

Appendix 2

Summary and Comparison of Effects on Resources by Alternative

Appendix 2. Summary and Comparison of Effects on Resources by Alternative

Summary and Comparison of Effects on Soils				
No Action	Alternative A	Alternative B	Alternative C	Preferred Alternative
The overall impact to soils of the Planning Area would be minor (with seismic operations) to negligible (without seismic operations).	<p>Effects of First Sale: Soil stability depends closely on vegetative cover; where vegetation is disturbed, impacts on soils follow. Impacts from activities other than oil exploration and development would be negligible. Impacts from seismic surveys and winter exploration would be expected to be minor to negligible. Development activities would cause loss or disturbance of up to 790 acres of soils. The duration of these impacts would be permanent. Oil spills would be cleaned up immediately causing minimal contamination to soils.</p>	<p>Effects of First Sale: Impacts from activities other than oil exploration and development would be negligible. Impacts from seismic surveys and winter exploration would be minor to negligible. Development activities would cause loss or disturbance of up to 650 acres of soils. The duration of these impacts would be permanent. Oil spills would be cleaned up immediately causing minimal contamination to soils.</p>	<p>Effects of First Sale: Impacts from activities other than oil exploration and development would be negligible. Impacts from seismic surveys and winter exploration would be minor to negligible. Because no development is anticipate, no acres would be disturbed by development and impacts from spills would be limited to those associated with non-oil and gas and seismic activities.</p>	<p>Effects of First Sale: Impacts on soils follow. Impacts from activities other than oil exploration and development would be minor to negligible. Impacts from winter exploration and well drilling would be expected to be minor to negligible. Development would cause loss or disturbance of up to 600 acres of soils. The duration of these impacts would be permanent. Oil spills would be cleaned up immediately, causing minimal disturbance to soils. Impacts from development activities to soils would be minor to low.</p>
	<p>Effects of Multiple Sales: There will be little impact to soils from exploration activities. Development could permanently destroy soils on up to 1,530 acres.</p>	<p>Effects of Multiple Sales: Impacts to soils from exploration activities would be small to negligible, while development could permanently destroy soils on up to 1,260 acres.</p>	<p>Effects of Multiple Sales: Impacts from all but oil and gas development would be similar, though smaller, than those under Alternative A. No impacts from development are anticipated.</p>	<p>Effects of Multiple Sales: Little impact to soils is expected from exploration activities; impacts from development activities would disturb or result in the loss of small- to moderate-sized areas. The overall impact to soils would be negligible (with seismic) to moderate (with development).</p>
<p>Cumulative Effects: Oil and gas exploration and development and other activities on the North Slope have and will impact a very small fraction of the soils of the area.</p>				

Summary and Comparison of Effects on Paleontological Resources				
No Action	Alternative A	Alternative B	Alternative C	Preferred Alternative
Impacts would be minimal (less than Alternative C) whether	<p>Effects of First Sale: Impacts would be minimal. Measures are in place to ensure effective</p>	<p>Effects of First Sale: The risk of impacts to paleontological resources would be slightly</p>	<p>Effects of First Sale: The risk of impacts would be significantly reduced from that under</p>	<p>Effects of First Sale: Impacts from activities other than oil and gas exploration and development</p>

Summary and Comparison of Effects on Paleontological Resources				
No Action	Alternative A	Alternative B	Alternative C	Preferred Alternative
or not seismic activity is allowed.	mitigation of any potential impact that might result from the two disturbances most likely to impact paleontological values — mineral extraction (estimate 175 acres) or burial of gas pipelines.	reduced from those in Alternative A primarily because of increased constraints on development near lakes, streams, and rivers.	Alternative A because of increased constraints on development and the reduced area made available for oil and gas leasing.	would be minimal, regardless of the level of seismic activity. Potential impacts from first sale oil and gas exploration and development would probably be minor because of the environmental constraints that would be in effect.
	Effects of Multiple Sales: The risk of impacts may increase by a factor of two over that of the first sale, but impacts would still be minimal.	Effects of Multiple Sales: The probability of the occurrence of impacts should decrease slightly from that under Alternative A.	Effects of Multiple Sales: The risk of impacts would be significantly less than under Alternative A.	Effects of Multiple Sales: Impacts from activities other than oil and gas exploration and development would be minimal. The probability of impacts from exploration and development would increase somewhat because of the amount of land potentially impacted.
Cumulative Effects: With current procedures for survey and inventory prior to oil and gas exploration and development activities on the North Slope, the impact to the resource would be minimal.				

Summary and Comparison of Effects on Water Resources				
No Action	Alternative A	Alternative B	Alternative C	Preferred Alternative
Impacts would be minimal. Seismic activities may have short-term impacts on 7 to 30 acres and long-term (several years to several decades) on less than 3 acres. Without seismic activities, impacts to water resources would be negligible	Effects of First Sale: Seismic activities may have short-term impacts on 20 to 80 acres annually and long-term (several years to several decades) on 2 to 8 acres annually. The potential short-term impacts from exploration and delineation drilling would be water removal from up to 130 lakes and riverine pools, and during construction, increased water impoundments, diversions, thermokarst erosion, and sedimentation of up to 3,000 ac. Long-term impacts from development of gravel roads,	Effects of First Sale: Seismic activities may have short-term impacts on 15 to 60 acres annually and long-term (several years to several decades) on 2 to 6 acres annually. The potential short-term impacts, from exploration and delineation drilling would be water removal from up to 90 lakes and riverine pools, and during construction, increased water impoundments, diversions, thermokarst erosion, and sedimentation of up to 2,000 acres. Long-term impacts from development of gravel roads,	Effects of First Sale: Seismic activities may have short-term impacts on 7 to 30 acres and long-term (several years to several decades) on less than 3 acres. The potential short-term impacts, from exploration and development drilling would be water withdrawals from up to 40 lakes, and during construction, increased water impoundments, diversions, thermokarst erosion, and sedimentation of up to 350 acres. Long-term impacts from development of gravel roads, pads, and pits could impact up to	Effects of First Sale: Seismic impacts are expected to be minimal. Greatest long term Impacts from oil and gas development activities on the water resources in the Planning Area are from gravel roads, pads, and structures. The potential short-term impacts from exploration and delineation would be water removal from up to 90 lakes, and during construction, increased water impoundments, diversions, thermokarst erosion, and sedimentation up to 2,000 acres. Long-term impacts from

Summary and Comparison of Effects on Water Resources (continued)				
No Action	Alternative A	Alternative B	Alternative C	Preferred Alternative
	pads, and pits could impact up to 1,500 acres.	pads and pits, could impact up to 1,000 acres.	200 acres. Alternative C protects areas of special aquatic resources, including areas adjacent to streams and lakes identified as critical aquatic habitat. Consequently, the potential adverse effects under Alternative C on water resources would be very much less than under Alternative A.	development could impact up to 1,000 acres. Overall impacts would be about 3,000 acres of short-term impacts and 1,500 acres of long-term impacts.
	Effects of Multiple Sales: Annual impacts from seismic activities would be the same as for the first sale. Although shared infrastructure could reduce impacts, overall impacts from other oil and gas activities could be double that for the first sale.	Effects of Multiple Sales: Annual impacts from seismic activities would be the same as for the first sale. Although shared infrastructure could reduce impacts, overall impacts from other oil and gas activities could be double that for the first sale.	Effects of Multiple Sales: Annual impacts from seismic activities would be the same as for the first sale. Although shared infrastructure could reduce impacts, overall impacts from other oil and gas activities could be double that for the first sale.	Effects of Multiple Sales: Seismic impacts are expected to be minimal. Impacts from oil and gas activities could be several times greater than impacts from a single sale. Indirect impacts might take years to develop. Short-term impacts include water removal of up to 1,800 acre/ft from 180 lakes for exploration and delineation drilling, increased water term impacts from development of gravel roads, pads, and pits could impact up to 2,000 acres from water impoundments, diversions, and thermokarst erosion. Shared infrastructure could reduce the adverse effects to water resources from multiple sales.
Cumulative Effects: Water use by North Slope villages and oil and gas activities will continue to draw from local surface water sources. Water is abundant on the North Slope and impacts are likely to be localized and minimal.				

