel fuel, engine lube oil, fuel oil, gasoline, grease, hydraulic oil, transformer oil, and transmission oil. Analysis of effects of small spills are based on the following assumptions:

- The average crude oil spill size of 3 bbl.
- The average refined product spill size of 0.7 bbl.
- Small crude spills can begin anywhere on the gravel pad facilities or along the pipeline.
- Small spills on gravel pads occur in contained areas or are cleaned up and do not reach the environment.
- Small spills from pipelines are likely to reach the environment.

Table 4-3. Crude Oil Spills Estimated Over the Production Life of the RMP

Alternative	Resources (Bbbl)	Spill Rate (spills/Bbbl)	Assumed Spill Size (bbl)	Estimated Mean Number of Spills[1]	Estimated Total Volume of Spills (bbl)[2]
Large spills – Crude oil					
A	0	0	0	0	0
B	0.5	0.64	500 or 900	0.16 ≈ 1	500 or 900
C	0	0	0	0	0
D	0.5	0.64	500 or 900	0.16 ≈ 1	500 or 900
Small spills – Crude oil					
A	0.5	0	0	0	0
B	0.5	178	3	89	267
C	0.5	0	0	0	0
D	0.5	178	3	89	267

[1]The estimated mean number of oil spills is based on the estimated resource volume multiplied by the spill rate.
[2]The estimated total spill volume is the total volume for all of the estimated spills for the given alternative and price of oil.

Table 4-4. Small Refined Oil Spills <500 bbl Estimated Over the Production Life of the RMP

Alternative	Resources (Bbbl)	Spill Rate (Spills/Bbbl)	Assumed Spill Size (bbl)[1]	Estimated Mean Number of Spills[2,3]	Estimated Total Spill Volume (bbl)
A	0.5 Bbbl	0	0	0	0
B	0.5 Bbbl	440	0.7	220	154
C	0.5 Bbbl	0	0	0	0
D	0.5 Bbbl	440	0.7	220	154

[1] The mean spill size for refined spills on the Alaska North Slope from 1989–2000; equivalent to 29 gal.
[2] The fractional estimated mean spill number and volume are rounded to the nearest whole number.
[3] The integers represent the estimated number of spills at the produced activity level with $33/bbl oil.

Table 4-5. Assumed Size Distribution for Small Crude Oil Spills for the Production Life of the RMP

Spill Size Range[1]	Estimated Number of Spills Under Each Alternative[2,3]			
	Alternative A	Alternative B	Alternative C	Alternative D
<1 bbl				
≤ 1 gal	0	19	0	19
> 1 gal and ≤ 5 gal	0	31	0	31
> 5 gal and < 1 bbl	0	17	0	17
Total spills < 1 bbl	**0**	**67**	**0**	**67**
≥ 1 bbl and < 500 bbl				
> 1 bbl and ≤ 5 bbl	0	17	0	17
> 5 bbl and ≤ 25 bbl	0	4	0	4
> 25 bbl and < 500 bbl	0	1	0	1
Total spills > 1bbl and < 500bbl	**0**	**22**	**0**	**22**
Total number of spills	**0**	**89**	**0**	**89**

[1]Spill-size distribution is allocated by multiplying the total estimated number of spills by the fraction of spills in that size category from the ADEC database
[2] Estimated number of spills is rounded to the nearest whole number.
[3] The integers are presented as the estimated number of spills at the predicted activity level with $33/bbl oil.

7. Coal

The objective for management of the Federal coal resources is to provide both short- and long-range development of Federal coal in an orderly and timely manner, consistent with the policies of the Federal Coal Management Program, environmental integrity, national energy needs, and related demands. In addition to observing the general obligations and standards of performance set out in current regulations, the coal lessee/licensee will comply with and be bound by the applicable ROPs outlined in Appendix A.

a. Exploration

With appropriate limitations and mitigation requirements for the protection of other resource values, all unleased BLM-managed lands in the planning area, excluding the northern Nulato Hills and the 300-foot setback on select rivers under Alternatives C and D, would be open to coal resource inventory and exploration as described under 43 CFR 3480. Opening lands to these activities would provide necessary information to assess the coal development potential and help refine the limited existing data on coal resources within the planning area. The information obtained from exploration programs will ultimately be used to determine the feasibility of developing the coal resources in the region.

Coal exploration includes drilling, excavating, and geological, geophysical or geochemical surveying operations designed to obtain detailed data on the physical and chemical characteristics of Federal coal and its environment. All exploration of coal resources, including the drilling of strata above and below the coal, drilling to assess conditions of coal hydrology, and drilling of overburden and of adjacent, non-coal bearing strata, requires an exploration license as described in 43 CFR 3410. Before an exploration license is issued, a NEPA analysis would be prepared to assess the potential effects on the natural and socio-economic environment. Each license would include requirements and stipulations to protect the

environment and associated natural resources, and ensure reclamation of the lands disturbed by exploration.

Coal exploration activities are expected to be minimal during the life of this plan on most BLM-managed lands, with increased potential on Federal lands within the Kukpowruk River Coal Field and the Cape Beaufort Coal Field. The lack of a transportation infrastructure is a primary obstacle. Since geology is not an exact science, the scope of work for proposed exploration activities could vary and would be refined as data is collected and evaluated. The types of activities and methods used to complete a typical exploration program include geologic mapping, preparation of drill sites, exploratory drilling, hydrologic monitoring wells, trenching, coal removal, drill hole abandonment, removal of equipment, backfilling and grading, and revegetation.

- **Geologic mapping:** The geology of the exploration area would be mapped using aerial photographs and topographic maps. Coal seam outcrops or other exposed geologic features identified during the mapping may be surveyed to provide more accurate locations. Travel will be limited to existing roads and trails, off-road vehicles, or other appropriate transportation mechanisms including helicopter or small fixed-wing aircraft. Most of the mapping and survey work would be done on foot.

- **Drill sites:** Wherever possible, drill sites will be located on relatively flat terrain to avoid excavating a level area for the drilling equipment. Excess vegetation will be removed to provide an adequate working area. If leveling is required, a small dozer will be used. Normally, an area approximately 50 feet by 40 feet is required to set up the drilling equipment. The actual size of the area may vary depending upon the type of equipment used.

- **Exploration drilling:** The drilling equipment for exploration work will be similar to that used for the construction of domestic water wells. In addition to the drill rig, equipment may include an air compressor and a carrier with drill pipe and support tools. In most cases, the maximum diameter of the drill holes will be 6 inches. Depths will vary based on the location and intended objective of each hole. In areas where surficial gravels or overburden occur, the hole may be cased with steel pipe from the surface down to bedrock to keep it open. At some drill sites, a nontoxic biodegradable drilling mud or foaming agent may be used to stabilize the walls of the hole and increase circulation. Relatively small quantities of water would be required for drilling.

  After drilling has been completed, the hole may be logged using geophysical tools to measure rock and coal characteristics such as resistivity, gamma ray, formation density, and hole diameter (caliper). Personnel handling the logging equipment will be properly licensed. To evaluate the physical and geochemical characteristics of the coal groups and rock types in each hole, samples of cuttings from selected intervals may be collected and sent to a laboratory for analyses. As an alternative to using cuttings, a drill rig may be used to retrieve samples of core from selected holes. Upon completion of the drilling work, each drill hole will be surveyed to provide accurate locations.

- **Monitoring wells:** To acquire data on the groundwater resources within the exploration area, some of the drill holes may be developed into groundwater monitoring wells. Actual well designs will be determined on site after a thorough review of the geologic and geophysical logs. Standard well installation procedures will be used to make certain that accurate and reliable monitoring data are collected.

- **Trenching:** Trenches may be excavated to more accurately understand the stratigraphy within the exploration area. Each trench may disturb an area up to 250 feet by 250 feet. After removal of the vegetation, salvageable topsoil will be stored on site. A backhoe will trench to depths of 25 to 30 feet and place the overburden material alongside the trench. If the backhoe cannot efficiently remove the material, small scale blasting procedures may be used. The length of the trenches may vary and could range up to 250 feet. The floor of the trench will be up to 5 feet wide. During the excavation work, appropriate erosion control measures will be used to contain excess off site sediment transport. Control measures may include ditching, silt fences and/or hay bales. After the coal seam has been exposed, geologists will map the sections and collect samples for laboratory analyses. The trench will be backfilled and reclaimed.

- **Coal removal:** Small amounts of coal may be taken from core samples and/or cuttings for quality analyses. In addition, larger amounts of coal obtained from trenching may be removed from the site to be used for laboratory analyses.

- **Drill hole abandonment:** After a drill hole has been completed or a monitoring well is no longer needed, the surface casing (if present) will be cut off approximately one foot below the ground surface. The hole will be filled with dry cuttings or sand to within 12 feet of the surface. A mixture of clay (bentonite), and drill cuttings or sand will be used to fill the next 10 feet of the hole. The top 2 feet will be filled with topsoil or overburden material. Temporary hole markers may be left at the hole collar until the survey work on the hole location has been completed.

- **Equipment removal:** All equipment and supplies would be removed from the exploration area upon completion of the exploration activities.

- **Backfilling, grading, and revegetation:** A small dozer will be used to backfill and regrade the drilling and trenching sites. Subsoil materials will be placed in the deepest portion of the excavations and all available topsoil will be applied to the surface. Water bars or ditches may be used to provide adequate drainage. Trenches may be left open for annual studies. Drainage from the disturbed area at each site will be directed into the trench or to a local sediment control structure. The disturbed areas, including the slopes of the overburden and topsoil piles, will be revegetated according to the most current and applicable standards.

b. Leasing

Under the Federal Coal Leasing Program, Federal coal lands are screened for coal development potential, unsuitability criteria, and multiple use constraints including consultation with all surface owners who meet certain criteria. The coal screening process is designed to identify areas of Federal coal that are acceptable for further leasing consideration under the procedures listed in 43 CFR 3420.1-4(e)(1-4). Areas that pass these screens are available for further consideration for competitive coal leasing. At present, BLM has deferred the coal screening process until a Lease-by-Application (LBA) is filed or industry expresses an interest in developing additional coal resources within the planning area. Leasing by application involves the submittal of an application, preparation of a NEPA document including appropriate stipulations and required operating procedures, a public hearing, and consultation with the Alaska State Governor. If the application satisfactorily meets the requirements of these steps,

an amendment to the RMP would need to be completed before a lease sale could be held subject to 43 CFR 3422.

The two existing preference right coal leases located in the planning area would be managed under all alternatives according to the individual lease terms and conditions and those established in 43 CFR 3470. Prior to commencement of mining operations, a detailed exploration plan would be submitted and approved by the BLM as described in 43 CFR 3482. The plan would include the location and type of exploration to be conducted, environmental protection procedures, present and proposed roads, and reclamation and abandonment procedures. The exploration activity would be similar in scope to those described in the Exploration section above. It is assumed that no development would occur on these leases.

Prior to commencement of any Federal coal development or mining operations, the lessee or operator would submit and obtain approval from the BLM a resource recovery and protection plan (R2P2). The plan would show that the proposed coal operation meets the requirements of 43 CFR 3480 as well as the Mineral Leasing Act of 1920, as amended, for: 1) development, 2) production, 3) resource recovery and protection, 4) diligent development, continued operation, and maximum economic recovery, for the life of the mine.

8. Geothermal

No development of geothermal resources on BLM-managed lands is anticipated within the life of the plan.

9. Coalbed Natural Gas

Coalbed natural gas (CBNG) exploration is not expected to occur on BLM-managed lands in the planning area. The western Colville Basin near Point Lay has been identified as a highly prospective CBNG coal basin. However, the economic viability of the Kukpowruk coal basin's CBNG resources is highly uncertain because sufficient data on gas and water productivity does not yet exist. Under the cumulative case, CBNG exploration and development may occur on private lands within the planning area as described in the RFD (BLM 2005j).

Within the planning area, 11 CBNG wells could be drilled close to a village (most likely Point Lay). The drill pads, access road, and monitoring well may disturb up to 20 acres. In support of production, a CBNG field compressor station with access road would be needed as well as gathering pipelines and utilities (23.5 acres of disturbance). A water disposal facility would also be required, resulting in approximately 10 acres, due to the construction of a pad, access road, pipelines, and utilities.

(b) Locatable Minerals

Chapter III summarizes the activity levels in the planning area based on surface disturbance tabulated from mining plans and notices of mining operations submitted through the Annual Placer Mining Application and Permit process from the 1989 to 2004 mining seasons for both placer and hard rock operations. The RFD for locatable minerals (BLM 2005g) summarizes the historical data characterizing mineral occurrences by commodity and genetic ore deposit modeling, as well as differentiating between placer and hard rock mining methods. Based on this information, a placer mine scenario was developed around a medium-scale (250 cubic yards per day) placer mine as the most likely mining activity to occur in the planning area in the reasonable future. The typical placer mine would result in a maximum of 10 acres of surface

disturbance at any given point in time. A similar hard rock mining scenario was dropped from further consideration as it was determined that due to the length of time needed to bring a hard rock deposit to production and the undeveloped nature of the potential hard rock deposits, there would be no development, particularly on BLM-managed lands, during the life of the plan.

1. Placer Mining

Placer mining for gold and, to a lesser extent, placer tin and nephrite jade is the most common type of mining to occur in the planning area. Of the three primary commodities, placer gold is the most likely development target. Placer tin and nephrite jade both require substantial transport limitations due to their bulk and requirements for further processing beyond the mine.

Since 1989, mineral resource development and mining in the planning area has occurred primarily on private lands and State lands. This can be attributed to the patenting of large numbers of Federal mining claims staked during the gold rush era, to the State and Native corporations targeting mineral resources for selection under the Alaska Native Claims Settlement Act (ANCSA) and low metals prices. An additional factor was the switch from annual labor fining requirements to payment of a $100 per claim rental fee to the government on Federal lands.

Filing and reclamation requirements instituted in 1980 rose steadily to a high of 34 notices and 10 plans in 1984 within the planning area. By 1997, this had declined to 13 notices and four plans. Each year one to two new notices would start up and the same number or greater would be closed out. For the past three years, the BLM has been left with one active notice and three inactive/abandoned notices/unapproved occupancies along with one inactive plan and one plan level record of non-compliance and unapproved occupancy.

Table 4-6. Anticipated New Placer Mines

	Alternative			
	A	B	C	D
Anticipated Placer Mines on BLM-Managed Lands	0	3-5	0	3-5

2. Hard Rock Exploration and Development

Historic producers of hard rock for gold and tin, both with tungsten by-product and base metals with silver byproduct operated on a small scale in the early part of the twentieth century. Today, development projects involve gold from a past producer and a developing new prospect. Both of these are located on private lands surrounded by State lands and are located on the existing seasonal road network out of Nome. Hard rock exploration is up in the region, generated by the increasing price of gold and increased interest in mineral occurrences on private and Native lands.

Around the State, exploration focused on deposits of rare metals (nickel and platinum group elements [PGE]) has occurred in the Broxson Gulch area north of the Denali Highway, East Central Alaska Range. Exploration results in this area indicate that there is the potential for a significant discovery of these metals. This interest, coupled with the rising price of platinum, has

sparked recent exploration efforts on the Seward Peninsula at Trilby and Dime creeks where platinum and PGE are known to occur.

If additional exploration should prove that development of a project at Dime Creek, Trilby Creek or another unspecified property in the planning area is feasible, the deposit would probably develop in a similar manner to the Pogo Mine (near Delta Junction), which is being developed as a cut and fill underground mine. Surface disturbance will vary depending on the mine design, construction of roads, power line corridors, selection of tailing disposal method, and other factors. An order of magnitude estimate would be in the range of 800-1,600 acres. Road building, airstrips, and associated material sites account for the largest surface disturbance followed by mine, mill, tailings disposal site, and camp facilities. While most of these disturbances would occur on State lands, some road construction or power lines would be across BLM-managed lands.

Currently in pre-production phase of development is the Rock Creek Mine on private and Native lands near Nome. This plan is a hard rock, open pit mine with a mill that combines free milling processes with floatation and vat cyanide leach circuits to recover gold. This mill will include ore from two locations, the Rock Creek Mine and the Big Hurrah Mine (a past producer on private and Native lands). More than 130 employees would contribute to the Nome economy and the mine mill complex would draw more than 7 megawatts of power from the Nome Joint Utilities grid. This 20-year-old project is still more than a year away from production.

(c) Mineral Materials

Demand for gravel, rip-rap and other mineral materials is expected to increase during the life of the plan as road maintenance and construction continue on State highways, and State, Native corporation and private lands. Sharp demand spikes may occur around Nome and Kotzebue depending on the availability of Federal or State funds for infrastructure improvement projects. Should the Rock Creek and Big Hurrah mines go to production, a sharp increase in mineral material needs for road improvement and maintenance would be required along the existing Nome to Council road. It is anticipated that these materials would come from private and State resources and not from BLM-managed lands.

Mineral material sales would occur under Alternatives B and D in association with oil and gas development. These impacts are discussed under leasable minerals.

(4) Recreation

Demand for recreational use of public lands will increase during the life of the plan. Increases will be focused on sport fishing, sport hunting, recreational OHV use (including snowmachines), hiking, canoeing and rafting, bird watching, highway tourism off the Nome Road System, and regional promotion of tourism. Commercial recreation applications will increase slightly in number. In a typical year, there are 12-14 hunting/guiding operations and three permits for snowmachine and dog races such as the Iditarod and Iron Dog.

Under some alternatives, a recreation management plan for the Squirrel River Special Recreation Management Area will be completed. This plan will address recreational use levels in the area during the big game hunting season (August-September) and will provide the BLM with greater flexibility in addressing conflicts and managing use levels.

(5) Travel Management

Demand for access–the physical ability and legal right of the public, agency personnel, and authorized users to reach public lands–will increase during the life of the plan. The need for access to public lands may increase slightly as Native corporation entitlements are met and if restrictions on use of those private lands are implemented by the Native corporations. Public easements reserved through Section 17(b) of ANCSA will become more important during the life of the plan. The need to identify and maintain these easements on the ground will increase.

The use of OHVs for recreational purposes will increase. The use of OHVs for subsistence will increase slightly. Changes in OHV design and technology will continue, enabling OHV users to range into areas that were once thought inaccessible due to terrain and water or soil features. For the purposes of this document, OHVs include snowmachines. However, most impacts described in this analysis result from OHVs used during snow-free months. Where impacts are specific to snowmachines, they are described as such.

Demand for roads and transportation rights-of-way on BLM-managed land will increase slightly during the life of the plan. Road development is contingent upon the economic viability of resource development, primarily minerals, and the needs of the State to plan and carry out transportation access in northwest Alaska. If the State does not obtain land selections designed as road corridor access from Interior Alaska to the northwest, the BLM will have to address these access needs through a right-of-way.

(6) Renewable Energy

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

(7) Lands and Realty Actions

There would be continued demand for land use authorizations such as rights-of-way (ROW) and various types of leases and permits within the planning area. The demand for these land use authorizations would fluctuate with the degree of economic growth and development occurring within or near the planning area, but would generally remain minimal.

Land conveyance to the State and Native corporations would be completed within the life of the plan. There would be a limited demand for land ownership adjustments to improve the manageability of both Federal and non-Federal lands. Land exchange would be the preferred method of land ownership adjustment.

Withdrawal review will be completed within five years of plan approval. All recommendations for lifting of (d)(1) withdrawals will be implemented as described in each alternative.

Recommendations for new withdrawals will be implemented during the life of the plan. Existing withdrawals in these areas will be retained until a new withdrawal is in place.

d) Special Designations Assumptions

(1) Areas of Critical Environmental Concern

Areas designated as Areas of Critical Environmental Concern (ACECs) will be managed to maintain the values for which they were designated.

(2) Iditarod National Historic Trail

The INHT will continue to be managed to promote the preservation and use of the trail. Use levels will increase slightly over the life of the plan.

(3) Wild and Scenic Rivers

Congress will accept the BLM's recommendation of non-suitable on the Squirrel River and the legislative and administrative withdrawals will be lifted, allowing State selections to attach to lands within the study corridor.

Eligible rivers will be managed to protect water quality, free-flowing nature, and outstandingly remarkable values from the time the draft RMP is published, until a suitability decision is reached with the publication of the Record of Decision.

Rivers found to be suitable for addition to the National Wild and Scenic Rivers System with the publication of the Record of Decision will be managed to protect water quality, free-flowing nature, and outstandingly remarkable values until such time as Congress acts on proposed designation legislation.

e) Social and Economic Assumptions

(1) Public Safety

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

(2) Social and Economic Conditions

The population within the planning area will increase during the planning period. The rate of change in population in this area is lower than the state average. This will continue to be the case, as out migration will continue to offset births. The plan assumes no change in borough status or boundaries.

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

(3) Tribal Treaty Rights

As a government agency, the BLM will maintain a special government-to-government relationship with Federally-recognized Indian Tribes. Residents of these areas utilize Native and village corporation lands as well as BLM-managed public lands for traditional subsistence activities, and will continue to do so. Through this planning process, the BLM has initiated consultation with different village entities. This consultation will continue throughout the planning period.

f) Subsistence Assumptions

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

3. Types of Effects

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

Direct impacts are caused by an action or by implementation of an alternative and occur at the same time and place as that action or implementation.

Indirect impacts also result from an action or implementation of an alternative, but usually occur later in time or removed in distance from the action or implementation.

Cumulative impacts result from individually minor but collectively significant actions over time. A cumulative impact is the impact on the environment that results from the incremental impact of the action when added to other past, present, and reasonable foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions.

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

- ANCSA and State land entitlements will be fulfilled within the life of the plan.
- The BLM will retain 20-40% of the lands currently selected by the State or Native corporations; conversely, 60-80% of these lands will be conveyed.
- Land sales (settlement and remote settlement areas) will continue on State lands consistent with Alaska Department of Natural Resources area plans.
- Mineral exploration and development will increase on State and Native lands.
- Mineral exploration and development will remain minimal in National Parks, Preserves, and Monuments within the planning area, and in Selawik National Wildlife Refuge.

- National parks, preserves and monuments within and adjacent to the planning area will continue to manage for remote, primitive recreation experiences. Access into parks will continue to be primarily by air, boat, or snowmachine.
- National wildlife refuges within or adjacent to the planning area will continue to be managed for wildlife and compatible remote, primitive recreation experiences. Access into refuges will continue to be primarily by air, boat, and snowmachine.
- Road construction will increase on State and Native corporation lands in support of local communities, and mineral exploration and development.
- Use of communication sites will increase.

Irreversible or irretrievable commitment of resources and unavoidable adverse impacts, and short-term uses versus long-term productivity are discussed after the Cumulative Impacts section. **Irreversible commitment of resources** result from actions in which resources are considered permanently changed. **Irretrievable commitment of resources** result from actions in which resources are considered permanently lost. **Unavoidable adverse impacts** are those that remain following the implementation of mitigation measures, and include impacts for which there are no mitigation. **Short-term uses versus long-term productivity** refers to the relationship between short-term uses of man's environment and the maintenance and enhancement of long-term productivity of the resources.

4. Critical Elements

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

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

There are no Prime or Unique Farmlands, designated Wild and Scenic Rivers, designated ACECs, or designated Wilderness on BLM-managed lands within the planning area. Impacts related to proposed designations or findings are described. The remaining elements are identified and addressed in the pertinent sections of this chapter.

5. Availability of Data and Incomplete Information

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

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

- Inventory and assessment of trails
- Detailed soil surveys
- Invasive weed occurrence for areas outside of Nome and Kotzebue
- Definitive sensitive species occurrence (plant and animal)
- Certain wildlife data (specific crucial habitat locations for many species)
- Upstream limits of anadromous fish for many rivers
- Watershed assessments
- Riparian assessments
- Forest inventory
- Vegetative land cover at 30 meters resolution for the entire planning area

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

B. Resources

1. Air Quality and Soil and Water Resources

Proposed management of the following resources/resource uses/programs would have no anticipated impacts to air quality and soil and water resources management: Cultural Resources, Paleontological Resources, Visual Resources, Wilderness Characteristics, Special Status Species, Social and Economic Conditions, Special Designations, Renewable Energy, Public Safety, and Subsistence.

a) Impacts Common to All Alternatives

(1) Impacts to Air, Soil, and Water from Vegetation Management

Implementation of mitigation measures to protect vegetation, both terrestrial and wetlands, on a project specific basis, would limit disturbance and thermokarst subsidence to permafrost soils, reduce sediment runoff that impairs water quality, limit airborne dust particulates, and aid in the recovery of both terrestrial and aquatic habitat from permitted uses.

(2) Impacts to Air, Soil, and Water from Fire and Fire Management

Fire has impacts to air quality and soil and water resources as described in detail in the Land Use Plan Amendment for Wildland Fire and Fuels Management for Alaska (BLM 2004b). Fire helps maintain a mixture of vegetation types and age classes that provide soil stability and limit water quality degradation. Fire removes some vegetative species while allowing for establishment of others. Certain species, such as willows and alder, will sprout soon after burning and initiate soil stabilization. Over time, vegetation recovers from fire disturbance as successional stages of vegetation develop. Fire is less prevalent in the planning area, where the dominant ground cover is herbaceous or shrub vegetation which is less prone to wildland fire, as compared to the boreal forests of the Interior. Therefore the effects of fire on soil, water, and air resources are less in the planning area than may be anticipated for Interior Alaska.

Wildland fire occurrence and impacts to air quality and visibility vary widely from year to year. Fires occurring in Canada or Siberia also may affect air quality within Alaska. Impacts are usually short term. The Alaska Department of Environmental Conservation (ADEC) has statutory authority for air quality and issues air quality alerts and advisories when needed. State air quality regulations distinguish between impacts from wildland fire and those from prescribed fire. Written authority is required from ADEC for a prescribed burn of 40 or more acres.

(3) Impacts to Air, Soil, and Water from Livestock Grazing

Grazing by reindeer can impact air quality, and soil and water resources by degrading habitat or reducing the viability of vegetative ground cover. Reindeer herders tend to keep their animals in the same general area to limit their wandering away with the migrating caribou. This has resulted in reduction of ground cover in limited areas, which could possibly cause soil erosion, sedimentation and water quality changes, and increased airborne particulates in windy areas.

With the trend towards a reduction in both size and number of reindeer herds, reduction of ground cover and associated issues is not likely to be an increasing problem for the foreseeable future.

(4) Impacts to Air, Soil, and Water from Locatable Minerals

Mining exploration can occur on existing Federal or State claims under any alternative. The range of potential impacts to soil and water resources include disturbance and redistribution of gravel, overburden, and soil materials. The structure of the soil profile as well as the stability of the floodplain could be destroyed and may require decades for recovery. The soil removal could also cause an increase in stream sedimentation and turbidity and a decrease in stream channel stability. Air quality deterioration is thought to be very localized, limited to the immediate mined area and access roads. Airborne deposition of heavy metals from ore trucks and mining-related activities has been observed on both sides of the Red Dog Mine haul road. The pattern of deposition is probably driven by topography and wind patterns. (Hasselbach et al. 2004). Despite localized impacts, overall air quality in the planning area should remain in attainment. The BLM has detailed impacts from surface mining to both terrestrial and wetland habitats in the Minto Flats Placer Mining EIS (BLM 1989). These impacts should be minimal due to the very low level of activity anticipated (less than four notices per year), the very minimal amount of acres disturbed (less than 20 acres per year), and the seasonal and temporary nature of the expected activity.

ROPs that protect soil, water, and air resources may include: separating organic strippings from mined gravels for future reclamation, constructing adequately sized bypass channels and/or retention ponds to contain a 50-year flood event, covering heavy metal concentrate to limit airborne dispersion, backfilling all mining pits with tailings as the mining progresses, and spreading the remaining vegetation and overburden piles on the floodplain up to the reconstructed stream channel at the conclusion of the mining activity.

(5) Impacts to Air, Soil, and Water from Mineral Materials

Mineral material excavation and disposal may degrade soil resources, may cause an increase in stream sedimentation and turbidity, or increases airborne particulates in windy areas. Depending on the location of the materials, some sites may recover to the original vegetation cover within a relatively short time frame. Other sites may never recover to the original vegetative cover due to loss of soil from the site. Additionally, construction of access roads to the site may add considerably to impacts, depending upon length, terrain, and permafrost. Impacts would be reduced under all alternatives with implementation of ROPs and mitigation measures developed during NEPA analysis of specific material site disposal actions.

(6) Impacts to Air, Soil, and Water from Recreation Management

There are minor impacts to air quality and soil and water resources from both commercial and non-commercial recreation activities. These include temporary disturbance of the vegetative cover due to recreational camps or to recreation associated with access (aircraft takeoff and landing on remote airstrips or gravel bars). In areas that are repeatedly used for camping sites, there may be minor, site-specific degradation of soils and vegetation. Given the low level of recreational use on most BLM-managed lands, these impacts would be minimal and overall the soil, water, and air quality in the planning area should remain pristine.

(7) Impacts to Air, Soil, and Water from Travel Management

OHV use, including snowmachines especially in high-use areas, can adversely affect soil and water through impacts to riparian and wetland resources. Where OHV trails traverse wetlands, the vegetative cover can become disturbed or destroyed, leading to thermokarst subsidence, water diversions, and ponding. Where trails cross streams, riparian soil and vegetation may be altered or destroyed, increasing soil loss and sedimentation into aquatic habitats and resulting in diminished water quality. Given the low level of recreational use on the remote BLM-managed lands, these impacts would be minimal overall and degradation of air quality and soil and water resources should not increase in the foreseeable future.

(8) Impacts to Air, Soil, and Water from Lands and Realty Actions

There are minor impacts to air quality and soil and water resources from lands and realty actions under all alternatives. The exception to this would be a right-of-way that authorized road construction. Roads typically have a major local impact. The road footprint destroys soil resources, bridges and culverts may create diversions and ponding, and sediment can be transported by wind and water, which may adversely impact air and water quality. Additionally, the material sites necessary for road construction may also impact soil, water, and air resources, as noted above. The magnitude of potential impacts would depend on the scale and methods of road construction and use. While these types of impacts would affect a very small percentage of BLM-managed land in the planning area, impacts from road construction could be reduced under all alternatives with implementation of ROPs and mitigation measures developed during NEPA analysis of specific realty actions.

b) Alternative A

(1) Impacts to Air, Soil, and Water from Vegetation Management

Impacts to air quality and soil and water resources from vegetation management would be the same as discussed under Impacts Common to All Alternatives.

(2) Impacts to Air, Soil, and Water from Livestock Grazing

Impacts to air quality and soil and water resources from livestock grazing would be similar to those discussed under Impacts Common to All Alternatives. Under this alternative, applications for grazing permits would be considered throughout the planning area but would likely not be approved outside of the Seward Peninsula due to the presence of caribou and the difficulty of managing reindeer within occupied caribou habitat. Impacts from grazing would be slightly higher than under Alternative C and D, but less than under Alternative B.

(3) Impacts to Air, Soil, and Water from Leasable Minerals

There would be no impacts to air quality and soil and water resources from leasable minerals under this alternative as no leasing would occur.

(4) Impacts to Air, Soil, and Water from Locatable Minerals

Impacts to air quality and soil and water resources from locatable minerals would be the same as discussed under Impacts Common to All Alternatives.

(5) Impacts to Air, Soil, and Water from Mineral Materials

Impacts to air quality and soil and water resources would be the same as discussed under Impacts Common to All Alternatives.

(6) Impacts to Air, Soil, and Water from Recreation Management

Under this alternative, impacts to air quality and soil and water resources from recreation management would be similar to those discussed under Impacts Common to All Alternatives.

(7) Impacts to Air, Soil, and Water from Travel Management

Impacts to air quality and soil and water resources from OHV use and travel management would be similar to those discussed under Impacts Common to All Alternatives. The planning area would remain undesignated and cross-country use of OHVs weighing 2,000 pounds or less Gross Vehicle Weight Rating (GVWR) would be allowed throughout. Sensitive habitat areas would not receive additional protection from OHV impacts.

(8) Impacts to Air, Soil, and Water from Lands and Realty Actions

Impacts to air quality and soil and water resources from lands and realty actions would be the same as discussed under Impacts Common to All Alternatives.

c) Alternative B

(1) Impacts to Air, Soil, and Water from Vegetation Management

Since Alternative B promotes exploration and development activities, impacts to air quality and soil and water resources from vegetation management would likely increase somewhat, due to a projected increase in surface-disturbing activities. In addition to the impacts described in Impacts Common to All Alternatives, management of vegetative resources under Alternative B would implement ROPs to preserve a protective cover on soil and permafrost, reduce sediment runoff that degrades water quality, and keep dust from forming wind-borne particulates.

(2) Impacts to Air, Soil, and Water from Livestock Grazing

Alternative B would likely have impacts to air quality and soil and water resources from reindeer grazing similar to those discussed under Impacts Common to All Alternatives. Even if the entire planning area would be open to reindeer grazing, it is unlikely that many new reindeer grazing operations would be established outside of the Seward Peninsula for the foreseeable future due to the presence of caribou throughout most of the planning area, and the difficultly of managing reindeer in caribou occupied habitat.

In addition, grazing by bison could be authorized on the Seward Peninsula under this alternative. Potential impacts to air quality and soil and water resources are likely to be minimal due to the probable small numbers of animals and limited extent of grazing areas.

(3) Impacts to Air, Soil, and Water from Leasable Minerals

(a) Seismic Exploration

Seismic surveys involve seasonal occupation and transport of seismic equipment and camps using sledge-drawn trailers (wanigans) at transitory locations when the snow cover accumulation is sufficient to insulate the tundra and after lakes and rivers are frozen. Historically, the principal effect of seismic activities on soil and water resources has been diversions of shallow water tracks and ponding in places where track depression compresses the organic mat sufficiently to alter the thermal regime, melt surficial ground ice, and alter the native vegetation (Emers and Jorgenson 1997). More recently, modern seismic lines, with newer low-ground pressure equipment have less impact on the tundra than older, outdated types, but impacts to the tundra are more likely to occur during the camp-move (WesternGeco 2003). A 2D operation covers less line miles, but the camp moves virtually every day; while a 3D seismic operation covers more line miles, but the camp moves less often (WesternGeco 2003). While extensive thermokarst erosion along recent winter seismic trails is seldom observed, impacts to vegetation and surficial compaction are still in evidence (Jorgenson et al. 2003a). Adequate protection of the tundra requires a uniformly distributed snow pack with a hard surface crust. Often, the less than ideal snow conditions on the North Slope, particularly where the snow pack is influenced by wind scour and drift, could expose tussock tundra to surface disturbance (Walker et al. 1987). Varying levels of disturbance have been documented even where the snow depth exceeded two feet (Felix and Raynolds 1989).

Observations by the BLM and others (National Research Council 2003) indicate that short-term transitory impacts, such as surficial compaction, diversions of shallow water tracks and limited ponding, are estimated at about 1% of the proposed seismic lines per season, though newer, low-ground pressure equipment could reduce this significantly. Since tundra vegetative mat has been shown to recover in 7 to 10 years where damage is not severe (Abele et al. 1984, Jorgenson et al. 2003a), the long-term impacts due to thermokarst erosion, such as permanent diversions of shallow water tracks and limited ponding, are estimated at only about 1% of the short-term impacts. These impacts are strongly influenced by snow depth and distribution and may only happen when seismic activities occur under less than ideal snow conditions (National Research Council 2003). Where disturbance does occur, it could take from several years to several decades for the effects to be ameliorated (Walker et al. 1987).

These types of impacts would be reduced by implementation of the ROPs, including limiting most seismic exploration to those times during the winter when the ground is frozen and snow cover is adequate.

(b) Exploratory Drilling

Because exploratory drilling occurs in the winter, the principal effects on air quality and soil and water resources would be the construction of ice roads and pads. Construction of ice roads allows winter overland transport of the equipment and material used in exploration and delineation well drilling. Ice pads are constructed to support drill rigs and staging activities. While this is preferable to summer surface activities, the ice roads and pads require large quantities of water–an estimated 1-1.5 million gallons per mile of road, and 2 million gallons per

pad. Water supply for drilling as well as for camp use also would be significant–up to 1.6 million gallons per site (BLM 2003b). While there are a multitude of lakes in the planning area, many of these lakes are shallow and either freeze solid or have very limited free water during the winter when exploration takes place (Sloan 1987). Based on remote sensing (Mellor 1987) and other surveys, a typical large tundra lake (about a mile or more in length and 8 to 10 ft deep) used as a winter water source could have from less than 10 acre/ft to more than 100 acre/ft of water available for pumping. This estimate assumes the Alaska Department of Natural Resources (ADNR) drawdown limitation of 15% of the under-ice water volume. While water withdrawal from riverine pools is generally not permitted by the Alaska Department of Fish and Game (ADF&G), it is not prohibited. Given that the seasonal fluctuation of water depth in rivers is much greater than that of lakes, and that the variability of overwintering fish population is also greater in rivers than it is in lakes, it is significantly harder to determine safe amounts of water removal from isolated deep pools within the largely frozen (up to 95%) rivers. Depending on the areas leased, number of exploratory wells drilled and length of ice roads, annual water usage for exploration could require pumping water from one to many lakes during a winter's exploration season. If more than 15% of the under-ice water volume is removed, as is possible, then fewer lakes would be required, but less of the critical overwintering aquatic habitat would remain in pumped lakes.

Removal or compaction of snow cover can increase the depth of freezing, often a foot or more, greatly reducing the water quantity within a lake or river pool. Since the ice thickness may approach seven feet on undisturbed lakes, significant amounts of additional water would be lost as the ice thickness increases from snow compaction or clearing. Altering travel to avoid crossing or clearing deep lakes and augmenting snow cover by using snow fences would reduce ice buildup on lakes and rivers, and melted snow could be used in camps and for drilling. Use of aggregate ice chips created from crushed lake ice could reduce water usage on ice roads, but would greatly increase the depth of freezing in the lakes used in this process. Shallow lakes and ponds that normally would freeze to the bottom are the best source for this ice aggregate. Taking aggregate from the frozen areas of deep lakes would increase the ice thickness of the unfrozen area and could eliminate marginal aquatic habitat.

After each season of use, ice roads are abandoned and allowed to melt in the spring. Ice ramps or bridges that cross streams or lakes should be removed or breached before spring break-up. While some ponding might occur during a rapid onset of snowmelt, melt-water channels, similar to the melt-water channels that cut through naturally occurring river aufeis (overflow icing), would develop in the ice-road surface and rapidly drain the impounded water (Sloan et al. 1975). If the location of ice roads is offset from year to year, the effects of these short-term impoundments should be negligible. Ice roads and pads created to last several years have a greater impact on the underlying tundra mat, compacting and killing larger areas of vegetation (Walker 1996). Because this could cause more thermokarst and subsequent drainage alteration, multiple-year ice roads should be avoided. Multiple-year ice pads show fewer impacts, since their limited size results in less disruption of flow and subsequent ponding, so effects are usually limited to minor vegetative impacts around the margins.

Overland ice road construction becomes impractical over 50 miles on low-relief terrain such as the coastal plain. Due to the relatively short length of the winter season for construction and drilling, overland moves using low-ground-pressure vehicles and trailers (rolligons) can be used to haul drilling rigs to ice pads without an ice road. In some cases, where distances are too great for drilling to be completed in one season, the ice pad is insulated and the drill rig stored over the summer. In these cases, the amount of water required is greatly reduced. However,

hauling heavy loads on snow roads could expose tussock tundra to surface disturbance, impact the tundra wetlands, and expose stream banks and lake shorelines to increased erosion.

The preferred and normal means of disposing of drilling wastes, including muds and cuttings, is by reinjection into disposal wells. Cuttings may be stored temporarily to facilitate reinjection and/or backhaul operations. Use of mud pits may be allowed by the Authorizing Officer. If mud and cuttings are stored on the surface, sediments and other contaminants could be flushed into the watershed. However, requirements that wastes be stored in lined and bermed areas and disposed of before spring break-up would reduce the potential of sediments and other contaminants being flushed into the watershed. Adherence to the ROPs and Stips by all permitted operations would help prevent pollution to any stream or lake.

(c) Development

Oil and gas development activities would involve constructing ice roads to haul equipment and gravel for the construction of production pads, connecting roads, and landing strips. The potential impacts of such development on air quality and soil and water resources may include disturbance of stream banks or shorelines and subsequent melting of permafrost (thermokarst), blockages of natural channels and floodways that disrupt drainage patterns, increased erosion and sedimentation, and removal of gravel and water from riverine pools and lakes.

Thermokarst refers to ground subsidence that occurs when the removal of surface cover exposes ice-rich permafrost soils to a higher temperature regime and subsequent melting. Stream banks and lakeshores are particularly vulnerable to thermokarst, because the wave action of the water would accelerate the soil removal once the protective vegetative cover is degraded (Sellman 1975). Erosion and sedimentation can also be caused by construction or other activities that disturb the streambed, stream banks, or remove protective shoreline vegetation. Inadequate design or placement of structures, culverts, or bridges can alter natural sediment transport and deposition, creating scour holes or channel bars. Improper placement or sizing of gravel fill can result in erosion from pads or roadbeds adjacent to streams or lakes. Natural drainage patterns can be disrupted when activities or structures divert, impede, or block flow in stream channels, lake currents, or shallow-water tracks. Blockages or diversions to areas with insufficient flow capacity can result in seasonal or permanent impoundments. Diverting stream flow or lake currents also can result in increased bank or shoreline erosion and sedimentation that degrades water quality. Proper location and adequate design capacity of culverts, bridges, pipelines, and other control structures would minimize drainage problems. Winter or low-water construction and transport activities and adequate armoring of fill would minimize erosion and sedimentation problems.

Consumptive water use in the summer seldom is a problem on the coastal plain, as water generally is abundant. Exceptions would be in smaller coastal streams or most foothills streams during late summer, when shallow pools might be pumped dry. In the winter, however, all but the largest lakes and riverine pools are subject to dewatering if consumptive use is high. Depending on the areas leased and number of development wells drilled, annual water usage for development activities under Alternative B would vary considerably. Because of the continued need for ice roads, annual water use during development could be similar to that for exploration, assuming the ADNR drawdown limit of 15% of the under-ice water depth. If more than 15% is removed then fewer lakes would be required, but less of the critical overwintering habitat would remain in the pumped lakes or rivers. Removal or compaction of snow cover also can increase the depth of freezing, greatly reducing the water quantity within a lake or pool. Augmenting snow cover by using snow fences not only would reduce ice buildup on lakes and

rivers, but melting snow also could be used as a supplemental water source for camps and drilling. Adherence to the ROPs and Stips for all permitted operations would prevent the unlimited drawdown or pollution of any stream or lake.

While some of the gravel used for the construction of permanent facilities may be obtained from non-BLM managed lands, some of the material sites would probably be located on BLM-managed lands within the planning area. Improper location of gravel-removal operations can result in alteration or destruction of soils, stream channel or lake configuration, stream-flow hydraulics or lake dynamics, erosion and sedimentation, and ice damming and aufeis formation. Locating gravel pits far enough away from streams and lakes to avoid break-up or storm flooding would greatly minimize these effects to water resources.

If oil pipelines result from the development under Alternative B, they could affect soil and water resources, primarily through temporary impoundments, diversions, and sedimentation during construction. Winter or low-water construction and transport activities and adequate armoring of fill would minimize erosion and sedimentation problems. Again, adherence to the ROPs and Stips for all permitted operations would prevent the unnecessary disturbance to soils, sedimentation in streams or lakes, and increased airborne dust particulates.

Under the potential development activities, spills and spill cleanup would involve both crude oil and refined petroleum products, probably from fuel-storage areas or handling operations. Storage of fuel in lined and bermed areas and the onsite availability of absorbents and removal equipment would help ensure that the size of any area affected by a spill and cleanup efforts is kept to a minimum. Crude oil spill cleanup associated with production operations and pipelines is possible and could adversely affect streams and lakes. While the petroleum residue from a spill could be flushed from streams within a few years, the impacts to lakes and ponds could persist for decades. Spill cleanup in a watershed would involve containing the spill, diverting or isolating it within the waterbody, skimming off the oil, and treating the remaining oil-contaminated water and sediments. Prevention and rapid response with adequate removal equipment would minimize effects. The ROPs associated with Alternatives B, C, and D are designed to prevent or otherwise mitigate oil spills in the planning area.

Spills of chemicals and saline waters would be rapidly diluted in a large lake or river. In small lakes, tundra ponds, and shallow water tracks, the impacts would be greater, with waters remaining toxic to sensitive species for several years. These spills could be pumped out of the waterbody, if confined, or neutralized and then diluted with uncontaminated freshwater.

Air quality impacts may result from the emissions of hydrocarbons and byproducts of combustion or wind-borne particulates. Ambient air quality on the North Slope of Alaska, however, is relatively pristine even though oil and gas exploration, development, and production have been under way for more than 30 years. Arctic haze is a phenomenon resulting from elevated concentrations of fine particulate matter found over the Arctic, primarily in winter and spring. Scientists believe that most of the pollutants contributing to Arctic haze are from combustion sources in Europe and Asia. It is not known to what extent local sources in Alaska contribute to Arctic haze. However, the Arctic haze phenomenon was first observed in the 1950s, long before oil development started on the North Slope. Emissions in the general area of the North Slope oil production have not been shown to violate air quality standards; therefore, any possible contribution from local sources to Arctic haze would be minimal. Emissions from development resulting from the Alternative B would be small compared to the emissions from Prudhoe Bay and Kuparuk oil field production; and therefore, would account for a minimal percentage of the emissions generated by total North Slope oil production.

(d) Effects of Spills

Spills could occur from pipelines, production and exploration pads, airstrips, and roads. Spills that leave the pads and roadbeds could reach one or more of several habitat types, including wet and dry tundra, tundra ponds, lakes, flowing creeks and rivers, and potentially the adjacent nearshore Chukchi Sea. Spills could occur anytime during the year. This analysis would examine the time of year and location that would have the most adverse impact on the soil, water and air resources.

1. Air Quality

As noted in the Northeast Integrated Activity Plan (IAP) and EIS (BLM and MMS 1998), the volatile component of an oil spill from offshore facility or pipeline oil spills likely would evaporate almost completely within a few hours after the spill occurred. The EIS discusses the rate of evaporation, ambient concentrations, and the types of compounds the EPA classifies as hazardous air pollutants. This summary showed that these compounds evaporated relatively quickly after the spill occurs. Ambient concentrations peak within the first several hours after the spill starts and are reduced by two orders of magnitude after about 12 hours. The heavier compounds take longer to evaporate and may not peak until about 24 hours after spill occurrence. Total ambient concentrations are significant in the immediate vicinity of an oil spill, but concentrations are greatly reduced after the first day. In the event of an oil spill on land, the air-quality effects would be less severe than offshore (because some of the oil could be absorbed by vegetation or into the ground), but some effects might last longer before the volatile compounds were completely dissipated.

Diesel fuel oil could be spilled either while being transported or from accidents involving vehicles or equipment. A diesel spill would evaporate faster than a crude oil spill. Ambient hydrocarbon concentrations would be higher than with a crude oil spill, but would also persist for a shorter time. Also, since any such spill would probably be smaller than potential crude oil spills, any air-quality effects from a diesel spill likely would be even lower than for other spills. Oil or gas blowouts may catch fire. In addition, in situ burning is a preferred technique for cleanup and disposal of oil spilled into water. This type of burning would be less likely in case of oil spilled on land, but the effects on air quality if some of the oil should be burned would be similar. Burning could affect air quality in two important ways. For a gas blowout, burning would reduce emissions of gaseous hydrocarbons but slightly increase emissions of other pollutants. If an oil spill were ignited immediately after spillage, the burn could combust most of crude oil or diesel that otherwise would evaporate. On the other hand, incomplete combustion of oil would create an oily soot of unburned hydrocarbons, and minor quantities of other pollutants, into the air.

In situ burning as part of a cleanup of spilled crude oil or diesel fuel would temporarily adversely affect air quality, but the effects would dissipate as the fuel source is exhausted, so that only an extremely large spill would have long-lasting effects. Air pollution would be limited because of atmospheric dispersion. Also, large fires create their own local circulating winds--toward the fire at ground level--that affect plume motion. Accidental emissions likely would have a minimal effect on air quality. Other air quality effects from cleanup activities would include emissions from vehicles and equipment used in the cleanup effort; these should be very low.

2. Soil Resources

Oil spills could impact soils, primarily when the surface vegetation is altered. The oil would decrease vegetation growth, but leave the organic mat largely intact, though likely saturated with oil to a depth dependent on the amount of oil spilled, ambient temperature, and the

presence or lack of snow cover. Snow, ice, and a frozen ground surface would limit oil absorption into the surface organic mat and simplify cleanup. Spill cleanup, however, is more likely to damage soils when the ground surface is not frozen. Cleanups are not always well controlled; heavy traffic and digging are common, resulting in damaged soils. Oil-spill cleanup mitigates impacts on soils only if cleanup methods and operations are very carefully controlled and minimize surface disturbance. Thermokarst, or ground subsidence, occurs when the removal of surface cover exposes ice-rich permafrost soils to a higher temperature regime and subsequent melting. The impacts to soil resources from surface disturbing activities during oil-spill cleanup when the tundra is unfrozen may be greater than the impact of the spilled oil, as the area affected may not be limited to that area immediately adjacent to and covered by the spill.

3. Water Resources

Small crude or diesel spills (< 1 bbl and smaller) are projected to occur onshore (Table 4-3, Table 4-4, Table 4-5). Likely, all small fuel spills would occur on or near pads or roadbeds, though some fuel may possibly reach adjacent waters. Spill response during the winter, likely would remove almost all of a spill from the frozen tundra prior to snowmelt. During that part of the year when the tundra is unfrozen, late May through late September, spills could reach and adversely impact tundra waters before oil-spill response is initiated or completed. Storage of fuel in lined and bermed areas and the onsite availability of absorbents and removal equipment would help ensure that the size of any area affected by a spill and cleanup efforts is kept to a minimum. Since most oil exploration and development activities, as well as pipeline and facilities construction, would occur during winter when the ground is frozen, it is likely that most anticipated small fuel spills would be largely contained and removed prior to reaching tundra waters.

In the case of a larger spill, the Northeast NPR-A IAP/EIS (BLM and MMS 1998), analyzed the effects of a 325-bbl spill reaching the Colville River and Teshekpuk Lake in summer and the effects are hereby incorporated by reference. In the Colville River, the high rate of water flow would rapidly disperse the spill and preclude any effects on dissolved oxygen concentrations. Direct toxicity in the water column would be minimal and limited to the first few reservoir pools downcurrent of where the spill entered the river. Some toxicity might persist in these initial reservoir pools for a few days to weeks, until toxic compounds were washed out of the oil trapped in the sediment or the oiled sediment was buried under cleaner sediment. Where ice is present in the river, the oil would remain on top of the ice until breakup, when it would spread between the ice floes as they separate and move downstream. Spills that occur when the ice cover is growing become encapsulated in the ice until breakup, when the currents would disperse the ice downcurrent and eventually deposit it on shorelines. Similar effects would be expected in the unlikely event that an oil spill were to reach any of the rivers within the planning area.

As noted in Northeast NPR-A IAP/EIS (BLM and MMS 1998), a similar oil spill reaching Teshekpuk Lake also would result in a minimal effect on water quality. Dissolved oxygen levels would not be affected. Direct toxicity would be minimal because of the much greater dilution volume in Teshekpuk Lake than in the small ponds and lakes and because of the relatively unrestricted movement of the slick and underlying water. The spreading of the spill over about 60 acres (0.03% of the lake surface) could be considered an effect on water quality. This effect would exist for a few weeks, until the slick was either cleaned up or the oil stranded on the shoreline. Small waterbodies, such as tundra ponds and small lakes, are more susceptible to oil spills than larger lakes, as they lack sufficient area to generate the wave action or currents to

dissipate the spill. The primary effect of an oil spill in tundra ponds would be long-term direct toxicity. Similar effects would be expected for any of the lakes in the planning area, if an oil spill were to occur.

Spill cleanup in a watershed would involve containing the spill, diverting or isolating it within the waterbody, skimming off the oil, and treating the remaining, oil-contaminated water and sediments. Storage of fuel in lined and bermed areas and the onsite availability of absorbents and removal equipment would help ensure that the size of any area affected by a spill and cleanup efforts is kept to a minimum. Prevention and rapid response with adequate removal equipment would reduce effects; spill-prevention measures are described in Appendix A.

(4) Impacts to Air, Soil, and Water from Locatable Minerals

Impacts would be similar to those discussed under Impacts Common to All Alternatives, but slightly greater in extent. Under Alternative B, three to five new mines could be expected, but these would be small, placer operations. The potential for disturbance to soil and water resources would not exceed an additional fifty acres over that discussed under Impacts Common to All Alternatives. Implementation of ROPs would further reduce the potential for impacts to riparian, floodplain, and wetland habitats, important for maintenance of stream bank stability and water quality. Air quality impacts may result from the emissions of hydrocarbons and byproducts of combustion or wind borne particulates, but would be localized in extent, such that the planning area would still meet regional air quality standards.

(5) Impacts to Air, Soil, and Water from Mineral Materials

Impacts to air quality and soil and water resources from mineral materials disposal would be similar to those projected under Impacts Common to All Alternatives but greater in extent as up to 1,000,000 cubic yards of mineral material would be needed for oil and gas development activities. Impacts relative to oil and gas development are discussed under Leasable Minerals.

(6) Impacts to Air, Soil, and Water from Recreation Management

Impacts to air quality and soil and water resources from recreation management would be similar to those discussed under Impacts Common to All Alternatives.

(7) Impacts to Air, Soil, and Water from Travel Management

Impacts to air quality and soil and water resources from OHV use and travel management would be similar to those discussed under Impacts Common to All Alternatives. Cross-country use of OHVs weighing 2,000 pounds or less GVWR would be allowed throughout and during the winter, the weight limit would be suspended. Under this Alternative, sensitive habitat areas would not receive additional protection from OHV impacts. Impacts would be increased compared to Alternative A. Because the heavier vehicles would be allowed only during the winter, additional impacts would be limited.

(8) Impacts to Air, Soil, and Water from Lands and Realty Actions

Impacts to air quality and soil and water resources would be similar to those discussed under Impacts Common to All Alternatives. Implementation of ROPs would further reduce the potential for impacts compared to Alternative A.

d) Alternative C

(1) Impacts to Air, Soil, and Water from Vegetation Management

Impacts to air quality and soil and water resources would be similar to those discussed under Impacts Common to All Alternatives, but to a lesser extent due to limits on specific ground-disturbing activities in certain areas.

(2) Impacts to Air, Soil, and Water from Livestock Grazing

Impacts to air quality and soil and water resources would be similar to those discussed under Impacts Common to All Alternatives, but to a lesser extent.

(3) Impacts to Air, Soil, and Water from Leasable Minerals

Impacts to air quality and soil and water resources would be similar to, but much less than, those impacts discussed under Alternative B as high potential areas would be closed to leasing. Due to the closure, the probability of seismic exploration occurring in the planning area would also be very low.

(4) Impacts to Air, Soil, and Water from Locatable Minerals

Impacts to air quality and soil and water resources would be similar to, but somewhat less than, those discussed under Impacts Common to All Alternatives. While no mineral development is anticipated under this alternative, exploration may occur under a mining notice in the limited area open to locatable mineral entry.

(5) Impacts to Air, Soil, and Water from Mineral Materials

Impacts to air quality and soil and water resources would be similar to, but somewhat less than, those projected under Impacts Common to All Alternatives. Two sensitive habitat areas, McCarthy's Marsh and the Kigluaik Mountains, would be closed to mineral material disposal, providing additional protection to sensitive wetlands in these areas. Beaches, floodplains, and riparian areas would also be closed, limiting both the availability and need for mineral materials disposal occurring on BLM-managed lands.

(6) Impacts to Air, Soil, and Water from Recreation Management

For most of the planning area, impacts to air quality and soil and water resources would be similar to, but to a lesser extent than, those discussed under Impacts Common to All Alternatives. The limits on commercial use under Alternative C would reduce the potential for disturbance from recreational activities.

(7) Impacts to Air, Soil, and Water from Travel Management

Under Alternative C, the entire planning area would be limited to designated trails. Some areas would be closed to OHV use during the snow free season. The least impacts to air quality and soil and water resources from proliferation of trails would occur under Alternative C.

(8) Impacts to Air, Soil, and Water from Lands and Realty Actions

Impacts to air quality and soil and water resources from lands and realty actions would be similar to those discussed under Impacts Common to All Alternatives, but to a lesser extent. Constraints on realty actions within designated ACECs would provide additional protection to air quality and soil and water resources.

e) Alternative D

(1) Impacts to Air, Soil, and Water from Vegetation Management

Impacts to air quality and soil and water resources would be similar to those discussed under Impacts Common to All Alternatives, but lesser in extent.

(2) Impacts to Air, Soil, and Water from Livestock Grazing

Impacts to air quality and soil and water resources would be similar to those discussed under Impacts Common to All Alternatives, but lesser in extent.

(3) Impacts to Air, Soil, and Water from Leasable Minerals

The impacts to air quality and soil and water resources would be the same as Alternative B.

(4) Impacts to Air, Soil, and Water from Locatable Minerals

Impacts to air quality and soil and water resources would be similar to Alternative B, but slightly lesser in extent. Under Alternative D, ROP SS-4 would apply to lands adjacent to eight lakes supporting Kigluaik Arctic char, slightly reducing the potential for disturbance to soil and water resources. ROP FW-7a would apply along ten rivers, providing additional protection for riparian habitat, which is important for maintenance of stream bank stability and water quality.

(5) Impacts to Air, Soil, and Water from Mineral Materials

Impacts to air quality and soil and water resources would be the same as Alternative B.

(6) Impacts to Air, Soil, and Water from Recreation Management

Impacts to air quality and soil and water resources would be similar to Alternative B, but slightly lesser in extent. Over the short-term, impacts in the Squirrel River Special Recreation Management Area (SRMA) would be similar to those discussed under Alternative A. Over the long-term, limits on both commercial and non-commercial recreational use levels in the Squirrel River would be established through a Recreation Area Management Plan (RAMP). It is

anticipated that improved management of both commercial and non-commercial recreation would result in reduced impacts to soil and water resources by limiting impacts to riparian and wetland habitats.

(7) Impacts to Air, Soil, and Water from Travel Management

Impacts to air quality and soil and water resources from OHV use and travel management would be similar to but somewhat less than under Alternative B because the 2,000 pound weight limit would apply yearlong.

(8) Impacts to Air, Soil, and Water from Lands and Realty Actions

Impacts to air quality and soil and water resources would be similar to those discussed under Alternative B and Impacts Common to All Alternatives. Under Alternative D, several ACECs would be designated including the (WACH) insect relief habitat and core winter habitat in the Nulato Hills. Management applied within these ACECs would provide additional protection of wetland and riparian habitat. Impacts from realty actions would be slightly higher than under Alternative C and somewhat lower than under Alternatives B and A.

2. Vegetation

Proposed management of the following resources/resource uses/programs would have no anticipated impacts to vegetation management: Air Quality, Cultural Resources, Paleontological Resources, Visual Resources, Wilderness Characteristics, Renewable Energy, Lands and Realty Actions, Iditarod National Historic Trail, Public Safety, Social and Economic Conditions, and Subsistence.

a) Impacts Common to All Alternatives

(1) Impacts to Vegetation from Soil, Water, and Special Status Species Plants

Vegetation throughout the planning area would benefit from proper management of soils, water, and special status species plant resources. Implementation of mitigation measures to protect soil, water and Special Status Species (SSS) plants and their habitats on a project specific basis would reduce disturbance to vegetation, and aid in recovery of various habitat types from permitted uses. See impact discussions in this chapter under Special Status Plants on page 4-84 for specific information concerning special status plants within the planning area.

(2) Impacts to Vegetation from Fish and Wildlife Management

Direct benefits to vegetation throughout the planning area would result from protection to important fish and wildlife habitats, such as riparian and tall shrub habitats, and from mitigation of impacts to fish and wildlife habitat through the NEPA and permitting processes.

(3) Impacts to Vegetation from Fire and Fire Management

Fire management programs emphasize protection of human life and site-specific values while recognizing fire as an essential ecological process and natural agent of change to ecosystems. Implementation of various fire management options (Critical, Full, Modified, or Limited) and level of utilization of wildland fire use would directly affect diversity of habitats and successional stages of plant communities throughout the planning area.

(4) Impacts to Vegetation from Forest Products

Forests cover approximately 8% of the land within the planning area. Although this is a relatively small amount, proper management of forest resources would have a positive impact on overall health of vegetation in the planning area. Implementation of mitigation measures to protect forest product resources on a project specific basis would reduce disturbance to vegetation in general, and aid in the recovery of forest habitats from permitted uses. See impact discussions under Forest Products on page 4-127 for specific information concerning forest resources within the planning area.

(5) Impacts to Vegetation from Livestock Grazing

Some form of livestock grazing is permitted under all alternatives, although areas open to grazing and types of livestock authorized differ among alternatives. Incidental grazing by pack animals associated with special recreation use permits would be considered on a case-by-case basis under all alternatives. Livestock grazing has the potential to negatively impact riparian and tundra vegetation in the planning area by creating localized areas of trampled and over-browsed vegetation, cratering to organics or mineral soil, and heavily browsed willow and dwarf birch shrubs. Long-term vegetation disturbance promotes potential spread of noxious and invasive weed species. Annual monitoring of reindeer grazing allotments, consultation with individual reindeer herders, and implementation/development of allotment management plans encourage proper techniques, which prevent or mitigate adverse effects to vegetation.

(6) Impacts to Vegetation from Locatable Minerals

Existing and future locatable mineral activities have the potential to unfavorably impact riparian and tundra vegetation and habitats by stripping away the vegetative mat as part of mine site overburden, re-routing original stream flow into stream bypass areas, trampling or eliminating (under camp buildings, gravel roads, gravel airstrip, etc.) vegetation, and compacting soils throughout the footprint of the mine site. Long-term surface disturbance would increase the potential for introduction and spread of noxious and invasive weed species into placer mine sites. Site-specific mitigation measures would be implemented where necessary and practical.

(7) Impacts to Vegetation from Mineral Materials

Sufficient mineral materials sources exist on private lands to meet the needs of most communities within the planning area. Few mineral materials disposal actions are anticipated on BLM-managed lands, although most lands would be available for such development. The one exception is that mineral materials would be needed to support oil and gas development, if it occurred. Site specific mitigations would be developed to reduce negative impacts to riparian and tundra vegetation. Mineral Material disposal can unfavorably impact vegetation by

destroying any vegetation growing on the site and compacting and removing soils throughout the footprint of the site, hindering regrowth.

(8) Impacts to Vegetation from Recreation Management

There could be minor impacts to riparian and tundra vegetation from both commercial and non-commercial recreation activities. Occasional-to-repeated use of campsites and aircraft landings at remote sites may have direct effects on riparian and tundra vegetation. Plants would be trampled or broken, and soil would be compacted and disturbed. The potential for human-caused wildland fire would increase with backcountry recreation use. Given the low level of recreation use on most BLM-managed lands in the planning area, these impacts are expected to be minimal.

(9) Impacts to Vegetation from Travel Management

There would be direct and indirect impacts on riparian and tundra vegetation from travel management and OHV use. OHV use on and off designated trails has the potential to destroy the vegetation mat, compact soils, accelerate permafrost melt, and lead to soil erosion and ponded water. Plants would be crushed and their habitats degraded. Higher, rockier terrain and remote areas are becoming more accessible over time as OHVs become more sophisticated and powerful, and as the human population in the planning area increases. This increases the total land area accessed and the potential for vegetation damage. Increasing levels of OHV use on and off designated trails bring an increased possibility that noxious and invasive weeds would be introduced to areas of surface disturbance.

b) Alternative A

(1) Impacts to Vegetation from Soil, Water, and Special Status Species Plants

Impacts to vegetation would be the same as discussed under Impacts Common to All Alternatives.

(2) Impacts to Vegetation from Fish and Wildlife Management

Impacts would be the same as discussed under Impacts Common to All Alternatives.

(3) Impacts to Vegetation from Fire and Fire Management

Impacts to vegetation would be the same as discussed under Impacts Common to All Alternatives. Alternative A endorses wildland fire use as a resource management tool. Wildland fire would be used to protect, maintain and enhance vegetative resources. For example, under Alternative A areas containing stands of white spruce-lichen woodland or lichen tussock tundra could be allowed to burn or be considered for protection from wildland fire on a case-by-case basis in order to evaluate specific resource benefits. Important wildlife habitats, such as lichen tussock tundra or spruce-lichen woodland, would be monitored for cumulative effects of wildland fire, suppression activities, and the effects of excluding fire as funding permits.

(4) Impacts to Vegetation from Forest Products

Under continuation of current management, requests for forest product resources (including permits for personal use firewood and house logs, small sales vegetative contracts, and commercial or salvage logging) would be considered on a case-by-case basis. Only a small number of personal or commercial permits would be expected during the life of the plan. Forested lands would be managed for a sustained yield of forest products. Overall impact to vegetation from forest products in the planning area would be minor.

(5) Impacts to Vegetation from Livestock Grazing

Under continuation of current management, livestock grazing would be managed on a case-by-case basis as permits are received. The type of livestock permitted would be limited to reindeer. Under current management (in addition to lands on the Seward Peninsula), other BLM-managed lands throughout the planning area have been open to reindeer grazing. However, no permits have been authorized, mostly due to conflicts with caribou or moose.

(6) Impacts to Vegetation from Leasable Minerals

There would be no impacts from leasable minerals because no leasing would occur.

(7) Impacts to Vegetation from Locatable Minerals

Under current management, many placer mine sites have a long history of occupancy. For the most part, a slow natural revegetation has occurred in mine tailings and disturbed ground of the mine sites. After mining operations cease, early successional native plants with good colonizing ability that are able to spread easily by seed or vegetative propagation gradually rebuild a vegetative mat at these locations. During the last 16 years, approximately 68 acres of surface disturbance have been associated with active placer mines in the planning area (Table 3-17). Permitted or authorized uses that may affect the surrounding riparian and tundra vegetation would be analyzed through the appropriate NEPA document. Based on this analysis, mitigation would be developed to minimize impacts from proposed activities. The resulting mitigation measures would be included in the permit authorizing the use.

(8) Impacts to Vegetation from Mineral Materials

Under current management, mineral material sales would be considered on a case-by-case basis, with specific operating stipulations developed to protect riparian and tundra vegetation. There are no current mineral materials sales on BLM-managed lands in the planning area, and few would be expected to develop within the life of the plan. Impacts would be similar to those discussed under Impacts Common to All Alternatives.

(9) Impacts to Vegetation from Recreation Management

Impacts would be the same as discussed under Impacts Common to All Alternatives.

(10) Impacts to Vegetation from Travel Management

Impacts from travel management and OHV use would be similar to those discussed under Impacts Common to All Alternatives. The planning area would remain undesignated and cross-country use of OHVs weighing 2,000 pounds or less GVWR would be allowed throughout. Sensitive habitat areas would not receive additional protection from OHV impacts.

(11) Impacts to Vegetation from Special Designations

No ACECs or RNAs would be designated under Alternative A. Sensitive habitats would not be afforded additional protection through designation and management.

No Wild and Scenic Rivers have been designated in the planning area under current management. The Squirrel River is a study river under Sec. 5(a) of the WSRA and the BLM would continue to manage it to protect wild river values until fall 2007. At that time, the three-year period for Congress to consider the study recommendation and finding that the river is not suitable for designation will have expired. Over the short-term, protection of wild river values would indirectly benefit riparian vegetation and sensitive habitat by maintaining the free-flowing nature and pristine water quality of the Squirrel River, and prohibit man-made infrastructure along identified river corridors.

c) Alternative B

(1) Impacts to Vegetation from Soil, Water, and Special Status Species Plants

Vegetation throughout the planning area would benefit from proper management of soils, water, and SSS plants resources. Implementation of ROPs (Appendix A) on a project specific basis would reduce disturbance to vegetation and aid in recovery of various habitat types from permitted uses.

