Alaska Outer Continental Shelf

OCS EIS/EA
MMS 2003-055

Cook Inlet Planning Area

Oil and Gas Lease Sales 191 and 199

Final Environmental
Impact Statement

Volume III
(Tables, Figures, Maps, Bibliography, and Index)

U.S. Department of the Interior
Minerals Management Service
Alaska OCS Region

COOK INLET PLANNING AREA OIL AND GAS LEASE SALES 191 AND 199
Final Environmental Impact Statement
OCS EIS/EA, MMS 2003-055, in 3 volumes:
Volume I, Executive Summary and Sections I through VI
Volume II, Section VII and Appendices
Volume III, Tables, Figures, Map, Bibliography and Index

The summary is also available as a separate document:
Executive Summary, **MMS 2003-056.**

The complete EIS is available on CD-ROM (**MMS 2003-055 CD**) and on the Internet (**http://www.mms.gov/alaska/cprojec/Cook _Inlet/Cook Inelt Sale.htm**).

This Environmental Impact Statement (EIS) is not intended, nor should it be used, as a local planning document by potentially affected communities. The exploration, development and production, and transportation scenarios described in this EIS represent best-estimate assumptions that serve as a basis for identifying characteristic activities and any resulting environmental effects. Several years will elapse before enough is known about potential local details of development to permit estimates suitable for local planning. These assumptions do not represent a Minerals Management Service recommendation, preference, or endorsement of any facility, site, or development plan. Local control of events may be exercised through planning, zoning, land ownership, and applicable State and local laws and regulations.

With reference to the extent of the Federal Government's jurisdiction of the offshore regions, the United States has not yet resolved some of its offshore boundaries with neighboring jurisdictions. For the purposes of the EIS, certain assumptions were made about the extent of areas believed subject to United States' jurisdiction. The offshore-boundary lines shown in the figures and graphics of this EIS are for purposes of illustration only; they do not necessarily reflect the position or views of the United States with respect to the location of international boundaries, convention lines, or the offshore boundaries between the United States and coastal states concerned. The United States expressly reserves its rights, and those of its nationals, in all areas in which the offshore-boundary dispute has not been resolved; and these illustrative lines are used without prejudice to such rights.

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Author
Minerals Management Service
Alaska OCS Region

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Table I.A-1
Blocks Offered and Deferred, Opportunity Index, and Lost Opportunity for Lease Sales 191 and 199 Alternatives

Alternative	Whole or Partial Blocks Deferred	Whole or Partial Blocks in Alternative	Hectares Deferred	Hectares in Alternative	Acres Deferred	Acres in Alternative	Opportunity Index*	Lost Opportunity**
Alternative I – Proposed Action	0	517	NA	1,011,736	NA	2,500,000	100%	0%
Alternative II – No Action (defer entire program area)	0	NA	NA	NA	NA	NA	0%	100%
Alternative III – Lower Kenai Peninsula Deferral	34	483	65,965	945,771	163,000	2,337,000	99%	1%
Alternative IV – Barren Islands Deferral	36	481	63,941	947,794	158,000	2,342,000	99%	1%
Agency-Preferred Alternative***	70	447	129,609	882,127	321,900	2,179,000	98%	2%

Notes:

For purposes of analysis, we assume that a singe field containing 140 million barrels of oil and 190 billion cubic feet of natural gas could be discovered and produced from either or both lease sales.

*The chance that commercial fields could be leased, drilled, discovered, and developed in the area offered for leasing is given by the Opportunity Index.

**The lost opportunity represents the estimated resource potential loss if the deferral is adopted. For example, an estimated 1% chance exists that a commercial field could be discovered and produced from the Lower Kenai Peninsula Deferral. As such, a 99% chance (the Opportunity Index) exists that the assumed single field containing 140 million barrels of oil and 190 billion cubic feet of natural gas could be leased, discovered, developed and produced in the area offered for leasing.

*** The agency-preferred alternative is the combination of Alternative III, the Lower Kenai Deferral, and Alternative IV, the Barren Islands Deferral. See Figure IA-2 for a representation of the agency-preferred alternative.

Key:
% = percent.
NA = not applicable.