Summary and Comparison of Effects on Freshwater Quality				
No Action	Alternative A	Alternative B	Alternative C	Preferred Alternative
With or without seismic activities, impacts would be negligible.	Effects of First Sale: Seismic and exploratory activity would create short-term (usually one	Effects of First Sale: The short-term, localized impacts from seismic and exploratory activity	Effects of First Sale: The short-term, localized impacts from seismic and exploratory activity	Effects of First Sale: Seismic and exploratory activity would create short term (usually one season)

Summary and Comparison of Effects on Freshwater Quality (continued)				
No Action	Alternative A	Alternative B	Alternative C	Preferred Alternative
<p>Long-term water quality over a total of less than an acre would be affected by biannual seismic programs.</p>	<p>season) and localized effects on water quality. Long-term impacts from seismic activity would be less than an acre. Development gravel structures could result in hundreds of acres of impounded water for each production pad with resultant impacts on turbidity from erosion. Oil spills could result in water quality degradation along short stretches of some rivers for a few weeks and about 7 ponds or small lakes could become toxic to sensitive species for about 7 years.</p>	<p>would be reduced approximately one third and one quarter, respectively, compared to Alternative A. Long-term impacts from seismic would be slightly less than for Alternative A. Impacts from impoundment of water would be one quarter less than for Alternative A. Oil spills could degrade water quality along short stretches of some rivers for a few weeks, and cause about 6 ponds or small lakes to become toxic to sensitive species for about 7 years.</p>	<p>would be reduced approximately one third and one quarter, respectively, compared to Alternative A. Long-term impacts from seismic would be less than Alternative B and equivalent with the No Action Alternative.</p>	<p>and localized effects. Short-term (year-or-more) effects would occur from winter extraction of unfrozen water from over 900 acre/ft of nearby lakes. Gravel construction would cover about 400 acres. Docks or staging areas could cover up to 400 more acres. Gravel construction can result in upslope water impoundment and thermokarst erosion equivalent to twice the area directly covered by gravel. Long-term (decade-or-more) effects from development of gravel roads, pads, and pits could occur on nearly 1,000 acres. Oils spills could degrade water quality over the course of a few weeks along a short stretch of nearby rivers and lakes and cause about 6 ponds or small lakes to remain toxic to sensitive species for about 7 years.</p>
	<p>Effects of Multiple Sales: Long-term (decade-or-more) effects of multiple sales would be slightly greater than for a single sale. Oil spills could result in waters of up to 9 ponds or small lakes remaining toxic to sensitive species for about 7 years.</p>	<p>Effects of Multiple Sales: Long-term (decade-or-more) effects of multiple sales would be similar to those for a single sale. Oil spills could result in waters of about 8 ponds or small lakes remaining toxic to sensitive species for about 7 years.</p>	<p>Effects of Multiple Sales: Long-term (decade-or-more) effects of multiple sales would be slightly greater than for a single sale.</p>	<p>Effects of Multiple Sales: Short-term effects of multiple sales would be similar to those for a single sale. Long-term effects of multiple sales are assumed to double over that of a single sale. Indirect impacts may take years to develop. Water quality could be affected on up to 2,000 acres from water impoundments, diversions, and thermokarst erosion. Oil spills could result in waters of about 8 ponds or small lakes remaining toxic to sensitive species for about 7 years.</p>

Summary and Comparison of Effects on Freshwater Quality (continued)				
No Action	Alternative A	Alternative B	Alternative C	Preferred Alternative
Cumulative Effects: Oil and gas activities may produce short-term local impacts to water quality. Oil spills can create short and long-term impacts to surface water. A crude oil spill from a tanker could cause short-term water quality impacts to saltwater along the tanker routes south of Valdez.				

Summary and Comparison of Effects on Estuarine Water Quality				
No Action	Alternative A	Alternative B	Alternative C	Preferred Alternative
Impacts to estuarine water quality under the No Action Alternative are expected to be negligible, whether or not seismic exploration activities are allowed in the Planning Area.	Effects of First Sale: Effects of regulated discharges would be negligible. The effects of gravel-island construction and buried-pipeline construction would probably be temporary and minor, especially for facilities along the naturally turbid Beaufort Sea coast. Short docks and causeways in bays would probably not affect hydrologic conditions, but long causeways with inadequate breeches would probably have measurable, long-term impacts on hydrologic conditions. Site-specific effects could be further reduced through additional mitigation developed as a result of additional NEPA assessments. If a large spill occurred during the ice-covered season, the effects would be minor; if it occurred during the open-water or broken ice seasons, hydrocarbons dispersed in the shallow estuarine water column could exceed the 1.5-ppm acute (toxic) criterion during the first day in the immediate vicinity of a spill. Because of the difficulty of	Effects of First Sale: Effects of regulated discharges and of disturbance due to permitted construction would be similar to those under Alternative A, except in Kasegaluk Lagoon, which would be excluded from leasing so there would be no effects. Winter spill effects on estuarine water quality would be similar to those under Alternative A, but open-water spill effects would be much lower than with Alternative A.	Effects of First Sale: There would be a greatly reduced risk of spills, but still a slight chance of them in NPR-A bays for two reasons — fuel might be transported across the bays for onshore exploration and there might be further State and Federal leasing of adjacent offshore waters.	Effects of First Sale: Discharges of drilling and human waste would be prohibited estuaries; no unregulated discharges of produced water would be allowed; and no adverse effects on kelp or special benthic communities from construction of ice islands or ice roads are expected. The effects of gravel-island construction and buried-pipeline construction would probably be minor and temporary. A short dock or jetty in estuarine waters probably would not affect hydrologic conditions, but a long causeway with inadequate breeches would probably have measurable, long-term impacts. If a large spill occurred during the open water season, formed a slick, or became dissolved in the water column, it could contaminate approximately two-thirds of the coastline in an estuary like Admiralty Bay, and the hydrocarbon concentration might exceed the 0.015-ppm chronic criteria for up to 30 days in an area that ranges up to 70 mi ² (180 km ²). Effects probably would not extend outside the estuaries unless the

Summary and Comparison of Effects on Estuarine Water Quality (continued)				
No Action	Alternative A	Alternative B	Alternative C	Preferred Alternative
	responding to open-water and broken-ice spills, the level of effects for Alternative A, which would not restrict offshore drilling to the ice-covered season, would be slightly greater than for other alternatives.			spill involved fuel at a coastal staging site, such as Cape Simpson. Stipulations G-1 and K-3 might be effective at moderating the effects of long causeways and estuarine spills.
	Effects of Multiple Sales: The effects of multiple sales on estuarine water quality would probably be slightly less than twice that for the first sale.	Effects of Multiple Sales: The effects of multiple sales on estuarine water quality would probably be slightly less than twice that for the first sale.	Effects of Multiple Sales: Multiple sales would have very low level of effects on estuarine water quality, similar to the effects from the first sale.	Effects of Multiple Sales: The effects of multiple sales on estuarine water quality would probably be slightly less than twice that for the first sale.
<p>Cumulative Effects: The types of impacts would be similar to those described for the Planning Area under Alternative A, but would occur in a more widely dispersed area of the North Slope witnessing oil and gas activities. The effects of regulated discharges would be negligible. The effects of gravel-island construction and buried-pipeline construction would probably be temporary and minor, especially for facilities along the naturally turbid Beaufort Sea coast. Short docks and causeways would probably not affect hydrologic conditions, but long causeways with inadequate breeches have and in one case would probably continue to have measurable, long-term impacts on hydrologic conditions. If a 500- to 900-bbl spill occurred during the ice-covered season, the effects would be minor. If it occurred during the open-water or broken ice seasons, hydrocarbons dispersed in the shallow estuarine water column could exceed the 1.5-ppm acute (toxic) criterion during the first day in the immediate vicinity of a spill.</p>				

Summary and Comparison of Effects on Air Quality				
No Action	Alternative A	Alternative B	Alternative C	Preferred Alternative
Concentrations of criteria pollutants would remain well within Federal air-quality standards. The overall effects on air quality would be minimal.	Effects of First Sale: Activities would cause only small, local, temporary increases in the concentrations of criteria pollutants. Concentrations would be within the Prevention of Significant Deterioration Class II limits and National Ambient Air Quality Standards. Therefore, effects would be low.	Effects of First Sale: The effects would be essentially the same as Alternative A.	Effects of First Sale: The effects would be essentially the same as No Action Alternative.	Effects of First Sale: Development and production activities would cause only small, local, temporary increases in the concentrations of criteria pollutants. Concentrations would be within the Prevention of Significant Deterioration (PSD) Class II limits and National Ambient Air Quality Standards (NAAQS). Therefore, effects would be low.