(2) Impacts to Vegetation from Fish and Wildlife Management

Indirect benefits to vegetation throughout the planning area would accrue due to inventory and monitoring of fish and wildlife habitats and the application of ROPs as appropriate.

(3) Impacts to Vegetation from Fire and Fire Management

Impacts would be similar to those discussed under Alternative A, except that application of wildland fire use as a management tool would not be allowed. Slightly more lichen-rich plant communities may be allowed to burn under Alternative B.

(4) Impacts to Vegetation from Forest Products

Impacts would be similar to those described under Alternative A, except that forest products permitting would be subject to the ROPs. A baseline forest inventory would be conducted to determine location of both commercial and non-commercial timber, and old growth stands. Coordination with the USDA Forest Service would be initiated to track forest health conditions concerning insect and disease outbreaks. These efforts would enhance overall knowledge

about vegetation status in the planning area. Small commercial logging and firewood sales would be considered in proposed special management areas such as SRMAs.

(5) Impacts to Vegetation from Livestock Grazing

Under Alternative B, all 11.9 million acres of BLM-managed land would be open to livestock grazing, including both reindeer and bison. An additional 9 million acres of BLM-managed lands outside the Seward Peninsula would be available for livestock use. (some of this acreage is State- or Native-selected). Until the WACH population declines significantly, it is unlikely that additional permits for reindeer grazing would be issued by the BLM. However, there has been recent interest in bison grazing on the Seward Peninsula. Overall, there could be a small increase in livestock grazing pressure and trampling effects on riparian and tundra vegetation throughout the planning area under Alternative B. The potential for introduction and spread of noxious and invasive plants could increase somewhat. Livestock grazing would be subject to ROPs, which include restrictions on picketing animals in riparian areas (ROP Veg-2i) and require that any supplemental feed products used on BLM-managed lands be certified weed-free (ROP Veg-2j).

(6) Impacts to Vegetation from Leasable Minerals

(a) Oil and Gas Exploration and Development

It is assumed approximately 710,000 acres of BLM-managed land would be leased in the high occurrence potential region during the life of the plan. Impact to tundra vegetation, including riparian and upland habitats, from leasable minerals would vary from short-term and low impact to long-term destruction of habitat.

Exploratory seismic surveys would be carried out during winter months, involving transport and camp move vehicles. Adequate snow cover and frozen ground offer some protection to underlying vegetation. A 2001 study conducted near the Colville River delta during the summer following seismic work found compression of the vegetation mat, broken shrubs and crushed tussocks as a result of winter seismic work (Jorgenson et al. 2003b). This study documented that during the summer following seismic work little to no impact to tundra vegetation occurred under seismic lines on 30% of the plots studied. Minor impacts to tundra vegetation were found on 66% and moderate impacts were found on 4% of the plots studied. No plots were highly impacted. Camp move trails in this study had little or no impacts to tundra vegetation on 18% of the plots studied, minor impacts on 54%, moderate impacts on 29%, and high impacts on none of the plots (Jorgenson et al. 2003b). If industry showed interest in the area, 43-55 exploration wells could be drilled during winter months involving ice roads, ice pads, and low-impact vehicles. Aside from destruction of vegetation in the immediate vicinity of each exploratory well (approximately 16 square feet), the impacts would be fairly short-term, with recovery from impacts to vegetation expected in a few years. The tundra mat would be compressed under ice roads and ice pads, and plants emerging in the spring would experience a shortened growing season due to delayed melt of ice cover. In localized areas impacts from ice roads may cause plants to die. If an economically viable field were discovered (unlikely during the life of the plan) up to 186 development wells totaling approximately 417 acres of disturbance could be possible. The oil field is assumed to include 1 main and 5 satellite gravel drill pads, an airstrip, and gravel access roads. An oil pipeline would also be necessary for transport to market, and 50-75 miles of a several hundred-mile pipeline could be routed through the planning area, resulting in additional impacts to vegetation.

In recognition of the potential for significant surface disturbing activities inherent in oil and gas exploration, leasing, and production and in accordance with ROP SS-3a, land cover mapping at a 30 meter resolution would be completed before approval of facility construction. Botanical inventory would be included in this effort. Oil and gas operations would comply with ROPs, including ROP Veg-2d for location of winter ice roads, ROP Veg-2e concerning sufficient snow cover, ROP Veg-2g to minimize footprint size, and ROP Soils-1f pertaining to recontour and revegetation guidelines.

(b) Coal Exploration

Under Alternative B, all BLM-managed lands in the planning area would be available for coal exploration. If exploration for coal occurred, it would most likely be within the Kukpowruk River Field or the Cape Beaufort Field, east of Cape Lisburne in the northern quarter of the planning area. Winter exploration for coal would have impacts on vegetation similar to those described above for oil and gas exploration. ROP FW-3a prohibits coal exploration activity within the WACH calving and insect relief areas from May 20 to August 15, reducing the potential for habitat disturbance impacts during the growing season.

(c) Effects of Spills

Vegetation is most vulnerable to a large crude oil spill in June, July, or August, when soils are thawed to seasonal maximum and plants are actively growing. The most vulnerable habitats are those with drier, well-drained soils that would allow oil to penetrate to plant roots and underground rhizomes and buds. Assumptions for both large and small spills are outlined in the Minerals section beginning on page 4-143. Further assumptions specific to the analysis of impacts to vegetation are:

- One occurrence of a large crude oil spill of 500 bbl in a remote stretch of pipeline.
- The spill would occur in June, July, or August and in a drier habitat type.
- Similar to an actual spill at Franklin Bluffs in July 1977 (Walker et al. 1978) the oil is imagined to squirt out vertically, and a strong north wind carries the oil south, creating a fan-shaped impact area. The oil is assumed to spread fairly evenly over the ground for approximately an acre, to form a 2.0 cm thick layer of oil over the ground and vegetation. In addition to oil flooding the ground, the oil is under pressure and backed by wind, thus it coats aerial stems of shrubs, taller grasses and sedges.

During an oil spill on dry tundra habitats the oil rapidly soaks into the soil. The most damaging components of the oil don't evaporate, but filter through the soil profile, killing roots, rhizomes and belowground buds. This causes much more short and long term vegetation damage compared to the same quantity of oil spilled on either water-saturated or frozen soils (McKendrick 1999 and Walker et al. 1978). At typical dry dwarf shrub and mat/cushion communities on the North Slope, most plant species can be expected to die due to oil contact with above and below ground plant parts (McKendrick and Mitchell 1978, Walker et al. 1978). This includes dwarf shrubs such as *Dryas integrifolia* (mountain avens), often a dominant plant community member at dry sites, and *Cassiope tetragona* (four-angled cassiope), a widely distributed evergreen shrub at northern sites, plus assorted forbs, grasses, mosses, and lichens. McKendrick (2000) states that "Dry habitats are the slowest to recolonize and the most susceptible to long-term damages from oil spills. " A dry habitat in the Prudhoe Bay area exposed to an experimental application of 4 cm crude oil (1,000 bbl/acre) supported less than 5% vegetation cover after 24 years (McKendrick 1999). In contrast, wet sedge meadow at

Prudhoe Bay dominated by sedges and willows showed the most complete natural recovery after 24 years from smaller spills (1.0 cm crude oil at 255 bbl/acre or less) with no cleanup measures. Vascular plant species cover had returned to 66% under the 1.0 cm treatment and to 83% under the 0.5 cm treatment (nearby control plots were at 91% cover). Where wet sedge meadow experimental plots at Prudhoe Bay were exposed to a heavy application, 4.0 cm crude oil, encouraging recovery was seen after 24 years with no cleanup treatments. Dominant sedges and willows were able to survive or reestablish to a limited extent, although vascular plant cover was still only 12 percent (nearby control plots were at 91% cover) (McKendrick 1999).

Recovery of vegetation components at the drier sites can take extended periods of time. For example, 24 years after an experimental crude oil spill at Prudhoe Bay at applications of 0.24 cm (64 bbl/acre), 0.5 cm (127 bbl/acre), 1.0 cm (255 bbl/acre), 2.0 cm (500 bbl/acre), and 4.0 cm (1,000 bbl/acre), *Dryas integrifolia* had not recovered at applications above 0.5 cm (McKendrick 1999). Without fertilization, at the site of the first crude oil spill on tundra at Prudhoe Bay, mosses failed to recover in some microhabitats even after 25 years (McKendrick 2000). Forbs (herbaceous annual or perennial plants) seem to be harmed more than other vascular plants (i.e., shrubs, sedges, grasses, and rushes) by exposure to crude oil. This susceptibility may be related to their growth form – low stature and above ground perennating buds – and limited protection of stems (McKendrick 1999). However prostrate and dwarf shrubs in the genus *Salix* (willow) and sedges (*Carex* and *Eriophorum*) have demonstrated more resilience to crude oil at all soil moisture levels, showing some degree of survival and recovery even in dry soils (McKendrick 1999, Walker et al. 1978).

Crude and refined oils react with tundra vegetation in several harmful ways. These oils are similar to contact herbicides, killing vegetation by destroying cellular membranes, and by coating leaf and stem surfaces, preventing critical oxygen and carbon dioxide exchange (McKendrick 2000). Spilled oils damage soils by making water less available, adversely affecting plant survival and development. The additional organic carbon also creates a negative shift in the carbon to nutrient ratios in the soils as microorganism populations increase to decompose the new carbon compounds. This deprives vascular plants of important nutrients such as phosphorus, nitrogen, and potassium (McKendrick 2000). Thus, plant growth is usually enhanced when fertilizer (especially phosphorus) is applied to areas affected by oil spills (McKendrick and Mitchell 1978, McKendrick 2000).

Some portion of the expected 89 small crude oil spills would occur on gravel pads, be cleaned up or contained, and pose no threat to surrounding tundra vegetation. The rest of these spills would stem from problems with pipelines and the product would contact vegetation. Impacts to vegetation would be the same as from large crude oil spills, except at a much smaller scale. Small crude oil spills can be expected to occur in all tundra vegetation habitats – standing water over tundra, as well as wet, moist, and dry tundra. Initial plant die-off would be lightest, and recovery quickest, in the wettest habitats or if the soil is frozen (McKendrick 1999). If spilled crude oil falls onto water-saturated or frozen soil, the light fractions (short chain) and aromatic fractions (ring structure) which are most toxic to plants may have time to evaporate before soaking into the soil (McKendrick 1999, McKendrick 2000).

Some portion of the expected 220 small refined oil spills would occur on gravel pads, be cleaned up or contained, and pose no threat to surrounding tundra vegetation. Since diesel oil spills tend to occur more often than those involving other refined oil products, this portion of the analysis will focus on impacts of diesel oil accidentally released onto tundra vegetation.

Diesel oil is lethal to plants. It was formerly used as an herbicide to selectively control weeds in carrots (McKendrick 1999). Almost no recovery was seen one year after application of 1.2 cm (approximately 300 barrels/acre) of diesel oil to six different common tundra plant communities at Prudhoe Bay (Walker et al. 1978). The six plant communities were selected to illustrate vegetation impacts on a wide range of soil moisture and topographic conditions, from a dry ridge through moist upland to a very wet marsh. The sole surviving species was a submerged aquatic moss (*Scorpidium scorpiodes*). As the diesel oil floated on the water's surface at the wet marsh, contact with emergent leaves of *Carex aquatilis* (water sedge) killed all individuals, even though the oil had not penetrated to their root system. However, the *Scorpipium* did not come in direct contact with the diesel oil, and the soluble components did not seem to affect it. Walker and associates (1978) rated the eventual recovery potential of the six plant communities as "poor" in the dry ridge habitats, "moderate" in the moist upland habitats, and "excellent" at the very wet marsh sites.

Observation of a three-year old diesel oil spill east of Prudhoe Bay, which occurred in winter on an ice pad, showed that all vegetation in moist tundra was initially killed. Despite cleanup efforts, some diesel had penetrated to the frozen vegetation and peat. However after three years several native plants had colonized the site: two forbs – *Melandrium apetalum* (bladder-campion) and *Caltha palustris* (marsh marigold), a sedge (*Carex* spp.), a grass species, and several moss species. The natural recovery of vegetation at this site indicates the toxic effects of the spill had diminished (McKendrick 2000).

(7) Impacts to Vegetation from Locatable Minerals

Alternative B has the highest potential for unfavorable impacts on riparian and tundra vegetation. All ANCSA (d)(1) withdrawals would be revoked and the entire planning area opened to locatable mineral entry, subject to adherence to ROPs. Within the life of the plan, the BLM assumes from 3 to 5 new placer mines might be initiated, each with an approximate 10 acre mining operation footprint, for a total of 30-50 acres of additional surface disturbance. Impacts of new placer mine operations would be the same as discussed under Impacts Common to All Alternatives. Mitigation of vegetation and habitat disturbance would be implemented by adherence to ROPs. Pertinent ROPs include those covering size of development footprint (ROP Veg-2g), wetland disturbance (ROP W-2a and others), stream and ground water handling (ROP W-3e), riparian buffer zones (ROP W-3d), and site reclamation (ROP W-3f).

(8) Impacts to Vegetation from Mineral Materials

The volume of gravel needed to support possible oil and gas development is projected to be approximately 1,000,000 cubic yards of material. Surface disturbance would amount to approximately 50-100 acres in terrain such as floodplains, shoreline deposits, bluffs, and rocky outcrops. Compared to the 710,000 acres estimated for oil and gas leasing, 50-100 acres set aside for gravel extraction is potentially a small impact. However, excavation of material and stockpiling of overburden would destroy all vegetation within each gravel extraction site. The ROPs would be adhered to during all gravel extraction operations in order to minimize adverse impacts to riparian and tundra vegetation.

(9) Impacts to Vegetation from Recreation Management

Impacts would be similar to those discussed under Impacts Common to All Alternatives except the Squirrel River would be designated as a SRMA. Potential restrictions on the number of commercial guiding operators and visitor use days of their clients within the SRMA could have a small beneficial impact on riparian and tundra vegetation as fewer temporary camps would be established each year. Inventory and monitoring of recreation activities and impacts will increase somewhat over current management (Alternative A).

(10) Impacts to Vegetation from Travel Management

Impacts would be similar to that discussed under Impacts Common to All Alternatives. Cross-country use of OHVs weighing 2,000 pounds or less GVWR would be allowed throughout and during the winter, the weight limit would be suspended. Impacts would be slightly increased compared to Alternative A. Because the heavier vehicles will be allowed only during the winter, additional impacts would be limited. Sensitive habitat areas would not receive additional protection from OHV impacts.

(11) Impacts to Vegetation from Special Designations

No ACECs or RNAs would be designated under Alternative B and no rivers would be recommended as suitable for designation under the WSR Act. Sensitive habitats would not be afforded additional protection through special management.

d) Alternative C

(1) Impacts to Vegetation from Soil, Water, and Special Status Species Plants

Impacts would be the same as discussed under Alternative B.

(2) Impacts to Vegetation from Fish and Wildlife Management

Indirect benefits to vegetation under Alternative C would accrue due to inventory and monitoring of wildlife habitats and the application of ROPs. An activity level management plan would be developed for management of caribou habitat in the Nulato Hills ACEC. This would indirectly benefit vegetation by offering additional habitat protection and monitoring. The ACEC proposed for the WACH calving ground and insect relief habitat on the Lisburne Peninsula would provide additional protection for this large, botanically unexplored region north of Kivalina and adjacent to the National Petroleum Reserve-Alaska (NPR-A).

(3) Impacts to Vegetation from Fire and Fire Management

Impacts would be the same as discussed under Alternative A, except more emphasis would be placed on developing activity level plans for important wildlife habitat and outlining site-specific prescriptions for wildland fire use. This would provide positive benefits to vegetation in specific parts of the planning area.

(4) Impacts to Vegetation from Forest Products

Impacts would be similar to those described under Alternative B, with some exceptions. No commercial logging or firewood sales would be permitted in the planning area. No small sales vegetation contracts would be allowed in any proposed SRMA, ACEC, or along rivers determined suitable for WSR status. These limitations could result in a small increase in the amount of live and standing dead timber, and forest understory vegetation left intact in forest stands scattered throughout the planning area.

(5) Impacts to Vegetation from Livestock Grazing

Impacts under Alternative C are similar to Alternative A, except that 2 of the 15 current reindeer grazing allotments, and 2 unalloted areas would be closed. In addition, permits for allotments where reindeer have been absent for 10 or more years due to migration with caribou would not be renewed. Non-renewed allotments would be permanently retired from grazing. Grazing allotment boundaries would be modified to exclude ACECs. These measures would result in slightly less grazing pressure and trampling damage to riparian and tundra vegetation in the near term, and potentially more benefit in the future when the WACH population declines and herders may attempt to build up their reindeer herds again. Livestock grazing would be subject to ROPs, which include restrictions on picketing animals in riparian areas (ROP Veg-2i) and require that any supplemental feed products used on BLM-managed lands be certified weed-free (ROP Veg-2j).

(6) Impacts to Vegetation from Leasable Minerals

The probability of seismic exploration for oil and gas is very low under Alternative C, and no exploratory drilling or development would occur. Under Alternative C, both fluid and solid mineral leasing would be deferred until industry showed interest. Impacts from seismic exploration to tundra and riparian vegetation in the northern quarter of the planning area would be slightly less than discussed under Alternative B. Under Alternative C, the upper portion main stems and tributaries of the Kivalina River, Kukpowruk River, Ipewik River, and Nilik River would have a 300-foot NSO setback, providing additional protection to riparian vegetation in these areas.

(7) Impacts to Vegetation from Locatable Minerals

Impacts to riparian and tundra vegetation from locatable minerals would be the least under Alternative C. Approximately 50% of BLM-managed lands in the planning area would be closed to mineral entry to provide additional protection to sensitive habitats, including 300-foot setbacks along most of the major rivers and tributaries in the planning area. Six proposed special management areas would be closed to mineral entry: WACH calving and insect relief habitat ACEC, Nulato Hills ACEC, Kigluaik Mountains ACEC, McCarthy's Marsh ACEC, Kuzitrin River ACEC, and Squirrel River SRMA.

(8) Impacts to Vegetation from Mineral Materials

Impacts to riparian and tundra vegetation from mineral materials would be similar to those discussed under Impacts Common to All Alternatives, and slightly less severe than those discussed under Alternative B. Under Alternative C, sale of mineral materials from riverbeds,

ocean and lagoon shorelines, and lakeshores will not be permitted. In addition, sales would be prohibited in the proposed Kigluaik Mountains and McCarthy's Marsh ACECs.

(9) Impacts to Vegetation from Recreation Management

Impacts would be similar to those discussed under Impacts Common to All Alternatives and Alternative B, except two SRMAs would be designated: the Squirrel River SRMA and the Salmon Lake/Kigluaik Mountains SRMA. Also under Alternative C, additional management attention may be focused on several areas containing sensitive habitat and important fish and wildlife resources: Koyuk, Inglutalik, Ungalik, Agiapuk, and Buckland rivers, plus the Nulato Hills, Fish River/McCarthy's Marsh, and Bendeleben Mountains. These measures may have small positive benefits to riparian and tundra vegetation by reducing surface disturbance.

(10) Impacts to Vegetation from Travel Management

Impacts from travel management and OHV use would be similar to that discussed under Impacts Common to All Alternatives, but lesser in extent. OHV traffic in the planning area would be limited to designated trails. Additional restrictions such as seasonal restrictions or closures, or weight limits may be implemented within ACECs and SRMAs. Sensitive habitat areas in McCarthy's Marsh, upper Kuzitrin River, Kigluaik Mountains, Nulato Hills, and the De Long Mountains/Brooks Range (WACH calving and insect relief habitat) would receive additional protection from OHV impacts.

(11) Impacts to Vegetation from Special Designations

Management of approximately 5.6 million acres of ACECs in five areas (Kigluaik Mountains, Nulato Hills, WACH calving and insect relief habitat, McCarthy's Marsh, and Kuzitrin River) would provide additional protection to sensitive habitats, as well as to riparian and tundra vegetation in general. Specific measures identified within various ACECs that confer direct benefit to riparian and tundra vegetation include: limitation of OHVs to designated trails from May 15 to October 31; closure to locatable and leasable mineral entry; designation as right-of-way avoidance area; and closure to livestock grazing.

Under Alternative C, 11 river systems are identified as suitable for designation under the WSR Act. Protection of wild river values would indirectly benefit riparian vegetation and sensitive habitat by maintaining the free-flowing nature and pristine water quality of the rivers, and limiting or prohibiting man-made infrastructure along identified river corridors. The number of field patrols by BLM personnel would increase, as would the level of monitoring of commercial operators. These measures would help protect riparian vegetation and sensitive habitats from disturbance and long-term degradation.

e) Alternative D

(1) Impacts to Vegetation from Soil, Water, and Special Status Species Plants

Impacts would be the same as discussed under Alternative B.

(2) Impacts to Vegetation from Fish and Wildlife Management

Impacts would be the same as discussed under Alternative C.

(3) Impacts to Vegetation from Fire and Fire Management

Impacts would be the same as discussed under Alternative C.

(4) Impacts to Vegetation from Forest Products

Impacts would be similar to those described under Alternative B, except no commercial logging or firewood sales would be permitted within the proposed Squirrel River SRMA. This limitation could result in a slight increase in the amount of live and standing dead timber, and forest understory vegetation left intact in the Squirrel River area.

(5) Impacts to Vegetation from Livestock Grazing

Impacts would be similar to those discussed under Alternative A. The difference is that the option to graze livestock on BLM-managed lands outside the current use areas would be eliminated. That option has not been utilized under the current Northwest Management Framework Plan (MFP), so no functional impact to riparian and tundra vegetation would result. Livestock grazing would be subject to ROPs, which includes restrictions on picketing animals in riparian areas (ROP Veg-2i) and require that any supplemental feed products used on BLM-managed lands be certified weed-free (ROP Veg-2j).

(6) Impacts to Vegetation from Leasable Minerals

Impacts would be similar to those discussed under Alternative B. Under Alternative D, additional ROPs would be implemented. ROP FW-7a would limit activities within 300 feet of the banks of active stream channels on the ten rivers shown on Map 2-8, including the Kivalina River. In addition, the Kivalina River would have no surface occupancy restrictions within 300 feet of the bank, slightly lessening the potential surface disturbance to riparian and tundra vegetation in that area, compared to Alternative B which does not impose no surface occupancy restrictions or ROP FW-7a on the Kivalina River.

(7) Impacts to Vegetation from Locatable Minerals

Impacts to and mitigation measures for riparian and tundra vegetation from locatable minerals would be very similar to those discussed under Alternative B, except that additional ROPs would be implemented. ROP FW-7a would limit activities within 300 feet of the banks of active stream channels on the ten rivers shown on Map 2-8. ROP SS-4 would limit mining activities within the watersheds of lakes in the Kigluaik Mountains. These measures would slightly decrease potential surface disturbance to riparian and tundra vegetation in those areas.

(8) Impacts to Vegetation from Mineral Materials

Impacts would be the same as discussed under Impacts Common to All Alternatives and Alternative B.

(9) Impacts to Vegetation from Recreation Management

Impacts would be similar to those discussed under Impacts Common to All Alternatives and Alternative B, except two SRMAs would be designated: Squirrel River SRMA and Salmon Lake/Kigluaik Mountains SRMA. These measures may have small positive benefits to riparian and tundra vegetation by decreasing potential surface disturbance.

(10) Impacts to Vegetation from Travel Management

Impacts to riparian and tundra vegetation would be similar to that discussed under Impacts Common to All Alternatives but lesser in extent than under Alternatives A and B. Although cross-country OHV use would be allowed in much of the planning area, additional restrictions such as limiting OHVs to existing or designated trails, seasonal restrictions or closures, and weight limits may be implemented within ACECs and SRMAs. Sensitive habitat areas in the Kigluaik Mountains, Nulato Hills, and the De Long Mountains/Brooks Range (WACH calving and insect relief habitat) would receive additional protection from OHV impacts.

(11) Impacts to Vegetation from Special Designations

Beneficial impacts to sensitive habitats, as well as riparian and tundra vegetation in general from management of ACECs and RNAs would be somewhat less than under Alternative C. McCarthy's Marsh, Kuzitrin River, and Kigluaik Mountains ACECs would not be designated. The Mount Osborn ACEC (in the Kigluaik Mountains) would be designated in the future, once conveyances are complete, and if sufficient State-selected lands return to the BLM. No rivers would be recognized as suitable for designation under the WSR Act

3. Fish and Wildlife

a) Fish

Proposed management of the following resources/resource uses/programs would have no anticipated impacts to fisheries management: Air Quality, Special Status Species, Cultural Resources, Paleontological Resources, Visual Resources, Forest Products, Livestock Grazing, Wilderness Characteristics, Renewable Energy, Iditarod National Historic Trail, Public Safety, Social and Economic Conditions, and Subsistence.

(1) Impacts Common to All Alternatives

(a) Impacts to Fish from Sedimentation

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

Erosion can lead to increased turbidity and sedimentation, which in turn can inhibit feeding and spawning success. All members of the biotic community have the potential to be affected.

Potential effects of sedimentation on benthic macroinvertebrates – which are prey species for fish – include interference with respiration, and interruption of filter-feeding insects' capability to secure food. A more important impact to benthic invertebrates would be smothering of physical habitat by increased sediment loads. A loss of interstitial space in the substrate would be highly detrimental to burrowing species. A decrease in abundance could be expected in these situations. In Arctic environments, where fish depend on summer food sources to grow and reproduce, a reduced prey base may preclude fish from directing energy towards spawning.

Direct threats to fish from sediment include changes to physical habitat, subsequent decreased reproductive success, and loss of rearing habitat. Physical habitat changes from sediments are most often attributed to finer size particles. Developing eggs can be smothered and newly hatched fry can be killed by deposited sediment that prevents emergence from spawning gravels and interferes with respiration. Developing fish eggs and larvae need a constant supply of cold, oxygen rich water which flows through the interstitial spaces in stream gravels. Embedded sediments fill these interstitial spaces and also limits essential winter habitat used by juvenile fish for feeding and cover from predators. The filling of pools with sediment further limits overwintering sites for juvenile and adult fish.

(b) Impacts to Fish from Soil, Water, and Vegetation

There would be beneficial impacts to fish from proper management of soils, water, and vegetation resources. Implementation of mitigation measures to protect soil, water, and vegetation on a project specific basis, particularly in riparian zones of watersheds, would reduce disturbance to fish habitats, and aid in the recovery of aquatic habitat from permitted uses. Improper management of soil, water, and vegetation resources can lead to increased sediment loads in affected watersheds. Climate change and the resultant melting permafrost along stream banks may increase localized input of sediments and decrease bank stability.

(c) Impacts to Fish from Fire and Fire Management

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

Fish species and aquatic fauna adapted to the cold water in Interior Alaska streams have been exposed to indirect effects of wildland fire for thousands of years. Fire can indirectly influence fish populations or their prey through increased siltation, increased water temperature, altered water quality (dissolved oxygen, pH, suspended and dissolved solids, total hardness, and turbidity), changes in nutrient input to water system, and changes in permafrost status that can lead to altered hydrology. The extent of surface erosion after a fire largely depends on the topography and soil types of the immediate area, and the amount of ice-rich frozen ground within the active layer. Stream siltation is usually negligible from surface erosion on burned sites in interior Alaska due to its gentle topographical features. Siltation may be a factor where severe burns occur on steep slopes or even shallow slopes with ice-rich active layers, where fire has severely damaged riparian protection of bank soils' integrity, or where heavy equipment is used in suppression activities. Lakes are also vulnerable to fire effects of concentration of nutrients, sedimentation, and erosion of riparian protected shorelines from wave and wind action. Response of deciduous riparian foliage after fire is related to already existing riparian vegetation; the impact of fire is a change in age structure and short-term productivity.

Data on how fires affect stream temperatures and productivity are currently inadequate to accurately assess the effects of fire on anadromous or resident fish habitats. Much of the published work has focused on changes in lake systems (McEachern et al. 2000, St-Onge and Magnan 2000). Analyses of long-term fire effects on stream ecology are currently under way as part of FROSTFIRE8, a landscape-scale prescribed research burn in the boreal forest of Interior Alaska conducted in July 1999. Future research may be able to clarify anecdotal information collected in some systems that seems to suggest higher abundance of juvenile salmonids in systems where land use or fire modifications in canopy cover have led to increased water temperatures.

Fish populations have generally shown a positive response during the initial five-year period after wildland fire where populations exhibit good connectivity with key refugia throughout the watershed (Gresswell 1999; Minshall et al. 1989). Fish will generally reinvade fire-affected areas rapidly where movement is not limited by barriers. These new colonists generally come from areas upstream of the affected area, from surrounding watersheds and from main-stem rivers where migration is not limited. Fish population recovery generally tracks the increase in primary and secondary production that occurs in the early post-fire period. Where sediment is continually delivered into the main-stem, there could be short-term negative effects on fish and macro-invertebrate communities.

Fuels projects are designed and implemented in a “non-emergency” manner that minimizes impacts to aquatic resources. Although wildland fires may still occur in areas where hazardous fuel loads have been reduced, fires which may occur are expected to be predominately ground fires rather than crown fires. Ground fires are easier to control with lower-impact suppression methods (such as hand-built fire line) that are less likely to adversely affect aquatic resources. In contrast, the crown fires associated with heavier fuel loads often require suppression techniques likely to have greater adverse impacts to aquatic habitats and species.

Competent planning and implementation will minimize the effects of fuels treatments. Some projects involve multiple treatments of the same area. Prescribed fires conducted in the spring (when drainage-bottoms are still snow covered) help to protect riparian vegetation and soils. The primary goal of these projects is to reduce the occurrence, risk, and impacts of wildland fires, not restore the natural capacity of aquatic species to withstand the effects of natural fires.

Removal of vegetation to reduce future fuel loading may be accomplished with minimal impacts in some areas, but in others, sensitivity to ground disturbance from loss of vegetation can cause increased erosion, compacted soils, and a loss of nutrients (FS 2000, Beschta et al. 1995). To protect water quality and the diversity of habitats for fish, amphibians and other aquatic organisms, standard operating procedures are in place to protect the proper functioning condition of riparian area and stream characteristics.

Impacts to fisheries from fire and fuels management would be the same under all alternatives. Most of the area within the planning region is in a limited fire suppression category, which means that fires would only be suppressed for the protection of human life and structures. In a worst case scenario, there may be some episodic events related to fire suppression that may affect fish and fish habitat. These effects would be from increased erosion and ground-based control, and alterations of water chemistry from aerial applications of fire retardant. Erosion impacts would likely be small in scale and localized, and could be minimized by rapid rehabilitation after the fire is under control, although improperly located bulldozer line fuelbreaks could greatly increase local stream sediment loads. The use of certain types of fire retardant

in/near fish bearing streams is a serious threat to these aquatic ecosystems. The by-products of the retardant are toxic to fish and would result in fish kills.

(d) Impacts to Fish from Minerals

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

During placer mining, streams may be diverted into bypass channels while the original channel is mined and then returned to a newly built channel once mining is complete. It has been common practice to construct stream bypasses and new channels with different geometry and physical characteristics (e.g. flood prone and bankfull widths, bankfull depth, sinuosity, slope, entrenchment, and substrate size) than that of the natural channel. This difference is often necessary because of the removal of streamside vegetation and other hard structural elements that help define the natural channel morphology. As a result, new channels are often straighter, have a higher gradient, and consequently have more energy than the natural channel. In addition, new channels often lack the diversity of habitats (pools, glides, riffles) and cover components (undercut bank, overhanging vegetation, and large woody debris) that enhance the quality of habitat in natural channels.

Placer mining operations may lead to a loss of riparian-wetland vegetation. Riparian-wetland vegetation influences the stability of uplands and certain stream types. Changes in the composition, vigor, and density of riparian vegetation can result in changes in sediment input, stream shade, protection from instream erosional processes, terrestrial insect habitat, and the contribution of detritus and structural components to the stream channel. Water quality and esthetic values are also affected by disturbance to riparian-wetlands (Rosgen 1996). The removal of streamside riparian-wetland vegetation during mining would result in loss or degradation of aquatic habitat until proper functioning condition was reestablished. In general, the time required for riparian-wetland areas to attain proper functioning condition would be dictated by natural processes and may require decades to centuries before it approximates the structure and function of the original aquatic habitat (North Carolina State University 1998; BLM and Montana Dept. of Environ. Quality 1996; BLM 1988c).

The altering of surface hydrology may result in stream conditions that are no longer suitable to species or life stages of fish and other aquatic organisms that occurred before disturbance. For example, increased stream flow may result in water velocities that (1) cause involuntary downstream displacement and mortality of juveniles, (2) result in scour-related mortality of eggs and alevins, (3) accelerate streambank erosion, and (4) over the long term, deplete large woody debris and organic material. The enlargement of stream channels may result in a shallow, slow water environment during periods of low flow. This new environment could result in crowding, loss of spawning habitat, reduced primary and secondary productivity, increased vulnerability to

predation, and increased sedimentation (Swanston 1991; Hicks et al. 1991; National Research Council 1992; Strouder et al. 1997).

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

(e) Impacts to Fish from Recreation Management

Research has shown that the greatest recreational impacts to upland soils and vegetation occur from the initial use, with little additional effect from increased use (Clark and Gibbons 1991). The main impacts on fish would come from additional trails or roads, which may gather runoff and begin to rut, thereby leading to increased erosion and subsequent sedimentation of fish-bearing streams.

Riparian impacts from recreation (such as dispersed campsites) include erosion, loss of shade, loss of food and cover, loss of a "buffer" to upland impacts, and decreased bank stability. Recreation-related changes to the aquatic habitat can occur through alterations to channel morphology and increased pollution. Stream morphology changes would probably only occur as a result of OHV use. Although OHV/stream interactions are sometimes only considered applicable at stream crossings, there are times and places where OHVs users utilize streams as trails. This is not authorized under any alternative, so it is doubtful that it occurs except in isolated, unauthorized and usually undetectable cases. If stream crossings are sited properly, their use would minimize impacts to stream morphology. Crossing of anadromous streams or rivers may require a fish habitat (Title 41) permit from ADNR (http://www.dnr.state.ak.us/habitat/FHpermits.htm).

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

(f) Impacts to Fish from Lands and Realty Actions

Opportunities for acquisitions are considered on a case-by-case basis. Acquisitions, particularly when they occur along riparian areas, can have a positive impact on fish habitat by preventing development of private land and by providing consistent habitat management.

Land conveyance could result in BLM losing management of valuable fisheries habitat (i.e., Nulato Hills, Fish River system, Kigluaik Mountains). However, the State is overselected and some of these areas may be retained by BLM.

(2) Alternative A

(a) Impacts to Fish from Minerals

Alternative A would continue management consistent with the Northwest MFP (BLM 1982). This planning document, through Public Land Order (PLO) 6477 subjects 23,800 acres to No Surface Occupancy (NSO) in the Pah, Shaktoolik, Ungalik, Inglutalik, Tubutulik, Kuzitrin, Fish, and Noatak rivers.

i) Leasable Minerals

There would be no impacts as oil and gas leasing would not occur under Alternative A.

ii) Locatable Minerals

Impacts to fish would be similar in type to those discussed under Impacts Common to All Alternatives. More than half of the BLM-managed land in the planning area is currently closed to locatable mineral entry due to selections or underlying ANCSA (d)(1) withdrawals, reducing the potential for mining related impacts to fish. Of all the alternatives, Alternatives A and C would have the least potential to affect fish and fish habitat due to the small area that would be open for locatable mineral entry.

iii) Mineral Materials

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

(b) Impacts to Fish from Recreation Management

Impacts would be similar to those discussed under Impacts Common to All Alternatives. There are no SRMAs that would set recreation objectives or develop visitor use limits. Unmanaged trail proliferation would continue, with no guidance for proper construction and placement of new trails. Of all the alternatives, Alternative A would have the most negative impacts to fish and fish habitat from recreation activities.

(c) Impacts to Fish from Travel Management

Under Alternative A, BLM-managed lands would remain undesignated with the exception of permitting required for vehicles over 2,000 pounds GVWR. This will result in some continued localized impacts from erosion due mainly to unauthorized stream crossings. The unauthorized and unmanaged proliferation of trails would increase under this alternative, with a resulting increase in erosion and sediment impacts.

Alternative A would see a slight potential for an increase in road construction associated with mineral exploration and development on State and Native corporation lands. Under this alternative, road construction would be considered on a case-by-case basis. Existing standard stipulations would apply that minimize the effects of erosion, flow augmentation, and runoff; however, these stipulations are not as effective or protective as the ROPs that would be applied under Alternatives B, C, and D.

(d) Impacts to Fish from Lands and Realty Actions

Under this alternative, specific lands use authorizations would be reviewed on a case-by-case basis for potential impacts. Alternative A anticipates more land use authorizations than Alternative C, but fewer than Alternative B or D. Land use authorizations may result in surface disturbance, leading to impacts such as increased sedimentation and other effects described under Impacts Common to All Alternatives.

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

(e) Impacts to Fish from Special Designations

Under Alternative A, there are no special management areas such as ACECs, RNAs or suitable rivers. Protective measures for selected values would be implemented on a case-by-case basis and no additional protection of fish habitat would be provided through designation of special management areas. The standard stipulations currently applied do not afford the same protections as do the ROPs that would be applied under Alternatives B, C, and D. Alternative A would have the most negative effects to fish and fish habitat.

(3) Alternative B

(a) Impacts to Fish from Minerals

1. Leasable Minerals

Under Alternative B, oil and gas development is projected to occur in the northern quarter of the planning area, and adverse effects would be limited to that area of potential development. The RFD scenario (BLM 2005j) estimates 1,000,000 cubic yards of gravel may be required to support oil and gas development, resulting in 50-100 acres of disturbance. Adherence to the ROPs and Stips concerning gravel removal will mitigate most adverse affects.

a. Effects from Seismic Surveys

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

The potential level of seismic activity would be greater under Alternatives B and D, than under Alternatives A and C, but it is expected that any impacts would still be localized.

b. Effects from Water Demand

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

Under Alternatives B and D, greater levels of water withdrawal would be expected in conjunction with the increased land available for exploration and development activities as compared to the other alternatives. However, adherence to the ROPs and Stips would offer adequate protection

to fish. Therefore, water withdrawal would not be expected to have an effect on fish populations in or adjacent to the planning area.

c. Effects from Exploratory Drilling

Drilling operations require large amounts of water for blending into drilling muds. Operations also produce large amounts of rock cuttings. If an exploratory well were to be plugged and abandoned, drilling muds and cuttings would be re-injected into the bore hole. If the well were to go into production, muds and cuttings would be removed to an approved disposal site. Any chemical leaching into surrounding waters by cuttings temporarily being stored at the drill site could affect nearby fish habitat. ROP Water-1a requires that all permitted operations be conducted in such a manner to comply with State and Federal water quality standards.

Even though the disturbance under Alternatives B and D would be greater than the amount of disturbance under Alternatives A and C, the prevention of drilling in rivers and streams would provide fish with adequate protection (ROP FW-2g). In general, it is not expected that exploratory drilling would have a measurable affect on fish populations in or adjacent to the planning area.

d. Effects from Pad, Road, and Pipeline Construction

Impacts from pad, road, and pipeline constructions are mainly increased erosion and sedimentation, subsurface and surface flow disruption, and increased pollution in runoff. Under Alternatives B, C, and D, the construction of permanent oil and gas facilities would generally be prohibited within 500 feet of any fish-bearing stream or lake (Leasing Stipulation 2).

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

e. Effects of Spills

Oil spills can have a range of effects on fish (Malins 1977, Hamilton et al. 1979, Starr et al. 1981). The specific effects depend on the concentration of petroleum present, the length of exposure, and the stage of fish development involved (eggs, larva, and juveniles are most sensitive). If lethal concentrations are encountered (or sub-lethal concentrations over a long enough period), fish mortality is likely to occur. However, mortality caused by a petroleum-related spill is seldom observed outside the laboratory environment. Most acute-toxicity values (96-hour lethal concentration for 50% of test organisms) for fish generally are on the order of 1 to 10 parts per million (ppm). Concentrations measured under the slicks of former oil spills at sea have been less than the acute values for fish and plankton. For example, concentrations of oil 1.6 to 3.3 feet beneath a slick from the Tsesis spill ranged from 50 to 60 parts per billion (Kineman et al. 1980). Extensive sampling following the Exxon Valdez oil spill also found hydrocarbon levels well below those known to be toxic or to cause sub-lethal effects in plankton (Neff 1991). The low concentration of hydrocarbons in the water column following even a large oil spill at sea appears to be the primary reason for the lack of lethal effects on fish and plankton.

The ROPs (Appendix A) associated with Alternatives B, C, and D are designed to prevent or otherwise mitigate oil spills in the planning area. ROP Water-5b prohibits refueling within 500 feet of the active floodplain of fish-bearing waterbodies and within 100 feet from non-fish-bearing waterbodies. Also, ROPs for Hazmat deal specifically with spill prevention and cleanup.

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

2. Locatable Minerals

Dependent on gold prices, Alternatives B and D anticipate a moderate increase (3-5) in the number small placer operations on BLM-managed lands. Large operations are possible in this planning period, but would occur on State or private lands, though roads or infrastructure could cross BLM-managed lands. Impacts to fisheries from mining activities would be similar to those discussed under Impacts Common to All Alternatives and may include increased erosion, impacts associated with infrastructure (roads), and toxic pollution. If mining occurs in riparian zones, the most likely result would be the loss of fish habitat.

The ROPs common to Alternatives B, C, and D are designed to minimize or prevent impacts from erosion, altered stream flow, stream crossings, and riparian impacts. However, ROP FW-7a would not apply under this alternative, increasing the potential for impacts compared to Alternative D. Strict adherence to the ROPs would minimize any effects to fish and fish habitat within the planning area, but there may be some short-term impacts on water quality and sedimentation based on the location of the actions. These impacts are expected to be short-term and small, and are not expected to have a significant impact to fish or fish habitat in the long-term.

3. Mineral Materials

Alternatives B and D anticipate increased gravel extraction in support of oil and gas development. In general, gravel extraction would not likely have a harmful effect on fish spawning grounds as ROP MM-1a prohibits gravel extraction in known fish spawning or rearing areas. However, if gravel mining activities were conducted in fish-bearing streams or in tributaries to fish-bearing streams, other detrimental effects could occur. These include the blocking and rerouting of stream channels and increased silt concentrations resulting in reduced primary production, loss of invertebrate prey species, and disruption of feeding patterns for sight dependent feeders (Branson and Batch 1971, Cooper 1965).

Under Alternatives B, C, and D, ROPs MM-1a and MM-1b would minimize the effects of gravel extraction on fish by avoiding spawning and rearing habitats and other habitats that may limit populations. The protection provided to fish and fish habitat under Alternative B would be superior to that provided under Alternative A, despite the fact that there would be increased activity under Alternative B.

(b) Impacts to Fish from Recreation Management

Under Alternative B, recreation management would continue to be custodial in nature, but more facilities would be developed to handle increased recreation use. The Squirrel River SRMA

would be designated and receive additional management emphasis. The proliferation of trails would continue in some areas, with no guidance for proper construction and placement of new trails. Alternative B would provide more protection to fish than would Alternative A as a result of the stronger ROPs that would be applied; however, there would be more impacts than under Alternative C or D.

(c) Impacts to Fish from Travel Management

Although a limited OHV designation would apply under Alternative B, it would allow for similar types of OHV use as those occurring under Alternative A. Therefore, impacts would be the same as for Alternative A.

Alternative B assumes there would be no increase in road construction associated with mineral exploration and development on BLM-managed lands. Equipment necessary for the potential 3-5 placer mines would be hauled in overland in the winter, and summer access would be by air or existing trails. Under Alternative B, any road construction would be considered on a case-by-case basis, although any new roads would come from the State or private development, not from BLM's proposed management. Application of the ROPs would minimize the effects of erosion, flow augmentation, and runoff.

(d) Impacts to Fish from Lands and Realty Actions

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

Alternative B would revoke all ANCSA (d)(1) withdrawals to allow for increased mineral exploration and development. Effects of mineral development on fish habitat under this alternative are described under Impacts to Fish from Mineral Exploration and Development on page 4-59. No new withdrawals from locatable mineral entry would be implemented under this alternative, leading to potential for greater impacts from locatable mineral development than under Alternative C, where some important streams would be withdrawn.

(e) Impacts to Fish from Special Designations

Under Alternative B, no ACECs or RNAs would be designated and no rivers would be determined suitable. Protective measures for selected values would be implemented on a case-by-case basis. The ROPs would be the only measures to protect fish and fish habitat. ACECs can provide additional protection if subsequent RMP decisions establish activity plans specifically designed to protect natural resource values contained within ACECs. This alternative provides the least amount of fish habitat protection.

(4) Alternative C

(a) Impacts to Fish from Minerals

1. Leasable Minerals

Under Alternative C, both fluid and solid mineral leasing would be deferred until industry showed interest. Impacts are the same discussed under Alternative A.

2. Locatable Minerals

The anticipated level of locatable mineral development under Alternative C is similar to that identified under Alternative A, but the application of ROPs under this alternative would further minimize impacts to fish from what limited mining activity would occur. Also, 5.6 million acres in ACECs would be withdrawn from mineral entry.

3. Mineral Materials

The anticipated level of mineral material sales under Alternative C would be similar to that identified under Alternative A, but the application of ROPs under this alternative would further minimize impacts to fish from what limited mining activity would occur. Also, sale of mineral materials from riverbed, ocean beach/lagoon, and lakeshore will not be permitted, providing additional protection to valuable spawning, rearing, and migratory habitat for fish.

(b) Impacts to Fish from Recreation Management

Proposed OHV management would focus on halting the unmanaged proliferation of trails. In general, as OHV use becomes more restrictive, the impact or potential for impact to fisheries habitat decreases. Recreation management under Alternative C would have a positive benefit for fisheries habitat within the planning area, mainly due to the management of increased use in specific areas. The Squirrel River, the Fish River system, and the Kigluaik Mountains are areas with important fisheries resources that would benefit from visitor use limits.

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

(c) Impacts to Fish from Travel Management

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

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

(d) Impacts to Fish from Lands and Realty Actions

This alternative limits land use authorizations in ACECs and RNAs to protect specific resource values. Where authorizations occur, they would be subject to the ROPs, which contain measures to protect fisheries. Overall, Alternative C would be the most beneficial to fish and fish habitat of all the alternatives relative to land use authorizations.

Within ACECs, withdrawals are maintained to provide maximum protection of resources under Alternative C. Impacts to fish from mineral activities are described in the Impacts to Fish from Minerals section beginning on page 4-59.

(e) Impacts to Fish from Special Designations

Under Alternative C, five ACECs totaling 5.6 million acres (WACH calving grounds and critical insect relief areas, Nulato Hills, McCarthy's Marsh, Upper Kuzitrin River, and Kigluaik Mountains) would be designated. Fish and fish habitat would benefit from the designations because special management is identified in this RMP to provide protection for important resources in the ACECs. Along with these special designations come restrictions on OHV use and surface disturbing activities, all of which are discussed above under Impacts Common to All Alternatives beginning on page 4-57. The designations would provide another level of prevention of impacts to fish and fish habitat above and beyond the ROPs that would still apply. Habitat for the Kigluaik char would receive additional protection through land use decisions in this RMP in support of designation of the Kigluaik ACEC.

Interim management of 12 suitable rivers would further protection of fish habitat by discouraging development within these drainages. The protection of fish and fish habitat based on these designations would be greater under Alternative C than under Alternative D, and would be much greater than under Alternative A or B.

(5) Alternative D

(a) Impacts to Fish from Mineral Exploration and Development

1. Leasable Minerals

Impacts from leasable minerals would be the same as those described under Alternative B.

2. Locatable Minerals

Impacts to fish and fish habitat would be similar to but somewhat less than Alternative B and greater than under Alternative C. Removal of the originally proposed mineral withdrawals on the Ungalik and Kivalina River through the 300-foot setback from the mean high water mark would result in less protection of fish habitat in these areas. If mining occurs in riparian zones, the most likely result would be the loss of fish habitat as discussed under Impacts Common to All Alternatives. If that loss is deemed to be an adverse effect on Essential Fish Habitat, an official consultation with the National Marine Fisheries Service (NMFS) will be required to mitigate these effects. However under this alternative, ROP FW-7a would be implemented on the Kivalina, Ungalik, Shaktoolik, Inglutalik, Koyuk including the East Fork, Tubutulik, Kuzitrin, Agiapuk, Pah, and Noatak rivers (Appendix H). Implementation of this ROP would reduce the potential for loss or degradation of riparian and wetland habitat, and the resulting impacts on aquatic habitats. ROP SS-4 would also apply under this alternative. This ROP places restrictions on activities within the watersheds of eight lakes that support Kigluaik Arctic char. In the unlikely event that locatable mineral development was proposed within these watersheds, this ROP would reduce the potential for impacts to aquatic habitats.

3. Mineral Materials

Impacts to fish and fish habitat would be the same as Alternative B.

(b) Impacts to Fish from Recreation Management

Similar to Alternative C, recreation management under Alternative D is expected to have a positive benefit for fisheries habitat within the planning area due to the management of increased use in specific areas. Impacts to fish would be the same as Alternative C.

(c) Impacts to Fish from Travel Management and OHV Use

Under Alternative D, proposed OHV management would focus on halting the proliferation of trails in specific management areas such as ACECs and SRMAs. In general, as OHV use becomes more restrictive, the impact or potential for impact to fisheries habitat would decrease. OHV trails have the potential to cause sedimentation in site-specific areas. There would continue to be some localized impacts from erosion, due mainly to stream crossings. Under this alternative, OHV trails would be managed with the objective of minimizing the unmanaged proliferation of trails within six million acres in ACECs and SRMAs.

Impacts to fish from roads would be the same as discussed under Alternative B.

(d) Impacts to Fish from Lands and Realty Actions

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

Under Alternative D, withdrawals would be revoked on 99% of the planning area. Where withdrawals are revoked, all proposed activities would be subject to ROPs, Stips, and site-specific mitigation measures for the conservation of fish habitat. New withdrawals would be established with 300-foot setbacks on the Ungalik River, Kivalina River, and Boston Creek. Impacts to fish from mineral activities are described in the Impacts to Fish from Mineral Exploration and Development section beginning on page 4-59.

(e) Impacts to Fish from Special Designations

Under Alternative D, six ACECs totaling 3,655,000 acres (WACH winter habitat in northern Nulato Hills and calving/insect relief habitat, Mount Osborn, and the Shaktoolik, Ungalik, and Inglutalik watersheds) would be designated. The additional protective measures to be applied through land use decisions in this RMP in support of the ACEC designation would benefit fish and fish habitat in the area, including additional protection of Kigluaik char habitat in the Mount Osborn ACEC.

(6) Essential Fish Habitat

Although there are no Federally-managed fisheries on BLM-managed land in the planning area, the ranges of the five species of Pacific salmon found within the land use plan boundaries are under the jurisdiction of the North Pacific Fisheries Management Council. The Magnuson-Stevens Act calls for direct action to stop or reverse the continued loss of fish habitats for species that are under this jurisdiction. Therefore, Essential Fish Habitat (EFH) is a specific classification term that only applies to the habitat of Pacific salmon and not to any other species in the planning area. EFH is defined as those waters and substrate necessary to salmon for spawning, breeding, feeding, or growth to maturity. For the purpose of interpreting the definition of EFH, “waters” include aquatic areas that are used by fish and their associated physical, chemical, and biological properties and may include areas historically used by fish where

appropriate; “substrate” includes sediment, hard bottom, structures underlying the waters, and associated biological communities; “necessary” means the habitat required to support a sustainable fishery and a healthy ecosystem; and “spawning, breeding, feeding, or growth to maturity” covers a species’ entire life cycle (National Marine Fisheries Service 2005).

For Alaska, freshwater EFH includes all streams, lakes, ponds, wetlands, and other waterbodies that have been historically accessible to salmon. A significant body of information exists on the life histories and general distribution of salmon in Alaska. The locations of many freshwater waterbodies used by salmon are described in documents organized and maintained by the ADF&G. Alaska Statute 16.05.870 requires ADF&G to specify the various streams that are important for spawning, rearing, or migration of anadromous fishes. This is accomplished through the Catalog of Waters Important for Spawning, Rearing or Migration of Anadromous Fishes (ADF&G 1998a) and the Atlas to the Catalog of Waters Important for Spawning, Returning or Migration of Anadromous Fishes (ADF&G 1998b). The catalog lists waterbodies documented to be used by anadromous fish. The atlas shows locations of these waters and the species and life stages that use them. Map 3-9 shows the locations of these streams in the planning area.

Potential impacts to the salmon that inhabit the planning area would be the same as described for other fish. Consequently, impacts to salmon as part of EFH, have been evaluated in the general fish analysis above. For the reasons described under Alternatives B and D and through adherence to protective ROPs and Leasing Stips, EFH is likely to be largely unaffected under the proposed development activities probable during the course of this land use plan.

b) Wildlife

Proposed management of the following resources/resource uses/programs would have no anticipated impacts to wildlife management: Air Quality, Fisheries Management, Special Status Species, Cultural Resources, Paleontological Resources, Visual Resources, Wilderness Characteristics, Iditarod National Historic Trail, Public Safety, Forest Products, Social and Economic Conditions, and Subsistence.

(1) Impacts Common to All Alternatives

(a) Impacts to Wildlife from Soil, Water, and Vegetation

There would be beneficial impacts to wildlife from proper management of soils, vegetation, and water resources. Implementation of mitigation measures to protect soil, water, and vegetation on a project specific basis would reduce disturbance to wildlife habitats and aid in the recovery of habitat from permitted uses. Changes in soil and vegetation due to global climate change may also affect wildlife. The effects of such changes may be slightly reduced through changes in management and application of the ROPs (Appendix A). Potential impacts of climate change are discussed further under Chapter IV, section (G)(2)(b) “Climate Change.”

Changes in vegetation due to climate change may result in increased stress on some wildlife species. Other species may benefit. One of the projected changes in the arctic is increased shrub cover. Such a change would reduce the amount of lichen available for caribou to some extent. Changes in vegetation could be gradual if due to climate change alone, and very rapid in areas affected by a combination of warmer temperatures, longer growing times and fires or

increased recreation and travel. It is difficult to predict what changes would occur during the life of the plan.

(b) Impacts to Wildlife from Fire and Fire Management

Approximately 93% of the planning areas is comprised of herbaceous or shrub habitats. Fire is less prevalent in these vegetation types compared to boreal forests, thus effects of fire on wildlife and habitats would be lower in the planning area than in Interior Alaska. The following effects would occur on both BLM-managed and land owned by others as wildland fire is not constrained by administrative boundaries.

Fire has both direct and indirect effects on wildlife and their habitats. These effects are described in detail in the Land Use Plan Amendment for Wildland Fire and Fuels Management for Alaska (BLM 2004b) which is incorporated by reference. Generally, the effects on habitat are much greater than the effects on resident animals. Short-term negative impacts from fire on resident wildlife include displacement, disruption of reproductive activities, and occasional mortalities. However, populations of certain species can recover quickly if suitable habitat is available. Adverse effects to individuals are generally offset by the benefits of habitat changes for future generations.

Fire helps maintain a mixture of vegetation types and age classes that provide habitat for a variety of wildlife. Fire alters habitats and may improve habitat components for some species while degrading habitat for others. Over time, as vegetation recovers from fire disturbance, various species of wildlife would benefit from various successional stages of vegetation. Herbivores are directly affected by the changes in vegetative cover and forage associated with fire, whereas predators respond to both changes in cover and abundance of prey.

Wildlife has evolved in the presence of fire and have adapted to it. Overall, a natural fire regime has a beneficial effect on maintaining a diversity of wildlife and their habitats. Grasses, sedges and herbaceous plants that quickly resprout after fire provide forage and cover for small mammals, grassland birds, and grazing species such as muskoxen. Browsers such as moose, hares, and ptarmigan benefit from fire when trees and shrubs begin to reestablish themselves. If fires are not too severe, sprouting of shrubs will occur soon after burning.

Moose generally benefit from fire due to increased production of high quality browse for 23-30 years after fire (McCracken and Viereck 1990). Prescribed fires are a management tool used to increase moose habitat. Moose populations generally react in a strongly positive manner to areas with increased browse. The level of effect is variable, depending upon the health of the moose population pre-fire and the amount of browse available. If browse is not a limiting factor on moose populations, then fire would have little impact on populations over the short-term (BLM 2004b).

Fire is relatively rare in muskoxen habitat; this is especially true for preferred winter habitat which is generally more windswept, barren, and montane. Over the long-term, fire would likely be beneficial to muskoxen summer range because it maintains herbaceous forage and willows, reduces encroachment of spruce forest into tundra, increases habitat heterogeneity, and rejuvenates decadent or over-browsed riparian communities (BLM 2004b).

The short-term effects of fire on caribou winter range are negative, and vary depending upon the severity of the burn. Lichens, primary winter forage for caribou, are highly susceptible to wildfire. Impacts to habitat include reduced availability of forage lichens for up to 80 years after

fire (Klein 1982, Joly et al. 2003). On caribou summer ranges, forage quality of vascular plants is improved by fire. Fire also affects caribou movement patterns. Research has shown that caribou actively avoid burned areas for 35--50 years after a fire (Joly et al. 2003). Over the long-term, fire would likely be beneficial to caribou as it helps maintain the ecological diversity of the habitat and may prevent mosses from out-competing forage lichens. Light fires may rejuvenate stands of lichen and replace old forest stands where lichen has been replaced by moss. Periodic fires create a mosaic of fuel types and fire conditions that naturally preclude large, extensive fires (BLM 2004b).

Fire is very rare in subalpine habitats used by Dall sheep. Fire may enhance sheep habitat by reducing encroachment of shrubs and spruce into subalpine habitats. Fire can also increase the amount or quality of herbaceous and graminoid forage available and reduce cover used by bears and wolves when hunting sheep.

Fire has both beneficial and negative effects on bears. Beneficial effects include increasing the availability of forage plants such as berries, grasses and forbs. On the negative side, some forage species may be reduced or temporarily eliminated by fire. Moose calves are an important prey item for both black and grizzly bears. Early stages of plant succession due to fire tend to increase moose production, resulting in more calves available for prey (BLM 2004b). Fire has little direct effect on grizzly bears as it is infrequent in tundra habitats and tundra fires tend to be small.

The effects of fire on furbearers are variable depending on the species. Carnivorous furbearers (e.g., lynx) respond to fire in a manner similar to their prey species, though there tends to be a lag period. If prey species benefit from fire, predators do as well. Snowshoe hares, voles, and other small mammals tend to respond positively to vigorous re-growth triggered by wild fires. Species such as marten and lynx tend to increase as well, tracking these prey species (Johnson et al. 1990). Fire is not common in the coastal habitats favored by Arctic foxes thus they are minimally affected. Herbivorous furbearers tend to benefit from fire due to rejuvenation of forage plants and maintenance of open water. Beavers may be negatively affected by severe fires until forage species recolonize the area.

Fire near wetlands can consume dead grass and sedges, opening up dense marsh vegetation to maintain habitat for waterfowl. Burning also stimulates new shoots that have greater forage value. Under the right conditions, fire may create new ponds or prevent old ponds from filling in with vegetation. Fire can have short-term negative effects on waterfowl when it occurs during nesting or molting periods, or when it eliminates woody vegetative cover (BLM 2004b).

It is difficult to generalize impacts of fire on passerine birds due to the great variety of habitat requirements. Shrub communities often support the greatest number and diversity of passerine birds (Spindler and Kessel 1980, Kessel 1989). Shrub communities are maintained by periodic fires. Within forested areas, fire creates openings in the forest, and snags used for nesting, perching, and foraging. Fire may cause direct impacts to birds when it occurs during the nesting season, killing nestlings and destroying nests. Raptors may benefit from fire due to increased populations of small mammals and birds in response to vegetative changes after fire. The timing of the benefit varies depending upon the type of prey favored by the raptor. Over the short-term, fires reduce cover available for prey species, making them more visible to raptors.

Fire suppression activities also cause both direct and indirect impacts to wildlife. Wildlife habitat may be destroyed, fragmented, or degraded due to construction of fire breaks or use of OHVs. Small mammals may be killed by the use of mechanized equipment. Mitigation measures

designed to reduce the impacts of suppression activities include limitations on the use of tracked, or off-road vehicles; measures to prevent the introduction of invasive or noxious plant species; establishment of riparian buffer zones; and rehabilitation of fire and dozer lines. These types of impacts would be small as most BLM-managed lands are far from the road system, minimizing the use of mechanized equipment.

(c) Impacts to Wildlife from Livestock Grazing

Grazing by reindeer can indirectly impact wildlife by degrading habitat or reducing the availability of preferred forage species. Because reindeer are the same species as caribou, a native ungulate, impacts to other herbivorous wildlife are minimal. The greatest potential for impact would be on caribou as they have the same forage requirements. Because reindeer remain in the same area yearlong, they may overuse lichen in localized areas. This has been a problem in recent years due to incursions by caribou into reindeer ranges. Reindeer herders have been forced to keep their animals in the same area, year after year in order to keep them separate from caribou. This has resulted in reduction of lichen biomass in some areas.

Herding activities may result in disturbance impacts to wildlife. These impacts would be negative, especially during stressful times such as winter or reproductive periods. Reindeer herders may attempt to separate their reindeer from caribou, resulting in disturbance impacts to caribou. Disturbance to wintering moose by reindeer herding activities may result in increased stress on these animals.

Authorization of grazing may negatively impact brown bear and wolf populations due to the increased number of these animals harvested by reindeer herders in defense of life and property. Harvest of predators by reindeer herders in some parts of the Seward Peninsula has been substantial in the past (ADF&G 2002). From 1996-98, nine bears were reported harvested in defense of life and property (DLP) in GMU 22. This reported total does not accurately represent the actual number of non-hunting kills due to low compliance with reporting requirements. Nelson (1993) estimated that an additional 10-30 bears were killed annually and not reported in GMU 22. However, reindeer may also act as an alternative prey base to migratory caribou and keep predator numbers inflated.

Approval of grazing permits may result in conflicts between wildlife management and reindeer grazing. ADF&G spends a large amount of time managing caribou hunts in areas that overlap with reindeer ranges in an attempt to reduce accidental harvest of reindeer by hunters.

Disease transmission is potentially a key issue. Under current levels of grazing, potential for impacts would be limited due to the small numbers of reindeer remaining. However, since reindeer and caribou are the same species, if disease transmission did occur, it could have serious, negative impacts on the WACH.

Under current levels of grazing, impacts to wildlife would be limited to the western Seward Peninsula and would be minimal due to the small numbers of reindeer remaining. The impacts discussed above would not be limited to BLM-managed land. BLM issues joint grazing permits with the National Park Service and the State. Reindeer are not closely herded and move freely between State, BLM, and Park Service land.

Grazing associated with Special Recreation Permits (SRPs) could be authorized under all alternatives on a case-by-case basis. Potential impacts include transmission of disease to wildlife from domestic animals; reduction of forage availability; and introduction of noxious or

invasive plants from feed carried in for pack animals. As with disease transmission from reindeer, the probability of impacts is low but there is potential for serious, negative consequences.

(d) Impacts to Wildlife from Locatable Minerals

Although mineral development is not anticipated under every alternative, some exploration may occur under any alternative. Potential impacts to wildlife would include temporary disturbance in very localized areas, temporary loss of habitat, long-term degradation of habitat, and possible direct mortality of small rodents or nestling birds. These impacts would be minimal due to the very low level of activity anticipated (less than four notices per year), the very minimal amount of acres disturbed (20 acres per year), and the seasonal and temporary nature of the activity.

(e) Impacts to Wildlife from Mineral Materials

Mineral material disposal has both direct and indirect impacts on wildlife and their habitat. Habitat is degraded or destroyed, depending upon the location of the material site. Some sites may recover to the original vegetation cover within a relatively short time frame. Other sites may take decades to recover. In some cases, disturbance to the site by mining of mineral materials may result in improved habitat for species which depend upon habitats in a low seral stage. Temporary disturbance impacts would occur to larger and more mobile animals. Direct mortality may result to smaller and less mobile animals such as lemmings, voles, or nestling birds. Impacts would be reduced under all alternatives due to implementation of mitigation measures developed during NEPA analysis of specific disposal actions.

Impacts to wildlife from mineral material disposal would be minimal under most alternatives. Sufficient material sources exist on private lands to meet the needs of most communities within the planning area and few mineral material disposal actions are anticipated on BLM land, unless a new road or other infra-structure are constructed. Under Alternatives B and D, mineral material disposal would occur in association with oil and gas development and would impact wildlife. These impacts are discussed under Alternative B, Impacts to Wildlife from Minerals beginning on page 4-74.

(f) Impacts to Wildlife from Recreation Management

There would be minor impacts to wildlife from recreational activities. The primary impacts would be temporary stress and displacement of wildlife due to recreational activities, or to recreation associated access (aircraft overflight and landing in remote areas). In areas that are repeatedly used for camping sites, there may be minor, site-specific degradation of habitat. Given the low level of recreational use on most BLM-managed lands within the planning area, these impacts would be minimal and would not have population level effects.

(g) Impacts to Wildlife from Travel Management

The noise and activity associated with OHV use (including snowmachines) can adversely affect wildlife both directly and indirectly. Direct effects include stress and displacement of animals, possibly to less suitable habitats. Both stress and displacement may result in reduced productivity (ADF&G 1990). Changes to traditional movement patterns, distribution and behavior of wildlife can result from exposure to OHVs. Wildlife are particularly vulnerable to disturbance at areas of concentration such as caribou calving grounds, or during stressful periods during life history. High levels of OHV use may result in changes in density or species composition in the vicinity of the trail.

Indirect effects include habitat degradation and alternation, and increased access into habitats due to proliferation of trails. Refugia areas will become more accessible over time as OHVs become more powerful and as the human population in the planning area increases. Snowmachine use compacts snow and may inhibit movement under the snow by small rodents. At current use levels, OHV impacts to wildlife habitat within the planning area are minor.

(h) Impacts to Wildlife from Renewable Energy

If renewable energy sources such as wind are developed on within the planning area, there would be both direct and indirect impacts on wildlife. Direct impacts would include disturbance during construction and maintenance activities, mortality due to bird strikes on wind towers, and mortality of small, less mobile animals such as small mammals or nestling birds during construction. Indirect impacts would include minor loss of habitat due to facility construction. To be most useful, these types of development need to be located near population centers. However, most land near villages is private. Therefore, little renewable energy development is anticipated on BLM-managed lands, actual impacts would be minimal, and would not have population level effects.

There is a potential for bird mortality due to collisions with wind turbines. On the basis of mortality estimates at existing wind energy projects in the western United States, the mid-range expected for passerine mortality would be approximately 1.2 to 1.8 birds per turbine per year (BLM 2005e). These data are based upon wind energy projects in the western United States, exclusive of Alaska. Wind energy projects in Alaska are much smaller with fewer turbines, and would have even less impact on birds. In 2003 the Kotzebue Electric Association wind farm was monitored for bird strikes. At the time of the study, there were 12 towers. No bird strikes were documented on wind towers, although one dead sparrow was found near a radio tower (Moran 2005). Wind energy facilities would also be sited to minimize bird strikes.

(i) Impacts to Wildlife from Lands and Realty Actions

There would be both direct and indirect impacts to wildlife from lands and realty actions under all alternatives. Wildlife may be temporarily displaced or disturbed during activities authorized under this program. There may be direct mortality to small or immobile wildlife species. Wildlife habitat may be destroyed, fragmented, or degraded. However, BLM-managed lands are generally far from settled areas and the demand for realty actions is low. These types of impacts would affect a very small percentage of the BLM-managed land in the planning area.

(2) Alternative A

(a) Impacts to Wildlife from Soil, Water, and Vegetation

Impacts would be the same as under Impacts Common to All Alternatives.

(b) Impacts to Wildlife from Livestock Grazing

Impacts would be the same as those discussed under Impacts Common to All Alternatives. Under this alternative, applications for grazing permits would be considered throughout the planning area but would likely not be approved outside of the Seward Peninsula due to the presence of caribou and the difficulty of managing reindeer within occupied caribou habitat. Impacts from grazing would be slightly higher than under Alternatives C and D as a larger area would be open to grazing, but less than under Alternative B because alternative forms of livestock would not be considered.