Summary and Comparison of Effects on Air Quality (continued)				
No Action	Alternative A	Alternative B	Alternative C	Preferred Alternative
	Effects of Multiple Sales: The effects for multiple sales would be essentially the same as those above for the first sale — effects would remain low.	Effects of Multiple Sales: The effects for multiple sales would be essentially the same as those above for the first sale — effects would remain low.	Effects of Multiple Sales: The effects for multiple sales would be essentially the same as those above for the first sale — effects would remain low.	Effects of Multiple Sales: Effects of all activities under all sales would cause only small increases in the concentrations of criteria pollutants. Concentrations would be within the PSD Class II limits and NAAQS. Therefore, effects would be low.
Cumulative Effects: The cumulative effects of all projects affecting the air quality of the North Slope of Alaska in the past and occurring now have caused generally little deterioration in air quality, which remains better than required by national standards. All reasonably foreseeable North Slope projects would not change this situation.				

Summary and Comparison of Effects on Vegetation				
No Action	Alternative A	Alternative B	Alternative C	Preferred Alternative
Impacts would be negligible without seismic exploration. With seismic exploration, from 0.1 to 2.0% (11,300 to 183,100 acres) of the Planning Area would be affected every other year. Complete recovery could vary from a year to decades. This would be a minor impact to vegetation communities, though if a moderate to high level of disturbance occurred in the area of a population of one of the rare plant species, the effect on that particular taxon could be moderate to severe.	Effects of First Sale: Impacts from activities other than oil and gas exploration and development would involve a small fraction of the Planning Area. The overall impact from non-oil and gas activities would be minor to negligible. The impacts of oil and gas exploration would include vegetation disturbance on 0.3 to 6% (33,800 to 549,000 acres) of the Planning Area per year from 2-D and 3-D seismic surveys. Ice roads and pads could impact <870 acres per year. Development could permanently destroy vegetation on <790 acres and alter plant species composition of <2,220 acres. Unless these impacts occurred to a rare plant species, these impacts would not likely adversely affect any plant species or community. Small oil	Effects of First Sale: Impacts from activities other than oil and gas exploration and development would be slightly less than for Alternative A. The impacts of oil and gas exploration and development would be the same types as for Alternative A, but would affect fewer acres and may be shifted away from marsh and riparian wetland habitats. Seismic surveys could affect 0.2 to 4% (22,500 to 366,000 acres) of the Planning Area per year. Construction of ice roads and ice pads would annually impact <420 acres and <170 acres, respectively. Development could involve destruction of vegetation on <650 acres and the alteration in plant species composition of <1,950 acres. Unless these impacts occurred to a rare plant species, these impacts would not	Effects of First Sale: Impacts from activities other than oil and gas exploration and development would be slightly less than for other alternatives. The impacts of oil and gas exploration would be of the same types as for Alternative A, but would affect fewer acres and be less likely to affect marsh and riparian wetland habitats. Seismic surveys could disturb 0.1 to 2% (11,000 to 183,000 acres) every other year. Construction of ice roads and ice pads could affect <210 acres and <35 acres, respectively. Small oil spills could occur during seismic surveys and exploratory drilling, but would affect much less vegetation than under the other alternatives.	Effects of First Sale: Impacts from activities other than oil exploration and development would involve disturbance or destructive impacts to a small fraction of the Planning Area, and overall impacts would be minor to negligible. Impacts from oil exploration would include vegetation disturbance on 22,500 to 366,000 acres per year from seismic surveys. About 25 percent of the disturbance would be at a medium to high level. After 9 years, recovery would be about 90 percent. Ice road construction would have impacts on < 420 acres/year and ice pads on < 170 acres. Exploration activities would cause permanent, minor vegetation destruction and alteration from the construction of exploration well cellars.

Summary and Comparison of Effects on Vegetation (continued)				
No Action	Alternative A	Alternative B	Alternative C	Preferred Alternative
	spills could affect <5 acres and would cause minor ecological damage, and ecosystems would be likely to recover in a few years to 2 decades.	likely adversely affect any plant species or community. Oil spills would affect <4.3 acres of vegetation within the Planning Area.		Development activities would cause the destruction of vegetation on ≤ 650 acres and the alteration in plant species composition on ≤ 1,915 acres, affecting a total of over ≤ 2,565 acres. These impacts would be permanent if gravel pads remain after production ends, although some plant species would be able to grow on the pads. Development impacts would affect less than 0.03 percent of the total Planning Area and would not likely adversely affect any plant species or community. If a development facility were to be placed over a rare plant population, the effects on that taxon could be severe. However, it is expected that rare plants colonies would be avoided through careful siting at the facilities-approval stage. Oil spills during exploration and development would affect < 4.3 acres of vegetation. Spills would be cleaned up immediately, causing minor ecological damage, and ecosystems would likely recover in a few years to 2 decades.
	Effects of Multiple Sales: Compared to the impacts of the first sale, there would be a small increase in the amount of disturbance from seismic activities that would be evident at any one time. Up to 2,090 acres around and under ice pads and	Effects of Multiple Sales: There would be a small increase in the amount of disturbance from seismic activities that would be evident at any one time compared to that described for the first sale. Up to 1,940 acres around and under ice pads and	Effects of Multiple Sales: There would be a small increase in the amount of disturbance from seismic activities that would be evident at any one time compared to that described for the first sale. Up to 250 acres around and under ice pads and	Effects of Multiple Sales: Impacts from exploration would include about double the vegetation disturbance from seismic work expected for a single-sale. The extended period of time over which it would occur--coupled with the recovery time for disturbed areas--

Summary and Comparison of Effects on Vegetation (continued)				
No Action	Alternative A	Alternative B	Alternative C	Preferred Alternative
	roads could be disturbed. Development activities could cause the destruction of vegetation on <1,530 acres and the alteration in plant species composition of <4,660 acres. Oil spills could affect <10 acres of vegetation within the Planning Area. Recovery from spills would take a few years to two decades.	roads could be disturbed. Development activities from all lease sales would cause the destruction of vegetation on <1,260 acres and the alteration in plant species composition of <4,050 acres. Oil spills would affect <8.6 acres of vegetation within the Planning Area.	roads could be disturbed. Refined oil spills from seismic activities would remain at about the same level as for the first sale, and would be about one-sixth the level as under Alternative A. Spills during exploratory and delineation drilling would roughly triple from the level of a single sale, but would impact much less than the <10 acres affected under Alternative A multiple sales.	would result in a small increase in the amount of visible disturbance. Exploration activities would cause < 0.03 acres of permanent vegetation destruction around well cellars and alteration of < 1,940 acres/year around and under ice pads and roads. The combined effect of exploration and development activities over all lease sales would cause the destruction of vegetation on ≤ 1,260 acres and the alteration in plant species composition on ≤ 4,050 acres, for a total of ≤ 5,310 acres. These impacts would be permanent if gravel pads remain after production ends. Impacted areas (3,920 acres) represent about 0.04 percent of the total land cover, and, as such, they would not be likely to adversely affect any plant species or community. If a development facility were to be placed over a rare plant population, the effects on that taxon could be severe. Careful siting of facilities after site-specific environmental analysis is expected to avoid and protect rare plant species. Oil spills would affect < 8.6 acres of vegetation; recovery would take a few years to 2 decades.
Cumulative Effects: Human-caused impacts are expected to be additive in nature; no synergistic or countervailing impacts are anticipated. The areal extent of impacts would constitute a very small fraction of the total North Slope acreage. Global climate change could alter the species composition, increasing deciduous shrubs and decreasing sedges and grasses.				