(c) Impacts to Wildlife from Leasable Minerals

There would be no impacts as no leasing or exploration would occur.

(d) Impacts to Wildlife from Locatable Minerals

Impacts would be the same as discussed under Impacts Common to All Alternatives.

(e) Impacts to Wildlife from Mineral Materials

Impacts would be the same as discussed under Impacts Common to All Alternatives.

(f) Impacts to Wildlife from Recreation Management

Levels of recreational use would be dependent upon social and economic factors, current hunting regulations, and health of the wildlife populations. Under this alternative, no limits would be set on commercial recreational use levels. Impacts would be similar to those discussed under Impacts Common to All Alternatives. High levels of both commercial and non-commercial recreational use would continue in the Squirrel River, particularly during the moose hunting season in September. Wildlife may be temporarily stressed or displaced due to the large number of camps and numerous aircraft overflights and landings. Use of four-wheelers by guides may result in the creation of new trails into areas that were previously not easily accessible at this time of year – such as prime rutting habitat for moose. Local residents have expressed concern that migrating caribou may be diverted if they encounter high levels of activity along their migration route, resulting in animals not passing through traditional subsistence hunting areas. While individual groups of caribou may be delayed by a day or two, or diverted slightly to the east or west, the current level of recreational use is not expected to significantly affect caribou migration routes.

(g) Impacts to Wildlife from Travel Management

Impacts to wildlife from OHV use and travel management would be similar to that discussed under Impacts Common to All Alternatives. The planning area would remain undesignated and cross-country use of OHVs weighing 2,000 pounds or less GVWR would be allowed throughout. Sensitive habitat areas would not receive additional protection from OHV impacts.

(h) Impacts to Wildlife from Lands and Realty Actions

Impacts would be the same as discussed under Impacts Common to All Alternatives.

(i) Impacts to Wildlife from Special Designations

Under Alternative B, no ACECs or RNAs would be designated. Therefore, there would be no impacts on wildlife from such designations.

(2) Alternative B

(a) Impacts to Wildlife from Soil, Water, and Vegetation

There would be beneficial impacts to wildlife from proper management of soils, water and vegetation resources. Implementation of ROPs on a project specific basis would reduce disturbance to wildlife habitats and aid in the recovery of habitat from permitted uses.

Proactive management of vegetative resources would benefit most wildlife species. Vegetation would be managed to maintain a diversity of wildlife habitats. The BLM would manage lichen-rich plant communities (lichen tussock tundra, white spruce-lichen woodland, etc.) as priority, unique habitats due to the slow growth potential of lichen and its importance to caribou. Fire would be managed to maintain or increase old growth lichen stands in important caribou winter ranges. Proactive management to prevent introduction and spread of invasive and noxious plant species would help maintain wildlife habitats in good condition.

(b) Impacts to Wildlife from Livestock Grazing

This alternative has the potential for the greatest impacts to wildlife from grazing. Impacts to wildlife from reindeer grazing would be similar to those discussed under Impacts Common to All Alternatives, but possibly more extensive as the entire planning area would be open to reindeer grazing. It is unlikely that new reindeer grazing operations would be established outside of the Seward Peninsula during the life of the plan due to the presence of caribou throughout most of the planning area and the difficultly of managing reindeer in occupied caribou habitat.

In addition, grazing by domestic bison could be authorized on the Seward Peninsula under this alternative. Potential impacts to wildlife from authorization of bison grazing include competition with other herbivores including moose, caribou and muskox; potential for disease transmission to wildlife; possible increased DLP killing of predators; and stress/disturbance to wildlife from bison herding activities.

Two areas on the Seward Peninsula that are currently ungrazed (McCarthy's Marsh and Death Valley) were evaluated by BLM specialists in 2004 to determine the feasibility of authorizing bison grazing. Their recommendation was not to authorize this type of use based on: 1) low biomass of bison forage species, 2) lack of State support, 3) wet summer conditions, 4) potential conflict with moose, caribou, muskox, reindeer, fish, wetland and riparian species, 5) potential of emigration and founding of new, feral populations of bison, 6) potential spread of diseases, 7) threat to introduced individual bison, 8) threat to fragile, diverse, productive and unusual habitat, 9) lack of benefit to majority of local people, and 10) potential local opposition (Joly and Meyers 2004).

Moose populations on the Seward Peninsula are currently low. Competition between moose and bison could negatively affect moose recovery efforts. Competition may also exist between bison and caribou and muskox.

There are disease concerns related to introduction of bison to the Seward Peninsula. Because of susceptibility to many of the same diseases, crossover of diseases from bison to muskox would be of particular concern. Diseases likely to have the most serious impacts on wildlife health if infected, captive-raised bison were ranched on the Seward Peninsula would be tuberculosis, bovine viral diarrhea, infectious bovine rhinotracheitis, parainfluenza 3, Johne's disease, and various nematode parasites (Joly and Meyers 2004).

Grazing associated with SRPs could be authorized under this alternative and potential impacts are similar to those discussed under Impacts Common to All Alternatives. Negative impacts would be reduced by implementation of ROP FW-6a which would prohibit the use of goats, llamas, alpacas, and other similar animals for packing, and require the use of certified seed-free feeds.

(c) Impacts to Wildlife from Leasable Minerals

1. Seismic Exploration

Seismic exploration would have direct impacts on wildlife, including temporary disturbance or stress of wildlife. In one study, seismic activities within 1.15 miles (1.8 km) of a grizzly bear den caused changes in heart rate and movement of the female bear and cubs (Reynolds et al. 1986). The investigators suggest that seismic-testing activities within about 600 feet of the den may cause abandonment of the den. In studies on the effects of seismic exploration on muskoxen, some muskoxen reacted to seismic activities at distances up to 2.5 miles (4 km) from the operations; however, reactions by muskoxen were highly variable among individuals, with some individuals not reacting at very close distances (0.12 miles [0.2 km]) (Reynolds and LaPlant 1985). Responses varied from no response, to becoming alert, forming defense formations, or running away (Winters and Shideler 1990). The movements of muskoxen away from the seismic operations did not exceed 3.1 miles (5 km) (Reynolds and LaPlant 1986).

Helicopter support traffic seemed to have a cumulative effect on muskoxen responses to seismic activities (Jingfors and Lassen, 1984). Muskoxen reacted to helicopters flown at 325 and 1,300 feet (100 and 400 m) with durations of responses lasting from 2 to 12 minutes (Miller and Gunn, 1984). Muskoxen cows and calves appear to be more sensitive (responsive) to helicopter traffic than other age/sex classes, and muskoxen in general are more sensitive to overflights by helicopter than by fixed-wing aircraft (Miller and Gunn, 1979).

Seismic activity could potentially occur within habitat for the Cape Lisburne muskox population. Unlike caribou, muskox are not able to travel and dig through snow easily. In the winter, they search out sites with shallow snow, and greatly reduce movements and activity to conserve energy. Muskox survive the winter by using stored body fat and reducing movement to compensate for low forage intake (Dau 2001). Because of this strategy, muskox may be more susceptible to disturbances during the winter. Repeated disturbances of the same animals during winter could result in increased energetic costs that could increase mortality rates.

Seismic exploration would have minimal effects on caribou as exploration would occur during the winter when most of the WACH has migrated south of the Brooks Range. However, some portion of the WACH winters on the North Slope or Cape Lisburne area every year. These animals could be temporarily disturbed due to seismic activity. Caribou have been shown to exhibit panic or violent flight reactions to aircraft flying at elevations of approximately 160 feet and to exhibit strong escape responses (animals trotting or running from aircraft) to aircraft flying at 150 to 1,000 feet (Calef et al. 1976). These documented reactions were responses to aircraft that circled and repeatedly flew over caribou groups. Aircraft associated with support of seismic exploration would pass over caribou only once on any given flight to or from a camp.

Seismic camps may provide additional food sources for foxes at dumpster sites near the galley and dining halls and at dump sites (Eberhardt et al. 1982, Rodrigues et al. 1994). However, seismic crews are required by stipulation to incinerate and remove waste materials from BLM lands; hence this activity is not expected to enhance the survival of arctic foxes. Grizzly Bears would generally be hibernating during seismic exploration so they would not be affected.

In general, large mammal responses to seismic activities in the planning area are expected to be a temporary avoidance of the local area, with reoccupation of the area after the exploration activities are complete. Small rodents (such as lemmings and voles) and their predators (such as short-tailed weasels) are expected to be affected locally (direct mortality and loss of habitat

for individuals or small groups of lemmings and voles) along seismic lines. However, these losses would be insignificant to populations in the planning area.

Seismic surveys occur during winter months (December-April) when nearly all birds are absent from the region. Species present during the winter such as ravens, ptarmigan, gyrfalcons, and snowy owls could be temporarily displaced by seismic activities. In the unlikely event that a seismic operation extended into May, disturbance of early breeding season activities of some species could occur. Because the campsites and survey areas are occupied for relatively brief periods, and most of the birds are dispersed in relatively low numbers over a large area, the duration of disturbance incidents is likely to be brief and infrequent.

Indirect impacts to wildlife from seismic operation may include degradation of habitat (impacts to soil and vegetation) due to seismic exploration. These types of impacts would be reduced by implementation of ROP Veg-2e, which limits seismic surveys to the winter when the ground is frozen and covered with snow.

2. Exploratory Drilling

Impacts to wildlife from exploratory drilling for oil and gas or coal would be similar to those discussed under seismic exploration. As exploratory drilling will occur during winter, potential disturbance would come primarily from aircraft and surface traffic, and activities associated with ice road and drill pad construction. Numerous studies show that wildlife such as caribou and muskoxen react to low flying aircraft by exhibiting various behaviors from panic to strong escape responses (animals trotting or running from aircraft). Disturbance reactions to aircraft would be brief, lasting only minutes to less than one hour. Wildlife may be temporarily disturbed from ground traffic and activities associated with ice road construction. Wildlife may temporarily avoid the local area but would reoccupy the area after the exploration activities are complete. Small and less mobile animals such as lemmings and voles may suffer direct morality during ice road or pad construction. These losses would not result in population level effects.

3. Development

Although initial construction would occur primarily during winter, development of oil and gas resources will bring year-round facilities and activities to wildlife habitat in the northern part of the planning area. Potential effects of development activities include direct habitat loss from gravel mining and oil field facilities, and indirect habitat loss through reduced access caused by physical or behavioral barriers created by roads, pipelines, and other facilities. Depending on location and season, oil and gas activities in areas where waterfowl, caribou, muskoxen, and other species occur would result in increased disturbance to individual animals from routine aircraft operations, gravel-mining operations, presence of gravel pads and facilities, and associated vehicle and foot traffic.

Disturbance and stress impacts would be similar to those discussed under Seismic Exploration but more extensive due to the yearlong exposure. Various species could be affected to some extent by disturbance events (e.g., passage of aircraft), although most incidents are expected to result in negligible effects from which individuals would recover within hours to one day. However, the cumulative effect of repeated disturbance could extend for longer periods and potentially may adversely affect physiological condition, reproductive success, and productivity.

The presence of facilities, gravel mining, and construction of gravel structures would result in displacement from favored habitats and associated energy costs which could result in short-term, negative effects to wildlife during breeding, brood-rearing, or migration. Gravel mining

would occur in 2-3 areas and result in the loss of 50-100 acres of wildlife habitat. The footprint of structures and gravel mines is quite small relative to the distribution of wildlife, so effects would not be evident at the population level for most species. Species such as arctic ground squirrels may benefit from gravel deposition due the creation of suitable burrowing habitat.

The response of caribou to potential disturbance is highly variable from no reaction to violent escape reactions depending on their distance from human activity; speed of approaching disturbance source; frequency of disturbance; sex, age, and physiological condition of the animals; size of the caribou group; and season, terrain, and weather. Caribou cow and calf groups are the most sensitive to disturbance, especially in early summer during and immediately after calving. If development occurred within the calving grounds for the WACH, which is unlikely, impacts could be significant.

The distribution of calving caribou could shift away from development facilities into less suitable habitat. Displacement of caribou of the Central Arctic herd from a portion of the calving range near the Prudhoe Bay and Kaparuk-Milne Point facilities has been documented (Cameron et al. 1981, 1983, 1992; Lawhead et al. 1997; Wolf 2000). This shift in calving distribution occurred even though the Kuparuk-Milne Point area included improvements in field design and layout, such as elevated pipelines and reduced road density indicating that parturient female caribou (those about to give birth or accompanied by very young calves) are very sensitive to disturbance. Parturient caribou were less likely to cross roads and pipelines during the calving season (Cameron et al. 1992). Forage during peak lactation declined as the concentrated calving area shifted south-southwest of the developed area,1980-1995 (Wolfe 2000). Calving grounds are likely selected by some combination of factors including forage quality, forage quantity, and reduced predation on calves. Reduced access to annual and concentrated calving areas could reduce herd productivity unless compensated for by other factors.

Development within the calving range of the WACH would likely have similar impacts. However, development in the portion of the calving grounds within the planning area is highly unlikely. More than 43% of this area is under State or Native corporation ownership. Of the BLM-managed land in this area, 94% is Native-selected, or is high-priority State-selection. Most of the Native-selected lands are top-filed by the State, indicating that BLM is unlikely to retain these lands. It is estimated expected that only a small area along the southern boundary of the calving grounds could potentially remain under BLM-management for the long-term. Over the short-term, selected lands are segregated against the mineral leasing laws, therefore no leasing could occur until selections are relinquished.

Depending upon the location of oil development infrastructure, movement of caribou between calving grounds, insect relief habitat and summer range could be disrupted by oil development. The level of effect would depend upon the location and level of development. An aboveground pipeline with no associated road, as proposed under this alternative, would have little effect on movement, except perhaps by parturient females. Roads and associated traffic would have a greater impact.

Another issue arising from oil field development is the ability of caribou to move freely past oil fields to insect-relief habitats. Caribou under extreme insect harassment initially move rapidly to insect-relief habitat. When insect harassment abates, caribou move to better foraging areas, at which time, they are more sensitive to disturbance. Infrastructure and activities in oil fields could delay or alter movements of caribou from insect-relief areas to foraging habitat, potentially reducing food intake and slowing rates of weight gain (Smith 1996). The probability of producing a calf is directly related to body weight and fat content of females during the previous autumn

(Cameron et al. 2000). Since reproductive success of caribou is highly correlated with nutritional status (Cameron et al. 2002), there could be reproductive consequences from extensive disruption of caribou during the insect-relief season.

Under this alternative, the reasonably foreseeable scenario is that at most, only one oil field would be developed in the northern quarter of the planning area. It would most likely be within the defined WACH insect relief habitat. The field would consist of several well pads connected to a central processing facility and airstrip, the anticipated extent of the area encompassed by development would be approximately three miles in diameter. If located along the migration route of parturient females to the calving grounds, it could slightly delay caribou arrival at the calving grounds. Based upon available data from satellite collared caribou, the majority of the caribou appear to approach the calving grounds from National Park Service lands to the south, rather than through the planning area. The field could interfere with movements of caribou seeking insect relief habitat. However, since the field will be small, it is anticipated that caribou could move through or around the oil field with relative ease, making population level effects unlikely. Potential impacts to caribou from oil and gas development are discussed in greater detail in the Northeast National Petroleum Reserve-Alaska Final Amended IAP/EIS (BLM 2005h).

If the oil field is located in habitat for muskoxen, there would be displacement, and disturbance impacts to muskoxen similar to those discussed under seismic impacts. In addition, there would be direct habitat loss due to gravel mining and at oil field facilities, and indirect habitat loss through reduced access caused by physical or behavioral barriers created by roads, pipelines, and other facilities (Garner and Reynolds 1986, Clough et al. 1987). Muskoxen may be more exposed to oil exploration and development than caribou, because they tend to remain year-round in the same habitat area. Repeated disturbance of the same group during the winter, by air traffic, for example could negatively affect the energy balance of individual animals and potentially contribute to winter mortality.

Disturbance impacts to grizzly bears would be similar to those discussed under seismic impacts. A similar effect could occur from construction activities near maternal dens. The increase in human presence resulting from the establishment of permanent settlements (oil fields, mines, etc.), usually leads to human-bear encounters on a regular basis and to conflict, particularly if bears learn to associate humans with food (Harding and Nagy 1980, Schallenberger 1980, Miller and Chihuly 1987, McLellan 1990). Grizzly bears initially avoid human settlements because of the noise and disturbance (Harding and Nagy 1980), but if the area includes an important food source, some bears are likely to habituate to the noise and human presence, leading to an increase in encounters. Individual bears, especially females with cubs, vary in the degree of habituation-tolerance to human presence, and some would continue to avoid areas when humans are present (Olson and Gilbert 1994). Although, studies show that cub survival is higher in bears using anthropogenic food sources in the oil field region (Prudhoe and Kuparuk), this effect is countered by the fact that these bears have a lower than normal survival rate after becoming sub-adults (Shideler and Hechtel 2000).

4. Effects of Spills

Oil spills could negatively affect wildlife in several ways. Animals may be coated with oil and suffer from loss of thermal insulation, ingest oil during grooming, or absorb toxic hydrocarbons through the skin. Oil may be ingested through contamination of forage or prey. Clean up response may result in temporary disturbance and displacement of wildlife.

Oil may adhere to birds' feathers, causing the feathers to lose their insulating capabilities and result in hypothermia (Patten et al. 1991). This effect would be particularly severe for birds that come in contact with water where feather integrity is necessary to maintain water repellency and buoyancy. Birds could also suffer toxic effects from ingestion of oil by consumption of food contaminated by an oil spill or from oil ingestion resulting from preening of oiled feathers (Hansen 1981). Oil contacting bird eggs could cause toxic effects to embryos (Patten and Patten 1979, Stickel and Dieter 1979). Oil could come in contact with eggs directly as a result of a spill, or indirectly from oiled feathers of incubating adults.

A spill occurring during the summer breeding season would have a greater impact on birds than a spill occurring during the winter, when most birds are on wintering grounds. Cleanup of spilled oil during ice-covered periods or periods of broken ice may be difficult, and lingering oil may be present and may be hazardous to spring migrating birds. Lingering effects from a winter spill could impact returning birds during the following breeding season if clean-up activities did not adequately remove contaminants from bird habitats. In addition, oiled carcasses of dead birds washing up on beaches or shorelines could also be hazardous to scavenging birds such as gulls, golden eagle, gyrfalcon, and peregrine falcon, and to mammals such as Arctic fox and grizzly or polar bear, that feed on these carcasses.

Adult caribou and muskox that were oiled would not likely suffer from a loss of thermal insulation, although toxic hydrocarbons could be absorbed through the skin or inhaled. However, the oiling of young calves could reduce thermal insulation, leading to their death (BLM and MMS 1998). Toxicity studies of crude-oil ingestion in cattle indicate that anorexia (substantial weight loss) and aspiration pneumonia leading to death are possible effects (Rowe et al. 1973). Exposure of livestock (horses and cattle) utilizing grazing lands with oil development has resulted in mortality and morbidity (Edwards 1985). In cattle, this exposure has been shown to result in a wide variety of symptoms including effects on the central nervous system, cardiopulmonary abnormalities, gastrointestinal disorders, inhalation pneumonia, and sudden death. Caribou or muskox that become oiled by contact with a spill in contaminated lakes, ponds, or rivers could die from toxic hydrocarbon inhalation and absorption through the skin. No documented caribou deaths have been attributed to spills associated with the Trans-Alaska Pipeline (TAPS) (BLM and MMS 1998).

In the case of a large spill, some tundra vegetation would become contaminated. Caribou and muskox probably would not ingest oiled vegetation, as they tend to be selective grazers and are particular about the plants they consume (Kuropat and Bryant 1980). Control and clean-up operations (ground traffic, air traffic, and personnel) at the spill site would frighten animals away from the spill and limit the likelihood that these animals would ingest oiled vegetation. In most cases, onshore oil spills would not be expected to affect caribou and muskox through ingestion of oiled vegetation.

Grizzly bears depend on coastal streams, beaches, mudflats, and river mouths during the summer and fall for catching fish and finding carrion. If an oil spill were to contaminate these habitats, some grizzly bears would be likely to ingest contaminated food, such as oiled birds, seals, or other carrion. Such ingestion could result in the loss of a few bears. An oiling experiment on captive polar bears indicated that if a bear's fur becomes oiled and the bear ingests a considerable amount of oil while grooming, kidney failure and other complications could lead to the bear's death (Oritsland et al. 1981). Grizzly bears may have a similar reaction. Brown bears on the Shelikof Strait Coast of Katmai National Park (an area contacted by the *Exxon Valdez* oil spill) were observed with oil on their fur and were consuming oiled carcasses; one young bear that died had high concentrations of aromatic hydrocarbons in its bile and might

have died from oil ingestion (Lewis and Sellers 1991). Anecdotal accounts of polar bears deliberately ingesting hydraulic and motor oil, and foreign objects from human garbage sites suggest that bears are vulnerable to ingesting oil directly, especially from oiled carrion and other contaminated food sources (Derocher and Stirling 1991). Skin damage and temporary loss of hair can result from oiling, with effects on thermal insulation.

Spill response would disturb wildlife; some oiled animals could be captured for treatment, while others could potentially be hazed from the area under agency guidance. Aircraft or overland vehicles would temporarily disturb wildlife present in the vicinity of the spill. Response to disturbance could last from a few minutes to a few hours. Larger and more mobile animals would be temporarily displaced by human activity around the clean-up site; displacement could last for a few days to a few weeks.

Under Alternative B, impacts to wildlife from oil spills would be minimal. For the most part, oil spills would be localized in their effects and would not be expected to substantially contaminate or alter wildlife habitat. Most small spills would be contained on the gravel pads and would have virtually no impact on wildlife. Flat, coastal tundra may retain 300 to 1,500 bbl of oil per acre (Miller et al. 1980). Thus, a large spill (500-900 bbl) from a gravel pad that escaped to tundra could affect up to 3 acres. In the event of a pressurized discharge from a pipeline, a much larger area may be affected. In an incident in December 1993, 1-4 bbl of crude oil misted over an estimated 100-145 acres (Ott 1997). Given the millions of acres of tundra habitat within the planning area, contamination of 145 acres of habitat would be minor. Most spills would occur at facilities with human activity - areas that wildlife would tend to avoid, reducing the potential for animals to come in contact with oil.

(d) Impacts to Wildlife from Locatable Minerals

Impacts would be similar to that discussed under Impacts Common to All Alternatives but slightly greater in extent. Under this alternative, mineral development would occur. The development of 3-5 placer mines would have negligible impacts on wildlife. Impacts would be localized in the immediate vicinity of the mines. In these specific areas, wildlife would be displaced and an estimated 10 acres of habitat would be unavailable during the life of the operation. There may be mortality of small mammals, and eggs or nestling birds during initial clearing of land. These losses would be localized and would not have population level impacts. Implementation of the ROPs would further reduce impacts.

(e) Impacts to Wildlife from Mineral Materials

Under this alternative, up to 1,000,000 cubic yards of mineral materials would be required to support oil and gas development. Impacts to wildlife from mineral material disposal would be similar to those discussed under Impacts Common to All Alternatives but much greater in extent. A more detailed discussion of gravel mining impacts is included under Leasable Minerals above.

(f) Impacts to Wildlife from Recreation Management

For most of the planning area, impacts would be similar to those discussed under Impacts Common to All Alternatives.

Impacts in the Squirrel River would be similar to those discussed under Alternative A but potentially lower. The Squirrel River would be designated as SRMA. Allowable levels of recreational use would be dependant upon many factors but would likely be lower than under

Alternative A. Non-commercial recreational use would continue at a level similar to Alternative A. Recreational use associated with commercial operators would be limited by capping the number of guides allowed to operate within the area during high use periods.

(g) Impacts to Wildlife from Travel Management

Impacts to wildlife would be similar to those under Alternative A. However, disturbance of habitat may be slightly greater as the 2,000 pound GVWR limitation would not be applied during the winter. Use of heavier OHVs, during the winter months could result in some additional damage to vegetation and soils, impacting wildlife habitat, cover, and forage. In most areas, these additional impacts would be minor.

(h) Impacts to Wildlife from Lands and Realty Actions

Impacts would be similar to those discussed under Impacts Common to All Alternatives. Implementation of ROPs would further reduce impacts compared to Alternative A.

Large blocks of BLM-managed lands would be retained in Federal ownership, reducing the potential for habitat fragmentation. Alternatively, lands not identified for retention would be available for disposal. Privatization of BLM-managed lands would increase levels of human activity in wildlife habitat. Depending upon the location of the parcels, access into wildlife habitats may also increase. Wildlife may be displaced from preferred habitats, and habitat may be destroyed or degraded. Disposal of BLM-managed lands are expected to be minimal over the life of the plan. Lands would likely not be disposed of until conveyance to State and Native corporations is complete, demand for disposal of BLM lands is low, various parcels of State land within the planning area have been identified for sale, and land would have to meet the criteria for disposal in Federal Land Policy Management Act (FLPMA). The WACH calving and insect relief area, as well as core winter range in the Nulato Hills is identified for retention, as are the larger blocks of muskox habitat on BLM-managed lands. There would not be population level effects on wildlife.

(i) Impacts to Wildlife from Special Designations

No ACECs would be designated under this alternative. Nor would any rivers be found suitable for designation under the WSR Act. Therefore, there would be no impacts on wildlife from such designations.

(3) Alternative C

(a) Impacts to Wildlife from Soil, Water, and Vegetation

Impacts would be the same as Alternative B.

(b) Impacts to Wildlife from Livestock Grazing

Impacts to wildlife from livestock grazing would be similar to those discussed under common to all alternatives but lesser in extent. Reindeer would be the only type of livestock authorized, and grazing would be limited to the Seward Peninsula. In addition, 2,531,00 acres in four grazing areas would be closed. Areas where reindeer have been absent for more than 10 years would also be closed. The potential for conflicts between wildlife management and grazing would be reduced slightly by the closure of McCarthy's Marsh, upper Kuzitrin River, the Baldwin

Peninsula, and the Buckland River allotments. These areas include winter caribou range and important winter habitat for moose.

(c) Impacts to Wildlife from Leasable Minerals

Impacts from leasable minerals would be very limited as no oil and gas development is forecast under this alternative. Most high potential areas would be closed to leasing. There may be some impacts from seismic exploration, as discussed under Alternative B, but the probability of seismic exploration is very low.

(d) Impacts to Wildlife from Locatable Minerals

Impacts to wildlife would be similar to and somewhat less than those discussed under Impacts Common to All Alternatives. No mineral development is anticipated under this alternative. Although exploration may occur, additional areas would be closed to locatable mineral entry, further reducing the potential for exploration.

(e) Impacts to Wildlife from Mineral Materials

Impacts to wildlife from mineral material disposal would be similar to but less than impacts projected under Impacts Common to all Alternatives. Two sensitive habitat areas, McCarthy's Marsh and the Kigluaik Mountain ACEC would be closed to mineral material disposal, providing additional protection to habitats in these areas. River beds, beaches, and lakeshores would also be closed. These additional benefits would be minor due to the low probability of requests for mineral material disposal on BLM-managed lands in the planning area.

(f) Impacts to Wildlife from Recreation Management

Outside of special recreation management areas, impacts would be similar to and lesser in extent than those discussed under Impacts Common to all Alternatives. Under this alternative, limits on commercial use would be established in several areas including the Koyuk, Inglutalik, Ungalik, Shaktoolik, Buckland, and Agiaupuk rivers, the Nulato Hills, Bendeleben Mountains, and McCarthy's Marsh. This would reduce the potential for disturbance impacts to wildlife from recreational activities.

Impacts in the Squirrel River would be similar to those discussed under Alternative A, but would be lesser in extent. The Squirrel River would be designated as SRMA and limits would be set on both commercial and non-commercial recreational use levels. Commercial use would be limited by capping the number of guides allowed to operate within the area during the high use season. Non-commercial use would be limited during the high use season by requiring all visitors to obtain a permit. The number of visitor use days would be capped at 2,000. These limitations would reduce the potential for disturbance impacts to wildlife. Guides and outfitters would not be permitted to use four-wheelers during the snow-free period so impacts associated with proliferation of trails would be reduced.

The Salmon Lake-Kigluaik Mountain SRMA would be established and managed as a semi-primitive motorized area. Management would focus on enhancing the recreational experience while protecting natural resources. Over the long-term, management of this area for recreation may result in increased visitor use and a greater potential for disturbance impacts to wildlife. If over-use became an issue, limits on visitor use levels would be established. Facilities would be designed to minimize impacts to wildlife and their habitat. Overall, recreation management in the Salmon Lake-Kigluiak SRMA would have minimal impacts on wildlife and wildlife habitat.

(g) Impacts to Wildlife from Travel Management

Under this alternative, the entire planning area would be limited to designated trails. Guides and outfitters would not be permitted to use four-wheelers during the snow-free period. Both disturbance impacts, and impacts to wildlife from proliferation of trails would be reduced compared to Alternatives A, B and D.

(h) Impacts to Wildlife from Lands and Realty Actions

Impacts would be similar to those discussed under Alternative B and Impacts Common to All Alternatives. In addition under this alternative, several ACECs would be designated: including the WACH calving and insect relief habitat, and core winter habitat in the Nulato Hills; and moose, caribou and waterfowl habitat in McCarthy's Marsh and upper Kuzitrin River. Constraints on realty actions within these ACECs would provide additional protection of wildlife habitats, reducing the potential for habitat degradation, fragmentation, and reducing the potential for disturbance impacts to wildlife. The level of impact reduction compared to other alternatives would be dependant upon socio-economic conditions which would drive the demand for realty actions. It is anticipated that the level of impact to wildlife would be the lowest under this alternative.

(i) Impacts to Wildlife from Special Designations

Under this alternative, 5.6 million acres in five areas would be designated as ACECs, including the WACH calving and insect relief habitat and core winter habitat; and moose, caribou and waterfowl habitat in McCarthy's Marsh and upper Kuzitrin River. Constraints on or exclusion of other activities such as mining within these ACECs (Appendix B) would provide additional protection of wildlife habitats, reducing the potential for habitat degradation and fragmentation, and also reducing the potential for disturbance impacts to wildlife. All ACECs would be closed to mineral entry and leasing, thus no oil and gas development would occur within core caribou habitats under this alternative. OHVs would be limited to designated trails during the snow-free season. There is currently very limited OHV use in these areas during the summer. Therefore, beneficial impacts of reduced disturbance from OHVs would be minimal. Designation would also result in additional management attention for these areas.

In addition, 11 river systems would be considered suitable for designation as wild under the WSR Act. Protection of wild river values would indirectly benefit wildlife by protecting riparian vegetation and sensitive habitats from disturbance and long-term degradation.

(4) Alternative D

(a) Impacts to Wildlife from Soil, Water, and Vegetation

Impacts would be the same as Alternative B.

(b) Impacts to Wildlife from Livestock Grazing

Impacts from livestock grazing would be similar to Alternative C, but to a slightly greater extent. Under this alternative, the Baldwin Peninsula and Buckland River allotments would remain open to grazing by reindeer.

(c) Impacts to Wildlife from Leasable Minerals

Impacts would be similar to those in Alternative B. Impacts to caribou would be slightly less than under Alternative B, as oil and gas leasing stipulations 6 and 7 and ROP FW 3-c would apply. Stipulation 6 prohibits exploration activities between May 20 and June 20 in the WACH calving area. This stipulation would have little effect since the identified calving area is all Native-selected or high priority State-selected lands. No exploration is likely to occur in this area as selected lands are segregated against mineral entry. If the WACH calving area changed in the future, this stipulation would slightly reduce the potential for stress related impacts to calving caribou. The effect would be minimal as most exploration would be expected to occur during the winter, rather than during the calving period. Stipulation 7 prohibits exploration activities between May 20 and August 15 within WACH crucial insect relief habitat. ROP FW 3-c prohibits leases or permits longer than 14 days, surface disturbing activity, and mining exploration the peak calving period (May 20-June 20). Again, the protective effect of the stipulation would be minimal as not much exploration is likely to occur during the summer. Under Alternative D, a 300 foot setback on the Kivalina River would be designated as no surface occupancy for fluid leasable minerals. If mineral development was proposed in this area, there would be a slight reduction in long-term habitat disturbance of riparian habitats along the Kivalina River compared to the other alternatives, benefiting wildlife dependant upon these habitats. Given the low probability of leasable mineral exploration or development along the Kivalina River and the limited amount of habitat involved, these benefits would be minor.

ROP FW-3e would place seasonal restrictions on mineral exploration in caribou winter range in the Nulato Hills. If such exploration occurred in this area, the potential for disturbance and stress related impacts to wintering caribou would be reduced. However, the potential for solid leasable mineral exploration is very low and thus the effect of this ROP is expected to be minor.

(d) Impacts to Wildlife from Locatable Minerals

Impacts to wildlife would be similar to Alternative B, but to a slightly lesser extent. Under this alternative, strict required operating procedures (SS-4) would apply to locatable mineral development in the Kigluaik Mountains, reducing the potential for disturbance to ground nesting birds and small mammals. Areas within 300 feet of active channels of ten rivers would be subject to ROP FW-7 which would limit surface disturbance within riparian habitat, providing additional protection for riparian habitat in these areas. Riparian habitat is important to many species of wildlife including moose, migratory birds, bears, and wolverines.

(e) Impacts to Wildlife from Mineral Materials

Impacts would be the same as Alternative B.

(f) Impacts to Wildlife from Recreation Management

Outside of special recreation management areas, impacts would be similar to those discussed under Impacts Common to All Alternatives. Impacts to wildlife in the Salmon Lake-Kigluaik Mountain SRMA would be the same as discussed under Alternative C.

Until a recreation area management area plan (RAMP) is developed, impacts in the Squirrel River SRMA would be similar to those discussed under Alternative A. Over the long-term, limits on both commercial and non-commercial recreational use levels in the Squirrel River would be established through a RAMP. How this plan would affect wildlife is somewhat uncertain but it is

anticipated that improved management of both casual and commercial recreation would result in reduced impacts to wildlife and their habitat.

(g) Impacts to Wildlife from Travel Management

Impacts would be less than under Alternative B and greater than under Alternative C. Application of a 2,000 pound maximum GVWR yearlong and the institution of additional OHV limitations in ACECs and SRMAs would reduce the potential for habitat impacts compared to Alternative B. Application of the State's generally accepted uses (existing trails) on State- and Native-selected lands would also reduce habitat impacts and proliferation of trails on selected lands. Disturbance impacts would potentially be lower than under Alternative B as OHV use would be more confined within ACECs, SRMAs, and on State- and Native-selected lands.

(h) Impacts to Wildlife from Lands and Realty Action

Impacts would be essentially the same as those discussed under Alternative B and Impacts Common to All Alternatives. Under this alternative, several ACECs would be designated: including the WACH insect relief habitat, and core winter habitat in the Nulato Hills. Realty actions within these ACECs may be scrutinized more closely and subject to additional mitigation measures if approved, slightly reducing the potential for habitat degradation, and fragmentation, and reducing the potential for disturbance impacts to wildlife. The level of impact reduction compared to other alternatives would be dependant upon socio-economic conditions which would drive the demand for realty actions. Impacts from realty actions would be slightly higher than under Alternative C and somewhat lower than under Alternatives B and A.

(i) Impacts to Wildlife from Special Designations

Under this alternative, 3.7 million acres would be designated as ACECs: including the WACH insect relief habitat, and core winter habitat in the Nulato Hills. Constraints on other activities within these ACECs (Appendix B) would provide some additional protection of wildlife habitats, slightly reducing the potential for habitat degradation, fragmentation, and reducing the potential for disturbance of wildlife. These areas would be open to mineral entry subject to the required operating procedures, therefore, oil and gas development could occur in core caribou habitats under this alternative. OHVs would be allowed to travel cross-country year round, increasing the potential for disturbance impacts to wildlife compared to Alternative C. The primary benefit of designation would be the additional management attention given to the area and consideration of the identified values in the area during approval of future projects.

4. Special Status Species

a) Special Status Plants

Proposed management of the following resources/resource uses/programs would have no anticipated impacts to Special Status Plants: Air Quality, Cultural Resources, Paleontological Resources, Visual Resources, Wilderness Characteristics, Forest Products, Renewable Energy, Lands and Realty Actions, Fisheries Management, Iditarod National Historic Trail, Wild and Scenic Rivers, Public Safety, Social and Economic Conditions, and Subsistence.

(1) Impacts Common to All Alternatives

There are no Threatened or Endangered plant species within the planning area, and none that are being considered for listing with the U.S. Fish and Wildlife Service. Discussed below are impacts to the eight sensitive status plants which occur in the planning area, with mention where appropriate of impacts to plants classified as rare by the Alaska Natural Heritage Program.

(a) Impacts to Special Status Plants from Soil, Water, and Vegetation

Sensitive status plants would benefit from proper management of soils, water, and vegetation resources. Implementation of mitigation measures to protect soil, water, and vegetation on a project specific basis would reduce disturbance to habitat of sensitive status plants and aid in the recovery of habitat from permitted uses.

(b) Impacts to Special Status Plants from Wildlife Management

Indirect benefits to sensitive status plants would result from protection of wildlife habitats and mitigation of impacts to wildlife habitat through the NEPA and permitting processes.

(c) Impacts to Special Status Plants from Fire and Fire Management

Some sensitive status plants would benefit from fire suppression that minimizes loss of individuals, populations, or habitats. On the other hand, fire suppression activities can also affect sensitive plant species through mortality, disturbance, and damage or alteration of key habitat components (BLM 2004b). Impacts to sensitive plant species would vary depending upon range and distribution, life history, and preferred habitats.

(d) Impacts to Special Status Plants from Livestock Grazing

Some form of livestock grazing is permitted under all alternatives, although areas open to grazing and types of livestock authorized differ among alternatives. Incidental grazing by pack animals associated with special recreation use permits would be considered on a case-by-case basis under all alternatives. Livestock grazing has the potential to negatively impact sensitive status plants through partial or complete removal of individual plants, and through damage by trampling. The degree of impact would depend upon number of animals involved, and seasonal frequency of presence in sensitive plant habitat.

(e) Impacts to Special Status Plants from Leasable Minerals

Coalbed natural gas exploration is not expected to occur on BLM-managed lands in the planning area during the life of the plan and thus there would be no impacts on special status plants. There are no other sensitive status plants impacts common to all alternatives because under Alternative A no mineral leasing would occur, and under Alternatives B, C, and D varying amounts of leasing are possible.

(f) Impacts to Special Status Plants from Locatable Minerals

Existing and future locatable mineral activities have the potential to unfavorably impact sensitive status plants and their habitat by stripping away the vegetative mat as part of mine site overburden, trampling or eliminating (under camp buildings, gravel roads, gravel airstrip, etc.) vegetation and compacting soils throughout the footprint of the mine site. Site-specific mitigation measures would be implemented where necessary and practical.

(g) Impacts to Special Status Plants from Mineral Materials

Sufficient material sources (mainly sand and gravel) exist on private lands to meet the needs of most communities within the planning area. Few mineral material disposal actions are anticipated on BLM land, although most BLM lands would be available for salable mineral exploration and development. The one exception is that mineral materials would be needed to support oil and gas development (if it occurred) on BLM land, most likely in the northern quarter of the planning area. Site specific mitigations would be developed to protect sensitive status plants and their habitats from negative impacts.

(h) Impacts to Special Status Plants from Recreation Management

There could be minor to moderate impacts to sensitive status plants from both commercial and non-commercial recreation activities. Hiking, aircraft landings at remote sites, or occasional to repeated use of remote camp sites may have direct effects on sensitive plant species. Plants could be trampled or crushed, and soil could be compacted or disturbed. Special Recreation Permit holders are specifically directed via permit stipulation to avoid camping at locations where the BLM has identified populations of sensitive plants. Given the low level of recreation use on most BLM-managed lands within the planning area, and the scattered, infrequent placement of sensitive plant populations, these impacts would mostly be minimal, and would not have population level effects.

(i) Impacts to Special Status Plants from Travel Management

There would be direct and indirect impacts on sensitive status plants from travel management and OHV use. OHV use on and off designated trails has the potential to destroy the vegetation mat, compact soils, accelerate permafrost melt, and lead to soil erosion and ponded water. Sensitive status plants could be crushed and their habitats degraded. Higher, rockier terrain and remote areas are becoming more accessible over time as OHVs become more sophisticated and powerful, and as the human population in the planning area increases.

(2) Alternative A

(a) Impacts to Special Status Plants from Soil, Water, and Vegetation

Impacts would be the same as discussed under Impacts Common to All Alternatives.

(b) Impacts to Special Status Plants from Livestock Grazing

Under continuation of current management, there have been no known instances of reindeer grazing which negatively affected any populations of sensitive status plants. Annual visits to specific locations in grazing allotments directly monitored by the BLM have shown no evidence of harm to sensitive status plants. However, because reindeer are herded on a free-range basis over approximately 12.6 million acres of land on the Seward Peninsula (and under management by various Federal, State and Native entities), it is difficult to adequately track this situation. Under current management and on a case-by-case basis, other BLM-managed lands throughout the planning area have been open to reindeer grazing, but no permits have been authorized, mostly due to conflicts with caribou or moose. McCarthy's Marsh and the upper Kuzitrin River area on the Seward Peninsula have been closed to reindeer grazing.

(c) Impacts to Special Status Plants from Locatable Minerals

Under current management, impacts to sensitive status plants on BLM-managed lands are not well known. Many placer mine sites have a long history of occupancy and most were not inventoried for presence of sensitive plant species prior to authorization. During the last 16 years approximately 68 acres of surface disturbance have been associated with active placer mines in the planning area. Impacts are assumed to be minimal. Proposed permitted or authorized uses that may affect sensitive status plants would be analyzed through the appropriate NEPA document. Based on this analysis, mitigation would be developed to minimize impacts from proposed activities. The resulting mitigation measures would be included in the permit authorizing the use.

(d) Impacts to Special Status Plants from Mineral Materials

Under current management, mineral material sales would be considered on a case-by-case basis, with specific operating stipulations developed to protect sensitive status plants and their habitats through the NEPA process. There are no current mineral material sales on BLM-managed lands in the planning area, and few would be expected within the life of the plan.

(e) Impacts to Special Status Plants from Recreation Management

Impacts would be the same as discussed under Impacts Common to All Alternatives.

(f) Impacts to Special Status Plants from Travel Management

Impacts to sensitive status plants would be similar to that discussed under Impacts Common to All Alternatives. The planning area would remain undesignated and cross-country use of OHVs weighing 2,000 pounds or less GVWR would be allowed throughout. Sensitive habitat areas would not receive additional protection from OHV impacts.

(g) Impacts to Special Status Plants from Special Designations

No ACECs or RNAs or suitable rivers have been designated under this alternative. Sensitive habitats would not be afforded additional protection through designation and management.

(3) Alternative B

(a) Impacts to Special Status Plants from Soil, Water, and Vegetation

Sensitive status plants would benefit from proper management of soils and water resources. Implementation of ROPs on a project specific basis would reduce disturbance to sensitive status plant habitats and aid in the recovery of habitat from permitted uses.

Proactive management of vegetative resources would provide positive benefit to sensitive status plant species. Vegetation would be managed to maintain a diversity of habitats for sensitive species plants. Active management to prevent introduction and spread of invasive and noxious plant species would help maintain habitats in good condition.

(b) Impacts to Special Status Plants from Wildlife Management

Indirect benefits to sensitive status plants under this alternative would accrue due to inventory and monitoring of wildlife habitats and the application of ROPs as appropriate. An indirect negative impact could be sustained to sensitive plant species and their habitats under this

alternative because no seasonal restrictions (generally from mid-May to mid-August) would be applied if oil and gas development were to occur in caribou habitat.

(c) Impacts to Special Status Plants from Livestock Grazing

Under this alternative, all 11.9 million acres of BLM-managed land would be open to livestock grazing, including both reindeer and bison. Therefore, an additional 9 million acres of BLM-managed lands outside the Seward Peninsula would be available for livestock use (some of this acreage is selected). Until the large WACH population declines significantly, it is unlikely that additional permits for reindeer grazing would be issued by the BLM. However, there has been recent interest in bison grazing on the Seward Peninsula. Overall, there could be an increase in livestock grazing pressure and trampling effects on sensitive status plants throughout the planning area under this alternative.

(d) Impacts to Special Status Plants from Leasable Minerals

Under the RFD scenario for oil and gas development, approximately 710,000 acres of BLM-managed land would be leased in the high occurrence potential region during the life of the plan. Impact to tundra vegetation and populations of sensitive status plants would vary from short-term and low impact, to long-term destruction of habitat.

Seismic surveys would be carried out during winter months, involving transport and camp move vehicles. Adequate snow cover and frozen ground offer some protection to underlying vegetation, but studies near the Colville River delta have shown compression of the vegetation mat, broken shrubs and crushed tussocks, usually ranging from little to no impact, to minor impact, to moderate impact during seismic work (Jorgenson et al. 2003b). Development is not likely within the life of the plan. However, if industry showed interest in the area, 43-55 exploration wells could be drilled during winter months involving ice roads, ice pads, and low-impact vehicles. Aside from destruction of vegetation in the immediate vicinity of each exploratory well (approximately 16 square feet), the impacts would be fairly short-term, with recovery from impacts to vegetation expected in a few years. The tundra mat would be compressed under ice roads and ice pads, and plants emerging in the spring would experience a shortened growing season due to delayed melt of ice cover. In localized area impact from ice roads may cause plants to die. If an economically viable field were discovered and developed (unlikely over the life of the plan) 467-517 acres of disturbance would be possible. The 417 acre oilfield would include one main and 5 satellite gravel drill pads, an airstrip, and gravel access roads. An additional 50-100 acres of disturbance would result from 3 gravel sources. An oil pipeline would also be necessary for transport to market, and 50-75 miles of a several hundred mile pipeline could be routed through the planning area.

Only a small coastal area in the vicinity of Cape Thompson and Ogotoruk Creek has been studied botanically, from 1959-1962 (Wilimovsky 1965). The Lisburne Hills and interior portion of the Lisburne Peninsula have received little to no botanical exploration. The sensitive status species *Erigeron muirii* (Muir's fleabane) has been documented at Cape Thompson and much farther east in the Arctic National Wildlife Refuge. The sensitive status species *Mertensia drummondii* (Drummond's bluebell), *Potentilla stipularis* (stipulated cinquefoil) and *Poa hartzii* ssp. *alaskana* (Alaskan bluegrass) have been found farther east on the North Slope in the northcentral and/or northeastern National Petroleum Reserve-Alaska (NPR-A), and with further botanical inventory may be discovered in the northern quarter of the planning area. Three additional species categorized as rare occur in the northern quarter of the planning area: *Smelowskia johnsonii* (Johnson's smelowskia) in the northern Lisburne Hills, *Rumex krausei* (Cape Krause sorrel) at Cape Thompson and Cape Dyer, and *Trisetum sibiricum* (Siberian

oatgrass) at Cape Thompson and Ogotoruk Creek. In recognition of the potential for significant surface disturbing activities inherent in oil and gas exploration, leasing, and production under this alternative and in accordance with ROP SS-3a, an ecological land classification map would be developed before approval of facility construction. Botanical inventory would be part of this effort. In accordance with ROP SS-1e, measures would be taken to protect populations or individual sensitive status plants using site-specific buffers or management prescriptions.

Special status plant species are most vulnerable to a large crude oil spill in June, July, or August, when soils are thawed to seasonal maximum and plants are actively growing. The most vulnerable habitats are those with drier, well-drained soils that would allow oil to penetrate to plant roots and underground rhizomes and buds. General assumptions for a both large and small oil spills are outlined in the Minerals section beginning on page 4-143. Additional assumptions specific to analysis of impacts to sensitive plants are:

- One large crude oil spill (500 bbl) from a damaged valve in a remote stretch of pipeline.
- The spill would occur in June, July, or August and in a drier habitat type.
- Similar to an actual spill at Franklin Bluffs in July 1977 (Walker et al. 1978) the oil is imagined to squirt out vertically, and a strong north wind carries the oil south, creating a fan-shaped impact area. The oil is assumed to spread fairly evenly over the ground for approximately an acre, forming a 2.0 cm thick layer of oil over the ground and vegetation. In addition, the oil coats the aerial stems of shrubs and the taller grasses and sedges.

Some portion of the expected 89 small crude oil spills and 220 small refined oil spills would occur on gravel pads, be cleaned up or contained, and pose no threat to surrounding tundra vegetation. The remaining portion of these spills would stem from problems with pipelines and the product would come into contact with vegetation. Impacts to plants from small spills would be the same as from large spills, except at a much smaller scale. Small oil spills can be expected to occur in all tundra vegetation habitats – standing water over tundra, as well as wet, moist, and dry tundra. Initial plant die-off will be lightest, and recovery quickest, in the wettest habitats or if the soil is frozen (McKendrick 1999). If spilled crude oil falls onto water-saturated or frozen soil, the light fractions (short chain) and aromatic fractions (ring structure) which are most toxic to plants may have time to evaporate before soaking into the soil (McKendrick 1999, McKendrick 2000). Impacts from refined products would be the same as discussed under Vegetation, Effects of Spills beginning on page 4-46.

Of the species discussed above, only *Rumex krausei,* is found in wet habitats. The rest occur in various types of dry habitats. Any oil spill can be expected to have severe impacts on any special status or rare plant populations growing in dry habitats. As explained in detail under Vegetation, Effects of Spills beginning on page 4-46, the most vulnerable habitats are those with drier, well-drained soils that would allow oil to penetrate to plant roots and underground rhizomes and buds. Dry habitats are the slowest to recolonize and the most susceptible to long-term damages from oil spills (McKendrick 2000). As forbs, *Erigeron muirii* and *Smelowskia johnsonii* may be at greater risk from exposure to crude oil than other vascular plants (shrubs, sedges, grasses, and rushes). This susceptibility may be related to their growth form – low stature and above ground buds – and limited protection of stems (McKendrick 1999). Initial studies by Walker et al. (1978) indicated that grasses have a poorer recovery potential than sedges and shrubs at moderate to heavy applications of crude oil. One of the three rare plants known to occur in the northern one-quarter of the planning area is the grass *Trisetum sibiricum*. *Rumex krausei*, growing in moist to saturated soil habitats, would be expected to have at least a moderate chance to recover or recolonize after an oil spill.

If exploration for coal occurred, it would most likely be within the Kukpowruk River Field or the Cape Beaufort Field, east of Cape Lisburne. Winter exploration for coal would have impacts on vegetation and sensitive status plants similar to those described above for oil and gas exploration. ROP FW-3a prohibits coal exploration activity within the WACH calving and insect relief areas from May 20 to August 15. This stipulation would reduce the potential for habitat disturbance impacts during the growing season for any sensitive status or other rare plants possibly occurring in these areas.

(e) Impacts to Special Status Plants from Locatable Minerals

This alternative has the highest potential for unfavorable impact on sensitive status plant species. All ANCSA (d)(1) withdrawals would be revoked and the entire planning area opened to locatable mineral entry, subject to adherence to ROPs. Within the life of the plan, the BLM assumes that 3-5 new placer mines might be initiated, each with an approximate 10 acre mining operation footprint, for a total of 30-50 acres of additional surface disturbance. Impacts of new placer mine operations would be the same as discussed under Impacts Common to All Alternatives. Any new placer mine site would be inventoried for presence of sensitive plant species. Use would be redirected to maintain public land health through avoidance of sensitive habitat (ROP SS-1d). If populations or individual sensitive plants are located, measures would be taken to protect these populations or individuals through site-specific buffers or management prescriptions (ROP SS-1e).

(f) Impacts to Special Status Plants from Mineral Materials

The volume of gravel extraction needed to support possible oil and gas development in the northern quarter of the planning area is projected in the reasonable foreseeable development scenario to be approximately 1 million cubic yards of material. Surface disturbance would amount to approximately 50-100 acres in terrain such as floodplains, shoreline deposits, bluffs, and rocky outcrops. Compared to the 710,000 acres estimated as possible for oil and gas leasing in the high occurrence potential region in the northern portion of the planning area, 50-100 acres set aside for gravel extraction is potentially a small impact. However, to possible sensitive status plants occurring in this northern region it may have a proportionally larger impact, since this particular group of species tends to occur in drier habitats. At least four sensitive status plants occur or have potential to occur at drier, or more well-drained, or rocky sites in the northern one-quarter of the planning area. *Potentilla stipularis* (stipulated cinquefoil) found farther east near Umiat in the NPR-A, often grows on low vegetated river banks, in grassy riparian terraces, or in moist Dryas-heath tundra adjacent to lakeshores or alpine creeks. *Erigeron muirii* (Muir's fleabane) has been documented at Cape Thompson (within the planning area) and the Arctic National Wildlife Refuge. Both *Mertensia drummondii* (Drummond's bluebell) and *Poa hartzii* ssp. *alaskana* (Alaskan bluegrass) have been found in north-central NPR-A. These last three species occur in dry habitats associated with bluffs, floodplains, river terraces, sand dunes, rocky outcrops or fellfields. These habitats are often primary sources of gravel fill used during oil and gas-related construction and development on the North Slope (National Research Council 2003). In addition, *Smelowskia johnsonii* (Johnson's smelowskia), a rare plant documented from the Lisburne Hills and Cape Thompson, is known to occur on limestone talus slopes and Dryas fellfields. Possible impacts to sensitive and rare plant populations and habitats could be severe. In accordance with ROP SS-1e, measures would be taken to protect populations or individual sensitive status plants using site-specific buffers or management prescriptions.

(g) Impacts to Special Status Plants from Recreation Management

Impacts would be the same as discussed under Impacts Common to All Alternatives.

(h) Impacts to Special Status Plants from Travel Management

Impacts to sensitive status plants from travel management and OHV use would be similar to that discussed under Impacts Common to All Alternatives. The planning area would be designated as limited and across-country use of OHVs would be allowed throughout. Sensitive habitat areas would not receive additional protection from OHV impacts.

(i) Impacts to Special Status Plants from Special Designations

Impacts would be the same as Alternative A.

(4) Alternative C

(a) Impacts to Special Status Plants from Soil, Water, and Vegetation

Impacts would be the same as Alternative B.

(b) Impacts to Special Status Plants from Wildlife Management

Indirect benefits to sensitive status plants under this alternative would accrue due to inventory and monitoring of wildlife habitats and the application of ROPs. Seasonal restrictions (generally from mid-May to mid-August) would be applied if oil and gas development were to occur in caribou habitat. An activity level management plan would be developed for management of caribou habitat in the Nulato Hills ACEC. This would indirectly benefit sensitive plant species by offering additional habitat protection and monitoring, especially for *Douglasia beringensis* (Bering dwarf primrose) and *Potentilla stipularis* (stipulated cinquefoil), both of which occur in the Nulato Hills. The ACEC proposed under this Alternative for the WACH calving ground and insect relief terrain on the Lisburne Peninsula would provide additional habitat protection for this large, botanically unexplored region north of Kivalina and adjacent to the NPR-A.

(c) Impacts to Special Status Plants from Livestock Grazing

This alternative is similar to Alternative A, except that 2 of the 15 current reindeer grazing allotments would be closed. In addition, permits for allotments where reindeer have been absent for 10 or more years due to emigration with caribou would not be renewed. Non-renewed allotments would be permanently retired from grazing. Grazing allotment boundaries would be modified to exclude ACECs. These measures would result in slightly less grazing pressure and trampling damage to sensitive status plants in the near term, and potentially more benefit in the future when the WACH population declines, and herders may attempt to build up their reindeer herds again.

(d) Impacts to Special Status Plants from Leasable Minerals

The probability of seismic exploration for oil and gas is very low under this alternative, and no exploratory drilling or development would occur. Under this alternative, areas with high potential for fluid mineral leasing are closed and solid mineral leasing would be deferred until industry showed interest. If exploration occurred, impacts for seismic exploration to sensitive status plants would be the same as discussed under Alternative B.

(e) Impacts to Special Status Plants from Locatable Minerals

Impacts to sensitive status plants would be lightest under this alternative. Approximately 50% of BLM-managed lands in the planning area would be closed to mineral entry to provide additional protection to sensitive areas, including the 300-foot riverbank setbacks along many major rivers and tributaries. Impacts would be similar to those discussed under Impacts Common to All Alternatives. Mitigation measures would be the same under Alternative B.

(f) Impacts to Special Status Plants from Mineral Materials

Impacts would be similar to those discussed under Impacts Common to All Alternatives, and less severe than those discussed under Alternative B. Under Alternative C, sale of mineral materials from riverbeds, ocean and lagoon shorelines, and lakeshores will not be permitted. The Kigluaik and McCarthy's Marsh ACECs, which contain habitat for two sensitive plant species, would be closed to mineral material disposal.

(g) Impacts to Special Status Plants from Recreation Management

Impacts would be the same as discussed under Impacts Common to All Alternatives.

(h) Impacts to Special Status Plants from Travel Management

Impacts to sensitive status plants from travel management and OHV use would be similar to that discussed under Impacts Common to All Alternatives but lesser in extent. OHV traffic in the planning area would be designated as limited to designated roads and trails. Additional restrictions such as seasonal restrictions or closures, or weight limits may be implemented within ACECs and SRMAs. Sensitive habitat areas in McCarthy's Marsh, upper Kuzitrin River, Kigluaik Mountains, Nulato Hills, and the De Long Mountains/Brooks Range (WACH calving and insect relief habitat) would receive additional protection from OHV impacts.

(i) Impacts to Special Status Plants from Special Designations

Designation of approximately 5.6 million acres of ACECs in five areas would provide additional protection to sensitive habitats, as well as to known and undiscovered populations of sensitive status plant species.

Three of eight species of sensitive status plants in the planning area occur in the proposed Kigluaik Mountains ACEC. *Artemisia globularia* var. *lutea* (purple wormwood) has been documented in only four locations in Alaska, and the western flank of the Kigluaik Mountains is one of them. *Artemisia senjavinensis* (yellow-ball wormwood) is endemic to the Seward Peninsula and southeastern Chukota Peninsula in Russia. It is found at a range of elevations scattered throughout the Seward Peninsula, including the Kigluaik Mountains. *Beckwithia glacialis* ssp. *alaskensis* (Alaskan glacier buttercup) is known from only two areas in North America – Greenland and the Kigluaik Mountains. Two other plant species considered rare in Alaska by the Alaska Natural Heritage Program occur in the Kigluaik Mountains: *Primula tschuktschorum* (Chukchi primrose) and *Ranunculus auricomus* (goldilocks buttercup). Measures identified for the proposed ACEC would directly benefit sensitive plant species: 1) Limiting OHVs to designated trails May 15 to October 31; 2) closing the area to locatable and leasable mineral entry; 3) limiting commercial recreation use; 4) designating the area as a right-of-way avoidance area; 5) limiting communication site rights-of-way (ROW) to the existing sites; 6) retaining lands in Federal ownership once conveyances are completed; and 7) closing the area to livestock grazing.

Two of eight species of sensitive status plants known to occur in the planning area are found in the Nulato Hills. Several *Potentilla stipularis* (stipulated cinquefoil) populations have been documented along the upper reaches of the Buckland River, in the northwestern portion of the proposed Nulato Hills ACEC. *Douglasia beringensis* (Bering dwarf primrose) has been collected several places in the Nulato Hills, just south of the proposed ACEC southern boundary, and is expected to occur within ACEC boundaries. Measures identified for the proposed ACEC to protect caribou habitat would directly benefit sensitive plant species: 1) Limiting OHVs to designated trails May 15 to October 31; 2) closing the area to locatable and leasable mineral entry; 3) designating the area as a ROW avoidance area; 4) retaining lands in Federal ownership once conveyances are completed; and 5) closing the area to livestock grazing.

The proposed WACH Calving Grounds and Critical Insect Relief ACEC sits on the Lisburne Peninsula, in the far northeastern portion of the planning area. Multi-disciplinary studies conducted in the Cape Thompson and Ogotoruk Creek region in support of Project Chariot from 1959-1962 (Wilimovsky 1965) are probably the most thorough and most recent botanical records for this area. Cape Thompson and Ogotoruk Creek are State-selected coastal lands just outside the southwestern edge of the proposed ACEC. The Lisburne Hills and interior portion of the Lisburne Peninsula have received little to no botanical exploration. The Sensitive Status Species *Erigeron muirii* (Muir's fleabane) has been documented at Cape Thompson and much farther east in the Arctic National Wildlife Refuge. The Sensitive Status Species *Mertensia drummondii* (Drummond's bluebell), *Potentilla stipularis* (stipulated cinquefoil), and *Poa hartzii* ssp. *alaskana* (Alaskan bluegrass) have been found on the North Slope in north-central and northeastern NPR-A. One or more of these three species may turn up within the proposed caribou calving and insect relief ACEC. Three additional species categorized as rare by the Alaska Natural Heritage Program occur within the proposed ACEC – *Smelowskia johnsonii* (northern Lisburne Hills), or closely adjacent – *Rumex krausei* (Cape Thompson and Cape Dyer) and *Trisetum sibiricum* (Cape Thompson and Ogotoruk Creek). Measures identified within the proposed ACEC to protect caribou habitat would directly benefit sensitive and rare plant species: 1) Limiting OHVs to designated trails May 15 to October 31; 2) closing the area to locatable and leasable mineral entry; 3) designating the area as a ROW avoidance area; 4) retaining lands in Federal ownership once conveyances are completed; and 5) closing the area to livestock grazing.

McCarthy's Marsh proposed ACEC is bounded to the north by the crest of the Bendeleben Mountains. The sensitive status plants *Pedicularis hirsuta* (hairy lousewort) occurs in alpine tundra just inside the ACEC northern boundary. This is the only known location for Alaska. Three other rare plant species (tracked by the Alaska Natural Heritage Program) occur just outside the northern ACEC boundary, on closely adjacent slopes and foothills of the Bendeleben Mountains. These species are: *Carex holostoma* (arctic marsh sedge), *Pleuropogon sabinei* (Sabine grass), and *Primula tschuktschorum* (Chukchi primrose). Their close proximity and shared habitats indicate the possibility of occurrence within the ACEC. Measures identified to protect wildlife habitats and botanical values in the proposed McCarthy's Marsh ACEC include: 1) limiting OHVs to designated trails May 15 to October 31; 2) closing the area to locatable and leasable mineral entry; 3) closing the area to mineral material sales; 4) limiting commercial recreation use; 5) designating the area a ROW avoidance area; 6) retaining the lands in Federal ownership, once conveyances are completed; 7) closing the area to livestock grazing; 8) developing a fire management plan protect lichen habitats for caribou winter range; and 9) prohibiting FLPMA and Recreation and Public Purposes (R&PP) leases.

No sensitive status or rare plant species are currently known to occur in the proposed Kuzitrin River ACEC.

(5) Alternative D

(a) Impacts to Special Status Plants from Soil, Water, and Vegetation

Impacts would be the same as discussed under Alternative B.

(b) Impacts to Special Status Plants from Wildlife Management

Impacts would be the same as discussed under Alternative C.

(c) Impacts to Special Status Plants from Livestock Grazing

Impacts would be similar to those discussed under Alternative A. The difference is that the option to graze livestock on BLM-managed lands outside the current use areas would be eliminated. That option has not been utilized under the current Northwest MFP, so no functional impact to sensitive status plants would result.

(d) Impacts to Special Status Plants from Leasable Minerals

Impacts would be similar to those discussed under Alternative B. Under Alternative D, a 300 foot setback on ten key rivers would be designated as no surface occupancy. The Kivalina River, located in the northern quarter of the planning area where leasable mineral development is possible, is one of these rivers. This could confer some benefit to species such as *Potentialla stipularis* which grows on moist, vegetated floodplains or river banks.

(e) Impacts to Special Status Plants from Locatable Minerals

Impacts would be very similar to those discussed under Impacts Common to All Alternatives and Alternative B. Under Alternative D, two additional ROPs, SS-4 and FW-7 would apply to locatable mineral activity. These two measures, designed to protect riparian and aquatic habitat from disturbance, would potentially reduce disturbance impacts to special status plant species occurring in the Kigluaik Mountains and floodplains of ten rivers.

(f) Impacts to Special Status Plants from Mineral Materials

Impacts would be the same as discussed under Impacts Common to All Alternatives and Alternative B.

(g) Impacts to Special Status Plants from Recreation Management

Impacts would be the same as discussed under Impacts Common to All Alternatives.

(h) Impacts to Special Status Plants from Travel Management

Impacts to sensitive status plants from travel management and OHV use would be similar to that discussed under Impacts Common to All Alternatives, but to a lesser extent. Although cross-country OHV use would be allowed in much of the planning area, additional restrictions such as limiting OHVs to existing or designated trails, seasonal restrictions or closures, and weight limits may be implemented within ACECs and SRMAs. Sensitive habitat areas in the Kigluaik Mountains, Nulato Hills, and the De Long Mountains/Brooks Range (WACH calving and insect relief habitat) would receive additional protection from OHV impacts.

(i) Impacts to Special Status Plants from Special Designations

Beneficial impacts to sensitive status plants would be somewhat less than under Alternative C, because the McCarthy's Marsh, Kuzitrin River, and Kigluaik Mountains ACECs would not be designated. The single known population in Alaska of *Pedicularis hirsuta* (hairy lousewort) in the proposed McCarthy's Marsh ACEC and the one known population of *Artemisia glomerata* var. *lutea* (purple wormwood) in the planning area, in the proposed Kigluaik Mountains ACEC, would not come under protective ACEC management. The Mount Osborn ACEC (in the Kigluaik Mountains) would be designated in the future, once conveyances are complete. Designation of the Mount Osborn ACEC would offer direct protection to *Beckwithia glacialis* ssp. *alaskensis* (Alaska glacier buttercup) and *Artemisia senjavinensis* (yellow-ball wormwood), but does not include known populations of *Artemisia globularia* var. *lutea* (purple wormwood). Measures outlined in the proposed Mt. Osborn ACEC to protect scenic, cultural, botanical, and geological values would directly benefit sensitive plant species and habitats: 1) the area would be designated as "limited" to OHV use. Until conveyances are complete, OHVs would be managed consistent with the State's generally allowed uses. Once conveyances are complete or the selections are relinquished, an OHV management plan would be developed to outline limitations on OHV use; 2) the area would be open to locatable mineral entry subject to strict required operating procedures; 3) remaining lands would be retained in Federal ownership.

b) Special Status Fish

Proposed management of the following resources/resource uses/programs would have no anticipated impacts to special status fish management: Air Quality, Cultural Resources, Paleontological Resources, Visual Resources, Forest Products, Livestock Grazing, Wilderness Characteristics, Iditarod National Historic Trail, Public Safety, Renewable Energy, Social and Economic Conditions, and Subsistence. Impacts to special status fish from Fire and Fire Management would also have no anticipated impacts since the habitat utilized by the Kigluaik Char is high alpine country with little or no fuel to burn.

Impacts to special status fish from all other resources/resource uses/programs except recreation management would be the same as discussed under the Fish section beginning on page 4-53.

(1) Impacts Common to All Alternatives

(a) Impacts to Special Status Fish from Recreation Management

Increased recreational use usually leads to increased fishing pressure. Unchecked recreational access to the Kigluaik Mountains may increase fishing pressure on the sensitive species arctic char inhabiting Fall Creek Lake and Crater Lake, as well as those char populations inhabiting other Kigluaik Mountain lakes. Regardless of the alternative, population assessments and monitoring must be done on the fish populations in Fall Creek Lake and Crater Lake to determine if increased fishing pressure is adversely affecting these susceptible BLM sensitive species populations.

c) Special Status Wildlife

Proposed management of the following resources/resource uses/programs would have no anticipated impacts to special status wildlife: Air Quality, Fisheries Management, Cultural Resources, Paleontological Resources, Visual Resources, Forest Products, Wilderness Characteristics, Iditarod National Historic Trail, Public Safety, Social and Economic Conditions, and Subsistence.