Summary and Comparison of Effects on Fish				
No Action	Alternative A	Alternative B	Alternative C	Preferred Alternative
No measurable effects on arctic fish are anticipated	<p>Effects of First Sale: A small number of individual fish may be killed, but it is unlikely that there would be a measurable effect on arctic fish populations. Increased mortality is anticipated if water withdrawals occur in river pools, though it is unlikely that the entire population within a river system would be eliminated. Gravel extractions can lead to habitat enhancement under certain situations.</p>	<p>Effects of First Sale: The activities and type of effects expected from exploration and construction are similar to those under Alternative A. Reduced water (30% reduction) and gravel (20% reduction) needs would result in less impact to fish.</p>	<p>Effects of First Sale: The activities and type of effects expected from exploration are similar to those under Alternative A, but a 71% decrease in water needs in exploration, a prohibition on water withdrawals from rivers, and the projected lack of development would result in less impact to fish.</p>	<p>Effects of First Sale: Non-oil and gas activities, seismic surveys, causeways, and seawater spills are not expected to have measurable effects on arctic fish populations. Construction of pads, roads, and airstrips, and fuel spills might be expected to kill a small number of individual fish, but are expected to have no measurable effect on arctic fish populations. Potential mortality from water withdrawals in lakes is possible although limits on withdrawal and monitoring of water quality should minimize effects. Gravel extractions can lead to habitat enhancement under certain situations. Potential mitigation measures address water withdrawal in rivers and lakes and gravel extraction.</p>
	<p>Effects of Multiple Sales: Impacts may be greater than under the first sale, but would remain minor.</p>	<p>Effects of Multiple Sales: Impacts may be greater than under the first sale, but would remain minor.</p>	<p>Effects of Multiple Sales: Impacts may be greater than under the first sale, but would remain minor.</p>	<p>Effects of Multiple Sales: Seismic surveys and pipelines from multiple sales are expected to have the same overall effect on arctic fish populations for the first sale. Production pads and roads are expected to have about twice the effect as for first sale. Fuel and oil spills are likely to have a greater, though still minor, effect on arctic fish populations. Insufficient recovery time between sales and/or greater levels of activity would likely result in</p>

Summary and Comparison of Effects on Fish (continued)				
No Action	Alternative A	Alternative B	Alternative C	Preferred Alternative
				greater effects than those estimated here for multiple sales.
Cumulative Effects: Increased wide-range impacts to freshwater fish populations are not anticipated based on the cumulative analysis. Offshore oil spills that enter coastal waters are expected to affect a greater percentage of marine and anadromous fish than estimated for Alternative A. Assuming sufficient recovery time between spills, the recovery from a spill is expected within 3 to 5 years.				

Summary and Comparison of Effects on Birds				
No Action	Alternative A	Alternative B	Alternative C	Preferred Alternative
Disturbance in the vicinity of large summer camps, including air support, minor impact on uncommon, decreasing, or recently declined species at the ACP-population level. A large camp could have an elevated effect at the local level on declining species. Effects may be difficult to separate from natural variation in population numbers. Impacts of other activities would be negligible.	Effects of First Sale: Impacts from non-oil and gas activities would be similar to those for the No Action Alternative. Effects of summer air traffic and gravel mining that eliminates breeding habitat of declining species is likely to be minor. Crude oil spills confined to terrestrial and freshwater aquatic habitats could have a minor effect by killing a few waterfowl, shorebirds, raptors, and passerines. Impacts would be more serious, potentially elevated to moderate level, if a spill enters a river delta or nearshore marine habitats occupied by loons, large numbers of seaducks whose populations have declined, black guillemots, or Ross's gulls.	Effects of First Sale: Impacts would be similar to those described for Alternative A, except that effects on marine and river delta birds would be reduced.	Effects of First Sale: Impacts from non-oil and gas activities would be similar to those for the No Action Alternative. All other impacts are likely to be negligible.	Effects of First Sale: Disturbance effects from non-oil and gas activities are likely to be negligible for most local and regional bird populations. Elevated activity and air traffic near large summer camps could result in minor impacts on local populations. Regional populations are expected to experience negligible effects, except those species that are uncommon, decreasing, or recently declined, where a minor effect may occur. Routine summer air traffic, especially over higher bird density areas, is likely to result in minor impacts. Gravel mining, pads, airstrips, short pad-connecting roads, and pipelines, although eliminating small areas of breeding habitat and displacing small numbers of nesting birds, are likely to result in negligible population effects. Raptors nesting along major rivers are expected to experience negligible effects from disturbing activities. Effects from crude oil spills when confined to

Summary and Comparison of Effects on Birds (continued)				
No Action	Alternative A	Alternative B	Alternative C	Preferred Alternative
				terrestrial and freshwater aquatic habitats could go from negligible for most species to minor for rare species or those with declining populations. If a spill were to enter a river delta or nearshore marine habitats occupied by substantial numbers of birds, minor to moderate effects would be likely for stable/increasing and declining species populations, respectively. Effects (including disturbance) on species utilizing Kasegaluk Lagoon and the western Planning Area (particularly those with substantial numbers of post-breeding individuals concentrating in the lagoon, e.g., brant, king eider, common eider) could be lower under the Preferred Alternative than under Alternative A because of designation of Kasegaluk Lagoon as a Special Area and the 10-year leasing deferral. Quantitative effects might be difficult to separate from natural variation in population numbers.
	Effects of Multiple Sales: Although most effects that are likely to occur throughout the Planning Area are expected to be short-term and negligible or minor, moderate effects could occur if concentrations of particularly vulnerable species, declining or with small or sensitive populations were to be involved. Increased numbers of	Effects of Multiple Sales: Effects of multiple sales could elevate the overall probability of disturbance and spill occurrence above that of the first sale. This likely would result in a corresponding increase in the potential for disturbing breeding birds, and for spilled oil to reach waterfowl or other water bird concentration areas and cause	Effects of Multiple Sales: If multiple sales result in more seismic surveys in the remaining available area, effects may be elevated to minor for species with small or declining populations, such as gyrfalcon and snowy owl. In addition, multiple sales could elevate the overall probability of disturbance on leased lands, thereby	Effects of Multiple Sales: Displacement of birds from disturbance and habitat alteration or loss would be expected to increase substantially if development and production facilities were located in a limited region of higher resource potential. Such development potentially could alter local populations in these areas. For species that

Summary and Comparison of Effects on Birds (continued)				
No Action	Alternative A	Alternative B	Alternative C	Preferred Alternative
	spills are expected to result in the loss of substantial numbers of birds. These losses may not be detectable above the natural fluctuations of the population and survey methods/data available. Overall effect likely would increase from that discussed for the first sale if developments occurred in portions of the Planning Area where distributions of two or more vulnerable species overlap.	mortality.	increasing the potential for disturbing over-wintering birds above that of the first sale.	appear more vulnerable to habitat changes or disturbance (e.g., loons, eiders, raptors) effects could extend to regional populations and involve long-term changes in distribution. Although most likely effects are expected to be short-term and negligible to minor, moderate effects could occur if concentrations of several particularly vulnerable species—those with declining or small or sensitive populations--were to be involved. The likely increase in small crude and refined oil spills would be expected to elevate losses of birds somewhat during development. Subsequent recovery of cumulative lost productivity and recruitment may not be detectable above the natural population fluctuations. Multiple sales effects are expected to be additive to those of the first sale, and may range from a slight increase to a doubling or tripling of effects.
<p>Cumulative Effects: Cumulative effects of oil-industry activities on birds potentially could be substantial in the case of loons and waterfowl species and significant in the case of long-tailed duck and king and common eiders — primarily as a result of mortality in the unlikely event a large oil spill were to occur. Although the chance of oil spill occurrence is relatively small, the potential for contact with bird concentrations would be highest in the vicinity of primary support facilities. As a result of the apparent decline in populations of some species, and the challenge of recovering spilled oil, particularly in broken-ice conditions, there is uncertainty regarding the ultimate effect of any spills on bird populations. None of the typical management or industrial activities discussed in this analysis is likely to cause significant population effects.</p>				

Summary and Comparison of Effects on Terrestrial Mammals				
No Action	Alternative A	Alternative B	Alternative C	Preferred Alternative
<p>The effects are expected to be local and short term, with no significant adverse effects on mammal populations.</p>	<p>Effects of First Sale: Non-oil and gas activities are expected to increase somewhat compared to the No Action Alternative, but the increase is not expected to significantly affect terrestrial mammal populations. Some TLH caribou are expected to be disturbed and their movements delayed along an elevated pipeline to Kuparuk during periods of air traffic and construction. Near the oil fields, surface, air, and foot traffic is expected to displace some terrestrial mammals. If field development occurs in critical TLH insect-relief areas, movements of caribou from coastal insect-relief areas to foraging areas may be adversely affected. Extensive development could result in the loss of some insect-relief habitat for TLH caribou. Crude oil and fuel spills are expected to result in the loss of small numbers of terrestrial mammals.</p>	<p>Effects of First Sale: Impacts would be similar to but somewhat less than those projected under Alternative A.</p>	<p>Effects of First Sale: Impacts from non-oil and gas activities and seismic and exploratory oil and gas activities would be similar to but less than those projected under Alternative A. If, as projected, no development occurs, there would be no impacts from oil and gas development. If development occurs, the type of impacts would be similar to those under Alternative A, but much less in magnitude because many of the sensitive habitats would not be leased.</p>	<p>Effects of First Sale: Non-oil and gas activities, seismic work, exploration wells, and spills would have minor effects on terrestrial mammals. Projected levels of oil and gas development would result in increased disturbance of caribou and other terrestrial mammals. Some TLH caribou would be expected to be disturbed from increased habitat alteration and their movements delayed along the pipeline during periods of air traffic and construction. Near oil fields, surface, air, and foot traffic would be expected to displace some terrestrial mammals. If extensive development were to occur in the TLH insect-relief area, movements of caribou from coastal insect-relief areas to foraging areas would be disrupted to some extent. This effect would be minimized by locating and designing oil and gas facilities to allow for free movement of caribou. Within the Caribou Study Area, a study of caribou movements would be undertaken before facility development to better reduce development impacts on caribou movements. Extensive development in this area could result in the functional loss of some insect-relief habitat for TLH caribou. Activities under the Preferred Alternative are not expected to significantly affect</p>