(1) Impacts Common to All Alternatives

(a) Impacts to Special Status Wildlife from Soil, Water, and Vegetation

There would be beneficial impacts to special status wildlife from proper management of soil, water, and vegetation. Implementation of mitigation measures to protect soil, water, and vegetation on a project specific basis would reduce disturbance to habitat for these species and aid in the recovery of habitat from permitted uses.

(b) Impacts to Special Status Wildlife from Fire and Fire Management

In general, impacts to special status wildlife from fire would be similar to those described in the wildlife section above. More specific effects are described below.

Effects on Steller's and spectacled eider are described in more detail in the Land Use Plan Amendment for Wildland Fire and Fuels Management for Alaska Environmental Assessment (BLM 2004b). Both of these species are Federally listed as threatened.

Fire within the breeding habitat of either eider species could have negative effects on the breeding population. However, fire frequency in the northern wet tundra habitat used for breeding is very low (Map 3-18) and the threat of wildland fires to the breeding population of Steller's and spectacled eider, and polar bears and their habitat is negligible. Since fire frequency is so low in these habitats, no fire suppression activity would be likely to occur and there would be no impacts from suppression activities to eiders, polar bears, or their habitat. Outside of breeding, eiders spend most of their time in marine habitats and thus would not be affected by fire or fire management activities. Polar bears spend most of their time on the pack ice and thus would not be affected. There would be no affect on designated critical habitat for eiders.

Fire within the breeding habitat of Kittlitz's murrelet could have negative effects on the breeding population. However, fire is rare in the montane habitats used by murrelets for nesting. Since 1950, only one fire has occurred in the Kigluaik Mountains and only two small fires have occurred in the Cape Lisburne area (Map 3-18). The threat of wildland fire to breeding Kittlitz's murrelet is negligible. Since fire frequency is so low in these habitats, no fire suppression activity would be likely to occur and there would be no impacts from suppression activities.

Some sensitive species would benefit from fire suppression that minimizes loss of individuals, populations, or habitats. On the other hand, fire suppression activities can also affect sensitive species through mortality, disturbance, displacement, and damage or alteration of key habitat components (BLM 2004b). Impacts to sensitive species would vary depending upon range and distribution, life history, and preferred habitats.

Fire near wetlands can consume dead grass and sedges, opening up dense marsh vegetation to maintain habitat for waterfowl such as black brant and long-tailed duck. Burning also stimulates new shoots that have greater forage value. Under the right conditions, fire may create new ponds or prevent old ponds from filling in with vegetation. Fire can have short-term negative effects on waterfowl when it occurs during nesting or molting periods, or when it eliminates woody vegetative cover (BLM 2004b).

It is difficult to generalize impacts of fire on passerine birds due to the great variety of habitat requirements. Shrub communities often support the greatest number and diversity of passerine birds (Kessel 1989). Shrub communities are maintained by periodic fires. Within forested areas, fire creates openings in the forest, and snags used for nesting, perching, and foraging. Fire may cause direct impacts to birds when it occurs during the nesting season, destroying nests and killing nestlings.

Potential direct and indirect effects from fire management include:

- Mortality or injury of adults, young, or eggs from smoke inhalation, or crushing by vehicles or equipment used during fire management activities.
- Disturbance or displacement of individuals from smoke, noise, and other human activities associated with fire management operations. This disturbance or displacement may affect foraging, roosting, or reproductive behavior.
- Nest abandonment or mortality of young, resulting in the loss of one year's recruitment.
- Loss or conversion of key habitat components needed for nesting, foraging, roosting, or cover.
- Creation of key habitat components.
- Increased risk of predation associated with removal of cover.
- Changes in the quantity or quality of available forage and prey species.
- Long-term changes in habitat quality or quantity for nesting, roosting, foraging, or cover that affects the ability of a species continuing to occupy an area or facilitating the return of a species to it historic range.

(c) Impacts to Special Status Wildlife from Livestock Grazing

The majority of the special status wildlife are birds, many of which are migratory, only spending a portion of their time in the planning area. There may be minor impacts to habitat due to cratering and exposure of mineral soils by grazing reindeer. In rare cases, there could potentially be direct mortality of nestling birds or eggs of ground nesting species due to trampling by reindeer or OHV use associated with herding. Impacts would vary depending upon range and distribution, life history, and preferred habitats of specific species but are expected to be minor to negligible. Under most alternatives, grazing would not be authorized within the known distribution of olive-sided flycatcher, Steller's eider, spectacled eider, king eider, black guillemot, or trumpeter swans. Grazing would have no impact on polar bears. Most alternatives would not authorize grazing in areas likely to be used by polar bears.

(d) Impacts to Special Status Wildlife from Locatable Minerals

Some mining exploration may occur under any alternative. Potential impacts to special status wildlife would include temporary disturbance or displacement in very localized areas, temporary loss of habitat, long-term degradation of habitat, and possible direct mortality of nestling birds or eggs. These impacts would be minimal due to the very low level of activity anticipated (less than 4 notices per year), the very minimal amount of acres disturbed (20 acres/year), and the temporary nature of the activity.

(e) Impacts to Special Status Wildlife from Mineral Materials

Impacts from mineral material disposal would be negligible under most alternatives. Sufficient material sources exist on private lands to meet the needs of most communities within the planning area and few requests for mineral material sales are anticipated on BLM managed land. One exception is mineral materials needed for oil and gas development. These impacts are discussed under fluid leasable minerals, Alternatives B and D.

(f) Impacts to Special Status Wildlife from Recreation Management

There would be minor impacts to special status wildlife from both commercial and non-commercial recreation activities. The primary impacts would be temporary stress and displacement of individual animals due to recreational activities, or to recreation associated access (aircraft overflight and landing in remote areas). In areas that are repeatedly used for camping sites, there may be minor, site-specific degradation of habitat. OHV use associated with commercial recreational activities could occasionally result in mortality of nestlings and eggs of ground nesting birds. Given the low level of recreational use on most BLM-managed lands within the planning area, these impacts would be minimal and would not have population level effects.

(g) Impacts to Special Status Wildlife from Travel Management

There would be both direct and indirect impacts on special status wildlife from Travel Management and OHV. Direct effects include stress and displacement of animals, possibly to less suitable habitats. Changes to traditional movement patterns, distribution and behavior of wildlife can result from exposure to OHVs (ADF&G 1990). Wildlife are particularly vulnerable to disturbance during stressful periods during life history such as nesting, molting, or denning. Refugia areas will become more accessible over time as OHVs become more powerful and as the human population in the planning area increases. Indirect effects may include habitat degradation and alternation, and increased access into habitats due to proliferation of trails.

(h) Impacts to Special Status Wildlife from Renewable Energy

Impacts to special status wildlife would be the same as those described under wildlife, common to all alternatives. There is a potential for bird mortality due to collisions with wind turbines. Some of the avian mortality could involve special status species, particularly if wind-generating facilities were located within breeding habitats for these species. Based upon the low numbers of bird strikes on wind turbines in other parts of the United States (BLM 2005e) and the small-scale of wind energy projects anticipated, impacts are expected to be minimal.

(i) Impacts to Special Status Wildlife from Lands and Realty Actions

There would be both direct and indirect impacts to special status wildlife from lands and realty actions under all alternatives. Special status wildlife may be temporarily displaced or disturbed during activities authorized under this program. There may be direct mortality to small or immobile species such as nestling birds. Habitat may be destroyed, fragmented, or degraded. However, BLM-managed lands are generally far from settled areas and the demand for realty actions is expected to be low. These types of impacts would affect a very small percentage of the BLM-managed land in the planning area. Impacts would vary between species depending on their range, life history, and habitat preferences.

(2) Alternative A

(a) Impacts to Special Status Wildlife from Soil, Water, and Vegetation

Impacts would be the same as discussed under Impacts Common to All Alternatives.

(b) Impacts to Special Status Wildlife from Livestock Grazing

Impacts to special status wildlife would be similar to those discussed under Impacts Common to all Alternatives and would vary depending upon the range, life history and preferred habitats of individual species. Although the entire planning area is open to grazing by reindeer under this alternative, it would be unlikely for grazing to be authorized within the breeding range of Steller's eider, spectacled eider, king eider, trumpeter swans, or black guillemot due to the presence of caribou in these areas. There would be no impacts to these species or their breeding habitat.

(c) Impacts to Special Status Wildlife from Leasable Minerals

There would be no impacts to special status wildlife under this alternative as no leasing would occur. No exploration is anticipated.

(d) Impacts to Special Status Wildlife from Locatable Minerals

Impacts would be the same as discussed under Impacts Common to All Alternatives.

(e) Impacts to Special Status Wildlife from Mineral Materials

Impacts would be the same as discussed under Impacts Common to All Alternatives.

(f) Impacts to Special Status Wildlife from Recreation Management

Impacts would be the same as discussed under Impacts Common to All Alternatives.

(g) Impacts to Special Status Wildlife from Travel Management

Impacts to special status wildlife from OHV use and travel management would be similar to that discussed under Impacts Common to All Alternatives. The planning area would remain undesignated and cross-country use of OHVs weighing 2,000 pounds or less GVWR would be allowed throughout. Wildlife habitat areas would not receive additional protection from OHV impacts.

(h) Impacts to Special Status Wildlife from Special Designations

There would be no ACECs, RNAs, or suitable rivers under this alternative. Thus there would be no impacts from these designations to special status wildlife.

(3) Alternative B

(a) Impacts to Special Status Wildlife from Soil, Water, and Vegetation

There would be beneficial impacts to special status wildlife from proper management of soils, and water resources. Implementation of ROPs on a project specific basis would reduce disturbance to special status wildlife habitats and aid in the recovery of habitat from permitted uses. In addition, proactive management of vegetative resources would benefit special status

wildlife. Vegetation would be managed to maintain a diversity of habitats. The BLM would manage lichen-rich plant communities (lichen tussock tundra, white spruce-lichen woodland, etc.) as unique habitats. Proactive management to prevent introduction and spread of invasive and noxious plants would help maintain habitats in good condition.

(b) Impacts to Special Status Wildlife from Livestock Grazing

Impacts to special status wildlife from reindeer grazing would be similar to those discussed under Impacts Common to All Alternatives but possibly more extensive as the entire planning area would be open to reindeer grazing. It is unlikely that new reindeer grazing operations would be established outside of the Seward Peninsula due to the presence of caribou throughout most of the planning area. Therefore, impacts would be limited to special status wildlife occurring on the Seward Peninsula, including: blackpoll warbler, MacKay's bunting, gray-cheeked thrush, Kittlitz's murrelet, yellow-billed loon, black brant, red knot, red-throated loon, bristle-thighed curlew, surf scoter, long-tailed duck, and harlequin duck.

In addition, grazing by bison could be authorized on the Seward Peninsula under this alternative. Potential impacts to special status wildlife from authorization of bison grazing include trampling of nests or nestlings, minor disturbance to habitats, and stress/disturbance to special status wildlife from bison herding activities.

(c) Impacts to Special Status Wildlife from Leasable Minerals

1. Fluid Leasable Minerals

a. Seismic Exploration

Seismic exploration would only occur in the northern quarter of the planning area which includes habitat for Steller's eider, spectacled eider, king eider, black guillemot, red knot, Kittlitz's murrelet, and black brant. There would be no effect on these species from seismic exploration occurring during the winter months as they are not present in the planning area at this time. Polar bears also occur in this region and are present during the winter when seismic exploration would be expected to occur.

Summer geophysical work, including field sampling would involve helicopter support and could have negative effects on these species depending on the location of the work in relation to their habitat. Summer seismic work, including aircraft overflights would have temporary and non-lethal effects on special status wildlife, probably lasting less than an hour. Elevated activity and air traffic in the vicinity of large summer camps may result in minor impacts on both local and regional populations of these species.

As discussed above, disturbance effects from oil and gas seismic exploration on spectacled and Steller's eiders are likely to be short-term and localized. Summer seismic work could have temporary and non-lethal effects on eiders, probably lasting less than an hour (BLM 2003b). However, given the extremely low eider density and the land ownership patterns in the portion of the planning area where seismic exploration would be most likely to occur, few disturbance effects to eiders are anticipated.

Lynx may be temporarily disturbed or displaced by seismic activities, with reoccupation of the area after the exploration activities are complete. These impacts would be rare as lynx are not common in the areas were seismic exploration is most likely to occur.

Seismic surveys located near the coast could potentially expose a few denning polar bears to noise and disturbance. This activity could result in the displacement of a few maternal polar bears and their cubs, leading to the abandonment of the den site and possible loss of a small number of cubs (USDOI, BLM 2003b). Few polar bears are expected to be affected, however, because of the low number maternal den sites expected on BLM-managed land and the limited amount of coastal land under BLM management.

If the seismic camp was located near the coast, polar bears could be attracted to the camps by food odors and curiosity. Some polar bears could be harassed or killed to protect workers. These types of encounters are unlikely given the very limited coastal areas managed by BLM, the low level of seismic activity projected, and the low probability of encountering polar bears on BLM-managed land. The number of bears harassed as a result of such encounters is expected to be very low.

To limit and avoid excessive harassment or taking of non-endangered marine mammals, the Marine Mammal Protection Act requires lessees to have a permit or letter of authorization to conduct activities that may harass or take marine mammals. This requirement is expected to further limit disturbance of polar bears associated with leasable mineral activities within the planning area. Documented impacts on polar bears by the oil and gas industry during the past 30 years are minimal (Federal Register 2007). Polar bears spend a limited amount of time on land, coming ashore to feed, den, or move to other areas. During those periods, the likelihood of interactions between polar bears and industry activities increases. In Prudhoe Bay, the FWS found that polar bear interaction planning and training requirements have increased polar bear awareness and minimized these encounters. Since 1968, there have been two documented cases of lethal take of polar bears associated with oil and gas activities (Federal Register 2007). Both were in defense of human life.

Indirect impacts to special status wildlife from seismic operation may include degradation of habitat (impacts to soil and vegetation). These types of impacts would be minimized by implementation of the ROPs, including limiting seismic exploration to the winter when the ground is frozen and covered with snow.

b. Exploratory Drilling for Oil and Gas

Exploratory drilling for oil and gas would only occur in the northern quarter of the planning area which includes habitat for Steller's eider, spectacled eider, king eider, black guillemot, red knot, Kittlitz's murrelet, and black brant. Exploratory drilling would only occur during the winter. Therefore, there would be no effect on these species as they are not present in the planning area at this time. Polar bears and lynx may be temporarily disturbed or displaced by exploratory drilling, with reoccupation of the area after the exploration activities are complete. Impacts to polar bears would be similar to impacts from seismic exploration and to impacts to grizzly bears discussed in section (B)(3)(b) "Wildlife."

c. Oil and Gas Development

Although construction will occur primarily during winter, development will bring year-round facilities and activities to the northern quarter of the planning area which includes habitat for Steller's eider, spectacled eider, king eider, black guillemot, red knot, Kittlitz's murrelet, black brant, and polar bear. Those species present in the area may be disturbed by ground vehicles, humans on foot, and low-flying aircraft associated with oil development. Potential effects of oil-development activities include both direct and indirect habitat loss. Direct loss of habitat would result from gravel mining and gravel deposition on the tundra for roads, pads, and airstrips.

There may be indirect habitat loss through reduced access caused by physical or behavioral barriers created by roads, pipelines, and other facilities.

The oil and gas development activities with the greatest potential for causing loss of habitat are gravel mining and placement (BLM 2005h). Roads and pads are constructed using gravel, and tundra covered by gravel would no longer be available for eider nesting, brood-rearing, or foraging. This loss of habitat would continue for as long as the proposed development was in operation. If abandonment plans call for allowing gravel pads and roads to "bed" naturally, loss of habitat may extend considerably longer than the end of the operational life of the field. Under this alternative, up to 417 acres may be disturbed over the long-term, due to development of one oil field (development wells, airstrip, connecting roads, and other facilities). An additional 50-100 acres would be disturbed due to gravel mining. This potential loss of breeding habitat for most species would likely result in negligible population effects.

Although specific studies have not been conducted to investigate the population effects of eider displacement as a result of infrastructure construction, spectacled and Steller's eiders displaced from nesting or brood-rearing sites may move to adjacent habitats (BLM 2005h). Anderson et al. (2003) and Troy, D. (1996) reported spectacled eider nests within several hundred feet of roads and pads in the Kuparuk and Prudhoe Bay oil fields. Since nest site fidelity has been demonstrated by spectacled eiders (Troy, D. 1997), it is possible that spectacled or Steller's eiders displaced from traditional nesting sites by gravel placement would return to the same general area and utilize similar habitats. If spectacled or Steller's eiders were present within the proposed development area, BLM and the permittee would consult with FWS about the design and placement of roads and facilities.

Under this alternative, the reasonable foreseeable development scenario identifies the possibility of the development of one oil field with a footprint of 417 acres. Spectacled eider breeds and molts on the Arctic Coastal Plain from Cape Simpson east to the Sagavanirktok River (BLM 2005h) and may nest within the planning area (FWS 2004a). 467-517 acres of spectacled eider breeding habitat may be lost due to gravel mining and gravel deposition for facility construction (see Analysis Assumptions: Minerals beginning on page 4-11). Steller's eider breeds outside of the planning area (FWS 2004a), but likely migrates through the area. Therefore, no impacts to Steller's eider breeding habitat are anticipated.

Disturbance impacts to polar bears would be similar to those discussed under seismic impacts. A similar effect could occur from construction activities near maternal dens. The increase in human presence resulting from the establishment of permanent settlements (oil fields, mines, etc.), may lead to human-bear encounters and to conflict, particularly if bears learn to associate humans with food.

d. Effects of Spills

Impacts to special status species would be similar to those discussed under Wildlife, Effects of Spills beginning on page 4-77. Most of the BLM sensitive species occurring in the planning area are migratory birds which are only found in the area during the breeding season. The area where a spill might occur includes habitat for Steller's eider, spectacled eider, king eider, black guillemot, red knot, Kittlitz's murrelet, and black brant. Oil spills onto tundra, freshwater, or marine habitats could negatively impact these species. Birds may be oiled, causing feathers to lose their insulating ability, resulting in hypothermia. This effect would be more severe in marine and fresh water habitats than tundra habitats. Birds could also suffer toxic effects from ingestion oil contaminated food or oil ingestion resulting from preening of oiled feathers (Hansen

1981). Oil contacting bird eggs could cause toxic effects to embryos (Patten and Patten 1979, Stickel and Dieter 1979).

A spill occurring during the summer breeding season would have a greater impact than a spill occurring during the winter, when these species are on wintering grounds. However, lingering effects from a winter spill could impact birds during the following breeding season.

Spectacled eider breeds and molts on the Arctic Coastal Plain and may nest within the planning area in low densities. McDonald et al. (2002) conducted an oil spill risk assessment for spectacled eiders in the Prudhoe Bay area, using scenarios constructed to mimic spills that had occurred on lake and tundra habitats in the Prudhoe Bay oil field. Based on the assumptions of these scenarios, a maximum of 2.5 spectacled eiders would be exposed to oil from an aquatic spill covering 1,134 acres, and 0.34 spectacled eiders would be exposed to oil from a tundra spill covering 146 acres. Given that the planning area is much lower density eider habitat than that used in the scenario by McDonald et al. (2002) even fewer individual eiders would be potentially exposed to oil. In addition, projected spills in the planning area (Table 4-3, 4-4 and 4-5) would likely affect less acreage than in the scenario used by McDonald et al.

Steller's eider breeds outside of the planning area (FWS 2004a), but likely migrates through the area. There would be no impacts to Steller's eider breeding habitat. In the event of a large spill during the migratory season, a few individual eiders could potentially be affected.

Polar bears occur on coastal streams, beaches, mudflats, and river mouths during certain times of the year. If an oil spill were to contaminate these habitats, some bears could ingest contaminated food, such as oiled birds, seals, or other carrion. Such ingestion could result in the loss of a few bears. An oiling experiment on captive polar bears indicated that if a bear's fur becomes oiled and the bear ingests a considerable amount of oil while grooming, kidney failure and other complications could lead to the bear's death (Oritsland et al. 1981). Anecdotal accounts of polar bears deliberately ingesting hydraulic and motor oil, and foreign objects from human garbage sites suggest that bears are vulnerable to ingesting oil directly, especially from oiled carrion and other contaminated food sources (Derocher and Stirling 1991). Skin damage and temporary loss of hair can result from oiling, with effects on thermal insulation.

2. Solid Leasable Minerals

If exploration for coal occurred, it would be most likely within the Kukpowruk River Field or the Cape Beaufort Field, east of Cape Lisburne. These fields potentially include habitat for Steller's eider, spectacled eider, Kittlitz's murrelet, king eider, black brant, red knot, harlequin duck, long-tailed duck, black scoter, yellow-billed loon, and grey-cheeked thrush. There would be no effect on these species from exploration occurring during the winter months as they are not present in the planning area at this time. This is also within the normal range of the polar bear. Bears could be present in the area during the winter. Impacts to polar bears would be similar to those discussed under Fluid Leasable Minerals above.

Summer geophysical work, including field sampling would involve helicopter support and could have negative effects on special status wildlife depending on the location of the work in relation to their habitat. Summer exploration, including aircraft overflights would have temporary and non-lethal effects on special status wildlife, probably lasting less than an hour. Elevated activity and air traffic in the vicinity of large summer camps may result in minor impacts on both local and regional populations of these species. The potential for impacts to nesting birds would be further reduced by ROP FW-3a which prohibits coal exploration activity within the WACH

calving and insect relief areas, May 20-August 15. This stipulation would reduce the potential for disturbance impacts to special status birds that nest within these areas.

(d) Impacts to Special Status Wildlife from Locatable Minerals

Impacts would be similar to that discussed under Impacts Common to All Alternatives but slightly greater in extent. The development of 3-5 placer mines would have minor impacts on special status wildlife. The distribution of special status wildlife and the amount of habitat available within the state is such that the loss of up to 50 acres of habitat over the life of the plan would result in only minor impacts to any given species. Impacts would be localized in the immediate vicinity of the mines. In these specific areas, animals would be displaced and an estimated 10 acres of habitat would be unavailable during the life of the operation. There may be mortality of eggs or nestling birds during initial clearing of land to be mined. These losses would be localized and there would not be population level impacts. Implementation of the ROPs would further reduce the impacts to special status wildlife and their habitat under this alternative.

(e) Impacts to Special Status Wildlife from Mineral Materials

Impacts would be similar to those discussed under Impacts Common to All Alternatives but greater as up to 1,000,000 cubic yards of material would be needed for oil and gas development activities. Impacts to special status species are discussed under Fluid Leasable Minerals above.

(f) Impacts to Special Status Wildlife from Recreation Management

Impacts would be the same as discussed under Impacts Common to All Alternatives.

(g) Impacts to Special Status Wildlife from Travel Management

Impacts to special status wildlife from OHV use and travel management would be similar to that discussed under Impacts Common to All Alternatives. The planning area would be designated as limited and cross-country use of OHVs would be allowed throughout. Special habitat areas would not receive additional protection from OHV impacts.

(h) Impacts to Special Status Wildlife from Lands and Realty Actions

Impacts to special status wildlife from lands and realty actions would be the similar to those discussed under Impacts Common to All Alternatives. Under this alternative, large, contiguous blocks of BLM lands are identified for retention and thus would not be available for disposal, providing additional protection for special habitats.

(i) Impacts to Special Status Wildlife from Special Designations

There would be no ACECs, RNAs, or suitable rivers under this alternative.

(4) Alternative C

(a) Impacts to Special Status Wildlife from Soil, Water, and Vegetation

Impacts would be the same as discussed under Alternative B.

(b) Impacts to Special Status Wildlife from Livestock Grazing

Impacts to special status wildlife would be similar to those discussed under Impacts Common to All Alternatives but even lesser in extent. Grazing would be limited to the Seward Peninsula and 2.5 million acres in four areas would be closed to grazing. This would include McCarthy's Marsh and the upper Kuzitrin River, both areas with extensive waterfowl habitat.

(c) Impacts to Special Status Wildlife from Leasable Minerals

Under this alternative, areas with high potential for fluid mineral leasing are closed and solid mineral leasing would be deferred until industry showed interest. If exploration were to occur, impacts would be similar to those discussed under Alternative B. The probability of seismic exploration occurring under this alternative is very low, and no exploratory drilling or development would occur. If coal exploration occurred under this alternative, impacts would be the same as those discussed under Alternative B.

(d) Impacts to Special Status Wildlife from Locatable Minerals

Impacts would be the same as discussed under Impacts Common to All Alternatives.

(e) Impacts to Special Status Wildlife from Mineral Materials

Impacts to special status wildlife from mineral material disposal would be similar to but less than impacts projected under Impacts Common to All Alternatives. Two special habitat areas, McCarthy's Marsh and the Kigluaik Mountains, both area used by special status wildlife, would be closed to mineral material disposal, providing additional protection to habitats in these areas. Sale of mineral materials from riverbed, ocean beach/lagoon and lakeshore would not be permitted. Oil and gas development would not occur so there would be no material sales associated with oil and gas activity. These additional benefits would be minor due to the low probability of mineral material disposal occurring on BLM-managed lands in the first place.

(f) Impacts to Special Status Wildlife from Recreation Management

Impacts to special status wildlife from recreation would be similar to those discussed under Impacts Common to All Alternatives but possibly lesser in extent. The Squirrel River and Kigluaik Mountains would be designated as SRMAs and additional management attention would be focused in these areas. Activity level plans would be developed, providing an opportunity to develop more specific management objectives and to design recreation facilities to minimize impacts to special status wildlife.

(g) Impacts to Special Status Wildlife from Travel Management

Impacts to special status wildlife from OHV use and travel management would be similar to that discussed under Impacts Common to All Alternatives but lesser in extent. The planning area would be designated as limited to designated roads and trails. Additional restrictions such as seasonal closures may be implemented within ACECs and SRMAs. Special habitat areas in McCarthy's Marsh, upper Kuzitrin River, Kigluaik Mountains, Nulato Hills, and the De Long Mountains/Brooks Range (WACH calving and insect relief habitat) would receive additional protection from OHV impacts.

(h) Impacts to Special Status Wildlife from Lands and Realty Actions

Impacts would be the same as under Alternative B.

(i) Impacts to Special Status Wildlife from Special Designations

Designation of 5.6 million acres of ACECs and the area-wide restrictions implemented in five areas would provide additional protection of special habitats. Designation of the WACH calving and insect relief habitat would benefit Kittlitz's murrelet, king eider, yellow-billed loon, harlequin duck, long-tailed duck, surf scoter and black scoter by providing additional protection for habitat and reducing the potential for disturbance or displacement of birds from human activity in the area. Designation of the McCarthy's Marsh and Kuzitrin River ACECs would provide additional protection to habitats for bristle-thighed curlew, harlequin duck, long-tailed duck, surf scoter, red knot, yellow-billed loon, black-poll warbler, McKay's bunting, and black scoter. Designation of the Kigluaik ACEC would provide additional protection to habitat for Kittlitz's murrelet. Designation of the Nulato Hills ACEC would provide additional protection to habitat for harlequin duck, long-tailed duck, black-poll warbler, olive-sided flycatcher, and lynx.

Determination of 11 river systems as suitable for designation as wild under the WSR Act would provide some additional protection of habitats for Special Status Species using these habitats, such as harlequin duck.

(5) Alternative D

(a) Impacts to Special Status Wildlife from Soil, Water, and Vegetation

Impacts would be the same as Alternative B.

(b) Impacts to Special Status Wildlife from Livestock Grazing

Impacts to special status wildlife from livestock grazing would be similar to those discussed under Alternative C but slightly greater in extent. Grazing would be limited to the Seward Peninsula and approximately 1,060,000 acres in McCarthy's Marsh and the upper Kuzitrin River would be closed to grazing providing additional protection to habitats for bristle-thighed curlew, harlequin duck, long-tailed duck, surf scoter, red knot, yellow-billed loon, black-poll warbler, McKay's bunting, and black scoter.

(c) Impacts to Special Status Wildlife from Leasable Minerals

Impacts would be almost the same as Alternative B. Under Alternative D, a 300 foot setback on the Kivalina River would be designated as no surface occupancy for fluid leasable minerals. If mineral development was proposed in this area, there would be a reduction in long-term habitat disturbance of riparian habitats along the Kivalina River, benefiting special status species dependant upon these habitats. Given the low probability of leasable mineral exploration or development along the Kivalina River and the limited amount of habitat involved, these benefits would be minor.

(d) Impacts to Special Status Wildlife from Locatable Minerals

Impacts would be almost same as Alternative B. Under Alternative D, ROP SS-4 and FW-7 would apply to locatable mineral development within the floodplains of ten rivers and near the lakes in the Kigluaik Mountains. If mineral development was proposed in these areas, there would be a slight reduction in the potential for long-term disturbance of riparian habitats supporting special status species.

(e) Impacts to Special Status Wildlife from Mineral Materials

Impacts would be the same as Alternative B.

(f) Impacts to Special Status Wildlife from Recreation Management

Impacts would be the same as Alternative C.

(g) Impacts to Special Status Wildlife from Travel Management

Impacts to special status wildlife from OHV use and travel management would be similar to that discussed under Impacts Common to All Alternatives but lesser in extent. Although cross-country OHV use would be allowed in much of the planning area, additional restrictions such as limiting OHVs to existing or designated trails, and seasonal closures may be implemented within ACECs and SRMAs. Sensitive habitat areas in the Kigluaik Mountains, Nulato Hills, and the De Long Mountains/Brooks Range (WACH calving and insect relief habitat) would receive additional protection from OHV impacts.

(h) Impacts to Special Status Wildlife from Lands and Realty Actions

Impacts would be the same as Alternative B.

(i) Impacts to Special Status Wildlife from Special Designations

Impacts to special status wildlife would be similar to those discussed under Alternative C except that no rivers would be determined suitable. There would be less protection of waterfowl habitat in McCarthy's Marsh and the upper Kuzitrin River as these areas would not be designated as ACECs under this alternative. Kittlitz's murrelet habitat in the Kigluaik Mountains would receive less protection as a smaller area, the Mount Osborn ACEC, would be designated.

5. Fire Management and Ecology

a) Impacts Common to All Alternatives

(1) Wildland Fire

The impacts of other resources or uses on wildland fire are minimal. The exception to this is if one or more resources or uses wants fire excluded in a given area.

The biggest potential impact to Fire Management is in areas where fire exclusion is being attempted. Long-term fire suppression in the boreal forest does not create a fuel loading problem in the classic sense. Although the overall fuel load on any particular site may increase with time and fire exclusion, it usually does so with additional biomass being added to the organic layer. It also creates large homogeneous stand of flammable fuels, usually black spruce. Species diversity is decreased. The end result is larger more severe fires that may be outside the range of natural variability. This attempt at fire exclusion then impacts other resources over the long-term and with potentially high impact effects. For example, attempts at fire exclusion in the range of the western artic caribou's herds wintering range could result in significant portions of their range burning in one fire event limiting the carrying capacity of their range.

(2) Fuels Management

There are no planned fuels management projects at this time. If projects are proposed in the future, their impact on the fire program will be in the form of time commitment for preparation and budgetary for implementation.

6. Cultural Resources

a) Impacts Common to All Alternatives

Federal undertakings and unauthorized uses have the potential to cause irreversible disturbance and damage to non-renewable cultural resources. BLM would continue to avoid impacts to cultural resources from authorized uses through project redesign. If necessary, impacts would be mitigated through data recovery investigations in accordance with the National Cultural Programmatic Agreement and the Alaska Protocol for Managing Cultural Resources.

Without a 100% inventory of public lands within the planning area, the exact number, kind, and variability of cultural resources will be unknown. New cultural resources will continue to be found and evaluated for eligibility to the National Register of Historic Places as additional inventories are completed.

b) Alternative A

Under Alternative A, existing management practices would continue. Few impacts to cultural resources are anticipated from authorized activities due to the remoteness of most BLM-managed lands and the nature of most permitted activities. Currently the primary permitted activity in the planning area is Special Recreation Permits for big game guides, and these involve little potential for impacts. Other activities that have been authorized under current management include plans of operation for placer mining, rights-of-way for crossing public lands, leases for improvements associated with reindeer grazing, communication sites and research uses. These activities happen infrequently, and to date significant conflicts with cultural resources have not occurred. There is some potential for impacts from unauthorized activities, but it is difficult to estimate the extent of this, as the cost of monitoring known sites is prohibitive and there has been no consistent attempt to track the condition of the resource.

c) Alternative B

Under Alternative B, there could be a significant increase in the potential for impacts to cultural resources.

Exploration for leasable minerals involves little potential for impacts, with the application of the Required Operating Procedures and Oil and Gas Stipulations (Appendix A). Exploration and development of oil and gas is considered unlikely for the life of the plan, however, if it occurs, such development would probably result in surface disturbance that could pose a threat to cultural resources. Based on the Reasonable Foreseeable Development scenario, 417 acres

would be disturbed by construction of well pads and associated airstrip and roads. An additional 50 to 100 acres would be disturbed through extraction of gravel for these developments.

In the absence of specific information concerning design and location, it is difficult to estimate the extent to which cultural resources might be affected by other construction associated with oil and gas development. Gathering lines, delineation wells, and distribution pipeline are estimated to entail short-term disturbance of up to 4,979 acres. Most, if not all, of these features would be built during the winter, minimizing the amount of surface disturbance, but drilling for Vertical Support Members and any sections of buried pipeline would clearly have potential for disturbance or destruction of cultural resources. Given that this development would probably occur in the northern portion of the planning area, where numerous prehistoric sites are known to be located, there is clear potential for conflicts with cultural resources.

An additional 53.5 acres of non-BLM-managed land in the plan area might be disturbed as a result of development related to coal bed natural gas extraction.

Some impacts to cultural resources can be anticipated from locatable mineral development under this alternative. Three to five placer mines are expected to occur under this alternative, which would entail surface disturbance of 30-50 acres. Based on current experience with placer mining operations, this level of activity is unlikely to impact more than one or two sites.

Little or no impact to cultural resources is anticipated from all other resource uses. Increased OHV use would probably result in some increase in impacts to cultural resources from activities such as looting and vandalism, but it is impossible to develop a reliable estimate of the probable extent of this impact.

d) Alternative C

Impacts to cultural resources would be the same as for Alternative A.

e) Alternative D

Impacts to cultural resources would be the same as for Alternative B.

7. Paleontological Resources

a) Impacts Common to All Alternatives

Federal undertakings and unauthorized uses have the potential to cause irreversible disturbance and damage to non-renewable paleontological resources. The BLM would mitigate impacts to significant paleontological resources from authorized uses through project redesign and specimen recovery. Geologic formations with exposures containing vertebrate and non-vertebrate fossils would be impacted from natural agents, unauthorized public collection, and vandalism. Given the little information we have about paleontological resources in most of the planning area, it is difficult to estimate the extent and nature of anticipated impacts.

b) Alternative A

Under Alternative A expected impacts to paleontological resources would stem almost exclusively from unauthorized uses and natural causes.

c) Alternative B

Under Alternative B, anticipated development associated with leasable and locatable minerals, especially in the northern part of the planning area, could have adverse impacts on paleontological resources.

Exploration and development of oil and gas is considered unlikely for the life of the plan, however, if it occurs, such development would result in surface disturbance that could pose a threat to paleontological resources. Based on the RFD scenario, 417 acres would be disturbed by construction of well pads and associated airstrip and roads (BLM 2005j). An additional 50-100 acres would be disturbed through extraction of gravel for these developments. This development is considered most likely in the northern part of the planning area, where almost all of the known paleontological occurrences on BLM-managed lands are located. Winter construction of gathering lines, delineation wells, and distribution pipeline are estimated to entail short-term disturbance of up to 4,979 acres. The potential for this type of construction to impact paleontological resources is probably slight.

An additional 53.5 acres of non-BLM-managed land in the plan area might be disturbed as a result of development related to coal bed natural gas extraction.

Some impacts to paleontological resources can be anticipated from locatable mineral development under this alternative. Three to five placer mines are expected to occur, which would entail surface disturbance of 30-50 acres. Depending on the location of these mines and the methods utilized for stripping overburden, these operations could result in disturbance and destruction of paleontological materials.

Little or no impact to paleontological resources is anticipated from all other resource uses. Impacts from natural agents and unauthorized uses would also occur.

d) Alternative C

Impacts to paleontological resources would be essentially the same as for Alternative A.

e) Alternative D

Impacts to paleontological resources would be essentially the same as for Alternative B.

8. Visual Resources

Proposed management of the following resources/resource uses/programs would have minor anticipated impacts to visual resources: Cultural Resources, Paleontological Resources, Fish and Wildlife Management, Special Status Plants, Water Resources, and Livestock Grazing. Minor impacts would be from the result of research studies, inventory etc. that are temporary, lasting two to three seasons. These may require camps with temporary structures such as tents, outhouses, aircraft support and human presence and associated activity would create minimal short-term impact on visual resources (Table 4-1).

Proposed management of the following resources/resource uses/programs would have no anticipated impacts to visual resources: Air Quality, Soil Management, Wilderness Characteristics, Special Designations, Public Safety, Social and Economic Conditions, and Subsistence.

a) Impacts Common to All Alternatives

(1) Impacts to Visual Resources from Fire and Fire Management

Both wildland and prescribed fires affect the visual resource by changing line, color, and texture of burned areas in contrast to the surrounding unburned areas. Line would change from a more regular, smooth line to a irregular, jagged line along the adjacent burned and unburned area within the foreground-middleground zones. Short-term color impacts would be expected in burned areas until revegetation occurs. Fire can enhance color over time by creating more diversity in the hues and colors associated with a more diverse vegetation composition. Vegetation texture can change from a medium to fine dense texture in natural areas to a coarse, sparse texture in burned areas as a result of fire. Burned areas, if viewed in the foreground-middleground and background zones, would attract the attention of the casual observer. Because wildland fire does not stop at administrative boundaries, impacts to visual resources would occur on both BLM land and non-BLM land.

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

(2) Impacts to Visual Resources from Forest Products

Timber and firewood harvest activities would have impacts similar to those described above for Fire Management in that timber activities can primarily impact line, form, color, and texture. The removal of trees changes the density of vegetation, a characteristic of texture. Changes in line from the irregular, weak line of the natural landscape to a regular, strong line between natural vegetation and the harvest area is dependent on the harvest technique used. Form changes

from the irregular shape of the vegetation to a regular geometric shape from removal of vegetation. Changes in color would occur from the deeper hue of trees to the more diverse colors of lower growing vegetation. Clear-cutting would have the greatest impact to visual resources, while select cutting would have the least impact. Depending on size, timber harvest activities may attract the attention of the casual observer in the foreground-middleground zone, background zone, and even the seldom seen zone. These impacts would be limited to the 8% of the planning area that is forested, so would be minor.

(3) Impacts to Visual Resources from Minerals

(a) Leasable Minerals

Impacts associated with the seismic exploration for oil and gas, and coal would primarily be connected with the temporary support facilities, survey work and overland moves. Temporary structures (e.g. weatherports, housing mounted on sleds), vehicles (e.g. rolligons, track rigs), aircraft, and human presence and associated activity would create minimal short-term impacts on visual resources.

A longer lasting impact would be “green trails” resulting from overland moves. These trails are not always visible for the entire route. These “green trails” are quite visible from the air to the casual observer verses on the ground it becomes more difficult to recognize them. Seismic surveys (2D) are projected to occur every four years over the life of the plan covering between 150 and 800 miles. The RFD scenario also projects 130 miles of 3D seismic being acquired following a discovery. Coal exploration activities would be minimal on most BLM-managed lands, with increased potential for exploration on lands within the Kukpowruk River Field and Cape Beaufort Field. Lands available to exploration would vary between alternatives depending on discretionary and non-discretionary closures. Alternative C has the largest area closed to exploration, while under Alternatives B and D, most of the planning area is open to exploration. Exploration activities may attract the attention of the casual observer in the foreground-middleground zone, but would be undistinguishable in the background and seldom seen zones.

(b) Locatable Minerals

The impacts from the extraction of locatable minerals would vary depending on the methods used and size of operation. Large placer mining would have the greatest impact to visual resources impacting line, form, color, and texture of mined areas, with the removal of vegetative cover and stockpiled materials creating form contrast between the mined areas and the stockpiled materials and the background landforms. Mining and material stockpiles would also create color contrast between the greens of vegetation and the browns of soils. Texture would change from a natural medium, subtle texture of vegetation to a course, rough contrast of disrupted soils and organic materials. Changes in line from the irregular, weak line of the natural landscape to a regular, strong line between natural vegetation and disturbed landscape could occur. Shaft mining techniques would have the least impact but would still impact visual resources through the development of above ground support structures. Support structures from any support facilities would also impact line, form, color, and texture by introducing vertical lines from buildings into a predominately horizontal landscape. Colors would contrast between the greens of vegetation and the building colors. Buildings introduce a smooth texture into a more coarse texture of the vegetation, as well as a more geometric square or rectangular form into the more random and irregular form of the landscape. Depending on size, mining activities

may attract the attention of the casual observer in the foreground-middleground zone, background zone, and even in the seldom seen zone.

(c) Mineral Materials

The impacts on visual resources from extraction activities for mineral material sources are similar to those described for placer mining techniques in the previous paragraph for Locatable Minerals.

(4) Impacts to Visual Resources from Recreation Management

Recreation activities such as development of recreational facilities would impact visual resources by introducing straight vertical lines and smooth textures into a predominately horizontal, random landscape. Increased use of existing and new facilities would impact visual resources by introducing different colors into a predominately green and brown landscape. Some of the facilities may be reflective or shiny instead of the more subtle colors of vegetation, making them more visible from long distances. Buildings and other structures introduce a more geometric square or rectangle form into the more random and irregular form of the landscape.

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

(5) Impacts to Visual Resources from Travel Management

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

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

Major impacts from road construction are similar to those described above for OHV use. Additionally, fugitive dust is also a visual impact resulting from construction activities and from the use of gravel or natural material roads. However, fugitive dust is a short-term impact that can be temporary in nature and is dependent on the amount of traffic a road receives.

Road construction and use would attract the attention of the casual observer if viewed from a higher observation point and located within the foreground-middleground or background zones.

Roads that are properly designed and viewed from ground level, however, would not generally attract the attention of a casual observer, except as the road is being traversed, where roads intersect or when the road is at a higher elevation than the view point (traveling over a hill). Which could occur in the foreground-middleground, and background zone.

These impacts would be minimal as the planning area is mostly roadless, is not connected to the Alaska Highway System, and few roads would be constructed on or near BLM-managed lands over the life of the plan.

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

Land use authorizations such as leases and rights-of-way may result in impacts to visual resources. Most of the visual impacts from utilities would be from support structures for powerlines, communication sites, and weather stations and would impact visual resources by introducing straight, vertical lines into a horizontal landscape. Color impacts would include changes from the matte greens of natural vegetation to glossy reflective colors of metal structures and other colors of facilities such as buildings or towers. Texture and form impacts would include changes from irregular, random textures of vegetation to smooth, definite geometric shapes of buildings.

Consolidation of land ownership would reduce possible impacts to visual resources in that consolidation would eliminate the possibility of unmanaged development activities on private land located within or near BLM-managed lands. Consolidation would result in development activities taking place at access nodes along the edges of BLM-managed lands.

b) Alternative A

Under continuation of current management, visual resources would be managed on a project-by-project basis as no visual resource management classes have been established.

(1) Impacts to Visual Resources from Minerals

Impacts would be similar to those discussed under Impacts Common to All Alternatives. There would be no impacts from leasable minerals as oil and gas leasing would not occur under this Alternative. This alternative anticipates no locatable mineral development on BLM managed lands; mineral exploration may occur but is unlikely; however, without adoption of the ROPs that would be applied under all other alternatives, Alternative A has more potential for impacts to visual resources than does Alternative C, but less potential than do Alternatives B and D.

(2) Impacts to Visual Resources from Recreation Management

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

(3) Impacts to Visual Resources from Travel Management

Impacts would be similar to those described under Impacts Common to All Alternatives. Continued unmanaged proliferation of OHV trails would occur under Alternative A. This alternative has the most potential for adverse impacts from OHV use on visual resources because there are no OHV designations in place.

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

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

Under Alternative A, no withdrawal review would occur and ANCSA (d)(1) withdrawals would remain in place. These withdrawals, in most cases, prevent mineral leasing and locatable mineral entry, reducing the potential for impacts to visual resources as discussed under Impacts Common to All Alternatives: Impacts to Visual Resources from Mineral Exploration and Development beginning on page 4-115.

c) Alternative B

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

(1) Impacts to Visual Resources from Minerals

Alternative B opens the most area to mineral entry and thus allows for the highest level of mineral exploration and development. This alternative has more potential to impact visual resources than does any other alternatives. In addition to impacts discussed under Impacts Common to All Alternatives, oil and gas leasing could occur in the northern quarter of the planning area resulting in seismic exploration, exploratory drilling and the development of one oil field.

In addition, locatable mineral development could occur in the form of 3-5 small placer mines. Impacts from locatable mineral entry would be similar to those discussed under common to all alternatives. Impacts under this alternative would be greater than under Alternative A where only mineral exploration is anticipated.

Impacts associated with the seismic exploration for oil and gas, and coal would primarily be connected with the temporary support facilities, survey work and overland moves. Temporary structures (e.g. weatherports, housing mounted on sleds), vehicles (e.g. rolligons, track rigs), aircraft, and human presence and associated activity would create minimal short-term impacts on visual resources.

A longer lasting impact would be “green trails” resulting from overland moves or exploration. These trails are not always visible for the entire route. These “green trails” are quite visible from the air to the casual observer verses on the ground, where it becomes more difficult to recognize them. At best, exploration for oil and gas would be limited to 2 or 3 seismic surveys

over the life of the plan. Coal exploration activities would be minimal on most BLM-managed lands, with increased potential for exploration on lands within the Kukpowruk River Field and Cape Beaufort Field. Lands available to exploration would vary between alternatives depending on discretionary and non-discretionary closures. Alternative C has the largest area closed to exploration, while under Alternatives B and D, most of the planning area is open to exploration. Exploration activities may attract the attention of the casual observer in the foreground-middleground zone, but would be undistinguishable in the background and seldom seen zones.

Impacts to visual resources from activities associated with the development of leasable minerals would primarily be associated with the construction of support facilities. Impacts would be similar to those discussed under Impacts Common to all Alternatives Impacts to Visual Resources from Recreation. Mineral materials (gravel) would be needed for development of oil and gas facilities (drill pads and connecting roads). Gravel mining would have additional impacts to color, line, and texture in mined areas, with the removal of vegetative cover and stockpiled materials creating color contrast between the greens of vegetation and the browns of soils. Texture would change from a natural medium, subtle texture of vegetation to a course, rough contrast of disrupted soils and organic materials. Changes in line from the irregular, weak line of the natural landscape to a regular, strong line between natural vegetation and disturbed landscape could occur.

(2) Impacts to Visual Resources from Recreation Management

This alternative is similar to Alternative A even though it allows more construction of recreation facilities it is not anticipated to increase facility development due to remoteness and the expense of construction and maintaining these facilities.

(3) Impacts to Visual Resources from Travel Management

Impacts would be similar to those described under Impacts Common to All Alternatives. Continued unmanaged proliferation of OHV trails would occur under Alternative B. Impacts would be slightly less than under Alternative A because a limited OHV designation would apply to the entire planning area.

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

The types of impacts would be similar to those discussed under Impacts Common to All Alternatives. Alternative B anticipates a higher level of land use authorizations associated with increased resource development. Because the ROPs would be adopted, this alternative would have less potential impact on visual resources than would Alternative A, but more potential impact than Alternative C or D.

Alternative B Revokes all D-1 withdrawals and make the lands available to the full spectrum of the land laws. Revocation of these withdrawals would allows for more mineral leasing and locatable mineral entry, increasing the potential for impacts to visual resources compared to Alternatives A, C or D.

d) Alternative C

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

(1) Impacts to Visual Resources from Minerals

Because of area-wide constraints and 50% of the area being closed to mineral entry, Alternative C anticipates little locatable mineral exploration and no development. Combined with the most restrictive VRM classes and the application of ROPs, impacts to visual resources under this alternative would be less than Alternatives A, B or D.

Alternative C anticipates little to no leasable mineral exploration and development as the high potential fluid leasable lands are closed and leasing of solid minerals is deferred until industry shows interest. Combined with the most restrictive VRM classes and the application of ROPs, impacts to visual resources under this alternative would be more than Alternative A, but less than Alternatives B or D.

(2) Impacts to Visual Resources from Recreation Management

Alternative C would anticipate development and associated impacts to visual resources similar to those discussed under Impacts Common to All Alternatives. Facility development and associated impacts would be minor. However, this low level of facility development may be offset by visual impacts resulting from unmanaged use (such as bare ground and social trails). This alternative would implement visitor use restrictions in the Squirrel River SRMA, potentially reducing visual impacts.

(3) Impacts to Visual Resources from Travel Management

Alternative C would result in the least amount of unmanaged OHV trail development, as 100% of BLM-managed lands would be designated as limited to designated roads and trails. Consequently, this alternative would result in fewer impacts to visual resources than would any other alternatives.

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

Impacts from land use authorizations would be similar to but less than those discussed under Impacts Common to All Alternatives. Because of area-wide constraints, Alternative C anticipates the lowest level of land use authorizations and associated impacts to visual resources.

Alternative C is similar to Alternative A in that large areas would be withdrawn from mineral entry. These withdrawals, in most cases, prevent mineral leasing and locatable mineral entry, reducing the potential for impacts to visual resources as discussed under Impacts Common to All Alternatives: Impacts to Visual Resources from Minerals beginning on page 4-115.

e) Alternative D

(1) Impacts to Visual Resources from Minerals

Impacts would be the same as Alternative B for both leasable and locatable minerals.

(2) Impacts to Visual Resources from Recreation Management

Alternative D proposes construction of strategically-located recreational facilities to reduce existing impacts from dispersed use, including visual impacts. In combination with application of VRM classes and establishment of visitor use limits in specific areas, this alternative would be the most effective of all the alternatives at reducing or mitigating impacts to visual resources.

(3) Impacts to Visual Resources from Travel Management

Types of impacts would be similar to those discussed under Impacts Common to All Alternatives. Alternative D allows cross-country travel with 2,000 pound GVWR. Some unmanaged proliferation of OHV trails is expected to continue. There would be an OHV management plan developed for the Salmon Lake-Kigluaik Mountain SRMA and Squirrel River SRMA where additional limits may be placed on OHV use. This alternative would be more effective at limiting impacts to visual resources than would Alternative A or B, but would be less effective than Alternative C.

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

Alternative D anticipates a slight increase in land use authorizations. Application of the ROPs would result in fewer impacts to visual resources than under Alternative A and B. Fewer area-wide restrictions on land use authorizations would be in place, leading to a higher level of impacts than would Alternative C.

Impacts from withdrawal review would be the same as Alternative B.

9. Wilderness Characteristics

Proposed management of the following resources/resource uses/programs would have no anticipated impacts to wilderness characteristics: Air Quality, Soil Resources, Vegetation Management, Iditarod National Historic Trail, Public Safety, Social and Economic Conditions, and Subsistence.

Proposed management of the following resources/resource uses/programs would have minor anticipated impacts to wilderness characteristics: Water Resources, Cultural Resources, Paleontological Resources, Fish and Wildlife Management, Special Status Species Management, Livestock Grazing, and ACECs and RNAs. Minor impacts would be from the result of research studies, resource inventories and other administrative actions that are anticipated to be temporary in nature (two-three weeks per year). All of these actions may require camps with temporary structures such as tents, outhouses, aircraft support and human presence, but the presence of these impacts would be temporary, short-term and will impact a very small area on the landscape.

a) Impacts Common to All Alternatives

(1) Impacts to Wilderness Characteristics from Fire and Fire Management

Both wildland and prescribed fire affect wilderness characteristics of an area. Lightning-caused wildland fire is a natural occurring phenomenon. Visually, it is intrusive, but natural and a part of the wilderness characteristics of the landscape. Prescribed fire on the other hand, is not natural and will have an impact to the natural landscape.

Fire suppression activities (firefighters, vehicles, etc) cause impacts to wilderness characteristic, especially naturalness, and if a person is in the area at the time of suppression, to solitude and to a lessor degree to primitive and unconfined recreation. These activities can have lasting effects to the natural landscape. The effects to solitude and primitive and unconfined recreation will most likely be short-term. However, changes to naturalness due to firelines and vehicle use, may be long-term.

(2) Impacts to Wilderness Characteristics from Forest Products

Timber and firewood harvest activities would have impacts similar to those described above for Fire Management in that timber activities can primarily impact naturalness for a longer period of time and affect solitude at the time of harvest activities. The removal of trees changes the density of vegetation regime, an diminishes the naturalness of the area until reforestation occurs. Any impacts to the lands other than harvest of forest products, i.e.(roads to the area, techniques of harvest, camps, etc.) will additionally affect the naturalness of the area. Clear-cutting would have the greatest impact to wilderness characteristics, while select cutting would have the least impact. Impacts to wilderness characteristics from forest actions, should the entire forest resources be impacted would be limited to the 8% of the planning area, at that is all that is forested, so it would be somewhat minimal.

(3) Impacts to Wilderness Characteristics from Minerals

Impacts associated with exploration for oil and gas, and coal would primarily be connected with the temporary support facilities, survey work and overland moves. Temporary structures (e.g. weatherports, housing mounted on sleds), vehicles (e.g. rolligons track rigs), aircraft, human presence and associated activity would create minimal short-term impact on wilderness characteristics of naturalness and solitude.

A longer lasting impact on naturalness would be “green trails” resulting from overland moves. These “green trails” are quite visible from the air to the casual observer verses on the ground they become more difficult to recognize.

The impacts from the extraction of locatable minerals would vary depending on the methods used and size of operation. Large placer mining would have the greatest impacts to naturalness and solitude, because of noise, the footprint of associated facilities, stockpiled materials, and the removal of vegetative cover. Shaft mining techniques would have the least impact to naturalness and solitude as only the above ground structures would be visible.

The impacts on wilderness characteristics from extraction activities for materials sources are similar as those described for placer mining techniques in the previous paragraph.

(4) Impacts to Wilderness Characteristics from Recreation Management

Recreation activities such as development of recreational facilities would impact naturalness and solitude and are not a part of the recreation use in an undeveloped area where wilderness characteristics exist. That said however, some facilities outside of an undeveloped area may be necessary for people to enjoy the wilderness values within an undeveloped area.

Proper design and construction techniques can reduce visual impacts from recreation facilities and help maintain a more natural appearing landscape. If viewed from a higher viewpoint, facilities and recreation activities in the foreground-middleground zone would attract the attention of the casual observer, thus impacting the solitude and primitive recreation opportunities. As viewed from ground level, only activities in the foreground-middleground, would impact the naturalness of the area and affect the feeling of solitude.

(5) Impacts to Wilderness Characteristics from Travel Management

Impacts from OHV use on the landscape from trail construction or as a result of unrestricted overland travel presents a major impact to the naturalness of the area. In addition, even though it may be ephemeral in nature, solitude is also impacted at the time of OHV use. Infrequent use of a trail is not as impacting to wilderness characteristics as continuous overland OHV use, continuous use leads to destruction of vegetation, and the naturalness of the area.

Most routes or trails would attract attention of the casual observer if viewed from a higher observation point impacting the naturalness of the area, but probably not solitude. As compared to routes or trails that were viewed from a much closer distance, all three characteristics of wilderness would be impacted. Trails or routes that are properly designed and viewed from ground level, however, would not generally attract the attention of a casual observer, with the exception from trailhead observation points.

Major impacts from roads and road construction are similar to those described above for OHV use. The footprint of the road is an impact to the natural landscape and is long-term. However, fugitive dust is a short-term impact that can be temporary in nature and is dependent on the amount of traffic a road receives. Road construction and use will impact the wilderness characteristic of the area. However, if a person gets a distance of one-half mile from this intrusion, impacts to solitude and naturalness is much diminished. Roads that are properly designed and viewed from ground level, would not generally attract the attention of a casual observer, thus enhancing the feeling of solitude and naturalness in vicinity of the road. These impacts would be minimal as the planning area is not connected to the Alaska Highway System and construction of roads on BLM-managed lands is anticipated to be minimal.

(6) Impacts to Wilderness Characteristics from Renewable Energy

Development of renewable energy sources if it were to occur on BLM-managed lands would be authorized under a land use authorization. Impacts would be the same as discussed below under Land Use Authorizations.

(7) Impacts to Wilderness Characteristics from Lands and Realty Actions

Consolidation of land ownership would reduce possible impacts to wilderness characteristics in the planning area, in that consolidation would eliminate the possibility of unmanaged development activities on private land.

Impacts from land use authorizations would be from structures for communication sites, utility lines, weather stations and research projects, etc. These structures would diminish the naturalness of the immediate area and in the surrounding areas solitude and primitive and unconfined recreation would also be reduced.

b) Alternative A

(1) Impacts to Wilderness Characteristics from Visual Resources

Under this alternative, no VRM classes would be established. Lack of visual resource management could negatively impact naturalness in areas where development occurs.

(2) Impacts to Wilderness Characteristics from Minerals

Impacts would be similar to those discussed under Impacts Common to All Alternatives. This alternative anticipates no mineral development on BLM managed lands; mineral exploration may occur but is unlikely; however, without adoption of the ROPs that would be applied under all other alternatives, Alternative A has more potential for impacts to wilderness characteristics than does Alternative C, but less potential than do Alternatives B and D.

(3) Impacts to Wilderness Characteristics from Recreation Management

Alternative A anticipates increased levels of recreation use. Without application of the ROPs that would be applied to Alternative B, C, or D and without any elevated concerns for the wilderness characteristics on the lands, this alternative has more potential to adversely impact wilderness characteristics from recreation facilities and uses than would Alternatives C and D, but most likely less potential than under Alternative B.

(4) Impacts to Wilderness Characteristics from Travel Management

Impacts would be similar to those described under Impacts Common to All Alternatives. Continued unmanaged proliferation of OHV trails would occur under Alternative A. As OHV trails increase or expand, naturalness will decrease proportionally. This alternative has the most potential for adverse impacts from OHV use on wilderness characteristics because there are no OHV designations in place.

(5) Impacts to Wilderness Characteristics from Lands and Realty Actions

Impacts from land use authorizations would be similar to that discussed under Impacts Common to All Alternatives. Without adoption of the ROPs that would be applied under Alternatives B, C, and D, and with land use authorizations considered on a case-by-case basis, Alternative A has more potential for impacts to wilderness characteristics than Alternative B, C or D.

Impacts from land ownership adjustment would be similar to that discussed under common to all. Under this alternative no lands are identified for disposal, FLPMA disposal would be unlikely to occur and there would be little to no effect on wilderness characteristics.

Under Alternative A, no withdrawal review would occur and ANCSA (d)(1) withdrawals would remain in place. These withdrawals, in most cases, prevent mineral leasing and locatable mineral entry, reducing the potential for impacts to wilderness characteristics as discussed under Impacts Common to All Alternatives.

(6) Impacts to Wilderness Characteristics from Special Designations

Under this alternative, there would be no special designations. Therefore there would be no impacts to wilderness characteristics.

c) Alternative B

In general, Alternative B anticipates the greatest amount of resource development and in general, is the least restrictive and allows the most impact to wilderness characteristics.

(1) Impacts to Wilderness Characteristics from Visual Resources

Under this alternative, VRM classes would be established. Active management of visual resources would reduce impacts to naturalness by reducing the visual impacts of various types of development. This alternative has the least restrictive VRM classes and would therefore have the lowest positive impact of Alternatives B, C, and D.

(2) Impacts to Wilderness Characteristics from Minerals

(a) Leasable Minerals

Alternatives B and D anticipate the highest level of mineral exploration and development. Oil and gas leasing could occur in the northern quarter of the planning area. Based on assumptions, approximately 6.3 million acres would be available for leasing. It is projected that 710,000 acres would be leased. This has the potential of wilderness characteristics on 710,000 acres in one way or another being impacted over the life of this plan. It is anticipated that 2-D seismic surveys would occur every four years. Assuming three crews (1crew/ seismic survey) working over the course of the plan, ongoing seismic operations are expected to affect between 600 and 3,200 acres. These impacts to wilderness characteristics would be for the most part temporary and short-term.

Impacts associated with exploration for oil and gas, and coal would primarily be connected with the temporary support facilities, survey work and overland moves. Temporary structures (e.g. weatherports, housing mounted on sleds), vehicles (e.g. rolligons track rigs), aircraft, human presence and associated activity would create minimal short-term impact on wilderness characteristics of naturalness and solitude.

A longer lasting impact on naturalness would be “green trails” resulting from overland moves or seismic exploration. These “green trails” are quite visible from the air to the casual observer verses on the ground they become more difficult to recognize.

If industry should show some interest, 43 to 55 exploration wells could be drilled (in winter). Drilling would occur over several winter seasons using ice pads, roads, and airstrips. Temporary on-site location of structures (i.e. drilling rigs); noise from generators, vehicles, aircraft, etc.; human presence; and associated activity–all would have adverse, short-term impacts on solitude, naturalness, or primitive/unconfined recreation during the winter season. These impacts are expected to be greatest within a 2-mile radius of a drill site, an area of approximately 8,000 acres per well site. Accordingly, under this alternative, there would be a temporary loss of solitude, naturalness, or primitive/unconfined recreation over an area of approximately 344,000 acres (43 wells at 8,000 acres/wellsite) to 440,000 acres (55 wells at 8,000 acres/wellsite) over the life of the plan.

Exploration wells also would leave a small mound of dirt (oil companies are required to cut off casing pipe below ground level and cover the hole with dirt), expected to be on larger than one square foot of surface impact. This is essentially a permanent impact but almost unnoticeable from several hundred feet away.

If an economically viable field were discovered, up to 182 development wells (on a total of 6 development pads encompassing 417 acres) could be possible. In addition, this scenario would also assume 23 delineation wells, 36 miles of gathering lines for produced fluids, and up to 350 miles of pipeline (less than 75 miles within the planning area). Impacts to wilderness characteristics would be the most intense during facility construction for the development and production phases. An airstrip would be centrally located to service all pads (one mile length plus one-half mile delineation for solitude = approximately 960 acres impacted). With the cessation of construction and closure of material sites, the remaining structures, human presence, and associated activity and noise would still have adverse impacts on solitude, naturalness, or primitive/unconfined recreation. Because production would most likely occur over a long period (10-30 years), impacts would be long-term. These long-term, adverse impacts are expected to be greatest within 2 miles of production or staging sites (an area of about 8,000 acres per site). Additionally, pipelines and associated facilities would impact wilderness characteristics. Assuming pipelines are elevated and except during construction and repair, there would be no associated on the ground activity. This equates to about 640 acres per mile of pipeline (buffer of one-half mile either side of the pipeline for solitude purposes). The long-term loss of solitude, naturalness, or primitive/unconfined recreation from all these development aspects together would impact an area of up to approximately 120,000 acres ([8,000 acres/pad x 6 pads] + [960acres/airstrip] + [640acres/mi. x 111miles of pipeline]).

This alternative has more potential to impact wilderness characteristics than do Alternatives A and C.

(b) Locatable Minerals

Placer mining is site specific and will impact wilderness characteristics in the vicinity of the mine. As stated in the Alternative A, placer mines vary in size, based on the extent of the operation. The average placer mine within the planning will disturb approximately 10 acres. It is also safe to assume that you need to be at least one-half mile from any placer operation to receive solitude and primitive recreation. Assumptions are that under this alternative, we can expect up to 5 placer mines, therefore we can expect up to 7,850 acres of disturbance to wilderness characteristics (5 mines x 785acres/mine).

(3) Impacts to Wilderness Characteristics from Recreation Management

The types of impacts are similar to those discussed under Impacts Common to All Alternatives. The level of impact would be slightly more than Alternative A. Even though this alternative allows more construction of recreation facilities, it is not anticipated to greatly increase facility development due to remoteness and expense of construction. One SRMA would be managed for undeveloped recreation and provide the opportunity to use and enjoy the wilderness characteristics of the area.

(4) Impacts to Wilderness Characteristics from Travel Management

Impacts would be similar to those described under Impacts Common to All Alternatives. Continued unmanaged proliferation of OHV trails would occur under Alternative B. Impacts would be slightly less than under Alternative A because a limited OHV designation would apply to the entire planning area.

(5) Impacts to Wilderness Characteristics from Lands and Realty Actions

Alternative B anticipates a higher level of land use authorizations associated with increased resource development. Because the ROPs listed in Appendix A would be adopted, this alternative would have less potential for impacts on wilderness characteristics than would Alternative A, but more potential impact than Alternative C or D.

(6) Impacts to Wilderness Characteristics from Special Designations

Impacts would be the same as under Alternative A.

d) Alternative C

In general, this alternative anticipates the lowest level of resource development and adopts VRM classes that would be the most restrictive to development and would have the least impact on wilderness characteristics.

(1) Impacts to Wilderness Characteristics from Visual Resources

Active management of visual resources would reduce impacts to naturalness by reducing the visual impacts of various types of development. This alternative has the most restrictive VRM classes and would therefore have the greatest positive impact of Alternatives B, C, and D.

(2) Impacts to Wilderness Characteristics from Minerals

Alternative C anticipates little to no leasable mineral exploration and development as the high potential fluid leasable lands are closed and leasing of solid minerals is deferred until industry shows interest. Combined with the most restrictive VRM classes and the application of ROPs, impacts to wilderness characteristics under this alternative would be more than Alternative A, but less than Alternatives B or D.

Because of area-wide constraints and about 50% of the area being closed to mineral entry, Alternative C anticipates little locatable mineral exploration and no development. Combined with the most restrictive VRM classes and the application of ROPs, impacts to wilderness characteristics under this alternative would be less than Alternatives A, B or D.

(3) Impacts to Wilderness Characteristics from Recreation Management

Alternative C would anticipate the least development and associated impacts to wilderness characteristics than would any other alternatives because of low levels of facility development and implementation of restrictions on levels of commercial recreational use. However, this low level of facility development may be offset by visual impacts (such as bare ground and social trails). Two SRMAs would be managed for undeveloped recreation and provide the opportunity to use and enjoy the wilderness characteristics of the area.

(4) Impacts to Wilderness Characteristics from Travel Management

Alternative C would result in the least amount of unmanaged OHV trail development, as 100% of BLM-managed lands would be designated as limited to designated trails. Consequently, this alternative would result in the least impacts to wilderness characteristics than would any other alternative.

(5) Impacts to Wilderness Characteristics from Lands and Realty Actions

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

(6) Impacts to Wilderness Characteristics from Special Designations

Under this alternative, 11 river systems would be determined suitable for designation as wild. Interim management of these rivers to maintain values would have a positive impact on naturalness. Management actions implemented in designated ACECs would have a positive impact on naturalness.

e) Alternative D

(1) Impacts to Wilderness Characteristics from Visual Resource Management

Active management of visual resources would reduce impacts to naturalness by reducing the visual impacts of various types of development. Under this alternative, the level of positive impacts would be greater than Alternative B and less than Alternative C.

(2) Impacts to Wilderness Characteristics from Minerals

Alternative D anticipates the same level of mineral exploration and development as Alternative B. Impacts for both locatable and leasable minerals would be the same as under Alternative B.

(3) Impacts to Wilderness Characteristics from Recreation Management

Alternative D proposes construction of strategically-located recreational facilities to reduce existing impacts from dispersed use, including visual impacts. In combination with application of VRM classes and establishment of visitor use limits in specific areas, this alternative would be the most effective of all the alternatives at reducing or mitigating impacts to wilderness characteristics. However, overall, this alternative is more impacting to wilderness characteristics than Alternative C, but less impacting than Alternative A or B.

(4) Impacts to Wilderness Characteristics from Travel Management

Types of impacts would be similar to those discussed under Impacts Common to All Alternatives. Alternative D allows cross-country travel with a 2,000 pound GVWR. Some unmanaged proliferation of OHV trails is expected to continue. There would be an OHV management plan developed for the Salmon Lake-Kigluaik Mountain and Squirrel River SRMAs where additional limits may be placed on OHV use. This alternative would be more effective at limiting impacts to wilderness characteristics than would Alternative A or B, but would be less effective than Alternative C.

(5) Impacts to Wilderness Characteristics from Lands and Realty Actions

Alternative D anticipates a slight increase in land use authorizations; however, application of the ROPs would result in fewer impacts to wilderness characteristics than would Alternative A and B, but more potential impacts than would Alternative C.

(6) Impacts to Wilderness Characteristics from Special Designations

Impacts would be the same as under Alternative B.

C. Resource Uses

1. Forest Products

Proposed management of the following resources/resource uses/programs would have no anticipated impacts to forest products are: Air Quality, Fish and Wildlife Management, Special Status Species, Cultural Resources, Paleontological Resources, Visual Resources, Wilderness Characteristics, Renewable Energy, Lands and Realty Actions, Iditarod National Historic Trail, Public Safety, and Social and Economic Conditions.

Note that with respect to Social and Economic Conditions, even though considerable change could be expected in this arena during the life of the plan, no impact is predicted to forest products. Commercial logging is not likely to occur in the reasonably foreseeable future in the planning area due to low timber volume, low productivity, scattered locations of timber stands and long distances involved in timber transport.

a) Impacts Common to All Alternatives

(1) Impacts to Forest Products from Soil, Water, and Vegetation

Proper management of soils, water, and vegetation resources will provide a positive benefit to Forest Products. Implementation of mitigation measures to protect soil, water, and vegetation on a project specific basis will reduce disturbance to forest product resources and aid in the recovery of forest habitat from permitted uses.

(2) Impacts to Forest Products from Fire and Fire Management

Forests in the planning area are generally at North American tree line limits for latitude, altitude, and continental/maritime influence. Implementation of various fire management options (Critical, Full, Modified or Limited) and level of utilization of wildland fire use will directly affect the acreage of live timber stands.

(3) Impacts to Forest Products from Livestock Grazing

Although livestock grazing may increase somewhat over the life of the plan under all alternatives, the impact on forest lands is expected to be minimal. Reindeer generally avoid hilly, forested areas because of danger from wolves. Reindeer herders usually don't utilize forested portions of their grazing allotments due to problems with predators.

(4) Impacts to Forest Products from Leasable Minerals

The northern one-quarter of the planning area is likely the only area to receive interest from industry for exploration, leasing, or development of leasable minerals. Forested lands in the planning area are confined to the southern and eastern areas, and would not be affected by any reasonable foreseeable development of leasable minerals. Coalbed methane gas exploration is not expected to occur on BLM-managed lands within the planning area. Coal occurrences and coal fields do not include forested lands under BLM management.

(5) Impacts to Forest Products from Locatable Minerals

Existing and future locatable mineral activities have the potential for minor to moderate impacts on surrounding forest lands in the East Ambler, Central Omar-Kiana, and South Seward Peninsula areas by clearing of trees as part of mine site overburden or to make room for mine site buildings and equipment, or through increased risk of human-caused wildland fires. There are no forests in the North Red Dog Area. (Geographic regions for locatable mineral activity shown in BLM 2005g.)

(6) Impacts to Forest Products from Mineral Materials

Sufficient material sources (mainly sand and gravel) exist on private lands to meet the needs of most communities with the planning area. Few mineral material disposal actions are anticipated on BLM-managed land so impacts to forest resources would be minimal. If mineral material sales occurred in forested areas, it would result in minor impacts by clearing of trees as part of mine site overburden. The one exception is mineral materials needed for oil and gas development on BLM-managed lands, but since no oil and gas leasing is expected within forested habitats in the planning area, there would be no impact on forest resources (see discussion under Leasable Minerals, Impacts Common to All Alternatives).

(7) Impacts to Forest Products from Recreation Management

Under current levels of recreation use, and under expected future increases of visitor numbers and areas accessed, low-level impacts on forests will continue: firewood harvest, use of standing dead and live trees for wall tent poles, game meat hanging racks, etc. Risk of human-caused wildland fire will increase slightly with increasing levels of recreational use.

(8) Impacts to Forest Products from Travel Management

Existing levels of four-wheeler and snowmachine use, plus anticipated increases in such use will continue to cause damage to low-growing tree seedlings and saplings, especially white and black spruce, which are the most common tree species in the planning area.

(9) Impacts to Forest Products from Subsistence

Impacts to forest products and forest resources common to all subsistence alternatives include a slight increase over the life of the plan of firewood and house log use, plus a low continuing negative impact on tree seedling and sapling growth from OHV use, especially snowmachines.

b) Alternative A

(1) Impacts to Forest Products from Soil, Water, and Vegetation

Impacts from these programs would be the same as discussed under Impacts Common to All Alternatives.

(2) Impacts to Forest Products from Fire and Fire Management

Current guidance for fire management is provided by the BLM-Alaska Land Use Plan Amendment for Wildland Fire and Fuels Management (BLM 2004b, 2005c). Fire management programs emphasize protection of human life and site-specific values while recognizing fire as an essential ecological process and natural agent of change to ecosystems. This alternative endorses wildland fire use as a resource management tool. Under this alternative, forested areas could be allowed to burn or considered for protection from wildland fire on a case-by-case basis to achieve specific objectives for forest products. For example, areas containing stands of beetle-killed white spruce could be allowed to burn or considered for protection in order to proceed with planned salvage logging by interested community households. Forest habitats would be monitored for cumulative effects of wildland fire, suppression activities, and effects of excluding fire as funding permits.

(3) Impacts to Forest Products from Locatable Minerals

Under current management, impacts to forest product resources on from locatable mineral activities have been minimal. For example, from 1989-2004 less than eight acres of surface disturbance occurred on Federal lands within forested habitats of the Ambler River, Darby Mountains, East Seward Peninsula, Omar-Kiana, and Shaktoolik High Locatable Mineral Potential Areas (Chapter III, Locatable Minerals section). The remaining seven HLMP areas in the planning area do not include forested habitats. It is estimated that low-level use was made of surrounding standing dead and live timber for firewood and miscellaneous mining camp structures during the 1989-2004 period.

(4) Impacts to Forest Products from Recreation Management

Impacts would be the same as discussed under Impacts Common to All Alternatives.

(5) Impacts to Forest Products from Travel Management

Impacts would be the same as discussed under Impacts Common to All Alternatives.

(6) Impacts to Forest Products from Special Designations

Under current management of the planning area, no ACECs or RNAs have been designated.

No Wild and Scenic Rivers have been designated in the planning area under current management. However, BLM would continue to manage the Squirrel River WSRA Sec. 5(a) study river to protect wild river values until the fall of 2007. At that time, the three-year period for Congress to consider the study recommendation and finding that the river is not suitable for designation as a component of the national wild and scenic rivers system will have expired. Personal use permits to harvest firewood and house logs would be allowed in the Squirrel River WSR study corridor, but none have been authorized to date.

c) Alternative B

(1) Impacts to Forest Products from Soil, Water, and Vegetation

In addition to the situation as described under Impacts Common to All Alternatives, guidelines provided in the ROPs (Appendix A) implemented on a project specific basis would reduce disturbance to forest habitats and aid in the recovery of forested habitat from permitted uses.

Proactive management of vegetative resources would benefit forested habitats by recognizing their relative scarcity in the plan area and managing for a healthy, diverse mix of forest lands. White and black spruce-lichen woodlands would be managed as priority, unique habitats. Proactive management to prevent introduction and spread of invasive and noxious plant species would help maintain forest communities in good condition.

(2) Impacts to Forest Products from Fire and Fire Management

Impacts would be similar to those discussed under Alternative A, except that the application of wildland fire use as a management tool would not be allowed. The overall impact to availability of forest products due to the difference in management practices would be small.

(3) Impacts to Forest Products from Locatable Minerals

This alternative has the highest potential for unfavorable impact on forest product resources. As all lands remaining under BLM-management would be opened to locatable mineral entry, subject to adherence to ROPs and some of the ROPs would not apply under this alternative. Within the life of the plan, three to five new placer mines might be initiated, each with an approximate 10 acre mining operation footprint, for a total of 30-50 acres of additional surface disturbance. Stands of timber directly adjacent to a stream being mined for placer gold or within the estimated 10 acre footprint would most likely be cleared, or at best drastically thinned and subject to compacted soils. Incidental use may be made of standing dead and live timber in the larger surrounding area for firewood and miscellaneous mining camp structures. Risk of human-caused wildland fire would increase. However, 30-50 acres of disturbed forest is less than 1/10 of a percent of the approximate 993,000 acres of forested habitat within the planning area, so the overall impacts would be fairly small.

(4) Impacts to Forest Products from Recreation Management

Impacts would be the same as discussed under Impacts Common to All Alternatives. Additionally, if new public use shelters or other recreation facilities were constructed, harvest of firewood, and the use of standing dead and live trees for wall tent poles, racks to hang game meat, etc. would increase at a slightly faster rate.

(5) Impacts to Forest Products from Travel Management

Even though the entire planning area would be designated as limited to OHV use, the proposed seasonal and weight restrictions are similar to current BLM management. Impacts are expected to be the same as discussed under Impacts Common to All Alternatives.

(6) Impacts to Forest Products from Special Designations

Under this alternative, no areas would be proposed for designation as an ACEC. No rivers would be recommended as suitable for designation under the Wild and Scenic Rivers Act therefore, there would be no impacts to forest products.

d) Alternative C

(1) Impacts to Forest Products from Soil, Water, and Vegetation

Impacts would be the same as Alternative B.

(2) Impacts to Forest Products from Fire and Fire Management

Impacts from fire management would be mostly the same as discussed under Alternative A. However, given the emphasis on allowing wildland fire to function in its natural ecological role, it is possible that in a few cases, potential Christmas tree or spruce cone harvest sites would not be protected from wildland fire, and opportunities for house log harvest may be slightly less. However, opportunities for personal use and harvest of morel mushrooms may be slightly higher under this alternative.

(3) Impacts to Forest Products from Locatable Minerals

Impacts to forest product resources would be lightest under this alternative. Approximately 50% of BLM-managed lands within the planning area would be closed to mineral entry to provide additional protection to sensitive areas. Impacts would be similar to those discussed in Alternative B, except the land area affected would be reduced by about one-half. The overall impact may be further reduced because areas closed to mineral entry include regions with proportionally more timbered habitat, such as major rivers in southeastern Seward Peninsula, the Nulato Hills ACEC, the upper Selawik River drainage, and the Squirrel River, due to the 300-foot riverbank setbacks.

(4) Impacts to Forest Products from Recreation Management

Impacts would be the same as discussed under Impacts Common to All Alternatives, except due to limits placed on visitor numbers and use days in the Squirrel River Special Recreation Management Area (SRMA), and possible similar limits in selected areas within the Extensive Recreation Management Area (ERMA), low-level harvest of forest timber resources may decrease slightly.

(5) Impacts to Forest Products from Travel Management

Limiting OHV use to designated trails between May 15 and October 31, and the potential to develop additional OHV limits within designated ACECs would help to decrease damage to low-growing tree seedlings and saplings and forest soils throughout the planning area.

(6) Impacts to Forest Products from Special Designations

Under this alternative, ACEC management directives in the Nulato Hills ACEC (inclusive of the Shaktoolik, Ungalik, and Inglutalik Rivers) would be beneficial to Forest Product resources. A fire management plan would be developed for the Nulato Hills ACEC to evaluate and manage for the effect of wildland fire in important lichen habitats, including white spruce-lichen woodlands. The proposed ACEC would be closed to locatable and leasable mineral entry, preventing forest habitat disturbance and eliminating a threat of long-term degradation of forest resources.

Implementation of this alternative would identify 11 river systems as potentially suitable for designation as wild under the WSR Act. As such, these river corridors would be withdrawn from mining and surface occupation for oil and gas development. Over half of the recommended rivers include forest habitat within their corridors. The number of field patrols by BLM personnel would increase, as would the level of monitoring of commercial operators, such as hunting guides and air taxi operators. These measures would directly benefit Forest Product resources by protecting forest habitats from disturbance and long-term degradation. Opportunities to harvest personal use firewood and house logs would most likely continue. However, the opportunity to permit commercial logging (even though this type of request in is not anticipated) would be lost along river corridors managed as suitable for designation under the WSR Act.

e) Alternative D

(1) Impacts to Forest Products from Soil, Water, and Vegetation

Impacts would be the same as discussed under Alternative B.

(2) Impacts to Forest Products from Fire and Fire Management

Impacts would be the same as discussed under Alternative A.

(3) Impacts to Forest Products from Locatable Minerals

Impacts from locatable minerals would be very similar to those discussed under Alternative B. One difference would be the implementation ROP FW-7a which would limit surface disturbing activities within the flood prone width of ten rivers, several of which are found in the forested southeastern edge of the planning area. If locatable mineral development were to occur along these rivers, this ROP would result in a slight reduction in impacts to forest resources.

(4) Impacts to Forest Products from Recreation Management

Impacts from recreation management would be the same as discussed under Alternative C.

(5) Impacts to Forest Products from Travel Management

Even though the entire planning area would be designated as limited to OHV use, the proposed allowable uses and weight restrictions are similar to current BLM management. Due to the potential to develop specific OHV limitations within activity-level plans for designated ACECs,

Squirrel River SRMA, and the Salmon Lake-Kigluaik SRMA, the overall negative impact to tree seedlings and saplings and forest soils may decrease slightly.

(6) Impacts to Forest Products from Special Designations

Under this alternative, four ACECs would be designated in the forested southeastern edge of the planning area: Nulato Hills ACEC, Shaktoolik ACEC, Ungalik ACEC, and Inglutalik ACEC. Impacts to Forest Product resources would be similar to those under Alternative C, except that these ACECs would be open to both locatable and leasable mineral entry, with a 300' no surface occupancy zone for leasable minerals on the Ungalik, Shaktoolik, and Inglutalik rivers. These areas have been evaluated as having a low occurrence potential for presence of oil and gas reserves, and a very low development potential for oil and gas (BLM 2005j). Only the northern one-quarter of the planning area has been evaluated as having a high occurrence potential for oil and gas, and even there the actual possibility for development has been rated as low (BLM 2005j). Therefore, oil and gas exploration, leasing, and development in the Nulato Hills is not anticipated. Locatable mining operations would be subject to ROPs and Stipulations developed through mining plans of operation and activity-level planning for the ACECs. Under this alternative, one additional ROP, FW-7a would limit locatable mineral development within 300 feet of active stream channels on the Shaktoolik, Ungalik, and Inglutalik rivers.

2. Livestock Grazing

Proposed management of the following resources/resource uses/programs would have no anticipated impacts to livestock grazing: Air Quality, Soil Resources, Water Resources, Cultural Resources, Paleontological Resources, Visual Resources, Wilderness Characteristics, Forest Products, Mineral Materials, Recreation Management, Renewable Energy, Lands and Realty Actions, Iditarod National Historic Trail, Wild and Scenic Rivers, Public Safety, and Subsistence.

a) Impacts Common to All Alternatives

(1) Impacts to Grazing from Vegetation

Vegetation management could impact livestock grazing if invasive species were introduced that were detrimental to existing range. The potential of this happening is relatively low.

(2) Impacts to Grazing from Wildlife Management

The most important factor impacting livestock (reindeer) grazing currently is the distribution of the WACH. As the herd has grown, it has utilized more and more of the Seward Peninsula. When the herd migrates north to its calving grounds, reindeer are apt to migrate with them. Therefore, reindeer numbers have traditionally had an inverse relationship with the number of caribou in the region. This will likely remain the case under all Alternatives. High numbers of caribou will likely reduce the amount of available forage lichens for reindeer because of their grazing activity (Joly et al., submitted Rangifer).

(3) Impacts to Grazing from Special Status Species

Special Status Species could impose minor impacts on herders as new facilities would likely need to be kept away from known occurrences of Special Status Species. Relatively few structures are required by herders and almost all are pre-existing. Therefore, Special Status Species represent a minor impact with a very low probability of occurrence.

(4) Impacts to Grazing from Fire and Fire Management

Fire management could impact reindeer range. Lichens, primary winter forage for reindeer, are slow to recover from fires (Jandt et al., submitted). There may be an opportunity to reduce impacts to lichens through fire management options.

(5) Impacts to Grazing from Social and Economic Conditions

Social and economic conditions have the potential to strongly impact livestock grazing. Conditions may develop that are much more or much less favorable to herding. These conditions are largely unrelated to BLM management actions.

(6) Impacts to Grazing from Global Climate Change

Signs of global climate change are readily apparent on the Seward Peninsula where reindeer grazing occurs. Reindeer rely heavily on lichens as winter forage. Lichens are declining in the region. Although grazing by caribou contributes to this decline, it is not the only factor. The decline in lichen cover is consistent with the predicted affects of global climate change (Joly et al., submitted Rangifer). Shrubs are increasing in the region, which is also consistent with global climate change predictions (Joly et al., submitted Rangifer). Shrubs directly compete with lichens for resources such as space and sunlight. Global warming is predicted to warm soils which would give a competitive advantage to shrubs to the potential detriment of lichens. This could therefore have indirect impacts on grazing.

b) Alternative A

(1) Impacts to Grazing from Vegetation

Impacts would be the same as under Impacts Common to All Alternatives.

(2) Impacts to Grazing from Livestock Grazing

The BLM has estimated that a total of 13.8 million acres would continue to be available for reindeer grazing in 15 different allotments on the Seward Peninsula. Within these allotments 5.2 million acres are managed by the BLM, of which 3.9 million acres are selected. Livestock grazing, including reindeer, could be considered on a case by case basis for all of the BLM managed lands within the planning area (11.9 million acres of which 6.6 million are selected). New grazing permit applications would be screened for potential conflicts with wildlife and subsistence. Applications would be rejected where significant conflicts are likely to occur. The quality and quantity of forage available for livestock would be maintained. Livestock grazing management would be adjusted if watershed assessments and evaluations of rangeland health standards indicate that livestock are the reason that one or more of standards are not being

met, or if necessary to sustain other resources. Adjustments may include grazing rotation, season of use, timing, duration, utilization, or limited use riparian areas. Incidental grazing by pack animals would be considered on case by case basis. Generally speaking, this is the status quo alternative and there would be little impact to livestock grazing. The number of both reindeer and active reindeer herders could increase over the life of the plan.

(3) Impacts to Grazing from Leasable Minerals

No leasable mineral development would occur under this alternative so there would be no impacts on livestock grazing.

(4) Impacts to Grazing from Locatable Minerals

Mineral exploration would have very little impact on livestock grazing.

(5) Impacts to Grazing from Special Designations

There would be no impacts to livestock grazing as no areas would be designated.

(6) Impacts to Grazing from Subsistence

Subsistence activities have a minor impact on reindeer herding as reindeer are occasionally killed by hunters looking for caribou. Reindeer and caribou are subspecies of the same species, Rangifer tarandus, and can be hard to differentiate at a distance.

c) Alternative B

(1) Impacts to Grazing from Vegetation

Impacts would be the same as under Impacts Common to All Alternatives.

(2) Impacts to Grazing from Livestock Grazing

This alternative's impacts would be nearly identical to those of Alternative A. Approximately 11.9 million acres of BLM managed lands throughout the planning area would be open for consideration of livestock grazing, which would include bison. The number of both reindeer and active reindeer herders could increase over the life of the plan.

(3) Impacts to Grazing from Leasable Minerals

An oil and gas field could negatively affect grazing by destroying habitat and displacing free-ranging livestock, if livestock were to be in the area of the field. There are currently no livestock in the portion of the planning area where oil and gas development is forecasted, but under this alternative livestock grazing could be permitted in these areas.

(4) Impacts to Grazing from Locatable Minerals

The impact of 3-5 average size placer mines (Minerals-Locatable resource use) would likely have very little impact on livestock grazing. Individual herders could be more significantly impacted if, in the unlikely event, a mining operation happened to be centered on crucial livestock calving and/or wintering areas.

(5) Impacts to Grazing from Special Designations

There would be no impacts to livestock grazing as no areas would be designated.

(6) Impacts to Grazing from Subsistence

Impacts to grazing from subsistence would be essentially the same as Alternative A.

d) Alternative C

(1) Impacts to Grazing from Vegetation

Vegetation impacts are diminished as there is a lower chance of invasive plants because of the prohibition on livestock grazing, which often need feed sources.

(2) Impacts to Grazing from Livestock Grazing

The BLM has estimated that 10.7 million acres would continue to be available for reindeer grazing in 13 different allotments on the Seward Peninsula. Within this region 3.3 million acres are managed by the BLM, of which 2.2 million acres are selected. The entire planning area would be closed to livestock grazing, with exception of reindeer on the aforementioned allotments and incidental use of pack animals. Reindeer grazing permit renewals and new applications would be screened for potential conflicts with wildlife and subsistence. Applications would be rejected where significant conflicts are likely to occur. Allotments that have not had reindeer for 10 or more years, due to conflicts with caribou, would be denied renewal and the allotments would be permanently retired. The quality and quantity of forage available would likely be increased. Reindeer grazing management would be adjusted if watershed assessments and evaluations of rangeland health standards indicate that livestock are the reason that one or more of standards are not being met, or if necessary to sustain other resources. Adjustments may include grazing rotation, season of use, timing, duration, utilization, or limited use riparian areas. The number of both reindeer and active reindeer herders could increase over the life of the plan, though not as much as under Alternative A.

(3) Impacts to Grazing from Leasable Minerals

No leasable mineral development would occur within grazing areas under this alternative so there would be no impacts on livestock grazing.

(4) Impacts to Grazing from Locatable Minerals

Impacts from locatable minerals would be the same as Alternative A.

(5) Impacts to Grazing from Special Designations

Reindeer grazing would not be allowed in the portions of allotments that fell within proposed ACECs. The estimated 10.7 million acres open to reindeer grazing does not include closed lands within the ACECs.

(6) Impacts to Grazing from Subsistence

Subsistence activities would impact reindeer grazing less than in Alternative A because there would be fewer areas where caribou and reindeer were found together.

e) Alternative D

(1) Impacts to Grazing from Vegetation

Vegetation impacts are diminished as there is a lower chance of invasives because of the prohibition on livestock grazing, which often need feed sources.

(2) Impacts to Grazing from Livestock Grazing

The BLM has estimated that a total of 12.6 million acres would continue to be available for reindeer grazing in 15 different allotments on the Seward Peninsula. Within this region 4.1 million acres are managed by the BLM, of which 2.9 million acres are selected. The entire planning area would be closed to livestock grazing, with exception of reindeer on the aforementioned allotments and incidental use of pack animals. Reindeer grazing permit renewals and new applications would be screened for potential conflicts with wildlife and subsistence. Applications would be rejected where significant conflicts are likely to occur. The quality and quantity of forage available would be maintained or increased. Reindeer grazing management would be adjusted if watershed assessments and evaluations of rangeland health standards indicate that livestock are the reason that one or more of standards are not being met, or if necessary to sustain other resources. Adjustments may include grazing rotation, season of use, timing, duration, utilization, bank alteration or limited use riparian areas. The number of both reindeer and active reindeer herders could increase over the life of the plan, though not as much as under Alternative A.

(3) Impacts to Grazing from Leasable Minerals

An oil and gas field would likely not affect grazing as there are currently no livestock (including reindeer) in this portion of the planning area and none would be allowed under this alternative.

(4) Impacts to Grazing from Locatable Minerals

The impact of placer mines would be similar to those found in Alternative B.

(5) Impacts to Grazing from Special Designations

There would be no impacts to reindeer grazing as it would be allowed in within the ACECs.

(6) Impacts to Grazing from Subsistence

Subsistence activities would impact reindeer grazing as in Alternative A.

3. Minerals

a) Leasable Minerals

(1) Alternative A

(a) Oil and Gas Leasing

Within the planning area, 4.8 million acres were made available for oil and natural gas leasing through PLO 6477 (Seward 1008 Study). This PLO modified the ANCSA (d)(1) withdrawals and opened parts of the planning area to fluid mineral entry. For the purposes of analysis, it is assumed that under Alternative A no leasing would occur as appropriate NEPA analysis must be completed and approved before Federal oil and gas lease sales can take place. There are no active oil and gas leases in the planning area and no oil and gas leasing would occur under Alternative A. Additionally, no withdrawal review would occur and all ANCSA (d)(1) withdrawals would remain in place, pending future legislation or unrelated management direction.

The lack of NEPA analysis and retention of ANCSA (d)(1) withdrawals would preclude oil and gas leasing in the planning area. Therefore, under this alternative no oil and gas exploration and development would occur, rendering these resources unavailable.

(b) Solid Leasable Minerals

Under Alternative A, all unleased BLM-managed public lands (including selected lands) within the planning area, subject to leasing under 43 CFR 3400.2, would be open for coal exploration and non-energy leasable mineral prospecting. Within the planning area, 11.9 million acres (nearly 100%) are available for exploration and prospecting. The only area not available for exploration would be where two coal leases exist. Exploration of Federal coal would be handled on a case-by-case basis.

two leases in the planning area are preferential right coal leases. Both are located within the Cape Beaufort Field. The leases expire in 2009 unless the lessee showed development consistent with the lease agreement. Further leasing under any of the alternatives would require additional NEPA analysis, including the coal screening process outlined under 43 CFR 3425.

(2) Alternative B

(a) Oil and Gas Leasing

Under Alternative B, all existing ANCSA (d)(1) withdrawals would be revoked to allow increased opportunities for mineral exploration and development, pending Native and State conveyances.

Approximately 11.9 million acres (6,642,000 selected) of BLM-managed lands within the planning area would be open to mineral entry subject to the ROPs and Stips. Oil and Gas Stips #2, #6 and #7 and ROP FW-3c would not apply to Alternative B. Zero acres of the planning area would be open with special stipulations (e.g., timing/seasonal limitations). Approximately 23,800 acres would be subject to No Surface Occupancy (NSO). This figure represents the total number of individual 300-foot setbacks on select rivers within the planning area. Setback

distances that do not preclude the drill from reaching its target reservoir can limit exploration and development. For example, if a potential exploration target was determined to be within the NSO zone, the added cost of directional drilling could render the project uneconomical. Additionally, if a shallow target were previously defined through geophysical exploration, it could be technically unfeasible for an operator to directionally drill into such a reservoir. Consequently, these resources could be unavailable for future generations. Under this alternative, zero acres would be closed to oil and gas leasing.

(b) Solid Leasable Minerals

Under Alternative B, 11.9 million acres (100%) are available for coal exploration and non-energy leasable mineral prospecting subject to the ROPs and Stips. The only area not available for exploration would be where two coal leases exist. Selected lands, unless specifically closed, are open to coal exploration. Exploration of Federal coal would be handled on a case-by-case basis. With no closure restrictions to the lands under this alternative, coal exploration and general resource inventories would be maximized to their full potential.

(3) Alternative C

(a) Oil and Gas Leasing

Under Alternative C, land restrictions would significantly diminish interest in the fluid mineral resources. Withdrawals would be maintained or recommended for all proposed ACECs (Nulato Hills, WACH Insect Relief/Calving Habitat, Squirrel River, Kigluaik Mountains, McCarthy's Marsh, and Upper Kuzitrin River). These withdrawals would eliminate areas that possess geologic potential for oil and gas resources. The WACH Insect Relief/Calving Habitat ACEC is located in an area that possesses high occurrence potential for oil and gas. Additional closures would come from State and Native land selections which have a segregation against oil and gas leasing and would only be open if retained in long-term Federal ownership.

Approximately 1,763,000 acres (13%) of the BLM-administered lands within the planning area would be open subject to the ROPs and Stips. Of that, 1,428,000 acres are State- or Native-selected lands, leaving approximately 335,000 acres available for leasing.

Lands available subject to special stipulations are roughly 5,351,000 acres (41%) with 3,592,000 acres selected. A seasonal restriction applies to both the WACH winter range and the muskox habitat area. Additional closures would come from State and Native land selections which have a segregation against oil and gas leasing and would only be open if retained in long-term Federal ownership.

Approximately 181,000 acres (1%) of the planning area would be open to leasing subject to No Surface Occupancy (NSO). Of the 181,000 acres, 78,000 are selected. Stipulation #2 would not apply to this alternative as PLO 6477 would be retained. Additional 300-foot NSO setbacks would be applied to tributaries of the Pah, Shaktoolik, Ungalik, Inglutalik, Tubutulik, Kuzitrin, Fish, and Noatak rivers. In addition, setbacks would be applied on both sides of the upper portion mainstems and tributaries of the Agiapuk, Buckland, Squirrel, Omar, Kivalina, Pick, Kukpowruk, Ipewik, and Nilik rivers and Kiliovilik Creek (Upper Selawik), as well as the Koyuk River including the East Fork.

Oil and gas development in a NSO area could require directional drilling to extract hydrocarbon resources. Should areas with NSO occur beyond the technically feasible reach for directional

drilling, some hydrocarbon resource may be rendered unrecoverable. Product price fluctuations may require premature abandonment that would decrease the recoverability of the resource and potentially create an irretrievable incremental loss of resources. This is not likely with an NSO area composed of a 300-foot buffer around select sensitive streams. However, a 300-foot NSO buffer can limit exploration and development. For example, if a potential exploration target was determined to be within the NSO zone, the added cost of directional drilling would render the project uneconomical, and therefore miss the discovery. Additionally, if a shallow target pool were previously defined through geophysical exploration, it could be technically unfeasible for an operator to directionally drill such a reservoir. Consequently, these resources could be unavailable for future generations.

Approximately 5,830,000 acres (44%) of the planning area would be closed to oil and gas leasing. Closing these acres to leasing would preclude oil and gas exploration and development and render these resources unrecoverable.

Given these constraints, it is assumed that no oil and gas development would occur under this alternative and seismic exploration would be unlikely.

(b) Solid Leasable Minerals

Under Alternative C, approximately 7.2 million acres (55%) are available for coal exploration and non-energy leasable mineral prospecting subject to the ROPs and Stips. Selected lands, unless specifically closed, are open to exploration and prospecting. Exploration of Federal coal would be handled on a case-by-case basis.

Closed lands encompass nearly 5.9 million acres (45%). Areas closed to coal exploration include all proposed ACECs/RNAs as well as the streams with 300-foot setback per PLO 6477: Pah, Shaktoolik, Ungalik, Inglutalik, Tubutulik, Kuzitrin, and Fish rivers, and west bank of Noatak River; 300’ setback from bankfull stage on either side of tributaries of above mentioned rivers (including Boston Creek); 300-foot setback from bankfull stage on both sides of the upper portion mainstems and tributaries of the following rivers: Agiapuk, Buckland, Squirrel, Omar, Kivalina, Pick, Kukpowruk, Ipewik, and Nilik rivers and Kiliovilik Creek (Upper Selawik), Koyuk River including East Fork. These withdrawals would eliminate areas that possess geologic potential for coal and other non-energy leasable minerals. Consequently, these resources could be rendered as unrecoverable.

Given these constraints, it is assumed that little to no coal exploration or non-energy leasable mineral prospecting would take place under this alternative.

(4) Alternative D

(a) Oil and Gas Leasing

Under Alternative D, existing ANCSA (d)(1) withdrawals would be revoked or modified to allow for increased opportunities for oil and gas exploration and development, pending Native and State conveyances. This alternative would not close any lands, but rather implement an adaptable management approach. Oil and gas activities would be subject to timing restrictions and NSO.

Approximately 6,441,000 acres (54%) of the BLM-administered lands within the planning area would be open to leasable mineral activities subject to the ROPs and Stips. Of that figure, 4,242,000 acres are selected.

Approximately 5,420,000 acres (45%) of the planning area would be open to leasing subject to special stipulations (e.g., timing limitations), with roughly 2,350,000 acres subject to segregation from selections. Areas subject to special stipulations would include the Squirrel River SRMA, McCarthy's Marsh, Upper Kuzitrin River, Nulato Hills ACEC, as well as the WACH calving and insect relief habitat. The calving and insect relief habitat encompass the same lands that were given a high oil and gas occurrence potential rating. These constraints would limit exploration and development during specific time periods and increase recovery costs.

Approximately 52,000 acres (less than 1%) of the planning area would be subject to NSO (18,000 acres selected). The 52,000 acres represents the total number of individual 300-foot setbacks on the Kivalina, Ungalik, Shaktoolik, Inglualik, Tubutulik, Kuzitrin, Agiapuk, Pah, Noatak, and Koyuk rivers. Setback distances that do not preclude the drill from reaching its target reservoir can still limit exploration and development. For example, if a potential exploration target was determined to be within the NSO zone, the added cost of directional drilling could render the project uneconomical. Additionally, if a shallow target were previously defined through geophysical exploration, it could be technically unfeasible for an operator to directionally drill into such a reservoir. Consequently, these resources could be unavailable for the life of this plan.

The areas that show moderate to high potential for oil and gas and are currently State- or Native-selected, may likely be conveyed to the selecting entities. However, potential does exist for the leasing of oil and gas on BLM-managed lands. Exploration and development would proceed at the level described in the Reasonable Foreseeable Development scenario under the Analysis Assumptions for Leasable Minerals beginning on page 4-11. Should Federal leasing take place, the BLM-Alaska State Office would assume lease administration responsibilities and oversight of field operations.

(b) Solid Leasable Minerals

Under Alternative D, approximately 11.9 million acres (100%) are available for coal exploration and non-energy leasable mineral prospecting subject to the ROPs and Stips (Appendix A). Selected lands, unless specifically closed, are open to exploration and prospecting. Exploration of Federal coal would be handled on a case-by-case basis.

Certain areas within the planning area (about 8% of BLM-managed land) are open but subject to special conditions outlined in the ROPs. The following rivers have 300-foot setbacks (ROP FW-7a) that would require special conditions to be met in order to conduct exploration: Kivalina, Ungalik, Shaktoolik, Inglualik, Tubutulik, Kuzitrin, Agiapuk, Pah, Noatak, and the Koyuk including the East Fork. Additional restrictions for the Nulato Hills are outlined in ROP FW-3e. These special conditions could have a negative effect on the exploration for non-energy leasable minerals by precluding access to a known energy resource if the conditions could not be met. In that case, the resource would be considered unrecoverable.

b) Locatable Minerals

(1) Impacts Common to All Alternatives

State- and Native-selected lands will remain closed to mineral entry and location until conveyances are complete. Mining operations on withdrawn lands will require a validity exam prior to approval of a Plan of Operations. Mining operations using cyanide in the processing of amenable ores will require a Plan of Operations. Mining claim surface occupancy is guaranteed but must remain reasonably incident to current levels of mining activity. Bonding is required of all mining operations other than those notice level operations that were grandfathered. Reclamation of surface disturbance is required. Undue and unnecessary degradation will remain the standard for mining operations on BLM lands. The right of reasonable access across BLM lands to unpatented Federal mining claims is assured. Cultural resources encountered during surface disturbing activities are subject to the Antiquities Act.

(2) Alternative A

Under Alternative A, no withdrawal review would occur and current ANCSA (d)(1) withdrawals would remain in place. Under the Northwest MFP, withdrawal review was conducted on portions of the planning area and some areas were opened to mineral entry and location in 1983 (Map 3-29). There were at least two (d)(1) withdrawals that were not opened. Certain lands in the Lisburne and Selawik Mining Districts are only open to metalliferous locatable minerals and not for non-metalliferous. Under this alternative these lands would retain the non-metalliferous restriction. In addition, there are other locatable mineral closures beneath land selections that if the lands are not conveyed will remain closed to mineral entry. This alternative offers no process to address these closures.

The BLM would continue to administer existing, validly filed, Federal unpatented mining claims on selected lands through filings of Notices and Plans of Operations, but the potential for future exploration and development on BLM-managed lands would be limited. Once the selection process is completed, which is expected during the life of this plan, these withdrawals would continue to discourage mining interests and lock up blocks of land to exploration and evaluation of its mineral potential. Much of this land has been unavailable for mineral assessment for more than 30 years. In the meantime markets for new commodities have developed, ore deposit theory has advanced significantly, and new mining and milling processes that are less expensive, more efficient and environmentally friendly have been developed.

(3) Alternative B

Revocation of withdrawals under Alternative B would result in increased exploration and development activity, pending State and Native conveyances. Most operations would be small-scale placer mining operations, but potential would exist for larger mining operations on a scale of (5,000-7,000 tons per day) similar to what is being proposed as the Rock Creek Mine near Nome. However, given the limited mineral potential on remaining Federal lands and mining operation locations predominately on private and conveyed lands, it is expected that no more than five new modest-scale (250 cubic yards per day) placer mines will develop over the life of this plan. It is further expected that no new hard rock mines will develop to production during the life of this plan on Federal lands, primarily due to the long (more than 20 years)

development time usually needed to bring a hard rock mine from discovery to production. Administration of Notices and Plans of Operations, compliance, and mine reclamation would be conducted by BLM under the 3809 and 3715 regulations.

(4) Alternative C

Under Alternative C, less potential exists for mineral exploration and development than under any other alternative due to the maintenance or recommendation of withdrawals for all five ACECs, and setbacks along certain rivers (see table below). Some mining activity could continue to occur on valid existing claims, but new development would be doubtful based on proposed area-wide constraints. The BLM would continue to regulate surface disturbing activities on valid Federal claims through Notices and Plans of Operations, and the ROPs would be implemented. In addition, before a Plan of Operations could be approved on withdrawn lands, a validity examination would have to be conducted by the BLM to verify that there is a discovery of a valuable mineral deposit on the claims in question.

Under Alternative C the river banks of the following rivers, creeks, and tributaries from mean high water 300 feet back are closed to locatable minerals. Under Alternative D, ten rivers are subject to ROP FW-7a which establishes strict operating criteria within 300 feet of the banks of active stream channels or within the flood-prone width, whichever is narrower. The locatable mineral potential within these closures or 300-foot zones is discussed in Table 4-7.

Table 4-7. Proposed Riverbank Closures or 300-foot Flood-prone Zones (ROP FW-7a) under Alternatives C and D

River	Alternative(s)	Remarks
Pah	C, D	The main stem and tributaries lie outside any producing placer provinces. There are no known placer occurrences or APMA filings in conflict with the proposed closures or flood-prone zone. The nearest known mineral occurrences lie in the Clear and Caribou creeks tributaries in the Hogatza River drainage to the south. This producing placer province is active with a recent history of numerous APMA filings.
Shaktoolik	C, D	There is one known placer occurrence, no APMA filings and it lies just outside the Ungalik producing placer province. At one point the Shaktoolik brushes the eastern edge of the Shaktoolik HLMP and tributary (closure or flood-prone zone) that incorporates a known placer mineral occurrence in the headwaters area.
Ungalik	C, D	Main stem contains five known placer gold occurrences and APMA filings. APMA filings are located on Native (IC'd) and Native selected lands. The proposed closure or flood-prone zone of the river channel and Christmas Creek tributary cut through the center of a producing placer province that includes VABM Ungalik, Christmas Mt., and Christmas Creek. These uplands define an area of known mineral potential (KMPA) and HLMP which encompasses the lower Ungalik and touches the mid reach of the Shaktoolik. The HLMP is characterized by antimony-gold and gold-PGE mineralization.
Ingutalik	C, D	Main stem encompasses no APMA filings and is not located within a producing placer area. There is a single placer mineral occurrence (Au) along the middle reaches of the river.

River	Alternative(s)	Remarks
Tubutuluk	C, D	Main stem and tributaries are not within a placer producing area. The drainage basin on the Tubutluik from just above Caribou Creek to just below Clear Creek is defined by hard rock occurrences as a KMPA. These known mineral occurrences of gold, silver +/- tin, uranium, and PGE's dot the tributaries of the Tubutulik. Two known placer occurrences on main stem- Au,Ag,W,Bi,Pb. No APMA filings on main stem. Au, Sn, W known placer occurrence on Caribou Creek, an upper tributary with APMA filings upstream of the occurrence. Above Caribou Creek these APMA filings are located on State lands surrounded by State-selected lands. There are APMA filings on Clear Creek and unnamed minor tributary. These APMA filings are located on dual selected lands.
Kuzitrin	C, D	There are no known mineral occurrences within the active flood plain of the Kuzitirin/Noxapaga main stem. There are a number of placer occurrences on the northern tributaries of this system. There are a number of placer occurrences on Boulder Creek, the north bank of the upper Noxapaga River above Boulder Creek and the upper reaches of the Noxapaga. These occurrences define a producing placer region including the south side tributaries of Birch and Belt creeks which have setbacks on them. In addition a KMDA covers the north side of this river pair extending along the north bank from below Bunker Hill to the upper reaches of the Noxapaga. For hard rock there are two known lode mineral occurrences. The Wonder Gold lode (Au, Pb & Hg) is located in the Coffee Creek drainage. The other is a Au/Ag prospect in the Dahl Creek drainage. While there has been APMA filings on these tributaries (Dahl, Coffee, Garfield and Boulder creeks, the Kougarok River and the upper Noxapaga), these lands are either State or State-selected. A small part of the area has been IC'd to the Native corporation. The BLM's only remaining active notice of mining are Federal claims on State-selected lands of the upper Noxapaga tributary.
Fish	C	The main stem closure includes the river channel in the flats and enters the Fish River Canyon, where producing placer area starts. There are known placer gold occurrences on the tributaries in the Fish River canyon and downstream, and this defines the known producing placer province. There are no APMA filings indicating no mining activity since 1989. For hard rock the KMDA includes the upland area of the Fish River canyon and extends out into the flats to encompass recent interest in what have been described as roll front type uranium deposits. Uranium anomalies have been known to occur in the Flats since the late 1960's.
Noatak	C, D	The main stem and tributaries have no known placer occurrences or APMA filings and do not lie within any producing placer provinces.
Boston Creek	C	No known placer occurrences. No APMA filings. Not within a placer producing or HLMP area.
Agiapuk	C, D	The Agiapuk below the confluence of American Creek lies totally outside the producing placer region. There is one known placer mineral occurrence on the Agiapuk between Flat and Eureka creeks. It has not been active recently. There is one known placer occurrence on the south bank of the upper Agiapuk drainage. No APMA filings in the area from 1989. No known lode occurrences are affected by the setback.

River	Alternative(s)	Remarks
Agiapuk Tributaries	C	There is one known placer gold occurrence on an unnamed, south bank tributary of the upper Agiapuk, but it is not included in a closure. There is a known placer occurrence on Alene Creek, tributary to North Creek which flows into the Aigipuk River above American Creek There has been no active mining since 1989 (no APMA filings), it is affected by the closure on the North/Alene creeks. There are no known lode occurrences affected by these stream closures, though the upper reaches of these tributaries above American Creek confluence drain the KMDA here. Activity since 1989 has been limited to south flowing streams into Grantley Harbor.
Buckland	C	Main stem flows across the northeastern corner of a producing placer province but there are no know placer occurrences or APMA filings on the main stem.
Buckland Tributaries	C	Fairhaven Creek, western tributary to the lower Buckland drains a known placer gold occurrence that is well upstream of the proposed closures. No APMAs have been filed. There are two other placer gold occurrences on minor tributaries east of Buckland and west of the Selawik Hills. One is in the placer producing province the other not. The HLMP in the northern part of the drainage, the Selawik Hills, is known for its uranium occurrences.
West Fork Buckland	C	The main stem and tributaries have no known placer occurrences or APMA filings and do not lie within any producing placer provinces.
Middle Fork Buckland	C	The main stem and tributaries have no known placer occurrences or APMA filings and do not lie within any producing placer provinces.
Squirrel	C	No placer occurrences or APMA filings on the main stem.
Squirrel Tributaries (including North Fork and No Name Creek)	C	Excluding Timber and Klery creeks there are no placer occurrences or APMA filings. It is outside any producing placer provinces. Klery Creek has several known placer occurrences and APMA filings along its length. Upper Timber Creek has one known placer occurrence and several APMA filings. APMA filings on both are located on State-selected lands. Klery Creek lies wholly within a producing placer province and Timber Creek's upper end just touches the producing placer province.
Omar	C	No placer occurrences or APMA filings. Outside any producing placer provinces.
Omar Tributaries	C	No placer occurrences or APMA filings. Outside any producing placer provinces. In the northern part of the HLMP there are known mineral occurrences of Kipushi style copper, lead, zinc mineralization. There has been no active exploration on these occurrences since the mid-1970s and they are on State lands.
Kivilina and Tributaries	C, D	The main stem and tributaries have no known placer occurrences or APMA filings and do not lie within any producing placer provinces.
Pick and Tributaries	C	No placer occurrences or APMA filings. Outside any producing placer provinces.
Kukpowruk and Tributaries	C	No known placer occurrences or APMA filings. Outside any producing placer provinces.
Ipewik	C	The main stem and tributaries have no known placer occurrences or APMA filings and do not lie within any producing placer provinces.
Nilik and Tributaries	C	The main stem and tributaries have no known placer occurrences or APMA filings and do not lie within any producing placer provinces.

River	Alternative(s)	Remarks
Kiliovilik Creek and Tributaries	C	The main stem and tributaries have no known placer occurrences or APMA filings and do not lie within any producing placer provinces.
Koyuk	C, D	There are no APMA filings and the main stem is outside any known placer producing areas.
East Fork Koyuk	C, D	There are no APMA filings or known placer occurrences. Parts of the river channels within the closure or flood-prone zone cross a producing placer area.
Koyuk and East Fork Tributaries	C	There are no known placer occurrences or APMA filings on South-side tributaries. On the North side, the Peace River and Dime Creek have known placer occurrences. Sweepstakes Creek, tributary to Peace River has had recent activity but it is well above the proposed closure. Dime Creek contains known placer occurrences for gold and platinum and there have been recent APMA filings within proposed stream closures. Lands where recent activity has occurred are a mixture of BLM, State, and Native selected lands. Lode placer occurrences in the Dime Creek drainage above Haycock have recently been prospected for Ni-Pt-PGEs as shown by the recent APMA filings. Peace River, Dime Creek and East Fork drain a producing placer area.

Under Alternative C, impacts (see Table 4-7) of the river closures on mining exploration and development of known mineral occurrences would dramatically discourage further expenditure of funds in the planning area. In particular, two areas where there has been recent mining interest are in direct conflict with the proposed closures: the upper Noxapaga River tributaries and upper Dime Creek at Haycock and above.

The upper Noxapaga River tributaries drain a large block of State and State-selected lands. Mining activity is occurring on both State claims and Federal placer claims on State-selected lands. Application of proposed closures would trigger a validity exam on these Federal in-holdings before any further mining activity could occur.

Recent hard rock exploration of upper Dime Creek targeted historic known placer occurrences of placer platinum with the placer gold recovered from this area. Today the price of platinum is more than twice that of gold. The land status is mixed in this location, a combination of State and BLM lands. Exploration for lode source of the platinum and PGEs was launched from adjacent State claims onto BLM lands. No claims were located on BLM lands but continued demand for platinum could trigger more exploration. Proposed closures would definitely discourage exploration of this occurrence.

Under Alternative C, several ACECs would be closed to locatable mineral entry, subject to valid existing rights. Known placer mineral occurrences, APMA fillings, and producing placer provinces within each area are shown in the table below.

Table 4-8. Potential ACEC Units Under Alternatives C and D

ACEC Units	Alternative(s)	Remarks
Ingutalik River ACEC	C, D	No known placer mineral occurrences, no APMA filings and not within any producing placer provinces.
Ungalik ACEC	C, D	Only conflict is the southwestern corner intersects with the eastern part of a producing placer province with a single placer gold and antimony mineral occurrence on Christmas Creek No APMA filings in the area.
Shaktoolik ACEC	C, D	No known placer mineral occurrences, no APMA filings and not within any producing placer provinces.
Northern Nulato Hills ACEC	C, D	There are no known placer mineral occurrences, no APMA filings and the area is not included in any producing placer province (Buckland River basin south of Selawik Hills).
Western Arctic Caribou Insect Relief ACEC	C, D	There are no known placer mineral occurrences, no APMA filings and the area is not included in any producing placer province.
Mount Osborn and Kigluiak ACEC	C, D	Though the area encroaches on the margin and a corner of two separate producing placer areas, there is a single placer mineral occurrence for tungsten in the southeast corner of the ACEC on a tributary to the Grand Central River. On the north side of the Kigluaiks there are known occurrences of graphite, an industrial, locatable mineral, whose potential for development would be curtailed by inclusion in this ACEC.
McCarthys Marsh ACEC	C	
Upper Kuzitrin River ACEC	C	

Of the areas listed above only the Kigluaik ACEC/Mount Osborn ACEC would significantly curtail exploration interests in known mineral occurrences. This would be the industrial mineral, graphite found along the north flank and spine of the Kigluaik Mountains arch.

(5) Alternative D

As under Alternative B, revocation of all remaining withdrawals could result in some increased exploration and development activity, pending State and Native conveyances. This increased exploration and development would most likely be characterized as 3-5 small-scale (250 cubic yards per day) placer mining operations, limited mainly due to the lack of mineral potential on BLM lands. Development of mineral deposits on adjoining State and private lands could encourage exploration for mineral extensions onto adjacent Federal lands in some favorable instances. The potential would exist for exploration and development activities with the target of development a medium scale, hard rock mining operation (5,000-7,000 tons per day) similar to the recently proposed Rock Creek/Big Hurrah Mine. It is further expected that no new hard rock mines will develop during the life of this plan on Federal lands, primarily due to the long (more than 20 years) development time usually taken to bring a hard rock mine from discovery to production. Administration of Notices and Plans of Operations, compliance, and mine reclamation would be conducted by the BLM on BLM-managed lands.

Known mineral occurrences and mineral potential areas affected by ROP FW-7a, protection of aquatic and riparian habitat, as proposed under Alternative D (Kivalina River, Ungalik River, Shaktoolik River, Inglutalik River, Koyuk River including East Fork, Tubutulik River, Kuzitrin

River, Agiapuk River, Pah River, and Noatak River) are outlined in Table 4-7. Additionally, portions of the Mount Osborn ACEC would be restricted by ROP SS-4, strictly limiting any withdrawal or discharge of water from the tarn lakes that are identified as containing landlocked populations or Arctic char. Impacts are summarized in. This would negatively affect locatable mineral development by curtailing exploration interests in known mineral occurrences as discussed under Alternative C. The ACECs designated under Alternative D would be open to mineral entry, but would require a mining Plan of Operations.

Implementation of ROP FW-7a on the Kivalina River would have no impact on developing mineral resources as it is neither within a designated Placer Producing Area or a Known Mineral Deposit Area (KMDA).

Implementation of ROP FW-7a on the lower Ungalik River crosses both a designated Placer Producing Area and Known Mineral Producing Area. The Ungalik River, below the confluence of Diamond Creek has supported mining activities since at least the 1930s and a small bucketline dredge was actively mining the adjacent alluvial floodplain as recently as the early 1980s. There are patented mining claims on the hills and river floodplain in the vicinity of VABM Ungalik hills covering both lode and placer gold deposits. Nearby, Christmas Mountain, a known mineral occurrence in the KMDA, is an upland location outside the flood-prone zone but tributaries draining this mountain empty directly into the Ungalik. There may be indirect effects of this riverbank restriction to exploration and mining.

Table 4-8. This would negatively affect locatable mineral development by curtailing exploration interests in known mineral occurrences as discussed under Alternative C. The ACECs designated under Alternative D would be open to mineral entry, but would require a mining Plan of Operations.

Implementation of ROP FW-7a on the Kivalina River would have no impact on developing mineral resources as it is neither within a designated Placer Producing Area or a Known Mineral Deposit Area (KMDA).

Implementation of ROP FW-7a on the lower Ungalik River crosses both a designated Placer Producing Area and Known Mineral Producing Area. The Ungalik River, below the confluence of Diamond Creek has supported mining activities since at least the 1930s and a small bucketline dredge was actively mining the adjacent alluvial floodplain as recently as the early 1980s. There are patented mining claims on the hills and river floodplain in the vicinity of VABM Ungalik hills covering both lode and placer gold deposits. Nearby, Christmas Mountain, a known mineral occurrence in the KMDA, is an upland location outside the flood-prone zone but tributaries draining this mountain empty directly into the Ungalik. There may be indirect effects of this riverbank restriction to exploration and mining.

c) Mineral Materials

(1) Impacts Common to All Alternatives

A NEPA review is required for all mineral material extraction operations on BLM lands. Section 106 of the National Historic Preservation Act required a cultural resource evaluation be conducted and resources located cleared prior to conduct of any surface disturbance. Reclamation is required. Under interim management guidelines, mineral material sales and free use permits are not conducted on selected lands without written consent of the potential future land owner. Material sales and permits are not issued on un-certificated native allotments. Moneys collected from sales and permits on selected lands are put into escrow in favor of the future land owner.

Demand for mineral materials is driven by development projects which in turn which traditionally are driven by availability of Federal highway monies or State project monies. Unlike locatable minerals it is not driven by opening and closings of lands to mineral material sales regulations. Consequently the level of activity is much the same across the Alternatives A, B, and D of the plan alternatives. In Alternative C the restricting of riverbeds, ocean beach/lagoon, and lakeshore mineral material sources essentially closes all Federal lands in the planning area to sales and permits for mineral materials. Should a public works project develop in an area where mineral materials are not available by these de facto closures, public pressure through the political process would likely force the development of these mineral material resources.

(2) Alternative A

Development of mineral materials sites on BLM-managed lands would not be constrained under Alternative A except as restricted by interim management guidelines for selected lands. No unencumbered Federal lands would be closed to mineral material sales and permits.

(3) Alternative B

Development of mineral materials sites on BLM-managed lands would not be constrained under Alternative B except as restricted by interim management guidelines for selected lands and applicable ROPs. No unencumbered Federal lands would be closed to mineral material sales and permits.

(4) Alternative C

Development of mineral materials sites on BLM-managed lands would most likely be severely constrained under Alternative C. Under this alternative some unencumbered Federal lands would be closed to the operations of the Mineral Materials Sales regulations, but more importantly limitations on the type of mineral material deposit that could be developed would amount to a de-facto closure of public lands to the operation of this program.

Federal lands within the McCarthy's Marsh and Kigluaik ACEC would be closed to mineral materials sales and permits. In McCarthy's Marsh in particular this would curtail the maintenance of airstrips at Wagon Wheel, Omalik and elsewhere along the Mosquito Fork Creek, and preclude construction of any new airstrips. These airstrips would be mostly related to mineral exploration and development. This area is part of the HLMP for polymetallic veins, sulfide veins, and placer commodities gold, uranium and rare earths, tin, tungsten, and PGEs. The additional restriction of not allowing mineral material sales permits on riverbed, ocean beach/lagoon and lakeshores would preclude development of transportation corridors and house and cabin construction. This restriction is a defacto closure of all BLM-managed lands in the planning area to material sales and permits and would place severe restrictions on local economic development and construction of infrastructure in support of locatable minerals development.

(5) Alternative D

Impacts would be the same as discussed under Alternative B.

4. Recreation Management

For a more detailed description of the recreation proposals by alternative, see Table 2-14.

Table 4-9. Special Recreation Management Area Designations by Alternative

Area	SRMA Acreage by Alternative							
	A		B		C		D	
	Acres	%*	Acres	%*	Acres	%*	Acres	%*
Squirrel River	0	0	726,000	6	726,000	6	726,000	6
Salmon Lake/ Kigluaik	0	0	0	0	244,000	2	244,000	2
Total	0	0	0	0	970,000	8	970,000	8

* Percent of BLM-managed lands (11,913,000 acres) within the planning area.

Table 4-10. Management Emphasis Areas within the Extensive Recreation Management Area by Alternative

Area	Management Area Acreage by Alternative							
	A		B		C		D	
	Acres	%*	Acres	%*	Acres	%*	Acres	%*
Agiapuk River	0	0	0	0	220,000	2	0	0
Bendeleben Mountains	0	0	0	0	399,000	3	0	0
McCarthy Marsh	0	0	0	0	229,000	2	0	0
Koyuk River	0	0	0	0	217,000	2	0	0
Buckland River	0	0	0	0	215,000	2	0	0
Inglutalik River	0	0	0	0	295,000	2	0	0
Ungalik River	0	0	0	0	273,000	2	0	0
Nulato Hills			0		2,001,000	15	0	0

Proposed management of the following resources/resource uses/programs would have no anticipated impacts to Recreation Management: Forest Products, Livestock Grazing, Wilderness Characteristics, and Public Safety.

a) Impacts Common to All Alternatives

(1) Impacts to Recreation from Air Quality and Soil and Water Resources

Proposed or permitted uses would be analyzed through a NEPA document and measures enacted to mitigate impacts to watersheds. Healthy watersheds support a wide variety of recreational opportunities for present and future generations.

(2) Impacts to Recreation from Fish and Wildlife Management

Management of fish and wildlife habitats to provide environments to support viable populations of fish and wildlife will have a direct impact on recreation. By enhancing or altering wildlife habitats, the animals used for recreational hunting, fishing, and trapping would be either increased or deceased. Viewing opportunities of wildlife may be increased or decreased as well. Recreation could be enhanced through the introduction of sought after big game animals if habitat would support such introduction.

(3) Impacts to Recreation from Vegetation

Proper management of the vegetation, especially critical wintering habitat for the WACH (WACH), muskox, and winter moose browse will provide quality habitat to support wildlife for recreational use. Proper vegetation management will also preserve viewsheds that enhance the quality of recreational experiences.

(4) Impacts to Recreation from Special Status Species

Recreation can be impacted through specific limits on OHV use or from camp sites on areas that contain Special Status Species. Due to the lack of detailed knowledge within the planning area, no area has been limited or restricted from OHV use due to Special Status Species and therefore no impact is anticipated under this alternative. Proposed or permitted uses would be analyzed through a NEPA document and measures enacted if Special Status Species were encountered or known to be impacted. If Special Status Species are impacted from recreational use, the use can relocated to areas where this Species is unlikely to be encountered.

(5) Impacts to Recreation from Fire and Fire Management

Fire promotes vegetation and wildlife diversity, which can enhance recreation opportunities in both the short- and long-term. Vegetative diversity provides variation in vegetation types, providing variation in form, texture, and color and enhancing scenic qualities. Long-term opportunities for wildlife viewing or hunting may be enhanced by new vegetation growth (willow moose browse) and improved habitat quality. Wildland or prescribed fire may be used to improve wildlife habitat thereby increasing wildlife numbers to the benefit of recreational users. Negative effects of fire on recreation are generally short-term and are directly related to fire's effects on specific resources used in recreation, such as recreation facilities. Effects of fire on the critical wintering habitat of the WACH may negatively impact recreation if fire burns the lichen biomass and alters the winter migration of the WACH.

Effects on visual and cultural resources, wildlife, and vegetation would have immediate and direct effects on use of these resources for camping, sightseeing, hunting, and other activities. Recreation users are generally mobile, thus, if recreation is precluded by fire in one area, they generally can find an alternate area in which a similar recreational activity can be pursued. However, smoke thick enough to limit aircraft flights could result in impacts on recreational and commercial activities. Existing and future BLM structures and facilities will be protected (including the Salmon Lake Campground Facility) to the benefit of recreational users.

(6) Impacts to Recreation from Cultural and Paleontological Resources

Protection and possible interpretation of these resources would enhance recreation opportunities and experiences for those seeking these types of experiences.

(7) Impacts to Recreation from Forest Products

Current levels of firewood gathering, commercial harvests and house log permitting on BLM-managed lands have little effect on recreation. This is due largely to a small population and the distance to communities from stands of timber on BLM managed lands. However, if significant sales of forest product took place due to bark beetle infestations or from commercial timber harvests, recreational users would see increased trails, potential dislocation of wildlife and alteration of view sheds. Consideration of existing recreation facilities or trails is given on a case-by-case basis during consideration of these types of permits, with appropriate buffers provided between sale areas and trails/facilities. The continuation of forestry practices at this level would have little to no effect on recreation.

(8) Impacts to Recreation from Locatable Minerals

Existing small placer mining operations (disturbing less than five acres) have provided secondary access to recreational opportunities. A semi-primitive motorized management structure would be enhanced through the development of small placer mining operations. Often these operations provide remote air landing strips and localized trails. Large-scale mining operations with associated infrastructure (such as roads and powerlines) are not anticipated within the life of the plan.

Mineral development has the potential to create impacts to recreation, particularly if development occurs in areas that provide primitive or semi-primitive recreation experiences. Construction of necessary infrastructure would compromise any primitive, semi-primitive, or semi-primitive motorized experience. Mineral development has the potential to impact the viewshed. Public access into areas of development would have secondary effects on adjacent areas by increasing visitor use and may lead to the development of additional dispersed campsites and trails. In areas managed for a roaded-natural experience, additional access provided by mineral development could positively affect the recreation experience by offering additional roaded access to otherwise inaccessible areas.

(9) Impacts to Recreation from Travel Management

Acquisition of easements across or around private lands will be from willing landowners on a case-by case basis. Acquired easements may be necessary due to emerging land transfer issues. Recreational opportunities may be enhanced through acquired easements.

(10) Impacts to Recreation from Renewable Energy

Requests for permits would be acted upon on a case by case basis. If development were to occur, its impacts on recreation would be similar to those discussed under Impacts Common to All Alternatives: Impacts to Recreation from Mineral Exploration and Development beginning on page 4-157.

(11) Impacts to Recreation from Subsistence

Subsistence may impact recreation use if subsistence resources are limited. Recreational uses of fish and game resources may be limited or eliminated to all users except Federally qualified subsistence users as required under ANILCA or through regulatory changes by the Federal Subsistence Board.

b) Alternative A

(1) Impacts to Recreation from Fish and Wildlife Management

Impacts would be the same as discussed under Impacts Common to All Alternatives.

(2) Impacts to Recreation from Visual Resources

Under this alternative, no visual management classes have been established.

(3) Impacts to Recreation from Livestock Grazing

Under this alternative, reindeer grazing may be authorized. Reindeer and caribou do compete for the same ranges in some instances and therefore grazing may impact the recreational hunter seeking caribou. Areas where caribou and reindeer conflicts occur will affect the recreational user through regulatory issues with fish and game management. Reindeer may overgraze their ranges and limit caribou feed. Reindeer viewing can enhance the recreational experience for those wishing to view wildlife. Reindeer also draw other predatory wildlife, such as grizzly bear, wolves and wolverine to the area. These predators enhance the recreational opportunity for those interested in viewing, hunting and trapping.

(4) Impacts to Recreation from Leasable Minerals

There would be no impacts from oil and gas leasing as leasing would not occur under this alternative.

(5) Impacts to Recreation from Locatable Minerals

Impacts would be the same as discussed under Impacts Common to All Alternatives.

(6) Impacts to Recreation from Mineral Materials

Most gravel pit development occurs within or adjacent to existing roads and highways. Consequently, gravel extraction has little impact on recreation experiences but can negatively impact visual resources. In the planning area, old gravel pits provide de-facto parking areas and motorized play areas. Given current development levels and the lack of BLM lands along the existing road system, no effects to recreation would occur under this alternative.

(7) Impacts to Recreation from Recreation Management

No SRMAs would be designated under Alternative A. Facilities enhancement (such as the addition of public use cabins, trails or interpretive panels) may be added to the range of recreational experiences currently available. Recreational opportunities would be primarily limited to independent remote backcountry experiences and through guided tours.

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

Recreational conflicts between user groups (guides, transporters, and local users) in the Squirrel River and other areas within the planning area would not be addressed under this alternative.

(8) Impacts to Recreation from Travel Management

Semi-primitive motorized recreation opportunities would be maintained on lands currently undesignated for OHV use. OHV use would be allowed on all BLM-managed lands within the planning area subject to the 2,000 pound GVWR, trail proliferation would continue, with increased user conflicts between individuals seeking no OHV use and those wishing to use OHVs in their recreational pursuits. Associated impacts to visual resources (establishment of trails) would continue. In the planning area, some primitive and most semi-primitive recreation experiences would trend towards semi-primitive motorized or roaded-natural experiences. No primitive recreational experience is available under this alternative. However, given their remote location and lack of existing infrastructure, most BLM lands will have characteristics of a primitive recreational experience.

There is no anticipated impact to recreation from potential roads under this alternative. As discussed in the Resource Assumption section above, there is no foreseeable road construction unless economically viable resource development (minerals primarily) takes place or the State of Alaska proposes specific roads for public access in northwest Alaska across BLM managed lands. A request for road proposal would be acted upon on a case by case basis.

(9) Impacts to Recreation from Lands and Realty Actions

No lands have been identified for disposal under this alternative. There would be no impact to recreation if land disposal does not occur. If disposal was to occur, development on privatized lands may bring a heavy concentration of recreational users which may negatively impact adjacent Federal land or recreational users on adjacent Federal lands. Private landowners may limit access for recreational users to adjacent Federal lands.

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

Land use authorizations such as leases and permits often result in additional development that may result in adverse effects on areas being managed for a semi primitive recreation

experience. These effects may include impacts to visual resources, increased visitor encounters, and a diminished recreation experience. Alternative A would address mitigation of these effects on a case-by-case basis. The 300-foot setback on certain area rivers would mitigate potential negative recreation effects within river corridors (visual and fish resources primarily).

No withdrawal review would take place and, pending some other legislation, all ANCSA (d)(1) withdrawals would be maintained. Some BLM lands would continue to be closed to mineral entry. Small mineral development may enhance recreational access by providing for remote airstrips and localized OHV trails.

(10) Impacts to Recreation from Special Designations

No ACECs or RNAs, which provide measures for the protection of specific resource values, would be designated under this alternative. In general, resource values would be afforded less protection and wildlife viewing, hunting and fishing opportunities and other recreational use may decrease without the protective measures offered by these designations. There would be no impacts from wild and scenic river management as no rivers would be determined suitable.

c) Alternative B

(1) Impacts to Recreation from Fish and Wildlife Management

Impacts would be similar to those under Impacts Common to all Alternatives. Increased monitoring and application of the ROPs would provide additional protection to wildlife and fisheries habitat, benefiting wildlife related recreation.

(2) Impacts to Recreation from Visual Resources

Under this alternative the Squirrel River and the Kigluaik Mountains would be classified as VRM class II and III. The remainder of the plan area would be class IV. A class II and III designation would protect important viewsheds for recreational users. These classes could also impede recreational use by limiting facility construction or OHV use that may enhance recreational use for certain user groups.

(3) Impacts to Recreation from Livestock Grazing

Impacts would be the same as discussed under Alternative A, except bison may add to viewing opportunities.

(4) Impacts to Recreation from Leasable Minerals

Oil and gas development has the potential to create impacts to recreation, particularly if development occurs in areas that provide primitive or semi-primitive recreation experiences. Construction of roads, pipelines, powerlines, and other necessary infrastructure would compromise any primitive, semi-primitive, or semi-primitive motorized experience. By creating linear features (such as roads and pipelines) across the landscape, oil and gas development has the potential for significantly impacting visual resources. Such structures may also affect movements of the WACH which provides world class hunting and guiding opportunities on BLM

lands. Limited public access (winter overland crossings) into areas of development would have secondary effects on adjacent areas by increasing visitor use and may lead to the development of additional dispersed campsites and trails. Additional access provided by oil and gas winter roads could positively affect the recreation experience by offering additional trails for winter snowmachine use.

(5) Impacts to Recreation from Locatable Minerals

This alternative anticipates the greatest opportunity for exploration and development for locatable minerals. Dependent on gold prices, there would be a moderate increase in small placer operations on BLM-managed lands. Large operations are possible during the planning period, but would occur on State or private lands. Roads or infrastructure necessary for those operations, however, may cross BLM-managed lands. Impacts would be similar to but slightly greater than those discussed under Impacts Common to All Alternatives beginning on page 4-157.

(6) Impacts to Recreation from Mineral Materials

Impacts would be the same as those discussed under Alternative A.

(7) Impacts to Recreation from Recreation Management

One SRMA, the Squirrel River (726,000 acres), is proposed under this alternative. This alternative would limit the number of special recreation permits available and visitor use days in the Squirrel River, primarily impacting the sport hunter who relies upon guided hunts. Limiting use levels could enhance the experience of the sport hunter due to less competition for resources and a more dispersed camping setting. The limits may also deny an opportunity for some hunters to experience the area, if the guided hunting is not available due to limitations on the number of permits and visitor use days available. This alternative would also negatively impact the commercial service providers by limiting their potential client base. Limits in the Squirrel River may relocate recreational users to other areas or deny the recreational opportunity previously offered in a dispersed recreational management. Relocation of recreational users to other areas may negatively affect recreational users in those areas by increasing competition for campsites and resources.