Summary and Comparison of Effects on Terrestrial Mammals (continued)				
No Action	Alternative A	Alternative B	Alternative C	Preferred Alternative
				terrestrial mammal populations.
	<p>Effects of Multiple Sales: The effect of multiple sales is expected to increase disruption of TLH caribou movements to insect-relief areas along the coast and to cause some disruption of CAH and WAH caribou. Impacts to grizzly bears, moose, wolves, and wolverines would be greater, as development would be located in higher density habitats for these species.</p>	<p>Effects of Multiple Sales: Impacts would be similar to that those discussed for multiple sales under Alternative A, but somewhat less in extent as fewer fields would be developed.</p>	<p>Effects of Multiple Sales: Disturbance associated with multiple sales could result in increased local effects, particularly to species of limited range, over that expected from the first sale, especially if sales are concentrated in particular portions of the remaining Planning Area. However, the overall effect of routine oil and gas activities at the regional population level is likely to be negligible.</p>	<p>Effects of Multiple Sales: Impacts would be expected to increase disruption of TLH caribou movements within insect-relief areas and cause some disruption of CAH and WAH caribou. Impacts to grizzly bears, moose, wolves, and wolverines would be greater as more development would be located in higher density habitats for these species.</p>
<p>Cumulative Effects: Cumulative oil and gas development on the North Slope could result in a long-term displacement and/or functional loss of habitat for CAH, TLH, and WAH caribou. At present, cumulative oil development in the Prudhoe Bay-Kuparuk area has caused displacement of CAH caribou from a portion of the calving range, with a shift in calving distribution away from the oil fields. Calving by TLH caribou may be reduced near the pipeline corridors; this would represent a long-term (several-generation) effect on the distribution of the TLH caribou. The alteration of >8,000 acres of tundra habitat in the Prudhoe Bay area has not had any apparent effect on the distribution and abundance of other terrestrial mammals, with the possible exception of arctic foxes, which have apparently increased in numbers near the oil fields. The variance in cumulative impacts among the alternatives would be that associated with the alternatives. Particularly notable is the reduced impacts to the TLH under the No Action Alternative and Alternative C, which would not allow development in the TLH insect-relief habitat.</p>				

Summary and Comparison of Effects on Marine Mammals				
No Action	Alternative A	Alternative B	Alternative C	Preferred Alternative
<p>Impacts would be local and short term and could be lethal to a small number of animals, with no significant adverse effects to the populations</p>	<p>Effects of First Sale: Short-term impacts would occur within about 1 mi of resource-inventory-survey activities, survey and recreational camps, and overland moves. Oil and gas-associated noise, exploration, and potential spills would produce local impacts, which for a small number of animals (more than for the No Action Alternative) may be lethal. Overall impacts,</p>	<p>Effects of First Sale: Impact type and level would be similar to those for Alternative A</p>	<p>Effects of First Sale: Effects would be similar to those for the No Action Alternative</p>	<p>Effects of First Sale: Effects from activities other than oil and gas on marine mammals are expected to be local. Effects of oil and gas activities are expected to result in an increase in potential noise and disturbance along the coast, primarily in the Dease Inlet-Elson Lagoon Area, and these effects are expected to be local and short term (generally < 1 year or intermittent). Seals and polar bears</p>

Summary and Comparison of Effects on Marine Mammals (continued)				
No Action	Alternative A	Alternative B	Alternative C	Preferred Alternative
	however, are expected to be short term, with no significant adverse effects on populations.			could be affected by development offshore or along the coast in the Dease Inlet Area; effects would be local and are not likely to affect marine mammal populations. Potential oil spills are likely to affect small numbers of marine mammals with population recovery expected within 1 year. A small number of seals and polar bears might be adversely affected or killed by an onshore crude-oil spill if it contaminated Dease Inlet, or by small fuel spills occurring in and contacting Dease Inlet and Elson Lagoon; these losses would not be significant to marine mammal populations. Overall effects are expected to be short term, with no significant adverse effects on marine mammal populations
	Effects of Multiple Sales: Impacts would be about the same as for a single sale, but the duration and extent of impacts may increase.	Effects of Multiple Sales: Impacts would be about the same as for a single sale, but the duration and extent of impacts may increase.	Effects of Multiple Sales: Impacts would be about the same as for a single sale, but the duration and extent of impacts may increase.	Effects of Multiple Sales: Overall impacts would be about the same as for a single sale, but the duration and extent of activities and disturbance effects would be over a longer period.
Cumulative Effects: Absent a very large spill, impacts would be minor, primarily from brief and local noise and attraction to development facilities. A large oil spill in the arctic marine environment could kill 10 polar bears, a few hundred seals and walruses, and small numbers (probably less than 10) of beluga and gray whales; populations would likely recover within 1 year. Potential oil spills along the tanker route to the U.S. west coast could have long-term (more than one generation or perhaps 5 to 10 years) effect on sea otters and perhaps harbor seals and other marine mammals.				

Summary and Comparison of Effects on Endangered and Threatened Species				
No Action	Alternative A	Alternative B	Alternative C	Preferred Alternative
Most impacts would be negligible, though	Effects of First Sale: Impacts from non-oil and gas activities	Effects of First Sale: The effects are similar to those	Effects of First Sale: The effects are similar to those	Effects of First Sale: Impacts from non-oil and gas activities, oil

Summary and Comparison of Effects on Endangered and Threatened Species (continued)				
No Action	Alternative A	Alternative B	Alternative C	Preferred Alternative
<p>disturbance in the vicinity of large summer camps, and potentially also from smaller camps occupied for extended periods, could affect local nesting eiders and have a minor impact at the ACP population-level for spectacled eider population.</p>	<p>would be similar to those for the No Action Alternative. Impacts of oil and gas development generally would be negligible for bowhead whales and minor for eiders, though if a spill enters a nearshore staging area impacts to spectacled eiders may be more significant because the species population has recently experienced a sharp decline.</p>	<p>described for Alternative A. Both disturbance and oil-spill effects could be somewhat less than for Alternative A as a result of removal of Kasegaluk Lagoon from oil and gas leasing.</p>	<p>described for Alternative A, though impacts from oil and gas development would be less likely to occur because less exploration would occur, development is not projected to occur, and leasing would avoid much of the habitat of these species.</p>	<p>and gas transport, and seismic surveying may cause temporary avoidance behavior in bowhead whales. Effects from such exposures are likely to be short-term and negligible. Disturbance of eiders from aerial surveys, small summer camps, spill removal, river transport, winter ground transport, seismic surveying, and gravel mining are likely to be short-term and localized and result in negligible effects. Aircraft over flight effects on eiders are likely to be temporary and non-lethal. Reduction of breeding habitat by gravel mines, pads, roads, airstrips, and pipelines is likely to result in negligible population effects. Elevated activity and air traffic near large summer camps may result in minor impacts on both local and regional populations of eiders. Routine summer air traffic is likely to result in minor impacts. Depending on the nature and duration of behavioral changes caused by disturbance, such effects could be considered a "take" under the ESA.</p> <p>Effects from crude oil spills are expected to be minor when confined to terrestrial and freshwater aquatic habitats where mortality of eiders is likely to be relatively low. Minor to moderate effects are likely for eider</p>