(8) Impacts to Recreation from Travel Management

The lifting of the 2,000 pound GVWR limit during the winter months under this alternative may increase the potential for recreational opportunities by allowing larger OHV use in an unrestricted environment. It may also allow commercial operators (and private recreational enthusiasts with large OHV vehicles) the opportunity to travel in more comfort during the winter months. Impacts from roads would be the same as discussed under Alternative A.

(9) Impacts to Recreation from Lands and Realty Actions

Impacts from FLPMA disposal would be the same as discussed under Alternative A.

Under this alternative, BLM would consider acquisition of parcels along the Iditarod NHT through purchase or exchange with willing owners. This would increase the opportunity to enhance recreational use along the Iditarod NHT by increasing public lands which may be

developed to enhance visitor use, such as build or permit shelter cabins and create permanent access rights.

Impacts from land use authorizations would be the same as discussed under Alternative A.

This alternative would revoke all existing ANCSA (d)(1) withdrawals, which would allow increased mineral exploration and development on unencumbered BLM lands and on lands currently selected that are relinquished because of over-selection by the State or Native corporations. The effects of mineral exploration and development on recreation are discussed under Impacts Common to All Alternatives beginning on page 4-157.

Alternative B would add the Red Dog-Kuchiak Mine Corridor as proposed by Arctic Slope Regional Corporation (ASRC). Designation of the corridor itself would have no impact on recreation. However, if a road or utility such as a powerline were developed within the corridor, impacts would be similar to that discussed under Travel Management above. There would be increased potential for access into the planning area for recreational use. However, this would primarily affect local residents, as the corridor would connect to the Red Dog mine road which is not readily accessible to most outside recreational users.

(10) Impacts to Recreation from Special Designations

Impacts would be the same as discussed under Alternative A.

d) Alternative C

(1) Impacts to Recreation from Fish and Wildlife Management

Impacts would be similar to Alternative B; however, increased protection for lichen habitat for the WACH will further caribou management, a game species sought by recreational users. Additional oil and gas leasing Stips instituting seasonal restrictions in caribou calving and insect relief habitat would further protect crucial caribou habitats and would enhance hunting related recreation opportunities.

(2) Impacts to Recreation from Visual Resources

Impacts would be the same as discussed under Alternative B, except more area would be designated as Class II and III, and thus more restrictions on recreational enhancements could be placed in these areas. Alternatively, more viewsheds are protected, especially along river corridors where most recreation takes place.

(3) Impacts to Recreation from Livestock Grazing

Impacts would be the same as discussed under Alternative A, except that some areas known for caribou habitat would not be open to grazing which may enhance recreational opportunities for caribou hunting.

(4) Impacts to Recreation from Leasable Minerals

There would be no impacts from oil and gas leasing as it would not occur under this alternative. Seismic exploration could occur, but would be unlikely, as high potential lands would be closed to leasing. Impacts to recreation from seismic exploration would be negligible.

(5) Impacts to Recreation from Locatable Minerals

This alternative would close the Nulato Hills, WACH insect relief area, Squirrel River, Kigluaik Mountains, McCarthy Marsh, and the upper Kuzitrin River to locatable mineral entry. The Squirrel River has some of the best recreational hunting opportunities within the planning area and by eliminating potential impacts to wildlife in this area from mining that opportunity would be further protected. The other areas that are proposed as closed to mining in this alternative offer spectacular scenic vistas and prime habitat for ungulate populations. These areas are prime recreational use areas. By closing areas important to wildlife and river corridors, the potential impacts to recreation identified in the Impacts Common to All Alternatives are minimized.

(6) Impacts to Recreation from Mineral Materials

The following areas would be excluded from mineral material sale or development under this alternative: McCarthy Marsh, Kigluaik Mountains, riverbeds, ocean beach/lagoon and lakeshores. The excluded areas may adversely impact recreation by decreasing the economic viability of roads in the areas excluded. New roads would allow for greater recreational access opportunities. Conversely, the lack of material in these areas may prevent roads from being developed which would keep the recreational experience largely semi primitive and roadless.

(7) Impacts to Recreation from Recreation Management

Two areas totaling 970,000 acres would be designated as SRMAs under Alternative C: Squirrel River (726,000 acres) and Salmon Lake/Kigluaik (244,000 acres). Additional management attention would be focused on certain areas shown in Table 4-10 within the Extensive Recreation Management Area (ERMA) referred to as recreation management zones. This would allow for more intensive management and preservation of identified high value recreation resources to ensure the maintenance of the recreation experiences currently available. The proposed focus on recreation management zones within the ERMA under this alternative as compared with Alternative D, would afford enhanced protections to the watersheds, preserving high value recreation resources.

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

Impacts to commercial recreation in the Squirrel River would be similar to those discussed under Alternative B but more restrictive as air taxis would be required to obtain a permit and would be limited in number.

Increased delivery of environmental education and interpretation would increase public awareness regarding cultural and natural resources, encourage ethical and sustainable use,

and establish collaborative working relationships with the State, Native or village corporations, and special interest groups.

By electing not to develop additional facilities in the SRMAs and recreation management zones designated under this alternative, the demand for increased developed visitor services and the opportunity to direct visitor use to sustainable locations would be negatively affected. Unmanaged use of undeveloped areas would ultimately increase resource damage, resulting in the proliferation of user-created dispersed camping areas, and trails. The failure to promote the addition of public use cabins to the range of recreational experiences currently available would limit opportunities for those seeking road-accessible and remote backcountry experiences. The demand for public use cabins would not be met except for the Salmon Lake/Kigluaik SRMA where facilities may be permitted.

Proposed management of SRMAs and recreation management zones under this alternative has the potential to affect recreation more than any other alternative proposed.

(8) Impacts to Recreation from Travel Management

This alternative would restrict OHV use to designated trails during the snow-free season and keep the current maximum 2,000 pound GVWR limit throughout the planning area during the winter. This alternative would diminish opportunities for free and unrestricted OHV use. Seasonal restrictions would provide opportunities for those seeking a non-motorized experience during the brief summer months, an opportunity that is unavailable under other alternatives. Limiting OHV use to designated trails would allow also provide additional areas were recreational users could avoid encounters with OHVs.

In designated ACECs or SRMAs, future area specific plans may further limitation OHV use including designated trails, seasonal restrictions, weight limits or seasonal closures. The uncertainty of these future plans makes the impacts on recreation largely unknown. Areas that may be limited or closed would enhance recreational experiences for those seeking a primitive non- motorized experience.

The restrictions proposed in this alternative would impact the vast majority of recreational users by strictly limiting OHV use where no limits have been in place before. There may be areas that recreational users will have difficulty accessing due to the lack of designated trails, or where a specific recreational use may no longer be available. For example, big game hunting by OHV in the non-winter months would be restricted. These restrictions will lead to a different type big game hunting experience (backpacking) or require hunters to go to the additional expense of chartering aircraft. The restrictions may also affect hunter success rates in that OHV access provides the recreational user a larger geographic area to pursue game resources.

This alternative will impact recreational use more than any other alternative in the plan. This alternative will have a greater affect on non-local recreational users as their visits generally occur in the snow-free season when OHV designations would be the most restrictive.

Impacts from roads would be the same as discussed under Alternative A.

(9) Impacts to Recreation from Lands and Realty Actions

There would be no impacts to recreation from FLPMA disposal as no lands would be made available for disposal.

Impacts from acquisitions would be the same as discussed under Alternative B.

R&PP leases and FLPMA permits would not be authorized within any ACEC. Leases and permits often result in additional development. The absence of development would help to maintain existing recreation experiences which are largely semi primitive in nature. Due to the large number of ACEC and RNAs in this alternative, there may be recreational opportunities that will not be available to communities wishing to develop recreational sites or to commercial operators seeking an advanced level of recreational amenities such as a remote lodge setting. The development of facilities to enhance visitor use and experience would be limited under this alternative more than any other alternative.

Alternative C would result in mineral withdrawals on 6.5 million acres of land, thus preventing mineral development and its associated impacts (both positive and negative) on recreation.

(10) Impacts to Recreation from Special Designations

Under this alternative, 5.6 million acres in five areas would be designated as ACECs. ACEC designation would provide additional protection to WACH calving and insect relief habitat in the northwest, winter caribou habitat in the Nulato Hills, salmon habitat in the Shaktoolik, Ungalik and Inglutalik Rivers, and moose, caribou, salmon, and waterfowl habitats in McCarthy's Marsh and upper Kuzitrin River, potentially increasing hunting related recreational opportunities. There may be negative impacts to recreation from designation if additional restrictions are placed on OHV use and other recreational activities.

There are 11 river systems that have been identified as eligible for designation as wild under the WSR Act (Table 2-21). It is difficult to predict what effect future designation may have on recreational users. The outstandingly remarkable values for which rivers were identified (primarily fish resources) would continue to be protected. It is likely that recreational users would benefit from the recommendation of these rivers as suitable for designation.

e) Alternative D

(1) Impacts to Recreation from Fish and Wildlife Management

Impacts would be the same as discussed under Alternative C.

(2) Impacts to Recreation from Visual Resources

Impacts would be similar to Alternative C, except more area is classified as VRM Class III and IV and less area is Class II. This alternative would provide less protection for important viewsheds. Conversely, there would be less likelihood of facilities or trails being limited due to visual concerns.

(3) Impacts to Recreation from Livestock Grazing

Impacts would be the same as discussed under Alternative C.

(4) Impacts to Recreation from Leasable Minerals

The impacts associated with oil and gas development would be the same as those discussed under Alternative B, except that oil and gas leasing Stipulations #6 and #7, and ROP FW-3c to protect caribou habitat would be implemented under this alternative.

(5) Impacts to Recreation from Locatable Minerals

Effects to recreation are similar to those described under Alternative B.

(6) Impacts to Recreation from Mineral Materials

Impacts would be the same as discussed under Alternative A.

(7) Impacts to Recreation from Recreation Management

Two areas totaling 970,000 acres would be designated as SRMAs under Alternative D: Squirrel River (726,000 acres), and Salmon Lake/Kigluaik Mountains (244,000 acres). These designations would allow for the development of comprehensive management strategies, with the identification of specific goals and objectives, that would help preserve high value recreation resources while managing recreation experiences. More developed recreation opportunities could be provided to the public.

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

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

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

The ERMA would not receive the management emphasis provided in Alternative C. These areas would continue to have dispersed recreational use with occasional user conflicts.

(8) Impacts to Recreation from Travel Management

This alternative would be the second most effective (after Alternative C) at maintaining a diversity of recreational experiences across the landscape based on measures to regulate OHV use. All BLM-managed lands would be designated as limited to OHVs with a 2,000 pound GVWR limitation. Impacts to recreation in the ERMA would result in a gradual trend away from primitive recreation experiences towards semi-primitive motorized or roaded natural experiences.

In areas designated as ACEC or SRMA, limits may be imposed on OHV use including: limiting use to designated trails, seasonal weight restrictions or seasonal closures. The unmanaged proliferation of trails outside of these areas would continue to some extent because trails would not be designated. In these areas, designations would not be enforced until implementation-level planning occurred. Where OHVs are limited to designated trails, BLM would more intensively manage OHV use, reducing impacts to natural and cultural resources, thus benefiting the recreational user. Primitive, semi-primitive and semi-primitive motorized recreation experiences would be maintained in these areas. Some users may be temporarily displaced during the seasonal closures which may increase OHV use in other areas. A degree of uncertainty remains as to the future implementation-level planning and the impacts of limiting OHV use to designated trails or seasonal closure of areas.

Impacts from roads would be the same as discussed under Alternative A.

(9) Impacts to Recreation from Lands and Realty Actions

Lands available for future disposal in Nome and Kotzebue are small isolated tracts that will not affect recreation. The effects of land disposal upon recreation are the same as Alternative A.

Impacts from acquisitions would be the same as discussed under Alternative B.

Impacts from land use authorizations would be the same as discussed under Alternative C.

Impacts from withdrawal review would be the same as discussed under Alternative B.

(10) Impacts to Recreation from Special Designations

Impacts would be similar to those discussed under Alternative C. Additional protection would be provided to natural and cultural resources by designation of 3.6 million acres of ACEC in six areas. McCarthy's marsh and the upper Kuzitrin would not be designated as ACECs under this alternative, potentially providing less protection for moose, caribou and waterfowl habitats.

Where special designations are applied, effects under Alternative D would be similar to those described under Alternative C. However, Alternative D would provide less protection than that afforded by Alternative C as McCarthy's Marsh, Kuzitrin River and portions of the Kigluaik Mountains would not be designated. OHV restrictions from seasonal closures, weight limits or designated trail use will impact the recreational user as described in Alternative C.

5. Travel Management/OHV

An overview of Travel Management can be found in Chapter II. The table below summarizes the Off-highway Vehicle (OHV) designations.

Table 4-11. OHV Designations by Alternative

OHV Designation	Alternative							
	A		B		C		D	
	Acres	%*	Acres	%*	Acres	%*	Acres	%*
undesignated	11.9 million acres	100	0	0	0	0	0	0
Limited to 2,000 pound GVWR seasonally	11.9 million acres limited yearlong	100	June 1-October 31, 11.9 million acres	100	Nov. 1-May 14 with adequate snow/frost 11.9 million acres	100	7.4 million acres, outside of ACEC and SRMA limited yearlong	62%
Limited w/out 2,000 pound GVWR seasonally	0	0	Nov. 1-May 31, During adequate frost/snow 11.9 million	100	0	0	0	0
Limited to designated trails w/2,000 pound GVWR limitation	0	0	0	0	May 15-Oct 31 11.9 million acres	100	0	0
Limited with seasonal closures, weight restrictions or designated trails through activity plan	0	0	0	0	In ACECs and SRMAs (6.7 million acres) through activity plan	51%	In ACECs, RNAs or SRMAs (4.5 million acres) through activity plan	38%

* Percent of BLM-managed lands (11,913,000 acres) within the planning area.

Proposed management of the following resources/resource uses/programs would have no anticipated impacts to travel management/OHV: Air Quality, Soil and Water Resources, Vegetation, Fish and Wildlife Management, Cultural Resources, Paleontological Resources, Public Safety, and Subsistence.

a) Impacts Common to All Alternatives

(1) Impacts to Travel Management/OHV from Special Status Species

Travel can be impacted through specific limits on OHV use or on trail development within areas that contain Special Status Species. Proposed or permitted uses such as trail construction or

designation would be analyzed and measures enacted to minimize impacts. If it is determined that OHV use or trail construction may negatively affect a Special Status Species, the use may be limited to seasons when the species is not present, or the trail relocated to areas where the species is unlikely to be encountered.

(2) Impacts to Travel Management/OHV from Fire and Fire Management

Existing and future structures and facilities will be prioritized for protection (including the Salmon Lake Campground). Construction of fire lines if not rehabilitated may create new trails that would be available for OHV users. Travel and OHV use would likely not be interrupted due to fire management activities except on a short-term, temporary basis. In forested areas, falling trees may affect trail travel after a fire occurs. It is anticipated that there would be little impact to travel management and OHV from fire management.

(3) Impacts to Travel Management/OHV from Livestock Grazing

This activity does increase OHV use (primarily in the winter) and may have the potential for roads or trails to support the industry. Given the difficult economic viability in recent years of reindeer grazing due to caribou interactions, there would be little to no effect on travel management and OHV use under any alternative.

(4) Impacts to Travel Management/OHV from Travel Management

Fixed wing and helicopter access will remain largely unregulated on all BLM managed lands unless specifically addressed through the development of a RAMP or ACEC management plan or through regulation.

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

There is no foreseeable road construction unless economically viable resource development (minerals primarily) takes place or the State proposes specific roads for public access in northwest Alaska across BLM-managed lands. A request for road proposal would be acted upon on a case by case basis. If roads were developed, access opportunities for OHV users would increase.

(5) Impacts to Travel Management/OHV from Renewable Energy

Renewable energy projects would be authorized through the appropriate land use authorization on a case-by-case basis. Impacts would be similar to those discussed under Land Use Authorizations for each alternative.

(6) Impacts to Travel Management/OHV from Subsistence

No issues are identified that would affect travel or OHV use through subsistence use other than the ANILCA protections for access would continue under all alternatives.

b) Alternative A

(1) Impacts to Travel Management/OHV from Visual Resources

No VRM designations are in place, so there would be no impacts.

(2) Impacts to Travel Management/OHV from Forest Products

Current levels of firewood gathering, commercial harvests and house log permitting on BLM-managed lands have little effect on travel management and OHV use. This is due largely to a small population and the distance to communities from stands of timber on BLM-managed lands. However, if significant sales of forest product took place due to beetle bark infestations or from commercial timber harvests, trails and or roads would be needed. These roads or trails could be maintained after the sale for public use. The continuation of forestry sales and practices at current levels would have little to no effect on travel management or OHV use.

(3) Impacts to Travel Management/OHV from Minerals

(a) Leasable Minerals

There would be no impacts as leasing would not occur under this alternative.

(b) Locatable Minerals

There would be little to no effect due on travel management and OHV use from Locatable Minerals.

(c) Mineral Materials

Most gravel pit development occurs within or adjacent to existing highway right-of-ways. Consequently, gravel extraction has potential to impact travel management. Given current development levels, no effects on travel management or OHV would occur.

(4) Impacts to Travel Management/OHV from Recreation Management

No SRMAs would be designated under Alternative A. There would be little effect to travel or OHV use under this alternative other than the 2000 pound GVWR limit on OHVs would continue.

(5) Impacts to Travel Management/OHV from Travel Management

All BLM-managed lands within the planning area would remain “undesignated” to OHV use (limited to 2,000 pound GVWR) as specified in the Northwest MFP (BLM 1982). There would

be no opportunity for vehicles larger than 2,000 pounds without a permit under this alternative. Generally, this would mean the public could not use standard pickup trucks, jeeps, and track vehicles anywhere in the planning area without a permit unless a specific 17(b) easement or right-of-way allowed such use.

(6) Impacts to Travel Management/OHV from Lands and Realty Actions

No lands have been identified for FLPMA disposal under this alternative. There would be no impact to travel or OHV if land disposal does not occur. If disposal was to occur, development on privatized lands may bring new roads and trails near adjacent Federal lands. Private landowners may limit access for users to adjacent Federal lands.

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

Land use authorizations such as leases and permits often result in additional developments that may result in increased travel opportunities and OHV trails.

Under Alternative A, no withdrawal review would take place and some lands would continue to be closed to mineral entry. Small mineral development may enhance access by providing for remote airstrips and localized OHV trails.

(7) Impacts to Travel Management/OHV from Special Designations

No ACECs or wild and scenic rivers would be designated under this alternative.

c) Alternative B

(1) Impacts to Travel Management/OHV from Visual Resources

Under this alternative the Squirrel River and the Kigluaik Mountains would be classified as class II and III. The remainder of the plan area would be class IV. A class II and III designation may prohibit road or trail development or increase the costs of such development to mitigate the effects on visual resources.

(2) Impacts to Travel Management/OHV from Forest Products

Impacts would be similar to Alternative A. Timber harvest would be considered in special management areas under this alternative. Downed timber salvage sales may impact travel and OHV use. There could be a need for trails or roads for timber harvest under this alternative which then may be available for OHV use.

(3) Impacts to Travel Management/OHV from Minerals

(a) Leasable Minerals

Oil and gas development has the potential to create impacts to travel management and OHV use, particularly if development occurs in areas that may provide access from improved infrastructure to BLM lands. Construction of winter roads, pipelines, powerlines, and other necessary infrastructure would help develop needed road and trail infrastructure. Public access into areas of development would have secondary effects on adjacent areas by increasing visitor use and may lead to other developments.

(b) Locatable Minerals

This alternative anticipates the most exploration and development for locatable minerals given the revocation of all ANCSA (d)(1) withdrawals and the lack of area-wide constraints such as ACEC designations. There would be a moderate increase in small placer operations on BLM-managed lands. Large operations are possible during the planning period, but would occur on State or private lands. Roads or infrastructure necessary for those operations, however, may cross BLM-managed land. Greater impacts to travel management and OHV use are anticipated under this alternative compared to any other alternative. Increased trails and remote airstrip development (fixed wing) would be likely under this alternative. Road development (localized unless a large mineral deposit is developed) is likely if mineral development takes place.

(c) Mineral Materials

Similar to alternative A but increased opportunity for leasing and locatable minerals and the potential for road development may increase sales of mineral materials. New roads may be developed and turn outs created from gravel pit development.

(4) Impacts to Travel Management/OHV from Recreation Management

One SRMA, the Squirrel River, is proposed under this alternative. Limits on the number of special recreation permits available and visitor use days in the Squirrel River would be implemented. OHV use may be limited in an activity level plan. OHV use is likely to be affected in this alternative. Because OHV designations within SRMAs would be further developed through activity plans, the effect on travel is somewhat unknown.

(5) Impacts to Travel Management/OHV from Travel Management

All BLM-managed lands within the planning area would be designated as limited for OHV use. The lifting of the 2,000 pound limit during the winter months under this alternative will increase the potential for travel by allowing use of larger OHVs in an unrestricted environment. The lifting may allow commercial operators (and private recreational enthusiasts with large OHV vehicles) the opportunity to travel in more comfort during the winter months. The use of the larger vehicles is currently allowed under permit. This is the only alternative where vehicles larger than 2,000 pounds could travel on BLM-managed lands without a permit. No alternative gives an opportunity for travel on BLM-managed lands with vehicles over 2,000 pounds during the summer and fall months without a permit.

(6) Impacts to Travel Management/OHV from Lands and Realty Actions

Impacts from FLPMA disposal would be the same as under Alternative A.

Under this alternative, the BLM would consider acquisition of parcels along the Iditarod NHT through purchase or exchange with willing owners. When feasible, BLM would acquire less than fee title to property if management goals could be achieved. This would increase the opportunity to enhance OHV use along the Iditarod NHT by increasing public lands which may be developed and create permanent access rights.

Impacts from land use authorizations would be the same as under Alternative A.

This alternative would revoke all existing ANCSA (d)(1) withdrawals, which would allow increased mineral exploration and development on unencumbered BLM lands and on lands currently selected that are relinquished because of over-selection by the State or Native Corporations. Increased travel and OHV use under this alternative is expected due to the increased potential of mineral exploration and development by making more lands available.

Alternative B would add the Red Dog-Kuchiak Mine Corridor as proposed by ASRC. Designation of the corridor would have a direct impact on travel management if a road or utility such as a powerline were developed within the corridor. There would be increased potential for access into the planning area for a variety of public uses. However, this would primarily affect local residents, as the corridor would connect to the Red Dog mine road which is not readily accessible to most outside users.

(7) Impacts to Travel Management/OHV from Special Designations

No ACECs or wild and scenic rivers would be designated under this alternative.

d) Alternative C

(1) Impacts to Travel Management/OHV from Visual Resources

Impacts would be the same as those discussed under Alternative B, except more areas would be designated as Class II and III, leading to more restrictions on potential road and OHV trail development.

(2) Impacts to Travel Management/OHV from Forest Products

No wood salvage or commercial harvests would be allowed under this alternative. No increase in access or OHV use is anticipated under this alternative.

(3) Impacts to Travel Management/OHV from Mineral Materials

The following areas would be excluded from mineral material sale or development under this alternative: McCarthy Marsh, Kigluaik Mountains, riverbeds, ocean beach/lagoon and lakeshores. The excluded areas may adversely impact travel by decreasing the economic

viability of roads in the areas excluded. New roads would allow for greater access opportunities.

(4) Impacts to Travel Management/OHV from Recreation Management

The Squirrel River SRMA and Salmon Lake-Kigluaik SRMA would be designated and additional management attention would be focused on certain areas (Table 2-14) within the ERMA. Within the SRMAs, BLM may further limit OHV use. Air taxi's would be required to obtain a permit and would be limited in number within the Squirrel River, reducing access. Visitor use levels would be limited in the Squirrel River, reducing opportunities for recreation. Positive benefits may accrue because limits on visitor use levels will improve the quality of the recreational experience for some users. Levels of commercial recreation (guides and outfitters) would be limited in parts of the ERMA identified in Table 2-14, reducing opportunity for visitors dependant upon guides and outfitters.

(5) Impacts to Travel Management/OHV from Travel Management

All BLM-managed lands within the planning area would be designated as limited for OHV use. This alternative would restrict OHV use to designated trails during the snow-free period and keep the current maximum 2,000 pound GVWR limit throughout the planning area during the winter months. This alternative would diminish the free and unrestricted OHV use in the planning area.

In designated ACEC or SRMAs, further limitations may be placed upon OHV use including designated trails, seasonal restrictions, weight limits or seasonal closures through area specific plans. The uncertainty of these future plans makes the impacts on travel management and OHV use largely unknown.

Restrictions proposed in this alternative would impact the vast majority of users by strictly limiting OHV use where no limits have been in place before. There may be areas users will have difficulty reaching due to the lack of designated trails.

This alternative will impact OHV and travel use more than any other alternative. It will have a greater affect on non local users who visit the planning area primarily during the summer/fall months when OHV designations would be the most restrictive.

(6) Impacts to Travel Management/OHV from Lands and Realty Actions

Impacts from FLPMA disposal would be the same as under Alternative A.

Impacts from acquisition would be the same as under Alternative B.

R&PP leases and FLPMA permits would not be authorized within any ACEC. Leases and permits often result in additional development. The absence of development would decrease development of roads, trails, and OHV use. Due to the large number of ACECs in this alternative, there may be travel opportunities that will not be available to communities wishing to develop roads in these areas.

Alternative C would result in mineral withdrawals on 5.6 million acres of land within ACECs, thus preventing mineral development and its associated impacts (both positive and negative) on travel management and OHV use.

(7) Impacts to Travel Management /OHV from Special Designations

Under this alternative, 5.6 million acres in five areas would be designated as ACECs. There may be negative impacts to Travel Management and OHV from designation of ACECs if additional restrictions are placed on OHV use and access during development of activity plans.

There are 11 rivers within the planning area that have been identified as eligible for designation as wild under the WSR Act (Table 2-21). It is difficult to predict what effect a listing may have on travel management and OHV use. The outstandingly remarkable values for which the 11 rivers were identified (primarily fish resources) would continue to be protected. It is likely that OHV and travel use would be restricted to some extent within those rivers recommended as suitable.

e) Alternative D

(1) Impacts to Travel Management/OHV from Visual Resources

Impacts would be similar to those discussed under Alternative C, except more areas are classified as Class III and IV, the less restrictive classes. Fewer Class II areas are designated than alternative C but more than Alternatives A and B.

(2) Impacts to Travel Management/OHV from Forest Products

Impacts would be the same as those discussed under Alternative B.

(3) Impacts to Travel Management and OHV from Minerals

(a) Leasable Minerals

The impacts associated with leasable mineral development would be the same as Alternative B.

(b) Locatable Minerals

In areas open to locatable mineral entry, anticipated levels of mining activity and effects to travel management and OHV use are similar to those described under Alternative B.

(c) Mineral Materials

Impacts would be the same as those discussed under Alternative A.

(4) Impacts to Travel Management/OHV from Recreation Management

Two areas would be designated as SRMAs: Squirrel River (726,000 acres), and Salmon Lake/Kigluaik Mountains (244,000 acres). These designations would allow for the development of comprehensive travel management strategies, with the identification of specific goals and objectives, that would help preserve high value recreation resources while managing recreation experiences. OHV use and travel management would be addressed in a RAMP. The effect of this RAMP is unknown as specific management has not been determined. It is likely that OHV use in these areas would be more limited in some manner that is more restrictive than under Alternatives A or B.

(5) Impacts to Travel Management/OHV from Travel Management

Within the ERMA, all BLM-managed lands would be designated as Limited to OHV use. A maximum 2,000 pound GVWR would apply.

In areas designated as ACEC or SRMA BLM may impose additional limits on OHV use including: type of vehicle, limiting use to designated trails, seasonal restrictions or seasonal closures. The unmanaged proliferation of trails in other areas would continue. To some extent designations would not be enforced until implementation-level planning occurred. Impacts to Travel Management and OHV in these areas would be a gradual trend toward semi-primitive motorized or roaded natural experiences. Within areas where OHVs are limited to designated trails, the BLM would more intensively manage the effects of OHV use.

In SRMAs and ACECs some users may be temporarily displaced during the seasonal closures which may increase use in other areas. A degree of uncertainty remains as to future implementation-level planning, the potential to limit OHV use to designated trails or seasonal closure of areas, and the impacts that this planning would have on the OHV user.

(6) Impacts to Travel Management/OHV from Lands and Realty Actions

Impacts from FLPMA disposal would be similar as those discussed under Alternative A. Lands identified as available for FLPMA sale in Nome and Kotzebue under this alternative are small isolated tracts that will not affect travel management or OHV use.

Impacts from acquisitions would be the same as under Alternative B.

Impacts from land use authorizations would be the same as under Alternative C.

Impacts from withdrawal review would be similar as Alternative B.

(7) Impacts to Travel Management/OHV from Special Designations

Impacts would be similar to those discussed under Alternative C. Additional protection would be provided to natural and cultural resources by designation of 3.6 million acres of ACEC in six areas. McCarthy's Marsh and the Upper Kuzitrin would not be designated as ACECs under this alternative.

Where special designations are applied, effects under Alternative D would be similar to those described under Alternative C. However, Alternative D would provide less protection than that afforded by Alternative C as McCarthy's Marsh, the upper Kuzitrin River and portions of the Kigluaik Mountains would not be designated.

Protective measures described for permitted activities in the ROPs would apply to both alternatives. OHV restrictions from seasonal closures, weight limits or designated trail use will impact travel management and OHV use as described in Alternative C.

6. Renewable Energy

a) Impacts Common to All Alternatives

Renewable energy projects would be permitted through the appropriate land use authorization. Impacts to renewable energy would be the same as those discussed for Land Use Authorizations beginning on page 4-174.

7. Lands and Realty Actions

For a detailed description of the lands and realty actions proposals by alternative, see Table 2-19.

a) Land Use Authorizations

(1) Impacts Common to All Alternatives

(a) Impacts to Land Use Authorizations from Vegetation and Special Status Species

The management of vegetation, including Sensitive Status Species, could have several impacts on land use authorizations. The need to protect Sensitive Status Species and riparian and wetland vegetation would impact land use authorizations. Facilities proposed for construction under various land use authorizations where these types of vegetation are present may need to be mitigated, constructed in alternate locations, or, in extreme cases, dropped from consideration.

(b) Impacts to Land Use Authorizations from Fish and Wildlife Management

The management of wildlife and fisheries habitat, including Special Status Species, would have several consequences. The need to protect Special Status Species as well as certain other species of fish and wildlife and their habitat would impact land use authorizations. Facilities proposed for construction under various land use authorizations that could result in adversely affecting wildlife or fisheries habitat may need to be mitigated, constructed in alternate locations, or in some cases, dropped from consideration. These types of actions (restructuring of actions

to mitigate impacts to fish and wildlife) could increase processing costs and time for both the Federal and non-Federal parties.

(c) Impacts to Land Use Authorizations from Fire and Fire Management

Wildland fire poses a threat to structures and personal property; prescribed fires are planned and risks are mitigated. Permits and leases are issued with the provisions listed in the ROPs. Sites are prioritized for protection based on the fire management option designated for the site. A protection response is also dependant on other factors including but not limited to the availability of firefighting resources, the site condition and location, surrounding vegetation, and the statewide situation at the time of the threat. Increase in authorizations and land use increase the potential for human-caused fires.

(d) Impacts to Land Use Authorizations from Cultural Resources

The management of cultural resources could affect land use authorizations. These lands and realty actions are considered Federal undertakings and must avoid inadvertent damage to Federal and non-Federal cultural resources through compliance with Section 106 of the National Historic Preservation Act. In some cases, cultural inventories would need to be completed prior to these Federal undertakings, and impacts to important cultural sites would need to be avoided by project redesign, project abandonment, and/or mitigation of adverse impacts through data recovery. Actions taken to avoid impacts could include rerouting a proposed use authorization. Such actions (restructuring of actions to mitigate impacts to cultural resources) can increase processing costs and processing time for both the Federal and non-Federal parties.

(e) Impacts to Land Use Authorizations from Paleontological Resources

The impacts from the management of paleontological resources would be very similar to those of cultural resources as described in the previous paragraph. Land use authorizations occurring in known fossiliferous areas may require that adequate time and resources be allocated to conducting an inventory of these resources. The discovery of scientifically-important paleontological resources could result in the rerouting or redesign of proposed use authorization. Such actions (restructuring of actions to mitigate for paleontological resources) can increase processing costs and time for both the Federal and non-Federal parties.

(f) Impacts to Land Use Authorizations from Visual Resources

Visual resource management would affect land use authorizations such as rights-of-ways, leases, and permits. Facilities would need to meet objectives for the particular VRM class in which a project was proposed, which could entail mitigation, relocation, or elimination of certain facilities resulting in additional time and costs in project development.

(g) Impacts to Land Use Authorizations from Minerals

The management of leasable, salable, and locatable minerals under all alternatives would likely result in requests for land use authorizations such as rights-of-way and permits for utilities and access.

(h) Impacts to Land Use Authorizations from Travel Management

Consistent with ANCSA, the BLM would continue to manage 17(b) easements that access public lands across Native lands. Where 17(b) easements access public lands other than BLM-managed lands, the BLM would attempt to transfer management responsibility of the easement to the appropriate agency. Easement termination would only occur as a matter of law, or where

documented non-use exists and would be subject to public involvement. There would be little to no decrease in access currently provided by 17(b) easements.

Permits or other use authorizations are required for all OHV use which exceeds the various limits in the various alternatives.

(i) Impacts to Land Use Authorizations from Renewable Energy

Any renewable energy development proposed for public lands could result in requests for land use authorizations such as rights-of-way and permits.

(j) Impacts to Land Use Authorizations from Hazardous Materials

Land use authorizations for uses which would involve disposal or storage of materials which could contaminate the land would not be issued. The presence of contaminants may lead to actions such as the modification or abandonment of a landownership adjustment proposal, or remediation in the form of cleanup and removal of the contaminants.

(2) Alternative A

(a) Impacts to Land Use Authorizations from Travel Management

This alternative is the current situation which requires a permit for the use of vehicles exceeding 2,000 pounds gross vehicle weight. Historically, few permits have been requested or issued for vehicles which exceed the 2,000 pound GVWR limit.

(3) Alternative B

(a) Impacts to Land Use Authorizations from Forest Products

This alternative proposes inventory and possible commercial harvest of forest products for commercial logging, salvage cutting, and firewood harvest. Rights-of-ways and permits would be required for roads or use of vehicles exceeding weight limits. Road construction could require obtaining easements to cross lands under other ownerships.

(b) Impacts to Land Use Authorizations from Travel Management

This alternative would require the fewest number of permits of OHV use exceeding the weight or seasonal limits.

(4) Alternative C

(a) Impacts to Land Use Authorizations from Recreation Management

This alternative proposes facilities such as foot and pack animal trails, cross country ski trails, and interpretative signs within the Salmon Lake-Kigluaik SRMA. These facilities could require a right-of-way depending on their location.

(b) Impacts to Land Use Authorizations from Travel Management

This alternative is the most restrictive of OHV use, and would require more permits to be issued than the other alternatives.

(5) Alternative D

(a) Impacts to Land Use Authorizations from Forest Products

This alternative proposes beetle-killed spruce salvage cutting, small sales, and personal house log and firewood harvest. Rights-of-ways and permits would be required for roads or use of vehicles exceeding weight limits.

(b) Impacts to Land Use Authorizations from Recreation Management

Impacts would be the same as under Alternative C.

(c) Impacts to Land Use Authorizations from Travel Management

This alternative would require more permits for OHV use than Alternatives A and B, and less than Alternative C.

b) Disposal Actions

(1) Impacts Common to All Alternatives

(a) Impacts to Disposal Actions from Vegetation

The need to protect Sensitive Status Species and riparian and wetland vegetation would impact disposal actions. Disposal actions in areas where these types of vegetation are present may need to be mitigated, moved to alternate locations, or, in extreme cases, dropped from consideration.

(b) Impacts to Disposal Actions from Fish and Wildlife Management

The need to protect Special Status Species as well as certain other species of fish and wildlife and their habitat would impact disposal actions. Disposal actions in areas where wildlife or fisheries could be adversely affected may need to be restructured or eliminated from consideration. These types of actions (restructuring of actions to mitigate impacts to fish and wildlife) could increase processing costs and time for both the Federal and non-Federal parties.

(c) Impacts to Disposal Actions from Cultural Resources

The management of cultural resources could affect disposal actions. These actions are considered Federal undertakings and must avoid inadvertent damage to Federal and non-Federal cultural resources through compliance with Section 106 of the National Historic Preservation Act. Cultural inventories would need to be completed prior to these Federal undertakings, and impacts to important cultural sites would need to be avoided by project redesign, project abandonment, and/or mitigation of adverse impacts through data recovery. Actions taken to avoid impacts could include restructuring or abandoning a disposal action. Such actions (restructuring of actions to mitigate impacts to cultural resources) can increase processing costs and time for both the Federal and non-Federal parties.

(d) Impacts to Disposal Actions from Paleontological Resources

The impacts from the management of paleontological resources would be very similar to those of cultural resources as described in the previous paragraph. Disposal actions occurring in

known fossiliferous areas may require that adequate time and resources be allocated to conducting an inventory of these resources. The discovery of scientifically-important paleontological resources could result in the restructuring or abandoning of the disposal action. Such actions (restructuring of actions to mitigate for paleontological resources) can increase processing costs and time for both the Federal and non-Federal parties.

(e) Impacts to Disposal Actions from Hazardous Materials

Lands proposed for disposal would need to be inventoried for the presence of hazardous materials. The presence of contaminants may lead to actions such as the modification or abandonment of a disposal action, or remediation in the form of cleanup and removal of the contaminants.

c) Acquisitions

(1) Impacts Common to All Alternatives

(a) Impacts to Acquisitions from Vegetation

The management of vegetation, including Sensitive Status Species, could result in acquisition needs being identified. In the case of an easement, it could determine the routing of the easement.

(b) Impacts to Acquisitions from Fish and Wildlife Management

The management of wildlife and fisheries habitat, including Special Status Species, could result in acquisition needs being identified. In the case of an easement, it could determine the routing of the easement.

(c) Impacts to Acquisitions from Cultural Resources

The management of cultural resources could result in acquisition needs being identified. In the case of an easement, it could determine the routing of the easement. Acquisitions are considered Federal undertakings and must avoid inadvertent damage to Federal and non-Federal cultural resources through compliance with Section 106 of the National Historic Preservation Act. Cultural inventories would need to be completed prior to these Federal undertakings, and impacts to important cultural sites would need to be avoided by project redesign, project abandonment, and/or mitigation of adverse impacts through data recovery.

(d) Impacts to Acquisitions from Paleontological Resources

The impacts from the management of paleontological resources would be very similar to those of cultural resources as described in the previous paragraph. Acquisitions occurring in known fossiliferous areas would require that adequate time and resources be allocated to conducting an inventory of these resources. The discovery of scientifically-important paleontological resources could result in the rerouting or redesign of an easement acquisition.

(e) Impacts to Acquisitions from Travel Management

Transportation and facilities management could require that easements be acquired for any BLM roads or other types of facilities to be located on non-Federal lands.

(f) Impacts to Acquisitions from Hazardous Materials

Lands proposed for acquisition would need to be inventoried for the presence of hazardous materials. The presence of contaminants may lead to actions such as the modification or abandonment of an acquisition, or remediation in the form of cleanup and removal of the contaminants.

(2) Alternative A

Impacts would be the same as Impacts Common to All Alternatives.

(3) Alternative B

Impacts would be the same as Impacts Common to All Alternatives.

(4) Alternative C

(a) Impacts to Acquisitions from Recreation Management

This alternative proposes facilities such as foot and pack animal trails, cross-country ski trails, and interpretative signs within the Salmon Lake-Kigluaik SRMA. If they are not entirely on public land, an easement or other authorization would need to be acquired from the landowner.

(5) Alternative D

(a) Impacts to Acquisitions from Recreation Management

Impacts would be the same as Alternative C.

D. Special Designations

1. Areas of Critical Environmental Concern

Proposed management of the following resources/resource uses/programs would have no anticipated impacts to Areas of Critical Environmental Concern (ACECs): Air Quality, Soil Resources, Water Resources, Fish and Wildlife, Special Status Species, Cultural Resources, Paleontological Resources, Visual Resources, Wilderness Characteristics, Forest Products, Renewable Energy, Lands and Realty Actions, Iditarod National Historic Trail, Wild and Scenic Rivers, Public Safety, Social and Economic Conditions, and Subsistence.

a) Impacts Common to All Alternatives

There are no impacts common to all alternatives for ACECs and RNAs, other than all mining activity (even less than five acres) within an ACEC would require a mining plan in lieu of just filing a notice.

b) Alternative A

There are currently no ACECs in the planning area. Under this alternative, no ACECs would be created and thus there would be no impacts to them.

c) Alternative B

Impacts would be the same as discussed under Alternative A.

d) Alternative C

Alternative C would result in special management provisions being applied to an estimated 43% (5,591,000 acres) of the planning area. Management identified under ROPs (Appendix A) would provide protection of relevant and important values of these ACECs. The following sites would be designated under this alternative:

- WACH calving grounds and critical insect relief areas.
- Nulato Hills
- McCarthy's Marsh
- Upper Kuzitrin River
- Kigluaik Mountains

These five potential ACECs would be designated based on resource values and the need for special management (beyond standard provisions) to protect relevant and important values (values for each area are discussed in Chapter III). Management would result in limitations or restrictions placed on other resource uses and activities in order to prevent irreparable damage to the identified values. In some cases, special research projects would be initiated. This alternative provides the most protection to fish habitat as it is the most restrictive towards permitting development within active stream channels.

(1) Western Arctic Caribou Herd Calving and Insect Relief ACEC

Impacts to caribou and their habitat are under Alternative C are discussed under Wildlife beginning on page 4-80. There would be few impacts to relevant and important values in this ACEC as it would be closed to mineral leasing and location; designated as a right-of-way avoidance area; closed to livestock grazing; limited to designated roads and trails; closed to FLPMA leases; and would be unavailable for disposal.

(2) Nulato Hills ACEC

Impacts to caribou and their habitat under Alternative C are discussed under Wildlife beginning on page 4-80. Impacts to special status plants under Alternative C are discussed under Special Status Plants beginning on page 4-91. There would be few impacts to relevant and important values in this ACEC as it would be closed to mineral leasing and location; designated as a right-of-way avoidance area; closed to livestock grazing; limited to designated roads and trails; closed to FLPMA leases; and would be unavailable for disposal. In addition, impacts from commercial recreation could be reduced by placing limitations on the number of special recreational use permits issued. A fire management plan developed to protect lichen range for caribou would support the purpose of this ACEC.

(3) McCarthy's Marsh ACEC

Impacts to wildlife habitat under Alternative C are discussed under Wildlife beginning on page 4-80. There would be few impacts to relevant and important values in this ACEC as it would be closed to mineral leasing and location; designated as a right-of-way avoidance area; closed to livestock grazing; limited to designated roads and trails; closed to FLPMA leases; and would be unavailable for disposal. In addition, impacts from commercial recreation could be reduced by placing limitations on the number of special recreational use permits issued. A fire management plan developed to protect lichen range for caribou would support the purpose of this ACEC.

(4) Upper Kuzitrin River ACEC

Impacts to wildlife habitat under Alternative C are discussed under Wildlife beginning on page 4-80. There would be few impacts to relevant and important values in this ACEC as it would be closed to mineral leasing and location; designated as a right-of-way avoidance area; closed to livestock grazing; limited to designated roads and trails; closed to FLPMA leases; and would be unavailable for disposal.

(5) Kigluaik Mountains ACEC

Impacts to wildlife habitat under Alternative C are discussed under Wildlife beginning on page 4-80. Impacts to special status plants under Alternative C are discussed under Special Status Plants beginning on page 4-91. There would be few impacts to relevant and important values in this ACEC as it would be closed to mineral leasing and location; designated as a right-of-way avoidance area; closed to livestock grazing; limited to designated roads and trails; closed to FLPMA leases; and would be unavailable for disposal. In addition, impacts from commercial recreation could be reduced by placing limitations on the number of special recreational use permits issued.

e) Alternative D

Alternative D could result in special management provisions being applied to an estimated 31% (3,655,000 acres) of the planning area providing protection of relevant and important values. BLM-managed lands in six areas would be designated as ACECs. Designation of the Mount Osborn ACEC would be delayed until conveyances are complete. There would be no designation of ACEC on State-selected lands unless the State concurs with designation. After conveyances are complete, lands remaining in BLM ownership would be incorporated into existing ACECs. The following sites would be designated under this alternative:

- Shaktoolik watershed
- Inglutalik watershed
- Ungalik watershed
- WACH critical insect relief areas
- Nulato Hills
- Mount Osborn ACEC

These areas would be designated based on resource values and the need for special management (beyond standard provisions) to protect relevant and important values. Management would result in limitations or restrictions placed on other resource uses and activities in order to protect identified values and to prevent irreparable damage to the identified values.

(1) Shaktoolik Watershed and Inglutalik Watershed ACECs

Impacts to fish and their habitat under Alternative D are discussed under Fish beginning on page 4-64. Impacts to caribou under Alternative D are discussed under Wildlife beginning on page 4-82. The area would be open to mineral exploration, leasing, and location. Surface occupancy for leasable mineral activities would be prohibited within 300 feet of the river. Development of three to five placer mines would likely have little effect on this ACEC unless they were located within it. It is possible that a placer mine could be located on the river itself with detrimental effects on anadromous and resident fish populations. The Shaktoolik watershed contains vital migratory, spawning and rearing habitat for Chinook, coho, chum, and pink salmon populations that comprise important subsistence and commercial fisheries in eastern Norton Sound. Increased sedimentation due to erosion from development within active stream channels is the principal deleterious impact to be avoided. Other activities such as OHV use, dispersed recreation, and realty actions could have minor impacts on relevant and important values.

(2) Ungalik Watershed ACEC

Impacts would be the same as discussed under the Shaktoolik Watershed ACEC, except that locatable mineral entry would be prohibited within 300 feet of the river. The potential effects of placer mining on fisheries, riparian habitat and aquatic habitat would be greatly reduced because of this prohibition. There is higher mineral potential in the Ungalik watershed than in either the Shaktoolik or Inglutalik watersheds. However, placer mining could still occur on State managed lands within navigable portions of the riverbed itself. Impacts from mining in the active stream channel are the primary concern for the fisheries habitat. For a summary of impacts and

problems associated with increased sedimentation in fish-bearing streams, see Impacts to Fish from Sedimentation beginning on page 4-53.

(3) Western Arctic Caribou Herd Insect Relief ACEC

The highest potential for impacts to relevant and important values in this ACEC would be oil and gas development which is projected for this general area. The impacts of oil and gas development on caribou under Alternative D are discussed under Wildlife beginning on page 4-82. Impacts of oil and gas development on fish habitat under Alternative D are discussed under Fish beginning on page 4-64. Development of oil and gas has the potential to dramatically reduce the primary utility of this ACEC, which is to protect crucial caribou habitats. Reasonably foreseeable development scenarios for oil and gas include: 710,000 acres leased, up to 3,200 miles of seismic lines, nearly 200 wells drilled, numerous facilities including buildings, roads, and an airstrip, one million cubic yards of gravel borrowed and deployed, and a pipeline connecting the field to existing oil infrastructure to the northeast. Because of the scope of development possible within this proposed ACEC, an activity plan would be completed prior to oil and gas development to determine appropriate stipulations to protect caribou and their habitat. Other activities such as OHV use, dispersed recreation, and realty actions could have minor impacts on relevant and important values.

(4) Nulato Hills ACEC

Impacts to caribou and their habitat under Alternative D are discussed under Wildlife beginning on page 4-82. Impacts to special status plants under Alternative D are discussed under Special Status Plants beginning on page 4-94. Although this ACEC would be open to most types of resource uses, impacts to relevant and important values should be minimal due to its remote location and the low potential for mineral development. Impacts from most activities likely to occur in the area could be mostly mitigated during the permitting stage. The ACEC would be designated a ROW avoidance area, which would lower the potential for road construction within the ACEC. The impacts of roads on caribou are discussed under Cumulative Impacts, Wildlife on page 4-220. Grazing should have little to no impact as currently there are no reindeer in this allotment. Should a herd be reestablished, there would be potential to impact the purpose of the ACEC because the reindeer may utilize lichens in a small portion of the winter range. Locatable mineral development would likely have only minor and localized effects on the purpose of the ACEC (protect winter range of the WACH) given their small size of projected disturbance in relation to the overall size of the ACEC. An Activity Plan would be developed for this ACEC. Of primary concern would be to develop fire management objectives to protect lichen range. Mitigation measures to limit detrimental surface activities from development activities would also be addressed in case of the unlikely event viable minerals deposits are found and utilized.

(5) Mount Osborn ACEC

Potential impacts from OHV use would be reduced due to the development of an OHV plan, which may result in seasonal or other limits on OHV use. The issue of increasing fishing pressure on the BLM Special Species arctic char inhabiting the Kigluaik Mountain lakes due to increasing recreational use may be mitigated by development of an OHV plan to manage access to the ACEC. Impacts to special status fish under Alternative D are discussed under Special Status Fish beginning on page 4-95. Placer mining could occur within the ACEC but a mining plan of operations would be required reduce the potential impacts of this activity. In

addition, ROP SS-4 would be implemented around lakes supporting Kigluaik Arctic char, reducing the potential for mining related impacts to char habitat. The greatest potential for impacts to relevant and important values would be recreational use. The ACEC is located north of Nome with nearby road access and is located within a Special Recreation Management Area. If recreational use was negatively affecting resources values, additional limitations on levels and types of uses allowed could be implemented.

2. Iditarod National Historic Trail

Proposed management of the following resources/resource uses/programs would have no anticipated impacts to the Iditarod National Historic Trail: Air Quality, Soil Resources, Water Resources, Fish and Wildlife Management, Special Status Species, Cultural Resources, Paleontological Resources, Wilderness Characteristics, Livestock Grazing, Forest Products, Renewable Energy, Public Safety, Social and Economic Conditions, and Subsistence.

(a) Impacts Common to All Alternatives

The Iditarod National Historic Trail (INHT) would continue to be managed under existing cooperative agreements and comprehensive management plan. The values of the trail would be maintained. Surface disturbing actions associated with mineral development or land use authorizations could directly impact the trail. Given the low level of mineral development and land use authorizations anticipated, and the small amount of the trail under BLM-management, instances where these activities would occur on or immediately adjacent to the trail would be rare and every effort would be made to either avoid the trail or mitigate the impact. As an existing trail, the INHT would continue to be open to OHV use. Continued OHV use, particularly if it occurs during the snow-free season could impact the trail itself. If damage to the trail is sufficient to cause concern, trail improvement work may be undertaken. Any potential impacts to the INHT would be avoided or mitigated to the extent possible.

(b) Impacts Common to All Action Alternatives (B, C, and D)

The BLM would consider acquisition of parcels along the Iditarod NHT through purchase or exchange with willing owners. There would be beneficial impacts from consolidation of trail ownership. VRM management classes would be established, further protecting the viewshed along the trail.

3. Wild and Scenic Rivers

Wild and Scenic River areas are not essentially natural resources or resource uses, but represent statutory decisions to protect certain resources or uses over a long period of time. For this reason, impacts of various alternatives on Wild and Scenic River areas should be examined by looking at the impacts on resources and uses described elsewhere in this chapter. This section provides cross-references and a brief summary of impacts from interim management on the Squirrel River, and briefly documents a mitigating measure designed to aid long-term protection of water quality in Alternative D.

The most basic characteristics of a wild and scenic river are free-flow and unpolluted waters. Impacts of the various alternatives on free-flow and water quality are described in the Air Quality and Soil and Water Resources section beginning on page 4-27.

Seven outstandingly remarkable values were identified for the eligible river areas. Each of these values has a corresponding section in this chapter where an assessment of potential impacts may be found, as shown in the table below:

Table 4-12. Outstandingly Remarkable Values Cross-reference for Eligible Rivers

Outstandingly Remarkable Value	Eligible River Areas with this Value	Applicable DEIS Sections in Chapter IV
Fish habitat	Kivalina, Inglutalik, Fish, Upper Buckland/Fish, Ungalik, Shaktoolik, Koyuk/Peace/East Fork, Tubutulik, Agiapuk, Kiliovilik, Nilik/Ipewik/Kukpuk	Fish Management beginning on page 4-57
Water Quality for Subsistence Production and Domestic Use	Kivalina	Air, Soil, and Water beginning on page 4-31
Scenery	Ungalik, Shaktoolik	Visual Resources beginning on page 4-115
Primitive Recreation	Ungalik, Shaktoolik	Recreation management beginning on page 4-155
River Recreation	Koyuk/Peace/East Fork	Recreation management beginning on page 4-155
Moose Habitat	Fish River (McCarthy's Marsh)	Wildlife Management beginning on page 4-70
Caribou Habitat	Fish River (McCarthy's Marsh)	Wildlife Management beginning on page 4-70

a) Impacts Common to All Alternatives

The Squirrel River area that was designated for study under section 5(a) of the Wild and Scenic Rivers Act will be managed to monitor and protect wild river values until fall of 2007, pursuant to the BLM interim management policies, while congress considers the study recommendation finding the river area non-suitable for addition to the national wild and scenic rivers system. In addition to the basic requirement to protect water quality and the free flowing nature of the stream, the following outstandingly remarkable values will be protected during this time period:

- **Cultural Heritage Values:** Management actions will protect the fundamental relationship of the Iñupiat culture to the land. Native place names, traditional associations, and cultural concerns will be acknowledged and documented.
- **Fisheries Values:** Habitat for Dolly Varden, chum salmon, pike, grayling, and whitefish will be monitored and protected from degradation within the discretionary authority of BLM.
- **Recreation Values:** The Squirrel River area provides outstanding opportunity for primitive recreation, particularly boating, fishing, photography and sport hunting. These uses will be monitored, and protected from degradation within the discretionary authority of BLM.
- **Scenic Values:** The Squirrel River area will be managed to protect scenic values through the fall of 2007.

The 11 river areas described as *eligible* in Table 3-36 will be managed—to the extent possible using BLM discretionary authority—to protect the outstandingly remarkable values identified in the table until a final decision is made on the suitability or non-suitability of these rivers as additions to the national wild and scenic rivers system.

b) Alternative A

Under this alternative, no rivers are found to be suitable for addition to the national wild and scenic rivers system; however, there is little likelihood of significant impacts to water quality, free flow, or outstandingly remarkable values in the identified eligible river areas, simply because no dams or significant streamside development is proposed. Potential impacts to outstandingly remarkable values are minimal, and are described in several sections in this chapter, as indicated in the table above.

c) Alternative B

Same as Alternative A.

d) Alternative C

Under this alternative, all the eligible rivers are recommended as suitable additions to the national wild and scenic rivers system. This would provide maximum protection to water quality and free-flow, as the BLM would gain additional authority to review Federal authorizations for water resources projects, and would be mandated to protect the outstandingly remarkable values of designated rivers.

e) Alternative D

Under this alternative, no rivers are found to be suitable for addition to the national wild and scenic rivers system, but BLM would develop and implement a water quality monitoring plan for the eligible river areas, which would provide additional information that could be used to protect water quality in these areas. Otherwise, the impacts of Alternative D are the same as those of Alternatives A and B.

E. Social and Economic

1. Public Safety

a) Abandoned Mine Lands

(1) Impacts Common to All Alternatives

Fluctuation of the gold process and other economic situations all lead to the potential of abandonment of active mining activities. Bankruptcy, negative cash flow for an operation, or an unsuccessful exploration program all lead to the potential of abandonment of potentially hazardous substances, solid wastes and petroleum products at a site. In time these products and wastes result in potential environmental liabilities and physical hazards. Economic viability of potential responsible parties that operated at these sites is often marginal at best. This results in the increased likelihood of expenditures of Federal funds to clean up and remediate an abandoned site or reclamation claims being made against a bond if available.

b) Hazardous Materials Management

(1) Impacts Common to All Alternatives

Any increase of human activity such as but not limited to commercial mineral development, increase in rights-of-way, special recreation permits, subsistence, or recreation all have the potential for increasing the likelihood of spills or unauthorized waste disposal activities. Compliance to insure stipulations are completely adhered to is both economically and practically infeasible. Generally, this is not an issue and most users of public lands attempt to comply with laws, regulations, and conditions of approval. Because of the remoteness of the planning area and cost for properly disposing of wastes and conducting environmental investigations of spills, non-compliance occurs.

Additional future impacts to lands are associated with negotiation of alternative cleanup levels for existing hazardous materials management sites. This is a process where less stringent cleanup levels that are protective of public health and safety are authorized by the State. Often times these may also include institutional controls. An example of an institutional control can be associated with a long-term monitoring program of groundwater, a land use restriction for residential use based on contaminants that still may be present, or a limitation based on a closed landfill. These should generally be avoided. However, where appropriate these need to be evaluated on a case-by-case basis and ensure that any potential limitation of use is consistent with the scope of this plan.

2. Social and Economic Conditions

a) Social and Economic

(1) Impacts Common to All Alternatives

(a) Impacts to Social and Economic from BLM Expenditures

Income generated by BLM expenditures in the planning area, including expenses for field operations, services, and personnel are expected to remain similar to current contributions, or increase slightly, across all alternatives.

(b) Impacts to Social and Economic from Forest Products

Individual and subsistence use of forest products is typical in the planning area. There is **v**irtually no commercial demand, few permits for individual use, and no expectation of change in current pattern of use. The demand for forest products on BLM administered land within the plan area is not expected to change in the foreseeable future. Therefore, the effect on the regional economy is very low for all alternatives.

(c) Impacts to Social and Economic from Recreation Management, Travel Management, and Special Designations

Dispersed visitor use is estimated at 2,000 visitor user days in a fiscal year for the entire planning area (BLM/RMIS). BLM has not ascertained to what degree access to the planning area for commercial or public recreation is provided by local businesses. OHV management will not have economic effects on the area. Access to subsistence resources will remain unaffected.

(d) Impacts to Social and Economic from Leasable Minerals

Coal leasing is deferred in the planning area under all alternatives. Exploration for coal is allowed on 7 to 12 million acres under the alternatives. All alternatives have the same known resources on land open to exploration. No effect on the region's economy is expected to result from exploration under any alternative.

No employment would be generated from cleanup of small spills of less than 500 bbl, large spills of 500 bbl from a pipeline, or a 900 bbl crude or diesel spill from a facility. On-site workers engaged in other operations would clean up spills of these sizes.

(2) Alternative A

(a) Impacts to Social and Economic from Livestock Grazing

Reindeer grazing would continue at its present level or change as conditions warranted. The entire planning area is open to leasing, with exception of segregated lands (selected land.) The reindeer herds would continue to be limited and discouraged by the high population level of the WACH.

BLM does not charge a fee for grazing other than a $10 administrative fee. Total industry revenue was estimated at 1.1 million in 1996. This included fourteen herds, of 300-8000 animals each. In 2004, BLM estimated that 7500 animals were maintained by 5 allotment holders. Herds range on lands under multiple land ownership, making it difficult to isolate the effect of BLM management. Currently, only 5 of the 15 BLM grazing allotments on the Seward Peninsula are actively in use. The local population of the Seward Peninsula is not dependent on reindeer herding. More people and communities benefit and are supported by subsistent hunting of the WACH than depending on the reindeer herding industry. Reindeer herding practices can conflict with subsistence lifestyles and demands, introduce disease to wild caribou and other ungulates, and require considerable subsidy actions by the government and private enterprise to manage effectively. Although in communities with a resident herder, the reindeer industry provides some limited opportunity for seasonal employment. There is no seasonal employment on inactive leases.

Economic effects upon grazing will be strictly influenced by the caribou population, not directly by BLM grazing management.

(b) Impacts to Social and Economic Conditions from Leasable Minerals

The area is closed to mineral leasing. Therefore, management under this alternative will not result in contributions to the regional economy.

(c) Impacts to Social and Economic Conditions from Locatable Minerals

Approximately half of the land managed by BLM in the planning area was technically opened to mineral entry by PLO 6477, which revoked some ANCSA Section 17 (d)(1) withdrawals. However, State and native selections continue to segregate much of this land, preventing new mineral entry. Mining activity is currently taking place only on claims predating selections. Planning decisions do not limit mining on existing claims. Under this alternative, little or no new mining activity is expected. The effect to the regional economy is expected to be very low.

(d) Impacts to Social and Economic from Lands and Realty Actions

FLPMA permits, leases, and sales would continue to be processed on a case by case basis. There is no record of previous FLPMA sales. No economic effect is expected.

(3) Alternative B

(a) Impacts to Social and Economic from Livestock Grazing

Impacts from livestock grazing would be the same as Alternative A.

(b) Impacts to Social and Economic from Leasable Minerals

Most of the planning area (11.9 million acres) is open to mineral leasing. However, selected lands will remain segregated from leasing until the land selections are revoked or relinquished.

1. Revenues

Long term oil prices must be over $34.31 per barrel to encourage production where an oil pipeline must be constructed to connect with existing lines at the Alpine field. This is based on current costs. Leases may be offered as early as 2008, and exploration may begin during the

period 2008 to 2012. Leases are most likely to lie within the North Slope Borough boundaries, based on resource potential. Economic effects of an oil field will more likely result within the North Slope Borough, and less likely to result in change in the Northwest Arctic Borough or remainder of the planning area.

Bonus bids in the 2004 lease sale for Northwest NPR-A brought the State of Alaska and the Federal government each about $27 million dollars in revenue. In NPR-A the royalty revenue is split equally between the State and Federal government. The Northwest NPR-A was considered to have a full economic potential of 2.1 billion barrels of recoverable oil. A hypothetical field in the planning area is estimated to have 500 million barrels of recoverable oil, about 350 miles distant from the nearest oilfield and pipeline infrastructure. Given this situation, the bonus bids are expected to be much lower for a field in the planning area. The State of Alaska transferred part of its share of bonus bids to the NSB in 1998 following the Northeast NPR-A lease sale (DOI 2003).

Rent is charged for lease acreage until it produces oil and therefore royalty. The Federal government charges $1.50/acre for the first five years and $2.00/acre for the second five years of a typical 10 year lease. Rents are split with the State in the same manner as royalties. 1,404 million acres were leased in the Northwest NPR-A sales (of 5,816,919 acres offered).

Royalties will be based on 16.67% of the well head value of oil and be split between the State (90%) and Federal government (10%). The State received a total of approximately $1.755 billion from rents, bonus bids, and royalties statewide during Calendar year 2005.

Property tax may be assessed by the State and shared with the North Slope Borough. The borough could receive the equivalent of its 18 mil property tax from the State. The BLM estimates property tax to NSB at $52.98 million over the 30 year life of the field. NSB collected approximately $199 MM property tax from all sources during 2003-04 fiscal year.

2. Employment and Income

Northwest arctic oil industry employment and income will vary from low levels during exploration phase (2008 to 2012) increasing during development and dropping again during production phases. Workers will travel to the oilfield from other parts of the United States (27%) and from other parts of Alaska (58%), with very few workers originating from North Slope Borough or Northwest Arctic Borough (15%) (Hadland 2005). The North Slope Borough has the distinction of providing over 5000 jobs to workers living in other boroughs, States, or countries. These are typically oil field jobs.

In the NW NPR-A FEIS BLM and MMS assume only 7% local NSB employment through all the phases of an oilfield. They also assume a much higher multiplier effect in Anchorage and Fairbanks than in Barrow or other villages. Indirect employment is much higher in Southcentral Alaska and the Fairbanks North Star Borough than in remote boroughs. The NW NPR-A portrays indirect NSB employment effects in the range of 1:3 to 1:4. One worker in the borough is added for every 3 to 4 project workers. In Southcentral Alaska and Fairbanks North Star Borough the relationship is given as 1:2; one additional indirect worker for each two project workers.

The Interim Report *The Economic Multiplier* shows that in rural areas the multiplier has a value only a little more than one (ISER 2005). Most goods and services purchased by businesses and households in small towns come directly from larger trade centers outside the local market. In

this instance, sources are outside the planning area. The Institute of Social and Economic Research at the University of Alaska in Anchorage estimates that in rural census areas in Alaska it would take $15 or more of purchasing power flowing into the region to produce $1 of income in a support business within the region itself.

The table below was taken from the Northwest NPR-A IAP/FEIS (USDI 2003). It estimates direct and indirect effects of a hypothetical oil field in Northwest NPR-A with nearly three times (1,470 MMbbl) the recoverable resource as the hypothetical scenario in northwest Alaska considered in this plan. The intent is to illustrate a comparative oil field (estimate.) It is likely, since the recoverable resource is lower in the planning area, each phase of work would result in less direct and indirect employment. However, a major oil transmission line is required. Over the life of the project, the labor schedule would compare more closely to the table below.

The effect of the employment and income on the United States is negligible.

Table 4-13. Effects of the Alternative on Employment and Personal Income by Place of Residence with Oil at $30/bbl[1]

Phase of Activity	Employment Expressed as Annual Average Jobs			Total Personal Income Expressed as Annual Average in Millions of Constant 1999 $		
	Direct Workers	Indirect & Induced Workers	Total	Direct Workers	Indirect & Induced Workers	Total
North Slope Borough[2]						
Exploration Phase	4	1	5	0.4	0.1	0.5
Development Phase	60	20	80	4.8	2.0	6.8
Production Phase	9	3	12	0.6	0.3	5.0
Southcentral Alaska[3] and Fairbanks North Star Borough						
Exploration Phase	52	26	78	4.2	0.8	5.0
Development Phase	800	400	1,200	64.0	12.0	76.0
Production Phase	340	170	510	27.0	5.0	33.0

[1] $30 per barrel.
[2] Communities in the North Slope Borough, but not worker enclaves.
[3] Southcentral Alaska includes the Municipality of Anchorage, the Matanuska-Susitna Borough, and the Kenai Peninsula Borough.

Source: MMS, "Arctic IMPAK: 1st Step Model" and "Arctic IMPAK: 2nd Step Model."

(c) Impacts to Social and Economic from Locatable Minerals

Approximately half of the land managed by the BLM in the planning area was technically opened to mineral entry by PLO 6477. Revocation of remaining ANCSA Section 17 (d)(1) withdrawals would allow new mineral entry. Under this alternative three to five new placer operations could begin over the life of the plan. Up to 50 new jobs may be created, adding income of $150K to $250K per annum to the regional economy. A portion of this income would

be paid to workers who do not live in the region, and much of the capital investment would be spent outside the region. The effect to the regional economy is expected to be very low.

(d) Impacts to Social and Economic from Lands and Realty Actions

FLPMA permits, leases, and sales would continue to be processed on a case by case basis. Under the Alternative A approximately half of BLM managed lands in the planning area are currently withdrawn from mineral entry either by ANSCA (d)(1) withdrawals or segregated from mineral entry or leasing due to State or Native selection.

(3) Alternative C

(a) Impacts to Social and Economic from Livestock Grazing

Reindeer grazing would be allowed on about one-quarter the acreage in the planning area. No operations on existing allotments would be closed or otherwise effected. The reindeer herds would continue to be limited and discouraged by the presence of the WACH which is at a high population level. Economic effect upon grazing will be strictly influenced by the caribou population, not directly by BLM grazing management.

(b) Impacts to Social and Economic from Leasable Minerals

The portion of the planning area identified for oil and gas potential is closed to leasing under this alternative. The effect on the regional economy is expected to be the same as Alternative A.

(c) Impacts to Social and Economic from Locatable Minerals

Impacts from locatable minerals would be the same as Alternative A.

(d) Impacts to Social and Economic from Lands and Realty Actions

Impacts from lands and realty actions would be the same as Alternative A.

(4) Alternative D

(a) Impacts to Social and Economic from Livestock Grazing

Reindeer grazing would be allowed on about one-third the acreage in the planning area. No operations on existing allotments would be closed or otherwise effected. However, grazing may not be allowed on currently inactive leases. The reindeer herds would continue to be limited and discouraged by the presence of the WACH which is at a high population level. Economic effect upon grazing will be strictly influenced by the caribou population, not directly by BLM grazing management.