Summary and Comparison of Effects on Endangered and Threatened Species (continued)				
No Action	Alternative A	Alternative B	Alternative C	Preferred Alternative
				populations if a spill were to enter a river delta or nearshore marine habitats during a period when occupied by substantial numbers of brood-rearing, staging or migrating individuals. There is a potential for significant impacts in these circumstances. Quantitative effects may be difficult to separate from natural variation in population numbers. Stipulations would decrease disturbance from most factors for threatened eiders and help prevent fuel and oil pollution and degradation of important bird habitats. Overall effects on eiders could be somewhat less than Alternative A. Designation of Kasegaluk Lagoon as a Special Area and the 10-year leasing deferral could reduce potential risk to eiders that use this area prior to proceeding to molting areas in fall.
	Effects of Multiple Sales: Impacts could increase substantially from that discussed for the first sale if developments were concentrated in a limited area.	Effects of Multiple Sales: The effects are similar to those described for multiple sales for Alternative A.	Effects of Multiple Sales: Given that oil and gas development is not likely to occur, impacts would be similar to those for the first sale.	Effects of Multiple Sales: Displacement of eiders by disturbance and habitat alteration or loss is expected to increase substantially if production facilities are concentrated in areas with high eider densities. Such concentration could alter local populations in these areas. Steller's eiders may be particularly vulnerable to habitat changes or disturbance in the vicinity of nesting areas south of Barrow. Effects could extend to regional populations and involve

Summary and Comparison of Effects on Endangered and Threatened Species (continued)				
No Action	Alternative A	Alternative B	Alternative C	Preferred Alternative
				long-term changes in distribution. Effects are expected to be short-term and negligible to minor. Moderate effects could occur if eider concentrations were contacted frequently by oil spills. Although losses and subsequent recovery of cumulative lost productivity and recruitment may not be detectable above the natural population fluctuations, they are considered significant for these ESA-listed species. Effects from additional leasing are expected to be additive to those of the first sale, and to range from a slight increase to a doubling or tripling of effects.
<p>Cumulative Effects: Overall, exposure of bowhead whales to noise from oil and gas operations is not expected to kill any bowhead whales, but some could experience temporary, nonlethal effects. Whales exposed to spilled oil likely would experience temporary, nonlethal effects; prolonged exposure to freshly spilled oil could kill some whales. The effects from normal oil and gas activities in the Planning Area and adjacent marine areas are expected to include the loss of small numbers of eiders, particularly spectacled eiders, through disturbance effects on survival and productivity, and collisions with structures. Recovery from any short-term losses could be hindered by lowered productivity resulting from natural occurrences. If a large oil spill occurs in or reaches the marine environment during high-use periods for eiders, mortality of eiders is possible; any substantial loss of eiders could represent an important obstacle to full population recovery. Any tanker spill in the Gulf of Alaska could cause losses of wintering Steller's eiders that use ACP habitats during the breeding season.</p>				

Summary and Comparison of Effects on the Economy				
No Action	Alternative A	Alternative B	Alternative C	Preferred Alternative
Impacts would be negligible; seismic surveys would furnish about 50 part-time jobs every other year and commercial recreation	Effects of First Sale: Alternative A, at \$30/bbl of oil, would generate a 27% increase in North Slope Borough (NSB) revenue in the early years, tapering to a 5% increase in the	Effects of First Sale: The economic effects of oil and gas activities resulting from the first sale under Alternative B would be 10% less than Alternative A.	Effects of First Sale: Except for revenue for the federal and state governments received as a result of the lease sale, the economic effects of the first sale under Alternative C are likely to be the	Effects of First Sale: The Preferred Alternative, at \$30/bbl, would generate a 24 % increase in NSB revenue in the early years, tapering to a 5 % increase in the later years. In the early years, oil

Summary and Comparison of Effects on the Economy (continued)				
No Action	Alternative A	Alternative B	Alternative C	Preferred Alternative
would furnish 1 part-time job annually.	later years. In the early years, oil production would generate increases in revenues to the State of Alaska of 3.4%; this would taper to <0.3% in the later years. The increase in total employment and personal income during exploration, development, and production would be <1% over the 1999 baseline for the NSB, South Central Alaska, and Fairbanks, except for NSB personal income during development, which would be 3.4%. Alternative A, at \$18/bbl of oil, would generate a 1-year, 10% NSB revenue increase and <0.1% increase in employment and personal income for the NSB, South Central Alaska, and Fairbanks for 6 years of exploration.		same as those under the No Action Alternative because it is doubtful that development would occur.	production would generate increases in revenues to the State of Alaska of 3.1 %; this would taper to <0.3% in the later years. The increase in total employment and personal income during exploration, development, and production would be <1% over the 1999 baseline for the NSB, South Central Alaska, and Fairbanks, except for NSB personal income during development, which would be 3.1%. The Preferred Alternative, at \$18/bbl would generate a 1-year, 9 %t NSB revenue increase and <0.1% increase in employment and personal income for the NSB, South Central Alaska, and Fairbanks.
	Effects of Multiple Sales: The economic effect of multiple sales is projected to be approximately twice that of the first sale.	Effects of Multiple Sales: The economic effects of multiple sales under Alternative B would be 10% less than for multiple sales under Alternative A.	Effects of Multiple Sales: Except for revenues obtained from any second or subsequent sale, the economic effects of multiple sales are likely to be the same as those for the single sale.	Effects of Multiple Sales: The effect of multiple sales for the Preferred Alternative is projected to be approximately twice that of the first sale.
Cumulative Effects: The onshore and offshore oil industry in and near Prudhoe Bay is expected to decline. This decline would reduce direct employment and associated indirect employment in South Central Alaska, Fairbanks, and the NSB, and revenues to the Federal, State, and NSB governments. Variation in cumulative impacts among alternatives would be limited to the differences in impacts directly attributable to the alternatives.				

Summary and Comparison of Effects on Cultural Resources				
No Action	Alternative A	Alternative B	Alternative C	Preferred Alternative
Impacts would include displacement and/or destruction of resources and are anticipated to be minimal whether or not seismic activity is allowed.	Effects of First Sale: Impacts, though potentially higher than for the No Action Alternative, would still be minimal.	Effects of First Sale: Impacts would be slightly reduced from those under Alternative A primarily because of increased environmental constraints.	Effects of First Sale: Impacts would be significantly reduced from those under Alternative A because of increased environmental constraints, including a substantial reduction in the area made available to leasing.	Effects of First Sale: Impacts from activities other than oil and gas exploration and development would be the same as the No Action Alternative. Impacts would include displacement and/or destruction of resources and are anticipated to be minimal regardless of the level of seismic activity. Under the Preferred Alternative, overall potential impacts to cultural resources would probably be minor because of the environmental constraints that would be in effect. These constraints would benefit cultural resources because of the high probability of cultural resources being located near lakes, streams and rivers, which are afforded more protection from oil and gas exploration under Stipulations K-1 and K-2.
	Effects of Multiple Sales: Impacts could be twice those of the first sale.	Effects of Multiple Sales: Impacts should be slightly less than those for Alternative A.	Effects of Multiple Sales: Impacts may be slightly greater than that for a single sale.	Effects of Multiple Sales: Impacts from management activities other than oil and gas exploration and development would be the same as the No Action Alternative. Overall, impacts would increase somewhat simply because multiple sales would increase the amount of land that could potentially be impacted.
Cumulative Effects: With current procedures for survey and inventory prior to oil and gas exploration and development activities, the impact to the resource would be minimal.				

Summary and Comparison of Effects on Subsistence-Harvest Patterns				
No Action	Alternative A	Alternative B	Alternative C	Preferred Alternative
Subsistence resources of the communities of Pt. Lay, Wainwright, Barrow, Atqasuk, and Nuiqsut could be affected periodically, but overall effects on subsistence-harvest activities would be negligible.	Effects of First Sale: Subsistence-harvest patterns effects are expected to be minor with subsistence resources being periodically affected but no resource becoming unavailable, undesirable for use, or experiencing overall population reductions. Moderate to high effects, however, could occur if development takes place in critical insect relief areas, because caribou could become unavailable, undesirable for use, or experience reduced availability for a period greater than 2 years.	Effects of First Sale: Subsistence-harvest patterns effects are expected to be the same or somewhat less than Alternative A.	Effects of First Sale: Subsistence-harvest patterns effects are expected to be minor, with subsistence resources being periodically affected but no resource becoming unavailable, undesirable for use, or experiencing overall population reductions. No development is anticipated, but even if some do occur impacts would not rise above minor because many critical habitats and harvest areas are unavailable for leasing.	Effects of First Sale: Effects would be the same or slightly reduced from Alternative A. Effects are expected to be minor with subsistence resources experiencing local, short-term impacts and no resource becoming unavailable, undesirable for use, or experiencing overall population reductions. Moderate to high effects could occur if development takes place in critical insect-relief areas, if caribou become unavailable, undesirable for use, or experience reduced availability for a period greater than 2 years.
	Effects of Multiple Sales: Despite increased impacts on subsistence resources, effects to subsistence harvest practices in the communities of Pt. Lay, Wainwright, Atqasuk, Barrow, and Nuiqsut would still be expected to be minor, or possibly higher if development occurs in the TLH insect relief area	Effects of Multiple Sales: Effects to subsistence harvest practices in the communities of Pt. Lay, Wainwright, Atqasuk, Barrow, and Nuiqsut would still be expected to be minor, or possibly higher if development occurs in the TLH insect relief area	Effects of Multiple Sales: Effects to subsistence harvest practices in the communities of Pt. Lay, Wainwright, Atqasuk, Barrow, and Nuiqsut would still be expected to be minor	Effects of Multiple Sales: Most resources would see increases in effects due to increases in development activity. Overall effects on subsistence resources are expected to be local and short term (generally < 1 year), and to have no regional population effects. Effects to subsistence harvest practices in the communities of Point. Lay, Wainwright, Atqasuk, Barrow, and Nuiqsut would be expected to be minor, but if caribou experienced population effects, effects on community subsistence-harvest patterns would increase to high or very high effects if caribou become unavailable, undesirable for use, or experience reduced availability for

Summary and Comparison of Effects on Subsistence-Harvest Patterns (continued)				
No Action	Alternative A	Alternative B	Alternative C	Preferred Alternative
				a period up to 5 years or longer. Under the Preferred Alternative, terrestrial subsistence harvest areas for the communities of Pt. Lay and Wainwright would be included in a large deferral area where leasing would be deferred for 10 years, which would reduce potential impacts on subsistence practices in the areas used by Pt. Lay and Wainwright hunters
<p>Cumulative Effects: Caribou could become unavailable, undesirable for use, or experience long-term population and productivity effects for a period longer than 5 years — a significant adverse effect. Access to subsistence-hunting areas and subsistence resources, and the use of subsistence resources could change, if oil development reduces the availability of resources or alters their distribution patterns. The communities of Pt. Lay, Wainwright, Barrow, Atqasuk, and Nuiqsut would be most affected. In the unlikely event that a large oil spill occurred and contaminated essential whaling areas, major additive (but not synergistic) significant effects could occur when impacts from contamination of the shoreline, tainting concerns, cleanup disturbance, and disruption of subsistence practices are factored together.</p>				

Summary and Comparison of Effects on Sociocultural Systems				
No Action	Alternative A	Alternative B	Alternative C	Preferred Alternative
Changes in the sociocultural systems of the communities of Pt. Lay, Wainwright, Barrow, Atqasuk, and Nuiqsut are expected to be negligible.	Effects of First Sale: Periodic impacts on subsistence activities could periodically disrupt but not displace ongoing social systems, community activities, and traditional practices for harvesting, sharing, and processing subsistence resources.	Effects of First Sale: Effects would be the same or slightly reduced from Alternative A.	Effects of First Sale: Effects would likely be less than those under Alternative A because the risk of periodic impacts on subsistence from impacts on caribou in the insect relief area and from oil spills will be greatly reduced.	Effects of First Sale: Effects would be the same or slightly reduced from Alternative A. Effects on the sociocultural systems of the communities of Pt. Lay, Wainwright, Atqasuk, Barrow, and Nuiqsut would come from local and short-term, subsistence effects that could periodically disrupt, but not displace, ongoing social systems, community activities, and traditional practices for harvesting, sharing, and processing subsistence resources.

Summary and Comparison of Effects on Sociocultural Systems (continued)				
No Action	Alternative A	Alternative B	Alternative C	Preferred Alternative
	<p>Effects of Multiple Sales: Although traditional practices for the harvesting, sharing, and processing of subsistence resources could be disrupted this would not be expected to displace existing institutions or ongoing social systems.</p>	<p>Effects of Multiple Sales: Effects would be the same or slightly reduced from those of multiple sales under Alternative A.</p>	<p>Effects of Multiple Sales: The risk of impacts will not be greatly increased over that for the first sale.</p>	<p>Effects of Multiple Sales: Effects could cause chronic disruption of sociocultural systems for a number of years. Traditional practices for the harvesting, sharing, and processing of subsistence resources could be disrupted, subsistence impacts would not be expected to displace existing institutions or ongoing social systems. Deferral of leasing for 10 years for estuarine areas along the western coast of the Planning Area and important terrestrial subsistence harvest areas for the communities of Wainwright and Pt. Lay would further reduce sociocultural effects in these two communities by reducing potential effects to subsistence resources and practices.</p>
<p>Cumulative Effects: Cumulative effects, primarily those related to residents' reliance on caribou for subsistence, could chronically disrupt sociocultural systems in the community for a period longer than 5 years — a significant effect. Effects would be expected to disrupt community activities and traditional practices for harvesting, sharing, and processing subsistence resources, but are not expected to displace sociocultural institutions, social organization, or sociocultural systems.</p>				

Summary and Comparison of Effects on Environmental Justice				
No Action	Alternative A	Alternative B	Alternative C	Preferred Alternative
<p>Disproportionate, high adverse effects are not expected.</p>	<p>Effects of First Sale: Disproportionate, high adverse effects may be experienced by Pt. Lay, Wainwright, Barrow, Atqasuk, and Nuiqsut because of potential impacts on TLH caribou.</p>	<p>Effects of First Sale: Disproportionate, high adverse effects may be experienced by Pt. Lay, Wainwright, Barrow, Atqasuk, and Nuiqsut because of potential impacts on TLH caribou.</p>	<p>Effects of First Sale: Disproportionate, high adverse effects are not expected.</p>	<p>Effects of First Sale: Potential environmental justice related impacts would occur from long-term population and productivity effects to TLH caribou if development occurred in critical insect relief areas.</p>

Summary and Comparison of Effects on Environmental Justice (continued)				
No Action	Alternative A	Alternative B	Alternative C	Preferred Alternative
				Disproportionate, high adverse effects would be experienced by Point. Lay, Wainwright, Barrow, Atqasuk, and Nuiqsut-- communities that harvest caribou from the TLH. Deferral of leasing for 10 years for estuarine areas along the western coast of the Planning Area and important terrestrial subsistence harvest areas for the communities of Wainwright and Pt. Lay would further reduce sociocultural effects in these two communities by reducing potential effects to subsistence resources and practices. ROP H-1 provides for local stakeholder participation in planning and decision-making to prevent unreasonable conflicts between subsistence uses and oil and gas activities and ROP H-2 is designed to prevent unreasonable conflicts between subsistence activities and seismic surveying; both would both serve to further reduce environmental justice impacts.
	Effects of Multiple Sales: The effects of multiple sales would be essentially the same as those above for the first sale.	Effects of Multiple Sales: The effects of multiple sales would be essentially the same as those above for the first sale.	Effects of Multiple Sales: The effects of multiple sales would be essentially the same as those above for the first sale.	Effects of Multiple Sales: The only substantial source of potential environmental justice related effects to the Native villages would occur from long-term population and productivity effects to the TLH caribou development, if any, in critical insect relief. Disproportionate, high adverse effects would be experienced by

Summary and Comparison of Effects on Environmental Justice (continued)				
No Action	Alternative A	Alternative B	Alternative C	Preferred Alternative
				Point Lay, Wainwright, Barrow, Atqasuk, and Nuiqsut-- communities which all harvest caribou from the Teshekpuk Lake Herd. Deferral of leasing for 10 years for estuarine areas along the western coast of the Planning Area and important terrestrial subsistence harvest areas for the communities of Wainwright and Pt. Lay would further reduce sociocultural effects in these two and practices. ROP H-1 provides opportunities for local stakeholder participation in planning and decision-making to prevent unreasonable conflicts between subsistence uses and oil and gas activities and ROP H-2 is designed to prevent unreasonable conflicts between subsistence activities and seismic surveying; both serve to further reduce subsistence conflicts and any consequent sociocultural and environmental justice impacts.
Cumulative Effects: Disproportionate, high adverse effects are expected.				