(b) Impacts to Social and Economic from Leasable Minerals

Almost all BLM-managed land in the planning area (11.9 million acres) is open to fluid mineral leasing. Selected lands will remain segregated from leasing until the land selections are revoked or relinquished. Land with the highest potential for oil and gas would be open under this alternative. The effect on the regional economy is expected to be similar to Alternative B.

(c) Impacts to Social and Economic from Locatable Minerals

Impacts from locatable minerals would be the same as Alternative B.

(d) Impacts to Social and Economic from Lands and Realty Actions

An undetermined number of tracts in five townships near Nome and Kotzebue would be offered for sale under FLPMA regulations. Since the number of tracts is not yet clear, the value of the sale(s) is indeterminate. However, Sales would bring revenue to the Federal government and consolidate management. Revenue to the local area would not change as there is no property tax in the Northwest Arctic Borough, and the Nome area is an unorganized borough.

Table 4-14. Summary of Estimated Direct Input to Employment, Income, and Revenue

Action	Alternative	Employment	Income/year ($ K)	Revenue ($MM)	Notes
Forest Products	All	Low	Very low	0 (all alternatives)	none
Recreation	All	Unspecified slow growth	Unspecified slow growth	0 (all alternatives)	[1]
Oil & Gas	A, C B and D	0 60-860	0 4,600 to 68,800	0 7,400	[2]
Placer Mining	A B C D	0 10-50 5-15	0 $150 to 250 $50 to $150	0 (all alternatives)	[3]
Reindeer Grazing	All	$35,000 labor income	0	0	[4]

[1]Employment and income are unspecified. McDowell Group studies for the US Forest Service and others, conducted in the 1990s, showed most (>60%) recreation related employment and income was generated in Southcentral Alaska. In their report, the planning area is combined with other interior regions (McDowell Group 1999a).
[2]Revenue shown is combination of property tax and royalty payments for the life of the field. Calculation of tax and royalties were made using a Microsoft Excel Model developed by the Minerals Management Service (MMS 2005).
[3]New placer mining operations would likely be very small. As in some other parts of Alaska, mining is often a family or small business. As such, there may not be opportunity for wage based employment. The employment figures presented in this table are maximum numbers. Income is based on production per location. This is estimated at $50K per operation per year.
[4]Total of all costs for the industry is $588K. Year 2000 value of products was $781,628 ($386,628 antler + $395,000 Meat at $2.20-$2.50/lb). Revenue from antler sales has fallen in the last ten years. Industry wide cost estimate is for 14 herds, these are not all on BLM managed land, or may include BLM leases and other land used by the same herder. (Carlson 2005)

b) Environmental Justice

Seventy to eighty percent of the population in the planning area are Iñupiat and Yup'ik people, recognized minorities. Theirs is a significantly subsistence based economy characterized by high unemployment, low labor force participation, and relatively low income where the cost of

living is very high. Therefore, activities restricting subsistence practices, access, and resources will certainly affect a large segment of the local population. Arguably, creation of jobs and income provide positive effects on the environmental justice population.

Activities not associated with mineral extraction or oil and gas activities likely to occur in the planning area would primarily be transitory in nature, of short duration, and highly localized. Under all alternatives the effects of recreation, forestry, and grazing would be similar. Activities could temporarily divert, deflect, or disturb subsistence species from their normal patterns. These activities could alter the availability of subsistence species in traditional harvest areas, which could in turn affect harvest patterns by requiring hunters to travel further in pursuit of resources. Increased travel distances would result in greater expenditures for fuel and equipment, and increased wear and tear on equipment. Consequently, there could be an effect on the subsistence hunting activities of local minority populations as a result of these activities. The effect would be likely minor, short term, and highly localized. Expansion of reindeer grazing by increasing herd size would likely benefit local minority populations as jobs on the Seward Peninsula could result from herding and handling activities.

Alternatives B, or D would allow oil and gas activities in areas formerly unavailable for leasing. Year-round activities could increase the amount of area affected, increase the duration of effects, and spread the effects where development occurs in the planning area. Disturbances caused by development under Alternatives B, and D would be greater than under Alternative A. Mining of locatable minerals under Alternatives B, C, or D would not be likely to adversely affect local people since small placer operations would be seasonal, and short duration.

F. Subsistence

1. Impacts Common to All Alternatives

Proposed management of the following resources/resource uses/programs would have no anticipated impacts to subsistence: Paleontological Resources, Visual Resources, Wilderness Characteristics, Special Designations, and Public Safety. The following resources/resource uses/programs would have negligible effects on subsistence that would be minimized through appropriate mitigation.

a) Impacts to Subsistence from Fire and Fire Management

Fire management has the potential to impact wildlife or wildlife habitat in a variety of ways, and these impacts would result in impacts to subsistence if they: 1) depleted a subsistence resource population; 2) altered the range of a subsistence species away from the traditional use area; or 3) resulted in an easier route of access for non-subsistence users into subsistence use areas, increasing the potential for competition of the resource.

Impacts as a result of fire are expected to be minimal within the planning area, as fire has been and continues to be a normal part of the ecosystem. Mitigation measures designed to reduce the impacts of fire suppression activities include limitations on the use of tracked, or off-road vehicles; measures to prevent the introduction of invasive or noxious plant species; establishment of riparian buffer zones; and rehabilitation of fire and dozer lines. Impacts as a result of suppression efforts are expected to be minimal, as most BLM-managed lands are far from the road system, minimizing the use of mechanized equipment.

b) Impacts to Subsistence from Cultural Resources

Under all alternatives, the BLM is required to inventory cultural resource sites under Section 110 of the National Historic Preservation Act. However, extensive inventory efforts consisting of cultural resource surveys, especially those involving helicopter use, do have the effect of temporarily displacing resources in the areas to be investigated. If the research was to occur in a traditional subsistence use area, the displacement of resources may have a temporary impact on subsistence for the duration of the project. Additional project-specific subsistence stipulations and ROPs created in response to the proposed activity, such as limitations or directions regarding helicopter use would serve to minimize the potential impacts.

c) Impacts to Subsistence from Locatable Minerals

Some mining exploration may occur under any alternative. Potential impacts to subsistence resources would include the temporary displacement of wildlife from harvest areas. In addition, mining activity may also result in access constraints by subsistence users, or by an increase in competition for resources if miners took the opportunity to hunt. These impacts would be minimal due to the very low level of activity anticipated (less than four notices per year), the very minimal amount of acres disturbed (less than 20 acres year within the 11.9 million acres of BLM-managed land), and the seasonal and temporary nature of the activity. Additional project-

specific subsistence stipulations and ROPs created in response to the proposed activity, such as limitations in the timing or location of the proposed activity, would serve to minimize the potential impacts.

d) Impacts to Subsistence from Mineral Materials

Mineral material disposal has both direct and indirect impacts on wildlife and their habitat, and therefore, has an impact on subsistence. In addition, mineral material activity may also result in access constraints by subsistence users, or by an increase in competition for resources. However, these impacts would be very minimal under most alternatives, as sufficient material sources exist on private lands to meet the needs of most communities within the planning area and few mineral material disposal actions are anticipated, unless a new road or other infra-structure is built on or near BLM-managed land. Additional project-specific subsistence stipulations and ROPs created in response to the proposed activity, such as limitations in the timing or location of the proposed activity, would serve to minimize the potential impacts.

e) Impacts to Subsistence from Renewable Energy

If renewable energy sources such as wind are developed on BLM-managed lands within the planning area there are minor impacts on subsistence. Direct impacts include temporary disturbance and displacement of subsistence resources during construction and maintenance activities from the area of affect. However, to be most useful, these types of development need to be located near population centers and most land near villages is private. Therefore, little renewable energy development is anticipated on BLM-managed lands, and actual impacts would not have population level effects on key subsistence resources.

f) Impacts to Subsistence from Lands and Realty Actions

BLM-managed lands are generally remote from settled areas within the planning area, and the demand for realty actions is expected to be generally low over the life of the plan. However, some displacement of subsistence resources from the area of activity may occur, resulting in an impact to subsistence. Additional project-specific subsistence stipulations and ROPs created in response to the proposed activity, such as limitations or directions regarding helicopter use, would serve to minimize the potential impacts.

2. Impacts to Subsistence Common to Alternatives B, C, and D

Several management actions for programs or resources detailed in Chapter II are common to Alternatives B, C, and D. The following describes the impacts to subsistence from these shared management parameters.

a) Impacts to Subsistence from Air Quality and Soil and Water Resources

Under Alternatives B, C, and D, support for a program of monitoring and assessment of riparian areas for proper functioning condition, water quality in critical aquatic habitats and important

recreation use areas, soils in those areas of high resource value, and impacts to OHV trails are proposed. Management decisions include setting area-wide restrictions or other protective measures in cooperation with the appropriate Federal, State, local, or tribal requirements, and applying site-specific resource protections following the ROPs listed in Appendix A for any proposed activity on BLM lands.

In general, any effort to protect soil, water and air serves to protect the wildlife resources upon which subsistence users depend, by allowing the wildlife to live in a healthy, naturally-functioning environment. Restrictions with regard to subsistence use on Federal lands can only be effected by the Federal Subsistence Board, and so those proposed under the monitoring and assessment program described above would have little to no effect on subsistence. However, extensive research projects, especially those involving helicopter use, do have the effect of temporarily displacing resources in the areas to be investigated. If the research was to occur in a traditional subsistence use area, the displacement of resources may have a temporary impact on subsistence for the duration of the project. Additional project-specific subsistence stipulations and ROPs created in response to the proposed activity, such as limitations or directions regarding helicopter use would serve to minimize the potential impacts.

b) Impacts to Subsistence from Vegetation

Vegetation management actions common to all action alternatives include identifying and monitoring lichen-rich plant communities — which are important food resources for reindeer and caribou — as well as the presence and spread of noxious and invasive plant species within the planning area. Any effort to protect vegetation that is important to wildlife that is a primary subsistence resource benefits subsistence use. However, extensive research projects, especially those involving helicopter use, do have the effect of temporarily displacing resources in the areas to be investigated. If the research was to occur in a traditional subsistence use area, the displacement of resources may have a temporary impact on subsistence for the duration of the project. Additional project-specific subsistence stipulations and ROPs created in response to the proposed activity, such as limitations or directions regarding helicopter use, would serve to minimize the potential impacts.

c) Impacts to Subsistence from Fish and Wildlife Management

Management actions under Alternatives B, C, and D for fisheries include implementing an extensive inventory and monitoring program of fish habitat, populations, and genetic stocks. Additionally, the BLM would enter into cooperative projects to implement the priority restoration work identified in the Norton Sound Aquatic Habitat Management Plan and the Norton Sound/Bering Strait Regional Comprehensive Salmon Plan, in order to increase habitat productivity in streams/lakes currently utilized by anadromous fish but producing below potential. All of these efforts serve to positively impact subsistence use of fish, by ensuring a healthy, renewable resource base. However, extensive research efforts may have the effect of temporarily limiting access to particular locations by subsistence users. Additional project-specific subsistence stipulations and ROPs created in response to the proposed activity, such as limitations or directions regarding helicopter use, would serve to minimize the potential impacts.

Management actions under Alternatives B, C, and D for wildlife include implementing an inventory and monitoring program of the habitats and populations of important subsistence and Special Status Species in order to provide the necessary information to develop subsistence regulations and bag limits on Federal lands as required by the Federal Subsistence Board. Additionally, the BLM would work cooperatively with State and other Federal agencies to implement the WACH Strategic Management Plan, the Seward Peninsula Muskox Cooperators Plan, Boreal Partners in Flight Conservation Plan, and other cooperative management efforts. All of these efforts serve to positively impact subsistence use of wildlife, by ensuring a healthy, renewable resource base. However, extensive research projects, especially those involving helicopter use, do have the effect of temporarily displacing resources in the areas to be investigated. Likewise, research efforts that may temporarily stress an animal population may result in the death of a few animals. If the research was to occur in a traditional subsistence use area, the displacement of, or the slight reduction in available resources may have an impact on subsistence for the duration of the project. Additional project-specific subsistence stipulations and ROPs created in response to the proposed activity, such as limitations or directions regarding helicopter use, would serve to minimize the potential impacts.

d) Impacts to Subsistence from Special Status Species

Impacts from management actions on Special Status Species to subsistence would be the same as those identified for vegetation and fish and wildlife above.

e) Impacts to Subsistence from Forest Products

Under Alternatives B, C, and D, a baseline forest inventory of the plan area would be conducted to determine location of both commercial and non-commercial timber, and old growth stands. Extensive inventory efforts, especially those involving helicopter use, do have the effect of temporarily displacing resources in the areas to be investigated. If the inventory was to occur in a traditional subsistence use area, the displacement of, or the slight reduction in available resources may have an impact on subsistence for the duration of the project. Additional project-specific subsistence stipulations and ROPs created in response to the proposed activity, such as limitations or directions regarding helicopter use, would serve to minimize the potential impacts.

f) Impacts to Subsistence from Recreation Management

Under all action alternatives a baseline inventory of the plan area would be conducted to determine location of recreational opportunities and monitor changes in use patterns. Extensive inventory efforts, especially those involving helicopter use, do have the effect of temporarily displacing resources in the areas to be investigated. If the inventory was to occur in a traditional subsistence use area, the displacement of, or the slight reduction in available resources may have an impact on subsistence for the duration of the project. Additional project-specific subsistence stipulations and ROPs created in response to the proposed activity, such as limitations or directions regarding helicopter use, would serve to minimize the potential impacts.

g) Impacts to Subsistence from Travel Management

Under Alternatives B, C, and D a baseline inventory of the plan area would be conducted to identify existing trails and assess resource impacts. Extensive inventory efforts, especially those involving helicopter use, do have the effect of temporarily displacing resources in the areas to be investigated. If the inventory was to occur in a traditional subsistence use area, the displacement of, or the slight reduction in available resources may have an impact on subsistence for the duration of the project. Additional project-specific subsistence stipulations and ROPs created in response to the proposed activity, such as limitations or directions regarding helicopter use, would serve to minimize the potential impacts.

3. Alternative A

Alternative A would continue present management practices and levels of resource use based on the existing Northwest MFP (BLM 1982), supplemented by direction contained in existing laws, regulation and policy. Few uses would be limited or excluded as long as they were consistent with State and Federal laws. Activities would be analyzed through the NEPA process, including an ANILCA 810 evaluation, on a case-by-case basis, and any identified impacts from the proposed action to subsistence would be mitigated through appropriate consultation and stipulations.

a) Impacts to Subsistence from Livestock Grazing

Reindeer grazing would be managed using the current system of assessing permits on a case-by-case basis. Grazing by reindeer can indirectly impact wildlife, especially caribou, by degrading habitat or reducing the availability of the preferred forage species; by the transference of diseases from reindeer to caribou; by reindeer herders attempting to separate their reindeer from caribou, or by disturbing wintering moose by reindeer herding activities, resulting in increased stress on these animals. Grazing may negatively impact brown bear and wolf populations due to the increased number of these animals harvested by herders in defense of life and property. Any impact on the WACH would have an associated impact on subsistence, as every community in the planning area utilizes harvests from the WACH for subsistence.

b) Impacts to Subsistence from Leasable Minerals

There would be no impacts to subsistence from leasable minerals under Alternative A as no leasing would occur. No exploration is anticipated.

c) Impacts to Subsistence from Locatable Minerals

Impacts would be the same as discussed under Impacts Common to All Alternatives.

d) Impacts to Subsistence from Mineral Materials

Impacts would be the same as discussed under Impacts Common to All Alternatives.

e) Impacts to Subsistence from Recreation Management

Under Alternative A, the planning area would be managed for dispersed recreational use. Recreational activities would be monitored on a casual basis. Public use trail shelters may be constructed if funding is available. No special recreation management areas would be designated. Conflicts due to increasing recreational use levels in the Squirrel River and other areas would not be addressed. Under this alternative, no limits would be set on commercial recreational use levels, however, the amount of recreational use would be dependant upon social and economic factors, and current hunting regulations.

It is anticipated that high levels of both commercial and non-commercial recreational use would continue along the Squirrel River, particularly during the moose hunting season in September. There are currently 10 guides licensed to provide hunting services in Game Use Area 23-06. Use of OHVs by guides may result in the creation of new trails into areas that were previously not easily accessible at this time of year. Wildlife used for subsistence purposes may be temporarily stressed or displaced due to the large number of camps and extensive amount of aircraft use. The Squirrel River is an important subsistence use area to residents from Kotzebue, Kiana, Noatak, and Noorvik, and the issue of impacts arising from guided hunting has been raised at community meetings (BLM 2004c). Additionally, subsistence users in Koyuk have expressed major concerns about the impact of sport-hunters in the Norton Bay area. Direct impacts to subsistence use are a result of increased competition for resources by sport hunters and guides in these heavily-used areas, as well as other units in the planning area.

Subsistence hunters in other areas of the state have also expressed a reluctance to hunt in areas that are actively used, either for development purposes or for intensive recreational activities, such as the guiding activity described above (BLM 2005i). This is not only because of the safety factor (i.e., not wanting to accidentally shoot another person), but also because of the perceived lack of “wildness” of the animals within these areas. As a result, subsistence users tend to shift away from their traditional harvest areas when too much activity from outside sources occurs within them.

Indirect impacts to subsistence can occur because of displacement of wildlife due to concentrated recreational activity. Local residents have expressed concern that migrating caribou may be diverted if they encounter high levels of activity along their migration route, resulting in animals not passing through traditional subsistence hunting areas. While caribou may be delayed by a day or two, or diverted slightly to the east or west, the current level of recreational use is not expected to significantly affect caribou migration routes.

f) Impacts to Subsistence from Travel Management

Under Alternative A, the planning area would remain undesignated and cross-country use of OHVs weighing 2,000 pounds or less GVWR would be allowed throughout. Sensitive habitat areas would not receive additional protection from OHV impacts. As a result, impacts to

subsistence may occur due to the displacement of or harm to wildlife if OHV activity was concentrated in a key traditional use area, and essential habitat destroyed.

Currently, traditional Iñupiat hunters rarely utilize OHVs for the harvest of wildlife in the planning area. However, non-Iñupiat subsistence users may utilize OHVs, and therefore, may have the beneficial impact of easier access to harvest areas under this alternative.

4. Alternative B

Alternative B focuses on resource development. In this alternative, constraints to protect resource values or habitat would be implemented in very specific geographic areas rather than across the planning area or in special designations. Seasonal stipulations for oil and gas leasing in caribou habitat would not apply under this alternative (Appendix A). Travel and trail restrictions would be minimized. The Squirrel River would be an SRMA to focus management on recreational use. In other areas recreation management would focus on dispersed recreation and management of permits.

a) Impacts to Subsistence from Livestock Grazing

This alternative has the potential for the greatest impacts to subsistence resources from grazing because of the potential impacts to the WACH. Under this alternative the entire planning area would be open to reindeer grazing, in effect reducing the amount of habitat available for the WACH. However, it is unlikely that new reindeer grazing operations would be established outside of the Seward Peninsula during the life of the plan, due to the difficulties of managing a reindeer herd in the presence of caribou.

In addition, grazing by bison could be authorized on the Seward Peninsula under this alternative. Potential impacts to wildlife from authorization of bison grazing include competition with other herbivores including moose, caribou and muskox; potential for disease transmission to subsistence species; and stress or disturbance to subsistence resources from bison herding activities. Moose populations on the Seward Peninsula are currently low. Competition between moose and bison could negatively affect moose recovery efforts, thus limiting the amount of potentially harvestable resources to subsistence users.

b) Impacts to Subsistence from Leasable Minerals

(1) Seismic Exploration

Under this alternative, seismic exploration for oil and gas or coal would be allowed during the winter months (from December to April), and this activity could have direct impacts on subsistence resources, including temporary displacement and stress to wildlife. In general, large mammal responses to seismic activities in the planning area are expected to be a temporary avoidance of the local area, with reoccupation of the area after the exploration activities are complete.

Seismic exploration would have minimal effects on caribou as exploration would occur during the winter when most of the WACH has migrated south of the Brooks Range. However, some portion of the WACH winters on the North Slope or Cape Lisburne area every year, and these

animals could be temporarily disturbed due to seismic activity and associated air travel to and from the seismic areas. Unlike caribou, muskox are not able to travel and dig through snow easily. In the winter, they search out sites with shallow snow, and greatly reduce movements and activity to conserve energy, causing them to be more susceptible to disturbances during the winter. Repeated disturbances of the same animals during winter could result in increased energetic costs that could increase mortality rates

Subsistence activities that occur during the winter season, and therefore could be affected by seismic exploration or exploratory drilling include: furbearer hunting and trapping, fishing, and hunting of large mammals such as caribou, moose, and muskox. Recent testimony by community members from Barrow and Nuiqsut, where seismic activity is common has indicated that seismic exploration does interfere with overland travel by snowmachine (Brower 2002). Specifically, the deep ruts left in the snow by seismic vehicles create difficult terrain to traverse, and result in excessive wear-and-tear on both snowmachines and the sleds that are pulled behind them. Replacement or repair of these tools that are used for subsistence harvesting is costly. However, despite the hindrance and annoyance, seismic exploration does not create a substantial barrier between communities and subsistence resources.

Indirect impacts to subsistence resources from seismic operation may include degradation of habitat (impacts to soil and vegetation) due to seismic exploration. These types of impacts would be reduced by implementation of the ROPs, including the standard practice of limiting seismic surveys to the winter when the ground is frozen and covered with snow (ROP Veg-2e).

(2) Exploratory Drilling

Impacts to subsistence from exploratory drilling would be similar to those discussed under seismic exploration. Exploratory drilling will also only be allowed during the winter, so disturbance would result primarily from aircraft and surface traffic, and activities associated with ice road and drill pad construction. Wildlife may temporarily avoid the local area but would reoccupy the area after the exploration activities are complete.

Exploratory drilling activities could alter the availability of subsistence species in traditional harvest areas through direct interference with hunts. This direct interference could affect harvest patterns by causing a failed hunt, or by requiring hunters to travel further for a successful harvest because the subsistence resources are more wary than normal following a disturbance or are deflected from traditional harvest areas following the presence of vehicles and aircraft. Increased travel distances would result in greater expenditures for fuel and equipment, as wear and tear on snowmachines, outboards, and four-wheel vehicles would occur.

Impacts to subsistence would also result if access to traditional use areas was limited by the exploration activity due to safety factors and/or regulations. This type of access limitation is rare, and is only anticipated to result in temporary and localized effects to subsistence use.

(3) Development

Under this alternative, the reasonably foreseeable scenario is that at most, only one oil field would be developed in the northern quarter of the planning area, most likely what is considered insect-relief habitat for the WACH (see section 3(b), Wildlife, for potential impacts to WACH). It would consist of several well pads connected to a central processing facility (CPF) and airstrip. Development would occur within 25 miles of the CPF with five total satellite fields (including the

CPF). Although initial construction would occur primarily during winter, development will bring year-round facilities and activities to wildlife habitat in the vicinity of the CPF in the northern part of the planning area. Potential effects of development activities to subsistence resources include direct habitat loss from gravel mining and oil field facilities, and indirect habitat loss through reduced access caused by physical or behavioral barriers created by roads, pipelines, and other facilities.

During the construction phase, caribou and other large mammals would most likely avoid the area of development, due to the noise and disturbance caused by construction activities. The effects of disturbance from permanent oil and gas facilities on terrestrial mammals during the production phase would be of relatively long duration (10-30 years), but would be local in nature. This disturbance would consist of noise from the CPF, noise and visual impacts from traffic on the roads between the production pads and the CPF, and aircraft flights to the area. These effects would continue until species were able to habituate to the new environment, which could take several years (e.g., for infrastructure), or could never occur (e.g., for human and vehicle activities; Murphy and Lawhead 2000). Subsistence resources such as caribou, moose, and muskox would likely avoid the area of oil and gas activity and new infrastructure, which would make them more difficult to locate and harvest by hunters. As a result, the expense associated with the harvest of subsistence resources could increase, possibly reducing the amount of traditional foods available to the community. These effects would continue until species were able to habituate to the development and associated structures.

Access by subsistence users could be hindered by pipelines or other infrastructure, resulting in users from Point Lay or Point Hope having to travel greater distances to avoid any barriers. Based on data from Pedersen et al. (2000) and Pedersen and Taalak (2001), as a consequence of oil development, Nuiqsut harvesters avoid development. The avoidance of development by harvesters has two aspects: 1) the concern that discharging a firearm near the various facilities and infrastructure will result in liability for damage, death to a worker, or serious environmental consequences (e.g., an oil spill resulting from a punctured pipeline); and 2) the belief that animals that have habituated to oil and gas infrastructure are contaminated and not safe for human consumption (BLM 2005i). While this sentiment has not been documented for subsistence users within the planning area, it may still apply should development occur. As a result, the total area of any development in the planning area could be effectively removed from the traditional harvest area of a given community.

(4) Effects of Spills

The effects of oil spills on subsistence species would depend upon the size of the oil spill and the environment in which the oil spill occurred. Spills contained on pads (small and some large) would likely have few long lasting or wide-ranging effects on subsistence species. In addition, oil spills (small and large) on the land, if they did not escape to a waterway and occurred on snow or frozen ground, would likely have few long lasting or wide-ranging effects on subsistence species if properly cleaned up. On-land oil spills could affect small numbers of terrestrial mammals and waterfowl that were unable to avoid the spill area, but would be unlikely to have population-level effects, unless the spill seeped into a lake, river or stream. Oil spills directly into a water body, particularly under conditions that made them difficult to contain, such as breakup or broken ice, could spread widely and be toxic to fish and waterfowl. In the nearshore environment, a large spill, particularly during broken ice or storm conditions, could also affect marine mammals, such as seals, and beluga and bowhead whales.

Under Alternative B, the parameters to be used to analyze impacts of a large oil spill are defined as: 1) a release of 500 to 900 bbls; 2) the oil spill reaches the environment, with no cleanup or containment; and 3) the location and timing of the spill is that of greatest potential impact to the resource or program. For subsistence, the potential greatest impact as a result of a large spill would result if the spill occurred in the spring, just before breakup, and resulted in a release of crude oil into a river or stream below the ice, which in turn was released during breakup into the near coastal waters of the Chukchi Sea during the breakup surge. If oil were to be spilled in a waterway in large volumes, waterfowl, fish, and marine mammals could be fouled, contaminated, or killed. A large spill may be immediately toxic to fish, and could contaminate them for years even in apparently cleaned habitats. Waterfowl and marine mammal populations could be affected by the death of animals from hypothermia caused by oiling, reactions to toxic components of spilled oil, and gastric distress resulting from attempts to clean themselves. In addition, scavengers feeding on their remains, such as foxes, could also be harmed.

If a large spill were to occur on the tundra near or within the core calving or insect-relief area of the WACH during the period of intensive use by the caribou, the spill itself may not widely affect the herd. However, an extensive clean-up effort consisting of people, machinery and helicopter use could have the result of seriously stressing the herd, resulting in increased mortality or decreased productivity.

A large oil spill into nearshore marine or coastal riverine environments within the planning area could cause injury or death to sea mammals or cause them to move off of their normal course, thereby making them unavailable for subsistence harvest. In this unlikely event, residents would lose an important source of subsistence food as well as face issues of contamination, increased cost and effort to replace lost resources, social disruption due to resource damage and inability to participate in the spring sea mammal harvest, and financial hardship cause by the loss of a major source of subsistence food.

An estimated 89 small spills of crude oil, or 220 small refined oil spills is proposed for analytical purposes. Both of these types of spills would result in a total of less than 500 bbl in each scenario, and would result in the same types of potential impacts discussed above, albeit to a lesser extent. However, an oil spill of any volume into a river system or lake could have effects on subsistence fish harvests. Loss of some portion of the subsistence fish harvest would negatively affect the majority of communities in the planning area.

Oil spills also have the potential to impact subsistence harvest patterns indirectly, in that subsistence users will decrease harvests of a subsistence resource if they fear the resource has been contaminated. Subsistence users would likely also allow for a period of time for the impacted resources or resource area to recover following exposure to oil, effectively reducing the total number of acreage available to them for subsistence harvest.

c) Impacts to Subsistence from Locatable Minerals

Under Alternative B mineral development would occur. However, the development of three to five small placer mines is anticipated to have negligible impacts on subsistence resources. Impacts would be localized in the immediate vicinity of the mines. In these specific areas, wildlife would be displaced and an estimated 10 acres of habitat would be unavailable during the life of the operation, but would not have population level impacts.

Impacts to subsistence use would occur if the placer mining operations were located in traditional harvest areas, resulting in access and possible displacement issues. Implementation of site-specific stipulations and ROPs, such as limitations in the timing or location of the proposed activity, would reduce impacts to resources and subsistence use.

d) Impacts to Subsistence from Mineral Materials

Under Alternative B, the entire planning area would be made available for salable material exploration and development. Impacts to subsistence resources would result due to displacement and/or habitat loss in areas of activity, which could affect wildlife populations, depending on the scope of the development. Traditional harvest areas could be impacted if development was to occur within their boundaries, and access could be affected.

e) Impacts to Subsistence from Recreation Management

For most of the planning area, impacts to subsistence would be similar to those discussed under Alternative A. However, under this alternative, limits would be set on commercial recreational use levels in the Squirrel River, thus lowering the potential impacts to subsistence users in this area. Commercial use would be limited by capping the number of guides allowed to operate within the area during high use periods, thus reducing the competition for subsistence resources. In addition, the rest of the planning area would be managed as an Extensive Recreation Management Area, with a case-by-case review of those activities that require a BLM permit, resulting in the potential to reduce impacts to subsistence.

f) Impacts to Subsistence from Travel Management

Impacts would be similar to those discussed under Alternative A. Although the planning area would be designated as “limited”, the limitations would result in the same types of OHV use that are occurring under Alternative A.

g) Impacts to Subsistence from Lands and Realty Actions

Under Alternative B, large blocks of BLM-managed lands would be retained in Federal ownership, reducing the potential for habitat fragmentation for resources, and allowing for continued Federally recognized subsistence use and management. Alternatively, lands not identified for retention would be available for disposal. Privatization of BLM-managed lands would increase levels of human activity, and would revoke subsistence as the priority consumptive use. Depending upon the location of the parcels, access by subsistence users may be limited, and increased access by non-residents may increase, potentially resulting in the displacement of resources from preferred habitat, or an increase in habitat destruction or degradation. However, disposal of BLM-managed lands are expected to be minimal over the life of the plan and lands would not be disposed of until conveyances are complete.

5. Alternative C

Alternative C emphasizes active measures to protect and enhance resource values, thus limiting the amount of development that could occur in the planning area.

a) Impacts to Subsistence from Livestock Grazing

Impacts to wildlife from livestock grazing would be similar to those discussed under Alternative A. Reindeer would be the only type of livestock authorized, and grazing would be limited to the Seward Peninsula, and the potential for conflicts between subsistence resources and grazing would be reduced slightly by the closure of McCarthy's Marsh, upper Kuzitrin River, the Baldwin Peninsula allotment, and the Buckland River allotments to grazing. These areas include winter caribou range and important winter habitat for moose. Areas where reindeer have been absent for more than 10 years would also be closed to grazing, which may result in the expansion of the WACH into these areas and result in increased access to caribou by subsistence users.

b) Impacts to Subsistence from Leasable Minerals

Impacts to subsistence from leasable minerals would be similar to but less than impacts under Alternative B, as the high potential areas would be closed to leasing. Due to this closure to leasing, the probability of seismic exploration occurring in the planning area would be very low, and effects to subsistence use negligible.

c) Impacts to Subsistence from Locatable Minerals

Impacts to subsistence would be similar to those discussed under Impacts Common to All Alternatives. No mineral development is anticipated under this alternative, even though exploration may occur under a mining notice.

d) Impacts to Subsistence from Mineral Materials

Impacts to wildlife from mineral material disposal would be similar to but less than impacts projected under Alternative B. Two sensitive habitat areas, McCarthy's Marsh and the Kigluaik Mountains would be closed to mineral material disposal, providing additional protection to the habitat in these areas.

e) Impacts to Subsistence from Recreation Management

Under this alternative, limits on commercial use would be established in several areas, including the Koyuk, Inglutalik, Ungalik, Shaktoolik, Buckland, and Agiaupuk rivers, the Nulato Hills, Bendeleben Mountains, and McCarthy's Marsh. This would reduce the potential for impacts to subsistence from recreational activities. Under this alternative, limits would be set on both non-commercial and commercial recreational use levels in the Squirrel River, resulting in benefits to subsistence users as a result of the decrease in competition for subsistence resources.

A Salmon Lake-Kigluaik Mountain SRMA would be established and managed as a semi-primitive motorized area. Management would focus on enhancing the recreational experience while protecting natural resources. Over the long-term, management of this area for recreation may result in increased visitor use and a greater potential for disturbance impacts to wildlife, including impacts to subsistence access and use. However, this allowable use may also serve to alleviate impacts to subsistence in other areas, by providing an area specifically designated for recreational use.

f) Impacts to Subsistence from Travel Management

Under this alternative, the entire planning area would be limited to designated trails, and guides and outfitters would not be permitted to use ATVs during the summer. This would provide beneficial impacts to subsistence use, in that wildlife would not be displaced due to unchecked OHV activity and wildlife habitat would not be degraded.

g) Impacts to Subsistence from Lands and Realty Actions

Under this alternative, several ACECs would be designated including: the WACH calving and insect relief habitat, and core winter habitat in the Nulato Hills; and moose, caribou and waterfowl habitat in McCarthy's Marsh and upper Kuzitrin River. Constraints on realty actions within these ACECs would provide additional protection to wildlife habitats within these areas, reducing the potential for habitat degradation, fragmentation, and reducing the potential for disturbance impacts to subsistence resources. ANILCA provides for the opportunity for subsistence use on all Federal lands, and, therefore no restriction to subsistence use would apply as a result of the creation of the ACECs. By creating ACECs to protect the habitat of key subsistence species, future subsistence use of these resources is also protected.

6. Alternative D

Alternative D emphasizes a moderate level of protection, use, and enhancement of resources and services. Constraints to protect resources would be implemented, but would be less restrictive than under Alternative C.

a) Impacts to Subsistence from Livestock Grazing

Impacts to subsistence from grazing would be similar to Alternative A.

b) Impacts to Subsistence from Leasable Minerals

Impacts to subsistence from leasable minerals would be similar to those described under Alternative B, but would be lessened as a result of additional required operating procedures and special stipulations in place for the Nulato Hills, Kivalina River, and WACH calving and insect relief habitat.

c) Impacts to Subsistence from Locatable Minerals

Impacts to subsistence would be similar to Alternative B but slightly lesser in extent. Under this alternative, it is anticipated that 3-5 placer mines of approximately 10 acres each would be developed, resulting in localized impacts to subsistence use. Additionally, the 300-foot setback (ROP FW-7a) from the banks of active stream channels on the Kivalina, Ungalik, Shaktoolik, Inglutalik, Koyuk including the East Fork, Tubutulik, Kuzitrin, Agiapuk, Pah, and Noatak rivers would protect fisheries and subsistence use along these rivers

d) Impacts to Subsistence from Mineral Materials

Impacts to subsistence from mineral materials disposal would be the same as Alternative B.

e) Impacts to Subsistence from Recreation Management

Under Alternative D, 726,000 acres of the Squirrel River would be designated as a Special Recreation Management Area, with specific management controls regarding use effective upon plan approval. For example, the number of guiding permits allowed in the Squirrel River SRMA will be limited, and air transporters will now be required to obtain permits from the BLM. Future recreational use levels in the Squirrel River would be established through a RAMP to be developed within three years of plan approval, with significant input from local communities and users. In addition, an Extensive Recreation Management Area has been developed the remainder of the planning area, and will provide interim management goals, including management controls on commercial use. These measures all serve to reduce impacts to subsistence use as a result of decreased competition for resources, as well as benefits to subsistence resources due to a reduction in impacts to habitat.

f) Impacts to Subsistence from Travel Management

Impacts to subsistence from travel management and OHV management would be same as Alternative B; however, there would be less of an impact to subsistence in designated ACECs, RNAs, and SRMAs where OHV use may be limited.

g) Impacts to Subsistence from Lands and Realty Actions

Impacts to subsistence would be the same as Alternative B.

G. Cumulative Impacts

The National Environmental Policy Act (NEPA) and its implementing guidelines require an assessment of the proposed project and other projects that have occurred in the past, are occurring in the present, or are likely to occur in the future, which together may have cumulative impacts that go beyond the impacts of the proposed project itself. According to the Act (40 CFR Sec.1508.7 and 1508.25[a][2]):

A **cumulative impact** is the impact on the environment that results from the incremental impact of the action when added to the other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time. In addition, to determine the scope of environmental impact statements, agencies shall consider cumulative actions, which when viewed with other proposed actions have cumulatively significant impacts and should therefore be discussed in the same impact statement.

The analysis of cumulative impacts is a four-step process that follows guidance provided in Considering Cumulative Effects under NEPA (CEQ 1997).

1. **Specify the class of actions whose affects are to be analyzed.** Activities allowed under the RMP and advances in technology are considered in the analysis. The assumptions and scenarios used by the resource specialists in the analyses of the cumulative impacts include those identified for the planning area in Analysis Assumptions beginning on page 4-5.
2. **Designate the appropriate time and space domain in which the relevant actions occur.** For some resources and uses, the area of which an effect could be felt would be the "footprint," but for others the effect may extend well beyond that space. For example, noise effects to wildlife can extend beyond the footprint of the development. For purposes of this analysis, the spatial domain for past, present, and reasonably foreseeable activities is primarily the planning area. However, this document also considers effects to resources that could occur outside of the planning area, primarily to migratory birds and mammals (e.g. activities on the North Slope of Alaska). Due to the difficulty of predicting advances in technology and the need for oil and gas very far into the future, the analysis period which most of the cumulative effects analysis is focused, is 50 years into the future.
3. **Identify and characterize the set of receptors to be assessed.** The set of receptors assessed in the cumulative effects analysis are the physical, biological, and human systems discussed in Chapter III.
4. **Determine the magnitude of effects on the receptors and whether those effects are accumulating**. The potential extent of the total cumulative effects (e.g., number of animals and habitat affected, jobs and revenues created or lost), and how long the effects might last (e.g., population recovery time, duration of income flows) are estimated to determine the magnitude of effects that could accumulate for each resource. Where possible, the assessment of effects on a resource is based on quantitative analysis (e.g., number of miles of gravel constructed; number of animals killed). However, many effects are difficult to quantify (e.g., animal behaviors; human perceptions) and a qualitative assessment of effects is made.

1. Activities Considered in the Cumulative Case

The following are past, present, and reasonable foreseeable future actions either inside or outside of the planning area. Actions outside the planning area include those that could contribute to cumulative effects on resources within the planning area. BLM had issued a Notice of Intent to develop an integrated activity plan for South NPR-A. On May 14, 2007 a decision was made to stop the planning effort for South NPR-A (News Release No. 07-21). No leasing or development of either oil and gas, or hard rock minerals in south NPR-A is anticipated during the life of the RMP.

a) Past Activities

- Oil and gas exploration and development has occurred on the North Slope during the past 80 years. The most intense development activity occurred during the 1970s and early 1980s. It was during this period that the Prudhoe Bay and Kuparuk oil fields were developed, TAPS and the haul road were constructed, and a large portion of the roads, drilling pads, gravel sources, collector pipelines, and production facilities were built. It was also a period of much activity in the National Petroleum Reserve-Alaska (NPR-A), with thousands of miles of seismic lines surveyed and dozens of exploratory wells drilled. Since then, additional development has occurred, but incremental physical disturbance to the environment has been reduced (BLM 2005h).
- Within the NPR-A, nearly 15,000 miles of seismic survey was completed and interpreted between 1974 and 1982. Seismic work was discontinued after1982 and did not resume until 1994 after the discovery of the Alpine Field. The total line-miles of seismic data acquired are not known but include at least 2,615 line-miles (BLM 2005h).
- In the 1980s, 1999, 2002, 2004, and 2006, BLM held oil and gas lease sales for portions of the NPR-A. Leasing in the early 1980s resulted in the drilling of only one industry exploration well, located about 40 miles south-southwest of Point Barrow (BLM 2005h). The BLM re-instituted leasing in the Northeast NPR-A in May 1999 resulting in the leasing of 861,368 acres. The bulk of the leased areas are in the vicinity of Nuiqsut and between Teshekpuk Lake and the Ikpikpuk River. After the 1999 sale, industry began an extensive drilling program in this area. Nine wells were drilled in 2000 and 2001. Additional sales held in 2002, 2004, and 2006 resulted in leasing to the south and west of previously acquired leases. Through 2006, 21 wells have been drilled in NPRA with oil and/or gas discoveries on at least five of the wells. The size of the discoveries has not been made public, but the operators have indicated that the oil reserves are at least equal to those of the Alpine field.

b) Present and Reasonably Foreseeable Future Activities

- The Nome Road System includes approximately 200 miles of gravel road originating in Nome. The Nome-Teller Highway runs northwest from Nome to the village of Teller; the Council Highway runs east and north to the seasonal community of Council; the Taylor Highway runs north of Nome to the Kougarok River.
- The 29 mile Point Hope Multi-Purpose Road, included in the Northwest Alaska Transportation Plan (ADOT&PF 2004), could be constructed during the life of the plan. As of February 2006, $4.5 million was earmarked to upgrade the existing road and possibly begin the extension of the road (Gardino 2006).

- The Rock Creek Project, located on the Seward Peninsula includes two project components: the Rock Creek Mine/Mill Complex about 6 miles north of Nome and the Big Hurrah Mine located 42 miles east of Nome in the Solomon River watershed. The Rock Creek Mill complex will consist of an open pit gold mine, two rock dumps, a gold recovery plant, and tailings storage facility. Expected mine life is about five years. The Big Hurrah component consists of a smaller open pit gold mine and several stockpiles. Mine life is estimated to be four years. These developments are taking place on private lands (Alaska Gold Company 2006).
- As of 2004 the Red Dog Mine reports approximately 1,800 impacted acres on private land. This includes a 220 acre pit, 540 acre tailings impoundment, 300 acre waste dump, 11 acre subore stockpile, and 45 acres for the mill and other facilities. This does not include the haul road or the port facility. Over the life of the mine, the pit alone is expected to expand to three times its present size. Exploration of mineralization in areas adjacent to Red Dog Mine is ongoing. A 52-mile haul road constructed and owned by the State connects the mine to the De Long Mountain Terminal. This is the only industrial road in the region.
- The De Long Mountain Terminal is an existing facility located on State lands at Portsite, north of Kivalina used to receive, store and load ore concentrate from Red Dog Mine. There are plans to upgrade this facility. If the project is approved and funding available, construction could potentially occur 2009-11. The tentatively recommended plan includes construction of an approximately 18,500-foot-long, 53-foot-deep dredged channel leading to a 1,450-foot-long trestle, carrying a roadway and enclosed concentrate conveyor from shore to a deep-draft dock. In addition, the dock would have the capability to offload ocean going fuel tankers, with the fuel being stored in the existing fuel tank farm. The fuel would then be used for operations of Red Dog Mine and Portsite, and would be transshipped through the existing lightering barge dock to coastal and riverine fuel barges to serve numerous villages in northwestern arctic Alaska. The tentatively recommended project would provide the annual capacity for a projected throughput of 1,544,000 short wet tons (swt) of base metal concentrate and import of about 52,700,000 gallons of fuel (U.S. Army Corps of Engineers 2005).
- Improvements to Portsite could result in additional development in the Northwest Arctic Borough or North Slope Borough. Those considered reasonably foreseeable include: expansion of Noatak airport; fuel transfer to communities; road system from De Long Mountain Terminal System to communities; Kivalina relocation; and natural gas exploration near Red Dog Mine (U.S. Army Corps of Engineers 2005).
- There are 25 producing oil fields on the North Slope, with Prudhoe Bay, Kuparuk River, Alpine field, Northstar, Point McIntyre, and Milne Point being the most productive.
- It is assumed for analysis purposes that all oil that is accessible under the Northwest NPR-A ROD will be produced. This approach suggests more development and production than was analyzed in the Northwest NPR-A IAP/EIS (BLM 2003b) and likely greatly overstates the level of development that would occur. To develop the approximately 4,100 MMbbls of oil that is accessible within Northwest NPR-A, BLM anticipates the following amount of development: as many as 94 exploration wells, 71 delineation wells, 6 central production pads (540 acres), 300 satellite pads (300 acres), three staging bases, six pump stations, 300 miles of gravel road, 300 miles of gathering lines, and 295 miles of sales pipelines would be constructed (BLM in prep.). This scenario, assumes a peak oil production of 83 MMbbl per year.
- The Alpine oil field, which began producing on the Colville River Delta in 2000, is the closest oil field infrastructure to the planning area (approximately 300 miles to the east). The Alpine oil field encompasses approximately 890,000 acres of Federal, State, and

private lands near the eastern edge of the NPR-A. Oil is transported through a 34-mile pipeline to the Kuparuk River Unit. Ice roads and bridges provide access during the winter; otherwise there are no overland routes to this isolated field. The existing footprint of the Alpine oil field infrastructure, excluding the pipeline to the Kuparuk River, is approximately 170 acres. The field currently includes four production pads, with plans for an additional three. Pads CD-1, CD-2, CD-3, and CD-4 have been constructed and have come into production. Another production pad on Native Corporation Land (CD-5) is likely to be constructed and come into production in the next few years (Schultz 2007). Plans to construct satellite developments associated with the Alpine field (production pads CD-6 and CD-7) in the eastern portion of the NPR-A are being prepared (BLM 2004e), and construction would likely begin in 2010 or later.

- In the Northeast NPR-A planning area the following exploration and development is assumed for analysis purposes (based on Alternative C): 250 miles of 2-D seismic survey lines, 10, 560 miles of 3-D seismic survey lines, 120 oil exploration wells, 90 oil delineation wells, seven central processing facilities, 32 gravel production pads, seven gravel runways, 320 miles of in-field roads, 320 miles of gathering lines, 182 miles of sales oil pipelines, seven pump stations, four staging bases, and 16 gravel pits. An estimated 7,781 acres of short-term disturbance and 4,649 acres of long-term disturbance would result from this development (BLM in prep).
- State and Native entitlements will be met during the life of the plan. Up to 7 million acres within the planning area may be conveyed out of Federal ownership.
- Land conveyed to the State will fall under management prescribed in the Northwest Area Plan for State Lands (ADNR 1989) or other future plans developed by the State. Under the current State planning document, most state land, will be kept in public ownership and managed for multiple-use. Most state land will be open to mineral entry and coal leasing. All state land will be available for oil and gas leasing.
- Approximately 285,000 acres of State land within the Northwest Arctic Borough (NAB) would be conveyed to the Borough. Most of this land will be acquired in the Kobuk, Candle, Wulik, and Squirrel watersheds. Once conveyed, this land would be managed consistent with the Northwest Arctic Borough's Comprehensive Plan and Title 9 of the NAB Municipal Code. Title 9 NAB provides for a wide variety of activities.
- The North Slope Borough has selected approximately 26,000 acres of State land within the planning area: approximately 5,000 acres on barrier islands in the north and 21,000 acres about 40 miles southeast of Point Hope. However, the North Slope Borough may meet their entitlement (89,000 acres) in other areas of the Borough, outside of the planning area.
- Land conveyed to native corporations would fall under management prescribed by the Native Corporation. Title to the mineral estate under these lands is conveyed to regional Native Corporations and may be available for development in the future.
- The Minerals Management Service (MMS) has produced a hypothetical development scenario as part of the Chukchi Lease Sale 193 Draft EIS (MMS 2006). The scenario assumes an abrupt increase in the level of activity compared to the past. The Chukchi is viewed as one of the most petroleum-rich offshore provinces in the country, with a mean recoverable oil resource of 12 billion barrels (Bbbl). The actual size and location of future oil and gas developments in the Chukchi are uncertain. However, for purposes of analysis, the MMS estimated that one oil field containing 1 billion barrels (Bbbl) would be developed as a result of Sale 193. The scenario for new petroleum development in the Chukchi took into account existing infrastructure on the North Slope because it is likely that future projects in northern Alaska will be tied into these facilities. Under this scenario, production from the Chukchi lease sale area could begin in 2020 with peak oil

production rate from the first offshore field assumed to be approximately 225,000 bbl per day. Leasing to production would take approximately 15 years. The total life-cycle of the offshore project could last 30-40 years with 25 years of oil production.

- Approximately, 100,000 line miles of 2-D seismic data has been collected to date in the Chukchi Sea. Exploration will continue, including 3-D seismic surveys which would take place during the open water season (May-September). Survey times average 20 to 30 days to cover a 200 sq-mi area. The 3-D surveys could begin before the November 2007 lease sale. Up to 4 surveys could take place annually. During seismic surveys, the vessels are largely self-contained and helicopter support flights average one per day (MMS 2006).
- If a commercial discovery is made in the Chukchi Sea as a result of Lease Sale 193, a new shorebase would be constructed. Heavy equipment and materials would be moved to the coastal site using barges, aircraft, and winter ice roads. Transportation activities would be more frequent during the construction phase (three years), beginning about 3 years after the discovery. The overall level of transportation in and out of the shorebase would drop significantly after construction is completed. During production operations aircraft would generally be smaller with less frequent flights (2 per day). Ice road traffic would be intermittent (MMS 2006).
- There is no infrastructure in NPR-A at the present time, so a new large-diameter gathering line would have to be constructed from the Chukchi coast to the Prudhoe Bay area (MMS 2006). The pipeline and communication lines would be constructed on elevated vertical supports during the winter to connect with the western extent of the TAPS pipeline infrastructure (about 300 miles). Pump stations would be needed at about 100-mi intervals and where possible would be co-located with oil field facilities. The size and location of the overland pipeline would be influenced by future discoveries and development in the NPR-A, but it is assumed that it would be oriented west-east in the shortest corridor to TAPs.
- In 2006 Arctic Slope Regional Corporation began a five year coal exploration project on corporation lands south of Point Lay.

c) Speculative Activities

- The Northwest Alaska Transportation Plan (ADOT&PF 2004) outlines the possibility of the development of a Yukon River Highway. If this entire route were constructed, it would create road access from the Elliot Highway west of Fairbanks through the southern edge of the planning area to Nome. The highest priority segments of the Yukon River Highway are located east of the planning area and it is highly unlikely that highway segments in the planning area would be completed during the life of this plan.
- Other road projects in the Northwest Alaska Transportation Plan include inter-village roads within the region, without a connection to the statewide road system. Inter-village roads would provide greater access to boat launch sites, permanent barge operations, gravel sources, and improve community connections. Recommended road projects within the planning area include (ADOT&PF 2004): 19 miles of road in the Northwest Arctic Borough; and 130 miles of road in the Seward Peninsula region.

2. Resources

a) Air Quality and Soil and Water Resources

(1) Cumulative Impacts to Air, Soil, and Water from Minerals

Cumulative effects to soil resources would largely result from surface disturbing activities that degrade the vegetative cover over the ice-rich permafrost soils, resulting in thermokarst erosion and subsidence. This is especially true in wetland soils, along the stream banks, and lakeshores, where the wave action of the water would accelerate the removal of the melting ice-rich soil, resulting in increased sediment erosion and changes to stream channel and bed morphology. Thermokarst erosion could also result from the cumulative effect of seismic and exploration activity when less than ideal snow conditions expose tussock tundra to surface disturbance during winter months. Habitat maintenance and enhancement through adherence to the ROPs and Stips would prevent the unnecessary long-term disturbance to soils.

Cumulative effects to water resources from oil and gas exploration and development in the planning area and across the North Slope could result from: 1) disturbance of stream banks or lake shorelines from oil and gas operations and the possible subsequent melting of permafrost (thermokarst erosion); 2) temporary blockages of natural channels and floodways during construction of roads and pipelines that would result in the disruption of drainage patterns; 3) increased erosion and sedimentation in rivers and lakes; 4) the removal of water from lakes for ice roads and pads; 5) increased use of the tundra for both oil and gas and non-oil and gas activities; 6) an increased amount of seismic surveys; and 7) removal of gravel from riverine pools and lakes. The cumulative case assumes exploration and development for all of the planning area. Thus, the effects on water resources could be several times greater than those estimated under any of the alternatives. The ROPs and Stips provided for each alternative, would reduce impacts from oil and gas exploration and development and keep impacts to water resources at a minor to moderate level. Outside of the planning area, increased use of material sites, use of lakes as a water source for ice roads, and dust created by additional traffic on existing roads could cause impacts to water resources. Adherence to the ROPs and Stips for all permitted operations would prevent the unnecessary long-term sedimentation in streams or lakes. Coordination with FWS, ADF&G, and local agencies would continue to be essential for development that will likely occur across managerial boundaries.

Overall, the cumulative effects of oil spills on water resources on the North Slope, because the spills have been small and cleanup and rehabilitation efforts have generally been successful, have not been significant (NRC 2003). Cumulative effects of North Slope activities on water quality, Section V.C.1 of the Beaufort Sea Planning Area Sales 186, 195, and 2002 EIS (MMS 2002), are incorporated here by reference and summarized below. If a large oil spill were to result from oil and gas development in the Beaufort Sea, the marine environment would be degraded through the release of petroleum hydrocarbons into the water column. Small spills could exceed the acute-toxic level a day or less and chronic criteria could be exceeded for less than a month.

Cumulative air quality impacts may result from the emissions of hydrocarbons and byproducts of combustion. These impacts may be regionally additive (e.g., increased concentrations of specific pollutants) or synergistic (e.g., chemical reactions that form ozone), and could degrade air quality. Ambient air quality on the North Slope of Alaska, however, is relatively pristine even though oil and gas exploration, development, and production have been under way for more than 30 years. Given this expected development would be small compared to the emissions from Prudhoe Bay and Kuparuk oil field production; projected emissions from the alternatives would account for only a small percentage of current and projected emissions.

Arctic haze is a phenomenon resulting from elevated concentrations of fine particulate matter found over the Arctic, primarily in winter and spring. Scientists believe that most of the pollutants contributing to Arctic haze are from combustion sources in Europe and Asia. It is not known to what extent local sources in Alaska contribute to Arctic haze in the area of the Beaufort Sea. However, the arctic haze phenomenon was first observed in the 1950s, long before oil development started on the North Slope. Since oil development from all alternatives would be small compared to the emissions from Prudhoe Bay and oil field production; projected emissions from the alternatives would account for only a tiny percentage of current emissions.

Based on this assumption, the regional greenhouse gas emissions associated with future cumulative production would be small compared to the emissions from Prudhoe Bay oilfields, while greenhouse gas emissions associated with production activities can be reduced by using more fuel-efficient power generating equipment and vehicles and minimizing flaring. While the continued emissions of greenhouse gas to the atmosphere will affect climate, ocean and freshwater chemistry (Caldeira 2005), the cumulative future oil production in the planning area would produce a minimal contribution to global greenhouse gas emissions. Nationwide and global greenhouse gas emissions could be reduced by conserving energy, improving energy efficiency, and developing alternative energy sources.

Despite considerable oil- and gas-related activity since 1969, the overall air quality on the North Slope of Alaska remains relatively pristine. See Resources, Air Quality section in Chapter III for a discussion of the existing air quality in the planning area. Modeling performed for the Lease Sale 144 Final EIS (USDOI, MMS, 1996a) showed that impacts from widely scattered emissions sources on the outer continental shelf (OCS) are small and well within regulatory standards. The Final 5-Year Program EIS for OCS Oil and Gas Leasing Program 2002-2007 (MMS 2002) discusses the cumulative effects of the OCS Program in all areas. The relevant major finding was that no major degradation of onshore air quality is predicted. Air monitoring at a number of sites in the Kuparuk and Prudhoe Bay fields showed that concentrations of nitrogen dioxide, sulfur dioxide, and particulate matter 10 micrometers or less are well within the national ambient air-quality standards. Since any projected development in the planning area would be small compared to the combined Prudhoe Bay and Kuparuk oilfields, there would be very little cumulative interaction between developments under this proposal and other oil-producing facilities.

Potential impacts from future lease sales on the outer continental shelf and on land are difficult to evaluate. However, one can expect that any development would be small compared to Prudhoe Bay and Kuparuk, scattered over a rather large area, and well within existing regulatory standards.

(2) Cumulative Impacts to Air, Soil, and Water from Lands and Realty Actions

Privatization of State or Native corporation lands has the potential to open up areas to private development. There would be a limited demand for State and Federal ownership adjustment through land exchanges. While land use authorizations such as rights-of-way would continue to fluctuate with the degree of economic development, the expected level of development would generally remain low.

(3) Cumulative Impacts to Air, Soil, and Water from Travel Management

Development of regional roads and access would have the single greatest impact to air, soil, and water resources. These impacts would occur along the entire length of road, include soil compaction and thermokarst erosion, stream diversions, impoundments, increased sediments runoff, and increased airborne particulates, especially during construction. Material sites required for road construction would create similar additional impacts. Limiting the length of the roads would have the greatest reduction in impacts to the soil, water, and air resources. The Northwest Alaska Transportation Plan (ADOT&PF 2004) outlines the possibility of the development of a Yukon River Highway. If this entire route were constructed, it would create road access from the Elliot Highway west of Fairbanks through the southern edge of the planning area to Nome. Portions of the highway would likely require a right-of-way authorization by the BLM. The highest priority segments of the Yukon River Highway are located east of the planning area and it is unlikely that the Highway would be completed during the life of this plan.

Other road projects discussed in the Northwest Alaska Transportation Plan include inter-village roads within the region, without a connection to the statewide road system. Inter-village roads would provide greater access to boat launch sites, permanent barge operations, and gravel sources, and improve community connections. Recommended road projects within the planning area include (ADOT&PF 2004): 29 miles of road in the Point Hope area; 18 miles of road in the Northwest Arctic Borough; and 135 miles of road in the Seward Peninsula region. Construction of these projects within the life of the plan would be dependent upon social and economical conditions, some of which may require right-of-way authorization by the BLM. It is not clear which, if any, of these projects would be completed during the life of the plan. These types of roads would have similar types of impacts, but much less in extent than a regional highway.

(4) Cumulative Impacts to Air, Soil, and Water from Ports and Harbors

The Army Corps of Engineers recently released a Draft Environmental Impact Statement for Navigational Improvements De Long Mountain Terminal, Alaska (U.S. Army Corps of Engineers 2005). The De Long Mountain Terminal is an industrial site at Portsite, 80 miles northwest of Kotzebue. Portsite is connected to the Red Dog Mine via a 58-mile road, the only major road in the region. The proposed improvements would allow navigation by bulk freighters and tanker ships, allowing direct offloading of fuel from tanker ships. Improvements to Portsite could result in additional development in the Northwest Arctic Borough or North Slope Borough such as: increased through put from Red Dog Mine; new zinc mining in the De Long zinc belt; other metallic mineral development in the area; coal mining; development of land transportation corridors; new airport at Portsite; trans-shipment of goods to communities; fuel transfer to

communities; road system from De Long Mountain Terminal System to communities; and Kivalina relocation (US Army Corps of Engineers 2005).

(5) Cumulative Impacts to Air, Soil, and Water from Oil Spills

Despite considerable oil- and gas-related activity since 1969, the overall air quality on the North Slope of Alaska remains relatively pristine. See Chapter III for a discussion of the existing air quality in the planning area. Modeling performed for the Lease Sale 144 Final EIS (MMS 1996a) showed that impacts from widely scattered emissions sources on the outer continental shelf (OCS) are small and well within regulatory standards. The Final 5-Year Program EIS for OCS Oil and Gas Leasing Program 2002-2007 (MMS 2002) discusses the cumulative effects of the OCS Program in all areas. The relevant major finding was that no major degradation of onshore air quality is predicted. Air monitoring at a number of sites in the Kuparuk and Prudhoe Bay fields showed that concentrations of nitrogen dioxide, sulfur dioxide, and particulate matter 10 micrometers or less are well within the national ambient air-quality standards. Since any projected development in the planning area would be small compared to the combined Prudhoe Bay and Kuparuk oilfields, there would be very little cumulative interaction between developments under this proposal and other oil-producing facilities.

Cumulative impacts to air quality may result from the emissions of hydrocarbons and byproducts of combustion and development of regional roads. These impacts may be regionally additive or synergistic, and could degrade air quality. Oil and gas development under this plan would be small and projected emissions would account for only a small percentage of current and projected emissions on the North Slope.

Cumulative impacts to soil resources would occur from oil spills that adversely impact the vegetation covering the soils. The oil alone would decrease vegetation growth, but oil spills probably would leave the surface organic mat intact. Spill cleanup, however, is more likely to damage soils. Cleanups are not always well controlled; heavy traffic and digging are common, resulting in damaged soils. Oil-spill cleanup mitigates impacts on soils only if cleanup methods and operations are very carefully controlled and they minimize surface disturbance. Thermokarst, or ground subsidence, occurs when the removal of surface cover exposes ice-rich permafrost soils to a higher temperature regime and subsequent melting. The impacts to soil resources from surface disturbing activities during oil-spill cleanup when the tundra is unfrozen may be greater than the impact of the spilled oil, as the area affected may not be limited to that area immediately adjacent to and covered by the spill. The impacts from thermokarst tend to be long and may take years to develop; it could be decades before the impacts to soils are ameliorated.

Cumulative effects to soil resources could result from surface disturbing activities associated with the programs discussed above. Impacts include soil compaction and thermokarst erosion, stream diversion, impoundments, and increased sediment erosion. Impacts from thermokarst may take years to develop and it could be decades before the impacts to soils are ameliorated. Adherance to the Stips and ROPs for all permitted operations would reduce long-term disturbance to soils.

Overall, the cumulative effects of spills on water resources on the North Slope, because the spills have been small and cleanup and rehabilitation efforts have generally been successful, have not been significant (NRC 2003). Cumulative effects of North Slope activities on water quality, Section V.C.1 of the Beaufort Sea Planning Area Sales 186, 195, and 2002 EIS (MMS 2002), are incorporated here by reference and summarized below.

If a large oil spill were to result from oil and gas development in the Beaufort Sea, the marine environment would be degraded through the release of petroleum hydrocarbons into the water column. Small spills could exceed the acute-toxic level a day or less and chronic criteria could be exceeded for less than a month.

Effects on water resources could result from oil spills, increased soil erosion due to surface disturbance, and stream diversions or impoundments from construction of facilities and infrastructure. To date, impacts from oil spills on water resources on the North Slope have not been significant, as spills have been small and cleanup efforts successful.

Potential impacts from future lease sales on the outer continental shelf and on land are difficult to evaluate. However, one can expect that any development would be small compared to Prudhoe Bay and Kuparuk, scattered over a rather large area, and well within existing regulatory standards.

b) Climate Change

Alaska is experiencing significant effects of global climate change, including warmer temperatures, melting glaciers, reduction of pack ice, and changes to its vegetative communities (see Hansen et al., 1999; Barber et al., 2000; Oechel et al., 2000; Serreze et al., 2000; Goetz et al., 2005 and numerous others). Additional potential effects of global climate change in Alaska include increased precipitation, decreased snow cover, rising river flows, rising of sea level, thawing of permafrost, changes in fire frequency and severity, an ice-free shipping lane from Europe to Asia across the Arctic Ocean, changes in wetlands, and shifts in the distribution of wildlife (ACIA 2004). Over the past few decades, average temperature in the Arctic has risen at almost twice the rate as the rest of the world (ACIA 2004). From 1949 to 2005, average annual temperature at Kotzebue and Nome has increased by 3.3°F and 3.2°F respectively (Alaska Climate Research Center 2006). The majority of the warming trend has come during the winter months, where temperatures have increased by 7.2°F and 5.2°F in Kotzebue and Nome, respectively (Alaska Climate Research Center 2006). Most models project that rapid Arctic warming will continue.

These changes will have substantial direct and indirect impacts on people living in the region. For example, coastal erosion from storm surges may be exacerbated due to thawing of permafrost, reduced sea ice extent, and later formation of shore-fast ice. This combined with rising sea levels make it likely that entire towns, such as Kivalina, will have to be abandoned and relocated elsewhere. Villages are already taking these problems into account. The newer buildings in Teller were constructed away from the town center on higher ground to the southeast. This phenomenon has also had direct effects on the oil industry.

Another predicted result of climate change is a shift in vegetation. Projections are that the amount of tundra would shrink to its lowest extent in at least the last 21,000 years (ACIA 2004). Mosses and lichens are among the groups expected to decline as warming increases (ACIA 2004). The timeframe of these shifts will vary. Where suitable soils and other conditions do not exist, changes are likely a century away. However, significant changes in Arctic communities over the past few decades have already been documented (e.g., Sturm et al. 2001).

BLM's long-term vegetation monitoring transects in the Nulato Hills have documented that vegetative communities in the Arctic are changing as well. Lichens and mosses have

significantly declined since 1981 while grasses and shrubs have been increasing (Joly et al. 2007). These changes in Arctic vegetative communities will likely lead to shifts in animal distributions, which would indirectly affect people by altering the patterns of important subsistence species.

Changes in permafrost and resulting changes in lakes due to global climate change may negatively affect waterfowl. Shrinking pond surface areas could become a common feature in the discontinuous permafrost regions as a consequence of warming climate and thawing permafrost (Yoshikawa and Hinzman 2003).

The State of the Arctic Report (Richter-Menge et al. 2006) notes that "many of the trends documented in the Arctic Impact Climate Assessment are continuing, but some are not. Taken collectively, the observations in this report [State of the Arctic Report] indicate that during 2000 to 2005 the Arctic system showed signs of continued warming. However, there are a few indications that certain elements may be recovering and returning to recent climatological norms (for example, the central Arctic Ocean and some wind patterns). These mixed tendencies further illustrate the sensitivity and complexity of the Arctic physical system."

Because climate change must be viewed from a global perspective, the magnitude of emissions potentially contributed by any proposed activities in the planning area needs to be viewed in that context. Activities associated with oil and gas or mineral exploration and development, recreation, or prescribed burning would produce some greenhouse gases. The incremental contribution of greenhouse gases from the proposed alternatives in the planning area would be minor when compared to global greenhouse gas contributions. The required operating procedures (Appendix A) allow for changes in project design in response to changing environmental conditions.

c) Vegetation

Potential increased levels of mining and mineral leasing development on State and private lands, combined with similar activities on BLM-managed lands could result in cumulative surface disturbance with adverse effects on riparian and tundra vegetation over the long-term. Dispersed recreation effects from gradual increases in amount and frequency of OHV travel, remote landing sites for bush aircraft, campsites, plus potential new recreation facilities and trails may have minor adverse and cumulative impacts to riparian and tundra vegetation on BLM-managed lands throughout the planning area. The potential for displacement of native vegetation by noxious and invasive weeds will increase as the level of surface disturbance to once-intact habitat rises.

d) Fish and Wildlife

(1) Fish

A continuation of current water and land use practices, by private, State, and other Federal agencies would continue to affect fish habitat within the planning area. Higher intensity OHV use and mineral development or exploration on lands upstream from BLM-managed lands within a watershed could continue to be a concern due to sediment and water quality issues that influence the quality of fish habitat downstream from the source. Habitat improvement gains through more intensive management of recreation activities as proposed under Alternatives C

and D could be offset or enhanced by regulatory sport-fishing changes made by ADF&G. Coordination would continue to be essential.

Coordinating with regional planning actions and conducting interagency watershed planning efforts could help protect important fisheries values in watersheds such as the Kigluaik Mountains, Kivalina River, and Squirrel River.

(2) Wildlife

The combination of ongoing oil and gas development occurring on the North Slope on both State and Federal lands, future oil and gas development projected for the NPR-A, oil and gas development in the northern quarter of the planning area, ongoing solid mineral exploration and development in the same region, hunting, and climate change would have cumulative impacts on caribou from the WACH. Depending on the location of development, these impacts could include: short or long-term disturbance to caribou insect relief habitat and migratory routes; disruption of caribou movements; stress and disturbance impacts to caribou during all seasons of the year; possible reductions in herd productivity. Because caribou population size fluctuates naturally over time, it is difficult to determine if effects are accumulating at the population level, or just reflect natural shifts in population numbers.