Summary and Comparison of Effects on Coastal Zone Management				
No Action	Alternative A	Alternative B	Alternative C	Preferred Alternative
No conflicts with the Alaska Coastal Management Program (ACMP) standards or the enforceable policies of the NSB Coastal Management	Effects of First Sale: No conflicts with the ACMP standards or the enforceable policies of the NSB Coastal Management Program are anticipated.	Effects of First Sale: No conflicts with the ACMP standards or the enforceable policies of the NSB Coastal Management Program are anticipated.	Effects of First Sale: No conflicts with the ACMP standards or the enforceable policies of the NSB Coastal Management Program are anticipated.	Effects of First Sale: There are no inherent conflicts between exploration and development activities envisioned under the Preferred Alternative and the statewide standards and enforceable policies of the NSB

Summary and Comparison of Effects on Coastal Zone Management (continued)				
No Action	Alternative A	Alternative B	Alternative C	Preferred Alternative
Program are anticipated.				CMP. With mitigating measures and regulatory oversight, it should be possible to comply with all of the standards and policies relevant to oil and gas activities that have reasonably foreseeable effects on the coastal resources or uses of the coastal zone. Applicable policies can be more precisely addressed when specific proposals are brought forward by lessees.
	Effects of Multiple Sales: No conflicts are anticipated.	Effects of Multiple Sales: No conflicts are anticipated.	Effects of Multiple Sales: No conflicts are anticipated.	Effects of Multiple Sales: No conflicts are anticipated with the statewide standards of the ACMP and the enforceable policies of the NSB CMP.
Cumulative Effects: Conflicts with Statewide standards of the ACMP and the policies of the NSB are not inherent in the scenarios assumed for this EIS.				

Summary and Comparison of Effects on Recreational Resources and Wilderness				
No Action	Alternative A	Alternative B	Alternative C	Preferred Alternative
Impacts would be minimal and short term, except that seismic activities may create green trails, which may persist 2 to 5 years.	Effects of First Sale: Impacts from non-oil and gas activities would be minimal and short term. Green trails and green pads may occur where seismic surveys and exploratory drilling activities occur and persist for 2 to 5 years. Oil and gas development would result in a long-term loss of scenic quality, solitude, naturalness, and/or primitive/unconfined recreation of up to 2.4% of the Planning Area for the life of production fields and pipelines.	Effects of First Sale: Impacts would be similar to those for Alternative A, except that the amount of green trails would be reduced in proportion to decreases in seismic and exploratory drilling operations and impacts from development would result in the long-term loss on up to 2.0% of the Planning Area for the life of production fields and pipelines.	Effects of First Sale: Impacts would be similar to those for Alternative A, except that the amount of green trails would be reduced in proportion to decreases in seismic and exploratory drilling operations. Development would not occur, or if it did occur, impacts would be less than Alternatives A or B.	Effects of First Sale: Short-term impacts from non-oil and gas activities would increase, adversely affecting approximately 2,000 acres. Short-term impacts from oil and gas activities would impact 56,000 acres (at \$18/bbl of oil) and 240,000 acres (at \$30/bbl of oil). Oil and gas development would result in a long-term loss of solitude, naturalness, and/or primitive/unconfined recreation over very few acres with oil at \$18/bbl; however, with oil at \$30/bbl, the long-term loss would be an area of approximately 203,200 acres, or 2.2% of the

Summary and Comparison of Effects on Recreational Resources and Wilderness (continued)				
No Action	Alternative A	Alternative B	Alternative C	Preferred Alternative
				Planning Area for the life of production fields and pipelines.
	Effects of Multiple Sales: Long-term impacts from development may increase to affect up to about 3.7% of the Planning Area.	Effects of Multiple Sales: Long-term impacts from development may increase to affect up to about 3.4% of the Planning Area.	Effects of Multiple Sales: Long-term impacts would not be appreciably greater than those of the first sale.	Effects of Multiple Sales: Long-term impacts would be about the same as those of the first sale. Long-term impacts may increase to affect approximately 273,600 acres, or about 3.4% of the Planning Area. Restricting activities such as exploratory oil and gas operations and overland moves to winter months would considerably reduce impacts to recreation values.
Cumulative Effects: Opportunities for primitive recreation have and will continue to be reduced by oil and gas activities on the North Slope. Facilities at Deadhorse support recreational opportunities along the Dalton Highway and at Prudhoe Bay.				

Summary and Comparison of Effects on Wild and Scenic Rivers				
No Action	Alternative A	Alternative B	Alternative C	Preferred Alternative
Impacts on WSR values are expected to be minimal.	Effects of First Sale: Impacts on WSR values would be limited in scope	Effects of First Sale: Impacts are expected to be less than under Alternative A because of additional restrictions that protect stream banks and limit potential withdrawals of water.	Effects of First Sale: Impacts are expected to be less than under any of the other alternatives because of additional restrictions that protect stream banks and limit potential withdrawals of water.	Effects of First Sale: Impacts on WSR values would be limited. They are expected to be minimized by the deferral area, protected coastal areas, river buffers, and stipulations and ROP's that protect stream banks and limit potential withdrawals of water. The Colville River would likely see the greatest negative impact to river values because it is not under BLM management and would likely be crossed by access trails, ice roads, and pipelines. The Avak, Tunalik, Nokotkek, and Ongoravik rivers in the Kasegaluk Lagoon area are currently not impacted by oil and gas activities, and this situation is

Summary and Comparison of Effects on Wild and Scenic Rivers (continued)				
No Action	Alternative A	Alternative B	Alternative C	Preferred Alternative
				likely to continue because of low potential development.
	Effects of Multiple Sales: Multiple sales would have little additional impact on river values.	Effects of Multiple Sales: Multiple sales would have little additional impact on river values.	Effects of Multiple Sales: Multiple sales would have little additional impact on river values.	Effects of Multiple Sales: Multiple sales would have little additional impact on river values.
Cumulative Effects: Impacts to the WSR values of Planning Area rivers is limited to those described for the respective alternatives, plus the potential for impacts to portions of the Colville River under non-federal ownership. The only Wild and Scenic River north of the Brooks Range is the portion of the Ivashak River within the Arctic National Wildlife Refuge; its values are adequately protected.				

Summary and Comparison of Effects on Visual Resources				
No Action	Alternative A	Alternative B	Alternative C	Preferred Alternative
Impacts from activities other than oil and gas would be minimal and short-term, affecting about 500 acres. Impacts from seismic surveys would be short-term, affecting approximately 500 acres every other winter. Several hundred miles of green trails from overland moves and seismic surveys would be visible during summer months for 2 to 5 years.	Effects of First Sale: Impacts from activities other than oil and gas would be similar to those for the No Action Alternative. Impacts from seismic would increase substantially resulting in short-term impacts affecting up to 1,500 acres every winter and possibly 6 times the vegetative greening. Short-term impacts from exploratory drilling would impact approximately 16,000 acres and greening could occur on less than 2,000 acres of exploratory drilling facilities. Oil and gas development would result in the long-term loss of visual resources of approximately 2.3% of the Planning Area for the life of the production fields and pipelines.	Effects of First Sale: Impacts would be reduced from those of Alternative A; impacts from seismic by about a third, impacts from exploratory drilling by a quarter, and impacts from development by about an eighth.	Effects of First Sale: Impacts from non-oil and gas and seismic activities will be similar to those of the No Action Alternative. Impacts from exploratory drilling would be reduced by a quarter. Oil and gas development are not expected to take place under this Alternative.	Effects of First Sale: Impacts from activities other than oil and gas would be similar to those for the No Action Alternative. Short-term impacts from ongoing seismic activities would impact approximately 1,000 acres. The greening and ring effect of vegetation resulting from ice pads, roads, airstrips and compacted snow would impact up to 1,500 acres. Short-term impacts from exploratory drilling would encompass approximately 12,000 acres. Oil and gas development would result in the long-term loss of visual resources of approximately 166,700 acres, or 2% of the Planning Area, for the life of production fields and pipelines.

Summary and Comparison of Effects on Visual Resources (continued)				
No Action	Alternative A	Alternative B	Alternative C	Preferred Alternative
	Effects of Multiple Sales: Short-term impacts would not accumulate. Long-term or permanent facilities would impact about 6.6% of the Planning Area.	Effects of Multiple Sales: Short-term impacts would not accumulate. Long-term or permanent facilities would impact about 6% of the Planning Area.	Effects of Multiple Sales: There would be no additional impacts from multiple sales.	Effects of Multiple Sales: Short-term impacts such as green trails and pads, and other ongoing activities would not accumulate. Long-term Impacts from permanent facilities such as roads, pipelines, gravel pads, and pits would accumulate to the extent necessary to support exploration and production activities. These facilities would impact about 6% of the Planning Area, or approximately 505,500 acres.
Cumulative Effects: Oil and gas activities — both east and west of Prudhoe Bay — have impacted and will continue to impact visual resources of the North Slope. Impacts range from vegetative greening caused by seismic surveying and exploratory drilling to long-term presence of production pads, support facilities, roads, and pipelines.				