Currently, there is little exploration and no oil and gas development within the core range of the WACH, although some caribou from this herd occasionally winter in areas with ongoing exploration and development. The Kukparuk, Alpine, and Prudhoe Bay fields as well as the trans-Alaska pipeline are located on the easternmost extent of the herd's range. Most of the herd has little to no contact with oil-related structures (Dau 2005). Any new development as considered under Alternatives B and D would result in additive impacts to the herd. If significant activity occurred within the calving grounds or crucial insect relief habitat, these impacts could be significant. It is highly unlikely that any development activity would occur on BLM-managed lands in the calving grounds under this plan. All of the calving grounds within the planning area are Native-selected and/or high priority State-selected lands which are unlikely to remain under BLM management. Much of the land is top-filed by the State, meaning that if it is not conveyed to the Native Corporation, State selections will attach. Selected lands are segregated from mineral entry and leasing until such time as the lands are relinquished or conveyed. Therefore, no mineral exploration or development would occur over the short-term. If conveyed, mineral exploration or development could be authorized by the new land owner. BLM is not aware of any immediate plans for such activities in this area by the State or Native corporations. If not conveyed, no mineral development could occur until BLM lifted the ANCSA 17(d)(1) withdrawals, a process that would take several more years.

Under the RFD scenarios for this plan, oil and gas exploration and development could occur in the insect relief habitat under Alternatives B and D, although it would be unlikely, as the development potential of the area is low and the infrastructure necessary to get the oil or gas to market does not currently exist. The amount, specific location, and timing of such activities are highly uncertain. At most, it is anticipated that one oil field with no connection to the road system would be developed. This field would affect approximately 517 acres of more than a million acres of identified insect relief habitat. Cumulative impacts to caribou would be somewhat less under Alternatives A and C as oil and gas development would not occur on BLM-managed lands in the planning area.

To date, the largest industrial development within the planning area is Red Dog mine. The Final Environmental Impact Statement for the Red Dog Mine Project, Northwest Alaska (EPA 1984),

projected that development and operation of the mine and associated facilities would result in direct and indirect habitat loss, effects on animal movements, construction impacts, and increased human access into wildlife habitats. The EIS noted that the project might have an indirect, localized impact on caribou by displacing some animals from marginal winter range. Another potential impact on caribou was the possible increase in hunting pressure from employees based at the mine. The greatest anticipated impact on caribou from Red Dog mine was the potential for interruption of caribou movement patterns (EPA 1984). The EIS projected that the presence of the road itself and the level of traffic associated with the mine would be unlikely to cause a major shift in caribou movement patterns. However, if the road were open for other uses and high traffic levels resulted, a change in migration patterns might occur.

Red Dog Mine, which went into production in late1989, has impacted approximately 1,800 acres of wildlife habitat, not including the haul road or port facility. The mine is located in caribou migratory habitat, near the southern edge of summer range (Map 3-12). Activities at Red Dog Mine have disturbed much less than 1% of the available habitat. Mining activity will continue for the life of the mine (estimated at 23 years) and is projected to impact several hundred additional acres of habitat.

The 52 mile haul road connecting to the coast crosses an area used by some Western Arctic Herd caribou during migration and resulted in disturbance of approximately 200 acres of habitat. Local residents expressed concern that the road may interfere with caribou migration, and this was a major issue addressed in the EIS for the mine. Map 3-46 shows fall migration by caribou equipped with satellite radio collars from 1989 to 2004. This data shows that some caribou do cross the road. It is possible that some caribou avoid the area by going to the east, around the mine and road. The NANA/Cominco agreement for Red Dog Mine specifically recognizes the possibility of interrupting caribou migration. A subsistence Advisory Committee is empowered to request temporary closure of the haul road during caribou migration to minimize impacts on caribou movements. According to Dau (2005) the Red Dog Mine complex appears to have resulted in only limited and localized effects on the movement and distribution of the WACH.

The Rock Creek Mine Project near Nome is expected to come into production during the life of the plan. This mine would not add to the cumulative impacts on caribou as it is located outside of the defined seasonal ranges of the WACH. It would however add to the cumulative impacts on other wildlife in the vicinity of Nome.

A notice of intent to develop an integrated activity plan (IAP) for South NPR-A was published June 15, 2005. This planning effort was cancelled in May 2007 and no mineral leasing or development is anticipated in south NPR-A during the life of this plan. Therefore, the south NPR-A IAP will not result in additional cumulative impacts to caribou, caribou calving habitat, or other wildlife from development of oil and gas, coal or hard rock minerals. Currently there are no reasonably foreseeable mining activities forecasted for the WACH calving grounds on either State or BLM land.

Ongoing locatable mineral development in the planning area has not resulted in discernable population level effects on caribou to date and has not occurred within the core calving grounds or insect relief habitat. Reasonably foreseeable locatable mineral development on BLM-managed land within the planning area would be limited to five small placer mines of 10 acres each. When added to current and anticipated future development at Red Dog Mine, an estimated 2,500 acres, less than 1% of available habitat, might be impacted. As discussed above, no mineral development is likely to occur within the core calving grounds due to land selection patterns and Red Dog Mine is located outside of the insect relief habitat. Therefore,

very little if any mineral activity is anticipated within either the calving or insect relief habitats. The incremental contribution of impacts on caribou and other wildlife from locatable mineral development authorized under this plan would be minor and would not result in population level effects.

Reported harvest by both recreational and subsistence hunters in 2002 and 2003 was 14,700 and 11,600 caribou respectively (Dau 2005). This constitutes 2-3% of the population. Reported harvest is substantially lower than actual harvest, which likely ranges from 15,000 to 20,000 caribou annually. The WACH is still very large. However, indications are that the herd could decline in the foreseeable future (Dau 2005). At this point, there is no evidence that any single factor is limiting the size of the herd.

Privatization of State or Native Corporation lands within the planning area would have the potential to negatively affect wildlife and wildlife habitat by opening up areas to private development. Under the current Northwest Area plan (ADNR 1989), the State limits land sales to two disposal areas in the Kobuk Unit with maximum disposal of 350 acres of land and approximately 900 acres in four areas in the southwest Seward Peninsula Unit, out of approximately 11 million acres of State land considered in the plan. In general, there is little public support for State land sales within the planning area and minimal disposal of BLM-managed land is anticipated under any alternative. Cumulative impacts to wildlife would not be significant.

Conveyance of BLM land to the State and Native corporations includes conveyance of the mineral estate. There is potential that some industrial development of these lands could occur after they are conveyed. However, because no activities on these lands are currently proposed, assuming any level of development or effect would be purely speculative.

Development of regional roads within the planning area would have the potential to negatively affect wildlife, particularly caribou and other big game species. These impacts would include habitat fragmentation, increased access into wildlife habitats, increased disturbance impacts, increased potential for mortality (road kills) and possible alteration of behavior or movement patterns of wildlife. Construction of major road projects would be dependant upon social and economical conditions and it is not clear which if any of these projects would be completed during the life of the plan. Because regional road construction and the level of development projected through this plan is so minimal, no cumulative impacts to wildlife are anticipated.

In summary, the activity authorized by BLM with the most potential for cumulative impacts on wildlife is mineral development on the North Slope. There would also be cumulative effects on wildlife due to increased human activity, increased recreational use, subsistence harvest, sport hunting, and changes in habitat due to climate change. Wide ranging species such as caribou and migratory birds could be exposed to increased human activity and development throughout a large portion of their range. Although the additional impact of oil development under Alternatives B and D of this plan would be minor, it is predicted to occur in sensitive habitat areas for the WACH. However, the total area of impact is minor compared to the size of the sensitive area, and while it may impact individuals, the effects are unlikely to accumulate and result in population effects. Current and expected development have resulted in no measurable population effects. The additional development described in the RFD under all alternatives represents a minimal amount of the total area even when potential disturbance effects are included. The proposed development described in the RFD when added to the other cumulative effects may result in greater impacts to individuals or more individuals being impacted, but the incremental addition is not expected to result in measurable population impacts.

e) Special Status Species

(1) Special Status Plants

The widely scattered nature of special status plant populations and incomplete knowledge of their distribution and range complicate efforts to predict cumulative impacts. However, current and potential increased levels of mining and mineral leasing development on State and private lands, combined with that on BLM-managed lands, could result in cumulative, adverse effects on sensitive status plants and habitats over the long-term. Dispersed recreation effects from gradual increases in amount and frequency of OHV travel, remote landing sites for bush aircraft, campsites, and hiking may have minor adverse and cumulative impacts to sensitive status plants and habitats on BLM-managed lands.

(2) Special Status Fish

Effects would be the same as those described in the Fish section on page 4-53.

(3) Special Status Wildlife

The widely scattered nature of special status wildlife populations and incomplete knowledge of their distribution and range complicate efforts to predict cumulative impacts. Current and potential increased levels of oil and gas development on State and private lands on the North Slope combined with that on BLM-managed lands, and ongoing human activities would result in cumulative, adverse effects on Steller's and spectacled eider, and polar bears and their habitats over the long-term. The addition of one oil and gas field under either Alternative B or D, would result in minimal addition to cumulative impacts to these species due to their very limited distribution within the planning area and on BLM-managed land.

The following information on cumulative impacts to listed eiders is incorporated from the Endangered Species Act, Section 7, Biological Opinion for the Northwest National Petroleum Reserve-Alaska Integrated Activity Plan /Environmental Impact Statement (FWS 2004b), which is incorporated by reference. The Northwestern (NW) portion of the National Petroleum Reserve-Alaska (NPR-A) contains important breeding habitat for over 70% of spectacled eiders and over 90% of Steller's eiders on the Arctic Coastal Plain, and both species are known to occur or nest at comparatively medium to high densities within BLM defined areas of high geologic potential.

A small portion of the Steller's and Spectacled eider potential breeding range has been altered by oil and gas exploration/development on the North Slope. Future development in the NW portion of NPR-A may result in disturbance impacts to eiders. The number of listed eiders that would be exposed to oilfield activity is variable depending on the location of oilfield infrastructure within NPR-A. Disturbance from aircraft traffic, watercraft support, and exploration/delineation activity could adversely impact Steller's eiders by: 1) displacing adults and/or broods from preferred habitats during pre-nesting, nesting, brood rearing and migration; 2) displacing females from nests, exposing eggs or small young to inclement weather or predators; and 3) reducing foraging efficiency and feeding time. Some birds may be displaced with unknown physiological and reproductive consequences.

The biological opinion (FWS 2004b) did not forecast population-level effects to listed eider species from the following activities in NW NPR-A: aircraft overflights, watercraft activity in marine environments, seismic camps and exploration/delineation activities, habitat loss due to oil field activity, collisions with oil field structures, increased predator populations due to edible refuse associated with oil field development, increased subsistence activity due to additional road access, and terrestrial oil spills.

The FWS anticipates the proposed development in NW NPR-A will likely result in the take of 117 spectacled eiders and 9 Steller's eiders as a result of habitat loss/disturbance and fatal collisions with oilfield structures over a period of 30 years (FWS 2004b). The take is expected to be in the form of harm, harassment and/or killing. The FWS determined that this level of anticipated killing is not likely to result in jeopardy to the species or destruction or adverse modification of critical habitat. The FWS concluded that the proposed oilfield activities in NW NPR-A may adversely affect individual listed eiders. However, their low nesting densities combined with the limited amount of proposed oilfield infrastructure/activity suggests that few individuals would likely be adversely impacted.

In addition to projected exploration and development of oil, human population growth in North Slope Borough communities has also resulted in localized habitat loss due to construction activities and off-road vehicle use. Lead or other sources of contamination of habitat or prey species are possible in localized areas within the range of both Steller's and spectacled eiders. Increased densities of arctic foxes and glaucous gulls associated with human development, particularly landfills, have been noted at Barrow and Prudhoe Bay and common ravens have expanded their breeding range into these areas. There is very little information on predation of Steller's and spectacled eider nests throughout most of the species' range in Alaska. Listed eiders may be adversely affected by increased numbers or altered distribution of predators. Although information showing a direct link between oilfield activities and waterfowl nest predation rates is lacking, the FWS believes that actions that artificially enhance predator populations are a potentially large adverse impact to listed eiders (FWS 2004b).

Sport hunting for Steller's and spectacled eiders was closed in 1991. However, in 2003, a spring subsistence hunting season for migratory birds in Alaska was initiated. Although killing listed eiders is not permitted by the spring hunting regulations, accidental take of prohibited species may occur. Accurate information on current harvest rates is not available, but hunter surveys and other observations indicate that both intentional and unintentional shooting of Steller's and spectacled eiders likely continues in Northwest Alaska (Paige et al. 1996, Georgette 2000, Wentworth 2001).

Steller's eider research conducted in the Barrow area is also a source of disturbance, because those activities are oriented toward locating nests and broods. Research efforts unrelated to listed eiders also result in disturbance impacts. Field research typically occurs during the summer months, but numbers, locations, and type of activities remain speculative because data quantifying this activity has not been collected. The FWS has provided project applicants with recommendations and restrictions intended to minimize impacts of oilfield research on listed eiders, including timing restrictions and buffers around known nest. Estimating impacts from field research is difficult because many researchers are unaware of the requirement to consult. Without a better understanding of the extent of research activities in NPR-A, it is difficult to determine whether the cumulative effects of field research may result in take.

Both Steller's and Spectacled eiders occur in the planning area at low densities. The reasonably foreseeable development scenario is for one Alpine type oil and gas field. Given land ownership patterns, this field would not be located in nesting habitat for listed eiders. The level of activity forecasted is much lower than that occurring in NW NPR-A, as are densities of eiders. Therefore the incremental addition of impacts from activities approved under this RMP would be very small, and the cumulative effects to listed eiders are not expected to significantly affect the population.

f) Fire Management and Ecology

Under the current mix and match of fire management strategies being implemented across the planning area there are few if any anticipated cumulative impacts on BLM-managed lands. There is one large area of the WACH winter range in the Modified Management Option. This area will have to be monitored closely for the effects of fire exclusion.

Wildland fire management is done on an interagency basis and across administrative boundaries. There are several areas in that are in the Full and Critical Management Options that are adjacent to BLM-managed lands. These areas will have to be monitored in conjunction with our interagency partners, for the effects of fire exclusion.

g) Cultural Resources

Cumulative impacts to cultural resources could occur through incremental degradation of the resource base from a variety of sources which reduce the information and interpretive potential of historic and prehistoric properties, or which affect traditional cultural values important to Native Americans. Much of the anticipated development within the planning area would occur on lands that are not covered by Federal cultural resource laws. As a result, there could be losses to the regional resource base that could potentially limit or change management options within the planning area.

h) Paleontological Resources

Cumulative impacts to paleontological resources in the planning area could result from development on non-BLM managed lands as well as BLM-managed lands, and from natural agents and unauthorized uses throughout the area.

i) Visual Resources

Continued development of OHV trails, roads, recreational facilities, mining activities, overland explorations, and wildland and prescribe fire may lead to changes to existing visual resources by altering basic visual elements of form, line, color, and texture at the landscape level. These changes will influence the design of similar projects on adjacent BLM lands where repeating these basic elements is an objective of the visual resource management class.

j) Wilderness Characteristics

In addition to the impacts described under Alternative B, the construction of additional long-term or permanent facilities such as power lines, permanent roads, gravel pads, material sites, or other structures not necessarily related to oil and gas development and/or placer/hard rock mining would result in cumulative impacts to solitude, naturalness, or primitive/unconfined recreation. Short-term or transient loss of the area's naturalness and solitude from such impacts as green pads/trails and noise from aircraft and equipment would not accumulate as would impacts from permanent facilities. In that respect, their contribution to the cumulative impacts would be "momentary."

Under Alternative B, long-term impacts would be expected to affect an area of approximately 108,000 acres (this includes oil and gas and hard rock development). This represents only 1% of BLM-managed lands in the planning area. Considering past, present, and future development across the planning area, total cumulative impacts could affect an area maybe one to three times greater. This would depend on many factors, some of which are unforeseen at this time. Cumulative impacts along rivers such as the Squirrel River and other popular rivers in the planning area, would be seen as far more significant than impacts elsewhere.

Short-term impacts, such as green trails and disturbance from noise and other activities would not accumulate. Impacts from long-term or permanent facilities such as roads, major trails, pipelines, and gravel road/pads, would accumulate and would result in the long-term loss of solitude, naturalness, or primitive/unconfined recreation.

3. Resource Uses

a) Forest Products

Ongoing spruce beetle damage and the potential for more intense wildland fires may shift forest stand composition towards higher percent of young trees, and a more diverse mix of tree ages within stands. Early seral shrub-dominated plant communities may increase, interspersed with recovering forest communities. The overall amount of mature forest timber will likely decrease during the life of the plan.

The expected slow, steady increase in number and sophistication of OHVs traveling both on and off designated trails, able to access more difficult terrain will result in a small amount of continued damage to naturally revegetating or colonizing tree seedlings and saplings.

As rural village populations gradually rise and maintain their strong reliance on a subsistence lifestyle, the use of firewood and house logs will also show a slow, steady increase.

Increased mineral development on adjacent State and Native-owned lands may result in conversion of forested plant communities to tundra landscapes of sparse grasses, sedges, forbs, or shrublands. This could shift subsistence and wildlife use of forest product resources more strongly towards BLM-managed forest habitats.

b) Livestock Grazing

Management changes that are implemented on BLM-managed lands, in any of the proposed alternatives, are likely to have little cumulative impacts on grazing.

c) Minerals

(1) Leasable Minerals

(a) Fluid Leasable Minerals

The cumulative impacts to oil and gas resources would be the removal of the resources by producing wells on leases with the fewest restrictions and lowest operating costs. Production of oil and natural gas from one geologic reservoir would not affect the recovery of oil and/or natural gas from other geologic reservoirs. The production of natural gas and oil is a beneficial irretrievable commitment of the resource as the produced natural gas or oil no longer would be available for future use. The amount of oil, gas, or heat produced would vary depending on the number of wells drilled in the field and the ability to recover the resource.

The cumulative impact to Federal leases would be a reduction in lease value resulting from the application of ROPs, stipulations and regulations. The cumulative impacts to lease developments would result from a reduction in wells drilled on leases encumbered with stipulations, an increase in wells drilled on leases with minimal constraints, and an increase in operating costs because of land use decisions, lease stipulations, and regulations. Restrictions on Federal leases could impact the leasing and development of adjacent non-Federal leasable minerals. If an exploration company cannot put a block of leases together because of restrictions on Federal leasable minerals, the private or State minerals may not be leased or developed either. Leasing of Federal minerals on the other hand, could encourage the leasing of private or State minerals.

Oil and natural gas activities could be located in parts of the planning area where other mineral resources are mined or potentially could be mined. However, the production of oil and natural gas resources is not expected to be a significant impact on other mineable mineral resources within the planning area. A potential conflict exists between coal and CBNG. Should coal resource development precede CBNG development in a specific area, the biogenic gas would be displaced. Similarly, if CBNG were to occur first, coal development would be delayed which could affect economics. The long-term aerial extent of the RFDs (e.g., the acreage affected) for petroleum activities is small relative to the planning area. After abandonment of the facilities and wells, exploitation of the other minerals still can occur.

Cumulative impacts would be greatest under Alternatives B and D as no leasing will occur in Alternative A, and high potential areas are closed in Alternative C. Under Alternatives B and D, larger acreages of fluid mineral estate would be made available from the revocation of ANCSA (d)(1) withdrawals. However, exploration and development is not anticipated on BLM lands as indicated by the low-development potential assigned to the resource locations in the RFD (BLM 2005j). Lands with the greatest resource potential are owned by other entities or are on State- or Native-selected lands. In the case of selected lands, mineral activity would be hindered by segregation until the ownership status is finalized. If development were to occur, it is expected to take place on non-BLM-managed lands. CBNG exploration and development is projected in

the RFD scenario (BLM 2005j) on State or private lands. Up to 11 CBNG wells could be drilled with produced gas piped to a nearby village.

Roads resulting from mineral exploration and development (leasable, locatable, and salable) including community related activity, would add infrastructure to a region largely without and could increase interest in fluid leasable exploration on BLM-managed lands by reducing logistics costs. However, these types of benefits to industry could be offset by restrictions. An area on the cusp of showing economical development could become non-profitable by imposing restrictive guidelines. This would result in the displacement of mineral activities to adjacent landowners.

(b) Solid Leasable Minerals

Cumulative impacts to coal exploration and non-energy leasable mineral prospecting could occur through development of infrastructure by adjacent land owners. Infrastructure would be provided if CBNG exploration and development were to occur on non-BLM lands. According to the RFD scenario, up to 11 CBNG wells could be drilled on non-BLM lands with the produced gas piped to a nearby village.

(2) Locatable Minerals

Impacts to locatable minerals that are individually minor may cumulatively reduce exploration and production of commodities from public lands. Factors that affect mineral extraction and prospecting include, but are not limited to, such things as permitting and permitting delays, regulatory policy, public perception and concerns, travel management, transportation, mitigation measures, proximity to sensitive areas, low commodity prices, taxes, and housing and other necessities for workers. BLM has no control over many of these issues, but could improve in areas such as issuing permits in a more timely fashion or having sensitive areas already identified. If these issues result in additional costs and/or permitting delays, it can individually or cumulatively add additional costs to projects.

Public land that currently has no access could reduce the amount of mineral exploration and development that may occur. Mineral resources in other ownerships may not be developed if the adjacent public lands are withdrawn from mineral entry because the deposit may not be economically feasible to develop if it crosses ownerships and only a portion is available for development.

Overall, Alternative C would be the most restrictive to mineral developments and could result in the most cumulative impacts. While existing withdrawals instituted for general purposes would be revoked, they would be replaced with withdrawals specifically for closure to mineral entry and location. It proposes the most acres be withdrawn from mineral entry, the most areas limited or closed to motorized travel, and the highest protection to other resources to the preclusion of use of any locatable mineral deposits, both placer and hard rock, on BLM-managed lands.

(3) Mineral Materials

Under Alternative C the closure of two ACECs to sale/permit of mineral materials as well as the additional restriction on types of mineral material deposits that may be mined would essentially close all BLM-managed land to mineral materials development and production.

d) Recreation Management

The planning area currently provides a diversity of recreation experiences, provisions that are expected to continue over the planning period regardless of the alternative selected. The largest influence on recreation experience within the planning area is use of OHVs. Without management and some limitations on OHV use, the general trend, in OHV-accessible topography, is for recreation experiences to trend towards semi-primitive motorized and roaded natural experiences. However, much of the planning area is dominated by steep topography, wetlands, dense vegetation and remote settings with no road infrastructure, making it inaccessible to most OHVs (unless flown into a destination). These areas provide for primitive and generally inaccessible recreation experiences, regardless of which alternative is selected. Helicopter-supported commercial recreation ventures and winter snowmachine use have the potential to alter experiences in some of these areas.

There continues to be a need for facilities to provide positive recreation experiences for motorists traveling the Nome Road System. The State continually struggles with funding to support construction and especially maintenance of such facilities as waysides and outhouses for the motorist. Facilities for remote and dispersed recreation safety and comfort (such as remote cabin facilities) are also in need. Alternatives C and D may address these needs, but without a well-funded State or Federal recreation program, this rapidly growing need would not be met.

e) Travel Management/OHV

The planning area currently provides a tremendous diversity of OHV use within the current maximum 2,000 pound GVWR limit. However, OHV use and travel is restricted due to this limit and limits on State land. There continues to be a need for areas where OHVs larger than 2,000 pounds can be used without obtaining a permit.

The planning area suffers from lack of public access. There is little in this plan that will help alleviate this issue. While a small road system outside of Nome exists, it accesses largely private and State lands. Visitors use would increase with increased access such as new roads, trails, and developed airstrips.

Common to all alternatives, access to public lands would become more difficult as Native corporation entitlements are met and they exercise their private property rights. The BLM would maintain existing 17(b) easements and would extend those easements across Native-selected lands where trails currently exist to ensure reservation of easements when conveyance occurs. Future access is somewhat contingent on the resolution of State-recognized R.S. 2477 routes, particularly where they cross Native lands. Whether or not access routes to public land would be maintained in the long-term as a result of those determinations cannot be resolved in this planning effort.

f) Renewable Energy

No cumulative impacts from renewable energy are anticipated under any alternative.

g) Lands and Realty Actions

Effects from disposal, acquisition, and exchange proposals described for BLM-managed lands in any alternative are minor compared to conveyances to Native corporations and the State of Alaska. The recently signed Alaska Lands Transfer Acceleration Act (P.L. 108-452) will facilitate the conveyance process, with a target of completing conveyances by 2009. Once entitlements are met, land exchanges may be considered to consolidate land ownership patterns.

The number of land use authorizations, particularly rights-of-way and permits, is a function of demand for these uses. Additional future development of adjacent Federal, State, and private lands would likely result in additional requests for and approval of land use authorizations for facilities such as roads, utilities, and communication sites.

4. Special Designations

a) Areas of Critical Environmental Concern and Research Natural Areas

Cumulative impacts could have a wide range of effects on the different resources that are intended to benefit from the various ACECs proposed. These impacts largely stem from actions that are not guided by BLM management decisions. Management within certain ACECs could be significantly diminished by cumulative impacts in the unlikely scenario in which numerous development projects occur singularly within their bounds. Cumulative impacts to ACECs would be greatest under Alternatives B and D.

b) Iditarod National Historic Trail

No cumulative impacts to the INHT are anticipated under any alternative.

c) Wild and Scenic Rivers

No cumulative impacts to the Wild and Scenic Rivers are anticipated under any alternative.

5. Social and Economic

a) Public Safety

No cumulative impacts are anticipated under any alternative.

b) Social and Economic Conditions

(1) Social and Economic

The onshore and offshore oil industry in and near Prudhoe Bay is anticipated to decline. An authoritative source, DOE's Energy Information Administration (DOE 2001a), projects North Slope oil production to decline from 1.084 million barrels per day (MMbpd) in 2005 to 0.208 MMbpd in 2034. This decline encompasses oil exploration, development, and production and associated direct employment.

Associated indirect employment in Southcentral Alaska, Fairbanks, and the North Slope Borough (NSB), and revenues to the Federal, State, and NSB governments are also anticipated to decline. Fluctuations in Alaska's economy from 1975 to 1995 directly tracked fluctuations in oil prices and other industry factors (McDowell Group 1999b). Even though the Alaskan economy currently is not nearly as dependent on the oil sector as it was in the mid-1980's (when a major crash in the Alaska economy occurred), the oilfield development in northwest Alaska would generate employment, economic opportunity, and benefits to the cash economy of Alaska.

The effects below are expressed (in most cases) in annual averages for the sake of simplicity. However, the effects generally would be higher in the early years and lower in latter years, corresponding to the decline in production.

Cumulative effects have been addressed in other recent documents, including the Northwest National Petroleum Reserve-Alaska IAP/FEIS (USDOI 2003), and in the Alpine Final Development Plan FEIS (USDOI 2004). These are herein incorporated by reference and summarized in this section.

(a) Impacts to State and Local Revenues

The Conoco Phillips Project would generate the following revenues:

- $7 million revenue average annual to the North Slope Borough,
- $40 million average annual to the State, and
- $17 million average annual to the Federal Government.

Other reasonably foreseeable actions could generate the following additional annual revenue:

- $15 million as the State share of royalty receipts,
- $7 million as State income tax,
- $4 million as State spill and conservation tax
- $41 million as the Federal share of royalty receipts, and

- $56 million as Federal income tax.

In total, the cumulative effects would generate the following additive average annual revenues:
- $7 million to the North Slope Borough,
- $66 million to the State, and
- $114 million to the Federal government.

Oil development in northwest Alaska, outside of NPR-A would generate additional revenue to the Boroughs, the State of Alaska, and the Federal government. This is discussed in the analysis of Alternative B under effects to the Regional Economy. Other developments in the planning area resulting from forestry, recreation, grazing, and mining are considered to have little cumulative economic effect.

In 2000, revenues for the NSB were $245 million, the 2001 State operating budget was $4.3 billion, and 2001 Federal receipts of all types of $1.7 trillion.

(b) Impacts to Employment and Personal Income

The cumulative gains in direct employment would include additive jobs in petroleum exploration, development, and production, plus oil-spill cleanup activities. The direct employment would generate indirect and induced employment and associated personal income for all the workers. The cumulative effects are projected to generate additive employment and personal income increases as follows (USDOI 2004):

- 232 jobs annual average for NSB residents during development, declining to 40 during production. These include direct oil industry employment, indirect and induced employment.
- $16.3 million in total average annual personal income for workers residing in the NSB during development, declining to $3.7 million during production.
- 7,480 jobs annual average during development, declining to 3,750 during production. These jobs are for workers on the North Slope who reside in Southcentral Alaska and Fairbanks. These include direct oil industry employment and indirect and induced employment.
- $443 million in total average annual personal income for workers residing in Southcentral Alaska and Fairbanks during development, declining to $240 million during production.
- 60-190 jobs for 6 months for cleanup of unlikely oil spills in the Beaufort Sea.

In addition to the North Slope workers who reside in Southcentral Alaska and Fairbanks, additional workers commute to residences outside the state. As much as 30% of the North Slope workforce in the classification of oil and gas workers commutes to locations outside the State. However, the workers commuting to residences outside the state would not generate economic effects of indirect and induced employment or expenditure of income in the state and would have a negligible effect on the economy of the rest of the United States. Total NSB employment exclusive of oil workers in 1998 was 4,651. The projected employment for workers on the North Slope residing in Southcentral Alaska and Fairbanks is in comparison to 1998 NSB employment in mining (assumed to be all oil employment) of 4,753. Of these, 70% (3,329) reside in the rest of Alaska outside the NSB, primarily in Southcentral Alaska and Fairbanks. Employment projections can also be compared to the total number of workers in Southcentral Alaska and Fairbanks in 2002 (284,000).

Aggregate personal income in 1999 was $200 million for the NSB and $13.2 billion for Southcentral Alaska and Fairbanks.

(2) Environmental Justice

Alaska Iñupiat Natives, a recognized minority, are the predominant residents of northwest Alaska, the area potentially most affected by activities under Alternative B and D and other activities associated with cumulative projects on the North Slope and northwest Alaska. Environmental Justice effects on Alaska Natives could occur because of their reliance on subsistence foods, and potential effects could impact subsistence resources and harvest practices. Potential cumulative effects from noise, disturbance, and oil spills on subsistence resources and harvest practices and sociocultural patterns would focus on the Iñupiat communities throughout the planning area.

It is acknowledged that cumulative sociocultural impacts have occurred on the North Slope and that Iñupiat culture has undergone a noticeable change. The influx of money from wage employment has added benefits and raised the standard of living, but may result in an array of social pathologies. Expanded oil and gas development in North Slope or northwest Alaska, on both Federal and State leases, would expand the extent of disturbance effects on subsistence species and harvest patterns. While each individual project would likely be a small incremental increase, the cumulative effect would eventually become more and more repressive to the subsistence lifestyle. In addition to potentially diverting, deflecting, or disturbing subsistence species, oil and gas development could affect subsistence harvest by causing subsistence hunters to avoid certain areas because of concerns about firearm safety, and perhaps for aesthetic reasons. The North Slope still has vast undisturbed areas, yet the general subsistence hunting environment continues to change in response to increased development.

Transportation facilities and activities would also contribute to cumulative effects to subsistence resources and, consequently, to the Native population.

Contamination and oil spills could affect the food chain in the area of development and subsistence harvest. If this were experienced, the effects would fall largely on indigenous people.

6. Subsistence

In combination with ongoing oil and gas development occurring on the North Slope on both State and Federal lands, and the future oil and gas development projected for the NPR-A, oil and gas development in the northern quarter of the planning area under Alternatives B and D would have cumulative impacts on caribou from the WACH. As a result, subsistence would also be affected, as all communities within the planning area rely on the WACH as their primary source of terrestrial meat.

Privatization of State or Native corporation lands would have the potential to negatively affect wildlife, wildlife habitat and subsistence use by opening up areas to private development.

Development of regional roads within the planning area would have the potential to negatively affect wildlife, and thus affect subsistence. These impacts would include habitat fragmentation, increased access into wildlife habitats, increased disturbance impacts, increased potential for mortality (road kills) and possible alteration of behavior or movement patterns of wildlife. If the proposed road(s) linked small or regional communities to the already existent road system within Alaska, then increased competition for subsistence resource would likely result, as non-local hunters would be able to access the area with little effort. This may also result in an increase in tourist traffic and recreational use of the area, causing additional impacts to wildlife.

Small roads that connect communities within the planning area may aid subsistence users in accessing their traditional harvest areas. However they may also concentrate hunting efforts along the road corridor, thus depleting resources from the area, and potentially altering harvest from currently-used traditional harvest areas.

Currently, the only moderately deep port in the Region is Nome. The creation of additional ports could result in an increase in barge and ship traffic, resulting in impacts to marine mammal harvesting by residents of the planning area.

In summary, mineral development, privatization of land, and development of regional infrastructure would have cumulative impacts on subsistence. These activities have the potential to negatively affect wildlife and thus subsistence. Development of regional infrastructure such as roads, may improve access for non-local hunters, increasing competition for subsistence resources. Improved access may concentrate hunting efforts, depleting subsistence resources and potentially altering harvest.

H. Irreversible or Irretrievable Commitment of Resources

Only those programs or resources that would have irreversible or irretrievable commitment of resources are included here.

1. Resources

a) Air Quality and Soil and Water Resources

The only reasonable foreseeable activity that would cause irreversible or irretrievable commitment of soil and water resources would be large scale oil and gas development, placer mining, open pit mining, and the material site operations required for these large ventures. These activities are likely to occur only under projections for Alternatives B and D. These activities all require extensive material site excavation for gravel sources for road, pad, and airstrip construction. Impacts include soil compaction and thermokarst erosion, stream diversions, impoundments, and increased sediment runoff. These impacts would likely persist for the duration of the development, which once constructed, would continue for the foreseeable future. These impacts could be mitigated, but not entirely removed.

b) Vegetation

Irreversible loss of vegetation and habitat may occur as a result of placer mines and gravel extraction sites, and placement of infrastructure to support oil and gas development (gravel pads, drill sites, roads, etc.). Pre-project botanical inventory and associated habitat mitigation would minimize but not eliminate these harmful impacts to vegetation in the planning area.

c) Fish and Wildlife Management

(1) Fish

Actions that alter an aquatic community sufficiently enough to change the potential of a particular stream could represent an irreversible or irretrievable commitment of resources. The only reasonable foreseeable activity that would occur within the range of alternatives considered would be placer mining or large scale open pit mining, which is more likely to occur under Alternatives B and D.

(2) Wildlife

Under Alternatives B and D some irretrievable and irreversible loss of wildlife habitat could occur from the placement of gravel for oil and gas infrastructure, road construction, and other surface disturbing activities. Loss of wetland habitat occupied by waterfowl and shorebirds

could be particularly important. In most cases, alternate habitats would be available adjacent to development, and any habitat loss would have a minor effect.

d) Special Status Species

(1) Special Status Plants

Irreversible impacts to special status plants may occur as a result of surface disturbing activities such as mineral extraction and communication sites, right-of-way or other project construction and maintenance. Pre-project botanical inventory and associated mitigation would minimize but not always eliminate these impacts to sensitive plant species.

(2) Special Status Fish

Loss or decline in quality of aquatic habitat occupied by BLM sensitive status fish (Kigluaik arctic char) could cause a population to die out, representing an irreversible or irretrievable commitment of resources. This is not anticipated under any alternative.

(3) Special Status Wildlife

Under Alternatives B and D some irretrievable and irreversible loss of habitat could occur from placement of gravel infrastructure for oil and gas facilities in Steller's eider nesting or brood-rearing habitat. This loss of habitat could be permanent unless habitat restoration was planned and implemented during field abandonment. Because alternate habitat would likely be available in areas adjacent to proposed development and because the density of eider nesting within the planning area is so low, any habitat loss would have a minor effect on eiders.

Both Steller's and spectacled eider mortality could result from collisions with vehicles or structures during the life of the oil and gas field. Any losses of individual eiders through collision with facilities or structure would be irretrievable, but would not affect eiders at the population level.

e) Fire Management and Ecology

Areas that are in the Critical, Full, or Modified Management Options have the potential to lose key ecosystem components due to fire exclusion and move from condition class 1 to condition class 2 or 3. Based on desired conditions for land use and resources objectives, these conditions may be mitigated through fuel management projects or a change in management option. If the areas were not treated fire size and severity would increase and resources could be adversely impacted.

f) Cultural Resources

Mitigation through data recovery investigations at archaeological sites would recover information pertinent to current research concerns, but would also permanently remove the resource from future research and interpretive use at evacuated sites, which would constitute an irretrievable and irreversible commitment of these resources. Any management actions that cause the inadvertent destruction of a cultural resource or make them susceptible to illegal collection could

lead to the loss of these resources and would also be an irretrievable and irreversible commitment of these resources.

g) Paleontological Resources

Mitigation through data recovery investigations at significant paleontological sites would recover information pertinent to current research concerns, but would also permanently remove the resource from future research and interpretive use at evacuated sites, which would constitute an irretrievable and irreversible commitment of these resources. Any management actions that cause the inadvertent destruction of a significant paleontological resource or make them susceptible to illegal collection could lead to the loss of these resources and would also be an irretrievable and irreversible commitment of these resources. There would continue to be impacts on paleontological resources associated with unauthorized activities such as OHV use, dispersed recreation, and illegal collecting.

h) Visual Resources

Activities identified in this planning area under all alternatives by direct, indirect and cumulative effects analysis may affect the visual resources within the planning area by the changes in the existing landscape character. Actions by the following activities may affect visual resources: OHV use, timber harvest, mining activities, exploration, recreation, industrial development, research projects, and private land ownership. These activities may adversely affect the visual resources, and in some cases may be irreversible and irretrievable.

i) Wilderness Characteristics

There would be no irreversible and irretrievable commitment of wilderness characteristics. Proper rehabilitation and removal of development pads, mining areas, etc. would restore the perception of a natural environment. Wilderness characteristics would be forgone in those areas affected by development for the duration of the development, rehabilitation, and recovery.

2. Resource Uses

a) Forest Products

In the unlikely event of limited commercial logging within the planning area, harvest of timber would reduce the available timber resource. Re-growth would exceed the planning period, and would be considered an irretrievable commitment.

b) Livestock Grazing

Loss of native forage to invasive species, although not necessarily permanent, would be an irretrievable loss of the resource because of the number of years needed to restore native vegetation. The incremental degradation of rangeland within the planning area from the effects

of climate change, over-utilization, and the spread of invasive plant species could be an irreversible loss of the resource.

c) Minerals

(1) Leasable Minerals

The production of oil and gas, results in the irretrievable and irreversible loss of those natural resources. Most, if not all, surface disturbance and use can be restored through proper reclamation techniques.

(2) Locatable Minerals

The removal of minerals from public lands results in the irretrievable and irreversible loss of those non-renewable natural resources. However leaving these mineral resources in place serves no purpose as they neither add nor detract from the natural environment. While their extraction causes impacts to the natural environment, this extraction produces a positive impact to the limited cash economy and ultimate well being to the residents of the region.

The maintenance of withdrawals that prevent locatable mineral entry and location would cause an irretrievable, but not irreversible, loss of mineral extraction during the life of the plan. Some proposed withdrawals fall in high and moderate mineral potential areas.

(3) Mineral Materials

The extraction of mineral materials from the natural environment within the planning area would be an irreversible and irretrievable commitment of those extracted mineral material resources. Similarly as for locatable minerals, leaving these resources in the ground neither adds nor detracts from the natural environment. Their extraction causes impacts to the natural environment but their use provides positive impacts to the limited cash economy and improves the quality of life for the residents of the region.

d) Renewable Energy

Lands developed for renewable energy projects would no longer be available for various other purposes.

e) Lands and Realty Actions

Lands transferred out of public ownership generally stay in private hands unless they are subsequently acquired for a public purpose. The right-of-way avoidance areas in Alternatives C and D would limit the issuance of new rights-of-way in these locations

3. Social and Economic

Increases in employment and personal income would occur over the life of the exploration, development, and operation activities. Employment in oil and gas related activities represent a loss of opportunity for workers to pursue employment in other fields. Investment by the lessees and operators in oil and gas exploration and development activities in the planning area represents a loss of opportunity to invest those monies elsewhere. Revenue increases to the NSB and the State and Federal governments that would occur during production years would result in the irreversible and irretrievable commitment of those revenues. Development would result in new infrastructure that would be removed at the end of production.

Long-term population and productivity effects to the WACH from oil and gas development in calving and critical insect-relief areas could produce irreversible and irretrievable effects to the herd and to the subsistence caribou hunt to most villages in the planning area.

I. Unavoidable Adverse Impacts

Unavoidable adverse impacts are either impacts that remain following the implementation of mitigation measures or impacts for which there are no mitigation measures. Some unavoidable adverse impacts occur as a result of proposed management under one or more alternatives, others are a result of public use of BLM-managed lands. Only those programs or resources that would have unavoidable adverse impacts are included here.

1. Resources

a) Air Quality and Soil and Water Resources

Unavoidable adverse impacts to soil and water occur from road construction and material site excavation. Gravel roads, airstrips, and pads destroy soil structure through compaction and thermokarst erosion, block natural drainage patterns, create stream flow diversions, impoundments, and increase sediment runoff that impairs water quality. By limiting the length of the roads and requiring that all permanent facilities have an approved drainage plan, a reduction in adverse impacts is possible but not avoidable (Walker et al. 1987). Limiting development on floodplains and wetlands would insure ensure compliance with Executive Orders 11988 and 11990 that direct Federal agencies to minimize the destruction, loss, or degradation of floodplains and wetlands.

As noted earlier, a very large crude oil spill could have serious adverse impacts to soil and water resources. While the petroleum residue from a spill could be flushed from most streams within a few years, the impacts to lakes, ponds, and wetlands could persist for decades.

b) Vegetation

While recognized as a natural part of northern ecosystems, occasional large, intense wildland fires will temporarily destroy vegetation and priority habitats (such as lichen-rich plant communities). Recovery would be expected, but not always during the life of the plan. Scarring of the landscape could also result from unauthorized cross-country travel.

c) Fish and Wildlife

(1) Fish

Natural erosion processes, unauthorized travel, in addition to permitted land use activities, may increase sedimentation into fish bearing streams with the possible resultant adverse effects described in the Impacts to Fish from Mineral Exploration and Development section. These unavoidable impacts are not expected to be significant over the life of the plan.

(2) Wildlife

Some disturbance and disruption of wildlife under all alternatives, and some habitat alterations from mineral development under alternative B and D are unavoidable. Displacement or reduced habitat use by wildlife are likely to be local (within one-half to 2½ miles of development or activity). Disturbance and displacement from most activities occurring in the planning area would be short-term (a few hours to a few weeks). Disturbance and displacement due to mineral development would be long-term and would persist over the life of the development. Most unavoidable adverse impacts to wildlife would be short-term and localized, and would not substantially affect populations.

d) Special Status Species

(1) Special Status Plants

While a natural part of the landscape, occasional large, intense wildland fires or sporadic light burns may destroy sensitive status plant individuals or populations, and associated habitat. Recovery would be expected, but not always during the life of the plan. Small populations of sensitive status plants are vulnerable to grazing and trampling by caribou, muskox, Dall sheep, and reindeer, or by herbivory from small mammals such as ground squirrels, voles, and mice. Impacts could be localized and severe, but eventual recovery would be expected.

(2) Special Status Fish

The primary threat to the BLM Sensitive Status Kigluaik Mountain arctic char is increased fishing pressure from increasing recreational use of the Kigluaik Mountains. If it is determined that the BLM Sensitive Status fish populations are being threatened, fishing regulations can be made more restrictive through proposals to the State of Alaska Board of Fish. Therefore, adverse impacts to the fish can be mitigated and are not considered unavoidable.

(3) Special Status Wildlife

Unavoidable adverse impacts to special status species would be similar to those discussed above under wildlife. Under Alternatives B and D some disturbance to spectacled and Steller's eiders, or other sensitive status bird species by routine activities associated with oil and gas exploration and development are unavoidable. These include temporary disturbance effects such as displacement of incubating females from nests or broods, or disturbance of foraging, molting and migrating birds. Eiders could habituate to some disturbances or move to alternate habitats for foraging, nesting, and brood-rearing. Lease Stips and ROPs would effectively mitigate many of the effects of disturbance to spectacled and Steller's eiders, but some impacts could be unavoidable. There would also be a permanent loss of eider habitat associated with the construction of oil and gas related facilities. Most disturbances of endangered and threatened species associated with routine activities would be minimized or avoided through compliance with mitigation measures developed through the Section 7 consultation process. In addition, the distribution of eiders in the planning area is very limited, further reducing the possibility of unavoidable adverse impacts.

e) Fire Management and Ecology

Large landscape scale high severity fires could occur in portions of the planning area. Fire suppression activities pose a risk to other resources. Fire suppression impacts have the potential to be long-term in nature and high impact. Dozers can cause severe soil erosion and increase silt load into streams and rivers. Cultural resources could be damaged or lost. ROP FM-1d prohibits the use of fire retardant except in special cases. In these circumstances use of fire retardant may be unavoidable. Fire retardant drops into streams, rivers and lakes can cause fish kills and adversely impact other aquatic resources.

f) Cultural Resources

While measures are in place to identify threats to cultural resources and prioritize management actions, some impacts would be unavoidable. There would continue to be impacts to cultural resources from dispersed recreation activities, OHV use, vandalism, and other types of activities not authorized by the BLM. Natural processes such as erosion and natural decay or deterioration could also result in unmitigated damage to cultural resources.

g) Paleontological Resources

While measures are in place to identify threats to significant paleontological resources and prioritize management actions, some impacts would be unavoidable. There would continue to be impacts to paleontological resources from dispersed recreation activities, OHV use, vandalism, and other types of activities not authorized by the BLM. Natural processes such as erosion and natural decay or deterioration could also result in unmitigated damage to paleontological resources.

h) Visual Resources

Natural disasters or wildland fires could have unavoidable, adverse impacts to visual resources.

i) Wilderness Characteristics

Adverse effects to solitude, naturalness, and primitive/unconfined recreation from oil and gas exploration and hard rock development, and developed trails are unavoidable. These effects would be direct result of exploration and development activities and facilities such as drill pads and pipelines, mining overburden and trails. Recent and future technological advances may make green trails and pads an avoidable impact.

Short-term use of portions of the planning area for oil and gas and hard rock development could adversely affect the long-term use and values of the wilderness resources. Rehabilitation and removal of pads, roads, airstrips, and facilities would not restore the original condition of the land or its original wilderness characteristics, especially naturalness.

2. Resource Uses

a) Forest Products

Spruce beetle infestations, present in some forested regions of the planning area, and given current climate trends towards warmer, drier summers and milder winters, may continue to intensify and spread to currently unaffected areas. Standing dead and fallen timber will increase. The potential for larger, more intense fires and other detrimental forest insects and diseases may also increase (*Ips* bark beetle, aspen leaf miner, etc.). The volume of live, mature timber will most likely decrease during the life of the plan. Alteration of forest habitat from placer mine development would result in long-term loss of trees in limited areas.

b) Livestock Grazing

Decreases in the quantity and quality of forage could also result from Mineral-Locatable activities (placer mining activities), though they should be relatively minor. Authorized and unauthorized travel off roads via OHVs could cause scarring of the landscape, soil compaction, reduction in reindeer forage, and loss of protective vegetative cover, thereby increasing soil erosion. Weeds introduced by these and other management activities could cause a reduction in forage, though again the chance of this minimal. Any facility developments, including but not limited to recreation sites, range improvements and utility and road facilities, which are not properly restored even after mitigation measures are applied could result in increased soil erosion. Changes in the amount of recreational use, including hunting, visitation, subsistence, and associated duration and patterns of use could result in increased conflicts between users and unanticipated changes in resource conditions. Large-scale wildland fires that may occur within the planning area over the life of the plan could quickly change the amount of available winter forage for reindeer.

c) Recreation Management

Changes in the amount of recreational visitation and associated duration and patterns of use could result in increased conflicts between users and unanticipated changes in resource conditions. These resource conditions may include declines in fish and game resources through over harvest and environmental degradation from increased localized use.

d) Travel Management/OHV

Regardless of the alternative, access to public lands will become more difficult as Native corporation entitlements are met. As public lands become private lands, net access is lost even if the BLM reserves 17(b) easements. The seasonality and weight restrictions on these easements also diminishes the access previously afforded the public.

A mix of OHV opportunities is not provided in this plan due to the current maximum 2,000 pound GVWR limit imposed in all but Alternative B and only during the cold winter months.

Roads are not expected on BLM-managed lands but development of roads on State and private lands (especially Native corporation lands) will increase the need for the BLM to plan for increased access and travel management.

e) Renewable Energy

Mitigation measures would reduce the potential, but not eliminate the possibility, of bird strikes on wind turbines.

3. Special Designations

a) Areas of Critical Environmental Concern and Research Natural Areas

Changes in the amount of recreational visitation and associated duration and patterns of use could result in increased conflicts between users and unanticipated changes in resource conditions. Wildland fires within the planning area could quickly change the value of the ACECs without regard to objectives. Scarring of the landscape and damage to resources could also result from unauthorized cross-country travel.

b) Iditarod National Historic Trail

There may be impacts to the Iditarod National Historic Trail (INHT) from dispersed recreation activities, OHV use, and other types of activities not authorized by the BLM. Natural processes such as erosion and natural decay or deterioration could result in unmitigated damage to the INHT.

4. Social and Economic

Most economic effects of oil and gas leasing, exploration, development, and production in the planning area would be considered positive effects by many people. Increases in employment and associated personal income would occur over the life of the exploration, development, and production activities. Revenue increases to the NSB, NAB and to the State and Federal Governments would occur during production years. However, these increases would be short-term (less than 30 years). They would occur only for the duration of the activities. Development activity would establish infrastructure that could enhance the future productivity of oil and gas exploration, development, and production.

The Environmental Justice Executive Order includes consideration of potential effects to Native subsistence activities. The only substantial source of potential unavoidable environmental justice related effects on Native communities from oil and gas exploration and development in the planning area would occur from displacement of caribou as a result of exploration and development in calving or insect relief areas. The Native communities throughout northwest Alaska harvest caribou from the WACH. Noise and disturbance from routine activities would be

unavoidable, but not expected to produce disproportionate, high adverse Environmental Justice impacts on the Alaskan Native minority populations in any community.

5. Subsistence

Unavoidable adverse impacts that would affect fish and wildlife would also affect subsistence. These include: sedimentation of fish-bearing streams by natural erosion, unauthorized travel, and possible development; small amounts of habitat alteration; and temporary and localized disturbance and/or displacement of subsistence species. These unavoidable impacts are not expected to be significant during the life of the plan, and would not substantially affect populations or access to resources by the subsistence user.

Under all alternatives, some amount of competition by non-local hunters could occur on public lands, unless the subsistence priority was enacted by the Federal Subsistence Board. However, this competition is expected to be minor, and should not affect the opportunity for the subsistence user to harvest resources.

J. Short-Term Uses vs. Long-Term Productivity

This section discusses the short-term effects of the potential use of portions of the planning area for development activities, versus the maintenance and enhancement of potential long-term productivity of the planning area's environmental resources. The only significant development projected to occur under this plan is oil and gas development. It is assumed that one oil field could be developed during the life of the plan.

Short-term refers to the total duration of development activities, such as mineral development. Long-term refers to an indefinite period beyond the termination of development activities. The specific impacts vary in kind, intensity, and duration according to the activities occurring at any given time. For example, Initial activities related to oil and gas, such as seismic surveying and exploration drilling, result in short-term, localized impacts. Development drilling occurs sporadically throughout the life of an oil or gas field, but also results in short-term, localized impacts. Activities during the production life of a field may result in chronic impacts over a longer period of time (25 to 35 years), potentially punctuated by more severe impacts as a result of accidental events. Pad reclamation is also a short-term activity with localized impacts; the impacts of site clearance may be longer lasting.

Until more reliable data become available, the long-term effects of oil spills cannot accurately be projected. In the absence of these data, it must be assumed that chronic spills or a major large oil spill could result in decreased long-term productivity.

The long-term effects due to climate change are being predicted and some changes are already occurring within the planning area. Short-term uses could exacerbate or accelerate changes in the natural environment over the long-term.

1. Resources

a) Air Quality and Soil and Water Resources

Short-term degradation of air quality related to construction, placement, and operation of exploration and production facilities under Alternatives B and D would impact air quality for the duration of the project. Air quality is a renewable resource; and, when activities that produce emissions cease, the local air quality returns to its original condition.

The long-term impact on soils will be very limited in extent. Soils potentially affected by exploration and development activities cover much less than 1% of the planning area, although several thousand acres of soil could be directly impacted due to mineral development activities projected to occur under Alternatives B and D. Additional soil could be lost if new gravel sources are developed. The formation of soils is a very slow process and soils lost through the construction of permanent facilities would essentially be permanent.

Activities authorized under this plan would result in both short-term and long-term effects to water resources. Construction activities associated with road and pad construction; culvert and bridge work in streams and lakes that disturbed stream banks or shorelines; blockages of natural channels and floodways that disrupted drainage patterns; and removal of gravel would all cause short-term increases in erosion and sedimentation. Water removal could cause short-term changes in aquatic habitat. Permanent gravel roads and pads, airstrips, pipelines, and facilities constructed adjacent to or crossing streams and lakes would have long-term effects on water resources. Removal and remediation of these structures after production ceased would restore drainage patterns and natural sedimentation processes. Long-term changes could occur where thermokarst erosion caused major changes in stream banks, and lake shorelines, and altered natural drainage patterns. Oil spills would have both short- and long-term impacts, especially to fish-bearing lakes and streams. Degradation of water quality from construction and operation of oil field(s), winter ice roads, and spills could have a long-term effect on isolated water bodies.

b) Vegetation

The effects on vegetation from most activities authorized under this plan would be short-term. However, the construction of gravel pads and roads, mining of gravel, removal of the vegetative mat, and the most severe impacts caused by vehicles during overland moves and seismic exploration as projected under Alternatives B and D, would cause long-term effects on vegetation. All effects of oil-field construction on vegetation would be long term, though new oil spills, and dust and gravel spray from vehicular traffic on the gravel pads would not occur after field abandonment. The recovery time for vegetation from a spill could last several years (Jorgenson 1997, McKendrick 2000), but it is not known how long changes to plant communities as a result of dust effects would persist. Although research indicates that natural plant communities can be restored to gravel pads (McKendrick 1997), especially if some silt-loam soil is added to the substrate, the time until recovery of natural canopy cover would be so long that the impacts might be considered permanent from a human perspective.

The long-term productivity of these localized areas would be reduced; however, these areas represent less than 1% of the planning area. Placement of gravel drilling pads, roads, airstrips,

staging areas, and docks, as well as construction of pipelines or the use of gravel mine sites, would permanently disturb or destroy vegetation unless sites were reclaimed.

c) Fish and Wildlife

(1) Fish (including special status fish)

Impacts to fish resources and habitat would occur from mineral exploration and development under Alternatives B and D. Most impacts would be short term and confined to small segments of habitat and localized components of the fish population. Disturbances would be unlikely to result in decreased long-term productivity of fish populations, if they are confined to small segments of habitat. If surface disturbing activities are allowed throughout productive fish habitat, particularly placer mining activities, long-term productivity will be lost. A further example of long-term loss of productivity would involve an oil spill or other contamination in a waterbody with no migration pathways. Losses in a specific waterbody would be permanent if all individuals of a species were killed. This is a particular concern for the BLM Sensitive Species Kigluaik arctic char (Salvelinus alpinus) inhabiting the nutrient-poor marginal habitat of select Kigluaik Mountain range lakes.

(2) Wildlife

Birds may experience short-term effects from any factors or activities that disturb their normal daily and seasonal pattern of activities. Of the routine activities associated with oil and gas exploration and development as projected under Alternatives B and D, aircraft traffic would have the greatest potential for disturbing birds. Although much of the potential effect of air traffic could be avoided through compliance with lease stipulations and ROPs, aircraft could be required to fly at lower altitudes during inclement weather. Under these conditions, disturbance of birds along the flight path could occur. Disturbances that affect survival rates of birds could have long-term effects on populations. The other sources of disturbance related to roads and facilities would result from vehicular traffic, heavy equipment use, routine maintenance activities, oil spill response training activities, and pedestrian traffic. These disturbances would likely impact birds during the life of the project, but would not continue after project completion; the effects of habitat loss or alteration may continue for the long-term.

Most effects on terrestrial mammals and their habitats would be short term and localized. Potential effects include mortality of individuals, physiological stresses in surviving individuals, reduction in the number of changes in behavior or migration patterns. Long-term, cumulative effects could occur if recovery from the short-term effects extended beyond the life of the project. The potential effects of noise disturbance and terrestrial habitat alteration could also include short-term, localized effects such as mortality, stress, decreases in or redistribution of populations or species, and changes in survival patterns. Effects of oil and gas development projected under Alternatives B and D on terrestrial mammals and their habitats would be long term (beyond the production life of the field); population level effects would be minor to non-existent. Long-term biological productivity could be lost from areas used as facility sites. However, these sites are very small and represent much less than 1% of the available habitat.

d) Special Status Species

(1) Special Status Plants

Impacts to special status plants could occur from mineral exploration and development under Alternatives B and D if located in habitat for these species. Sensitive plant species that could be affected include: Erigeron muirii (Muir's fleabane), Mertensia drummondii (Drummond's bluebell), Potentilla stipularis (stipulated cinquefoil) and Poa hartzii ssp. alaskana (Alaskan bluegrass). Three additional species categorized as rare could also be affected: Smelowskia johnsonii (Johnson's smelowskia), Rumex krausei (Cape Krause sorrel), and Trisetum sibiricum (Siberian oatgrass).

Most impacts would be short term and confined to small segments of habitat and localized components of the plant populations. Surface disturbing activities that destroyed the soil or removed the vegetative mat could result in long-term destruction of habitat. Impacts would be reduced by implementing ROP SS-1e, which requires that measures be taken to protect populations or individual sensitive status plants using site-specific buffers or management prescriptions.

(2) Special Status Animals

If a project were sited in habitat for Spectacled and Steller's eiders, these birds could experience short-term effects from any factors that disturb their normal daily and seasonal pattern of activities and these would continue for the life of the project. These effects would result from disturbances related to aircraft traffic. In addition, disturbance effects related to roads and facilities would result from vehicular traffic, heavy equipment use, routine maintenance activities, and pedestrian traffic. These disturbances may impact birds during the life of the project, but would be unlikely to continue after project completion. Aircraft and ground-based research activities could impact threatened eiders. Many of these activities would likely discontinue after project abandonment, although some aerial surveys, to conduct long-term monitoring, would most likely continue.

The effects of eider habitat loss or modification adjacent to roads and pads would likely be short term, although loss of habitat due to gravel placement would have a long-term effect that would last well beyond project abandonment, unless habitat restoration was planned and implemented. Although nesting or brood-rearing habitat loss in the footprint of gravel infrastructure would have a long-term effect, other suitable habitat is widespread, and the effect on threatened eider populations would be minimal.

Potential eider mortality could result from collisions with vehicles or structures and would continue for the life of the project. Long-term effects could result if structures were not removed during project abandonment. However, eider mortality due to collisions with vehicles or structures has not been a major source of mortality in North Slope oil fields and would be unlikely to affect threatened eiders at the population level.

If a project were sited in suitable habitat for polar bears, bears could experience short-term effects from activities that disturb their normal daily or seasonal pattern of activities. Since polar bears spend the majority of their time off-shore on the pack ice, impacts to bears would generally be short-term. If impacts were substantial enough to result in reduced productivity, then long-term impacts would result. Past oil and gas development on the North Slope appears to have had minimal impact on polar bears. Given the low level of activity possible under Alternatives B and D of this plan and the paucity of bears within the planning area, long-term impacts to polar bear productivity are not anticipated. Any impacts resulting from this plan would be in addition to other stressors such as global climate change.

e) Cultural Resources

Because cultural resources are nonrenewable, there is no difference between short-term and long-term impacts. Cultural resources cannot recover from most types of effects. Historic structures could benefit from preservation and stabilization efforts. However, once disturbed, an archaeological deposit could never be returned to its original context. Any destruction of cultural resource sites would represent long-term losses. Salvage archaeology to recover remaining site data would generally result in the total destruction of the site, although the recovered data would effectively mitigate for loss of the site. Any discoveries of cultural resources made during surveys required prior to development of a project would enhance knowledge of the history and early inhabitants of the region and help to mitigate further potential effects of activities in the area. These impacts would be most likely under Alternatives B and D, but would occur to a lesser extent under the other Alternatives.

f) Paleontological Resources

Because paleontological resources are nonrenewable, there is no difference between short-term and long-term impacts. The resource cannot recover from some types of adverse impacts. Once disturbed, the materials and information of paleontological deposits may be permanently compromised. Any destruction of paleontological sites, especially ones determined to have particular scientific value, would represent long-term losses. Furthermore, once paleontological deposits are disturbed and exposed, then natural erosion could accelerate the destruction of fossils. Exposed fossils also are vulnerable to unauthorized collecting and digging. Any discoveries of paleontological resources as a result of surveys required prior to development of a project would enhance long-term knowledge of the area and these resources. These impacts would be most likely under Alternatives B and D, but would occur to a lesser extent under the other Alternatives.

g) Visual Resources

Short-term use of portions of the Planning Area for mineral development or recreational use (OHV) could affect the long-term value of visual resources. Rehabilitation, removal, and revegetation of pads, roads, and facilities would eventually cause the viewshed to resemble a more natural condition. However, it is possible that the full value of the original scenic quality and viewshed would not be regained. Visual resources could still be negatively impacted by any remnants of development activities and by changes from the original landscape. Established OHV trails would affect the visual resources over the long-term, as the trail would not

rehabilitate, and may continue to widen and degrade, if under continued use. These impacts would be most likely or widespread under Alternatives B and D, but would occur to a lesser extent under the other Alternatives.

h) Wilderness values

Short-term use of portions of the Planning Area for mineral development or recreational use (OHV) could impact wilderness values over the long-term. Removal and rehabilitation of pads, roads, and facilities would not restore the original condition of the land or its original wilderness value over the short-term. If facilities were not removed or rehabilitated, scenic quality, naturalness, and primitive and unconfined recreation opportunities, which are essential to wilderness values, would continue to be negatively impacted until such facilities were removed and the area restored. OHV use in the planning area would result in long-term impacts to scenic quality and naturalness along routes that continued to be used over time. These impacts would be most likely under Alternatives B and D, but would occur to a lesser extent under the other Alternatives.

2. Resource Uses

a) Forestry

Short-term use of the Planning Area for leasable mineral development would have no impact on forest resources as the areas with oil and gas development potential are not forested. The recovery time for forest vegetation from other types of surface disturbing activities would take decades even with reclamation. If disturbance occurred, the long-term productivity of these areas would be reduced. However, the potential for large surface disturbing activities to occur in forested areas is very low and it is anticipated that less than 1% of the forested land within the planning area would be impacted by any type of development activity. These impacts would be most likely under Alternatives B and D, but could occur to a lesser extent under the other Alternatives.

Authorization of a commercial timber sale under Alternatives B or D would have long-term impacts as it would take many decades to replace the timber removed. Given the low timber volume, low productivity, scattered locations of timber stands and long distances involved in timber transport, commercial logging is not likely to occur in the reasonably foreseeable future.

b) Livestock Grazing

Short-term use of the Planning Area for leasable mineral development as projected in Alternatives B and D would have no impact on livestock grazing as the areas with oil and gas development potential are not open to grazing. The effects on grazing from most other activities authorized under this plan would be short-term. However, the construction of gravel pads and roads, mining of gravel, removal of the vegetative mat, and the most severe impacts caused by vehicles during overland moves would cause long-term affects on vegetation and thus affect the availability of forage for livestock over the long-term. As discussed above under “Vegetation” recovery of the natural vegetative cover, particularly of the lichens favored by reindeer, would be

so long that impacts might be considered permanent from a human perspective. The long-term productivity of these localized areas would be reduced; however, these areas represent less than 1% of the land available for grazing.

c) Recreation Resources

Short-term use of portions of the Planning Area for mineral development under Alternatives B and D could affect the long-term use and value of recreation resources. Rehabilitation and removal of pads, roads, and facilities would be unable to restore the original condition of the land or its original recreation and wilderness value. If airstrips or roads were not removed or rehabilitated, recreation opportunities could be enhanced by increasing access for the long-term. However, scenic quality, naturalness, and primitive recreation opportunities would be negatively impacted by the presence of the airstrip.

3. Special Designations

a) Area of Critical Environmental Concern

Mineral exploration, development, and production activities under Alternatives B and D would constitute a short-term commitment of resources that could impact the values for which the areas were designated as ACECs. Mineral development could have long-term impacts on certain resources depending upon the location and extent of the development and the resource affected. These impacts are discussed under “Fish and Wildlife”, “Special Status Species”, and “Vegetation”.

b) Wild and Scenic Rivers

Mineral exploration, development, and production activities under Alternatives B and D would constitute a short-term commitment of resources that could impact river values. The short-term commitment of resources would not affect the finding of suitability or nonsuitability on the eleven river segments considered under this plan. The non-suitability determination on these rivers is based on lack of local support for designation and the ability to maintain outstandingly remarkable values without designation. River values that are non-renewable, such as cultural and paleontological resources might be affected for the long-term.

4. Social and Economic

a) Subsistence

The short-term redistribution, reduction, or displacement of subsistence species could affect regional subsistence-harvest patterns. Such short-term effects would not be expected to have long-term consequences unless chronically imposed on the subsistence resource base of the region. Habitat destruction could cause a local reduction in subsistence species, a potential long-term impact to communities affected by such reductions. Under Alternatives B and D land

used for infrastructure and development would slightly reduce the amount of area suitable for subsistence hunting. Roads would increase access and competition for resources over the long-term and could further affect subsistence harvests. Increasing human populations would require that more resources be harvested over wider areas to maintain the subsistence way of life. The potential for user conflicts could increase in areas where current uses overlap.

Short-term recreational use in the Squirrel River and other areas has resulted in user conflicts on a seasonal basis. Development of a recreation area management plan for the Squirrel River and other proposed management in the Extensive Recreation Management Area would likely reduce conflicts in these areas for the life of this plan.

b) Sociocultural Systems

Increased population, industrial activity, and minor gains in revenues and employment under Alternatives B and D could potentially disrupt individual family units in Native communities for the short term; however, it is unlikely that these minor changes would cause community-wide changes to the sociocultural system. Income and employment allocation disparities could increase, causing intra-community conflict. Any long-term effects on subsistence resources could disrupt social systems (i.e., the sharing network, or the passing on of hunting traditions), especially if they resulted in a substantial reduction to a key resource, such as caribou. Short-term effects from oil and gas development that impacted key resources could also lead to a disruption of social systems, especially if these effects were to occur repeatedly (chronic) throughout the projected lifetime of oil and gas activities in the Planning Area. As a result, sociocultural values and cultural institutions would be affected. Activities or policies that act against the values of the Iñupiat residents of the region would increase social stress and concerns in the community, and could also lead to changes to social systems.

c) Environmental Justice

Any impact on subsistence resources that would have a chronic effect on the sociocultural system or subsistence resources over the lifetime of oil and gas activities (about 30 years) would disproportionately affect the Iñupiat people. Such an effect would only be expected to occur in the event of long-term population and productivity effects to caribou, fish, or water birds.

d) Economy

Economic benefits would accrue from production of oil and gas from federal lands as projected under Alternatives B and D. Economic benefits, including any decrease in the Nation's dependency on foreign oil, would be short term. Increases in employment and associated personal income would occur over the life of the exploration, development, and operations activities. Revenue increases to borough, state and federal governments would occur during the production years. However, these increases would occur only for the duration of the activities. Development activity would result in infrastructure that in the short-term could enhance future productivity of oil and gas exploration, development, and production.