Table II.B-1
Exploration and Production Activities for Cook Inlet Lease Sales 191 and 199

Phase Activity/Event	Estimated Range
Exploration	
Shallow-hazard geophysical surveys (years)	2006-2010
Area covered (square miles)	62.3
Total number of days required	14-35
Well drilling	2006-2010
Exploration wells (2 wells following Lease Sale 191, 2 wells following Lease Sale 199)	4
Delineation wells	3
Drilling discharges (years)	2006-2010
Drilling muds (150 dry tons/well)	1,050
Drilling cuttings (440 dry tons/well)	3,080
Support activities (years)	2006-2010
Helicopter flights	1,825-3,650
Supply-boat trips	912-1,825
Development and Production	
Shallow-hazard geophysical surveys (year)	2010
Area covered—platform (square miles)	8.9
Area covered—pipeline (square miles)	10.73
Total number of days required	4-10
Oil pipeline construction (years)	2010-2011
Platform to shore	25 miles
Landfall to processing plant	75 miles
Gas pipeline construction	2022
Platform to shore	25 miles
Landfall to gas-pipeline tie in	5 miles
Production and injection-well drilling (years)	2011-2014
Oil Production wells	42
Injection wells	12
Drilling mud required (dry tons)	4,050
Drilling cutting (dry tons)	29,700
Drilling discharge (dry tons)	0
Gas Production well (years)	2023-2024
Production well (total)	6
Drilling mud required (dry tons)	450
Drilling cuttings (dry tons)	3,300
Drilling discharge (dry tons)	0
Support activities (years)	2011-2014
Helicopter flights (total)	1,460-2,920
Supply-boat trips (total)	730-1,460

Table II.B-2
Impact Summary for Lease Sales 191 and 199

Alternative I – Proposed Action	Alternative III – Lower Kenai Peninsula Deferral	Alternative IV – Barren Islands Deferral
Water Quality		
Effects of Routine Activity: Discharge of drilling muds and cuttings and other discharges associated with exploration drilling are not expected to have any measurable effect on the overall quality of the Cook Inlet water. The remaining activities—exploration discharges, small spills, and construction activities—would not significantly affect water quality. Construction activities would increase the turbidity in the water column along segments of the 40-km (25 mi) pipeline corridors for up to a few months, but no significant water quality degradation would occur. Drilling fluids and produced waters are not anticipated to be discharged during production. **Effects of an Unlikely Large Oil Spill/Natural Gas Release:** Would not significantly degrade the quality of Cook Inlet water. Concentrations of hydrocarbons in water would be less than the acute criterion within three days of spillage and concentrations above the chronic criterion would persist less than thirty days. These effects are considered unlikely given the chance of a spill occurring.	The effects are essentially identical to those for Alternative I. The permitted, routine discharges associated with oil and gas development and small (less than 1,000 barrels) oil spills are not expected to cause significant degradation of Cook Inlet water quality. A large spill is unlikely to occur and would not significantly degrade water quality if it did occur. If such a spill did occur in this alternative, it would be unlikely to reach the Lower Kenai Peninsula Deferral area.	The effects are essentially identical to those for Alternative I. The permitted, routine discharges associated with oil and gas development and small (less than 1,000 barrels) oil spills are not expected to cause any significant degradation of Cook Inlet water quality. A large spill is unlikely to occur and would not significantly degrade water quality if it did occur. If such a spill did occur in this alternative, it would be unlikely to reach the Barren Islands Deferral area.
Air Quality		
Effects of Routine Activity: Activities account for a very small percent of the maximum allowable Prevention of Significant Deterioration Class II increments and only a small percent of the Class I increments where they apply. The concentrations of criteria pollutants in the onshore ambient air would remain well within the air-quality standards. Consequently, it is estimated there would be only a minimal effect on air quality with respect to standards. The air-quality analysis is based on the specific emission controls and emission limitations that the	The effects are essentially identical to those for Alternative I. Air quality effects of all activities under this alternative would cause only small increases in the concentrations of criteria pollutants. Concentrations would be within the Prevention of Significant Deterioration Class I (where applicable) and Class II limits and National Ambient Air Quality Standards.	The effects are essentially identical to those for Alternative I. Air quality effects of all activities under this alternative would cause only small increases in the concentrations of criteria pollutants. Concentrations would be within the Prevention of Significant Deterioration Class I (where applicable) and Class II limits and National Ambient Air Quality Standards.

Table II.B-2 (continued)
Impact Summary for Lease Sales 191 and 199

Alternative I – Proposed Action	Alternative III – Lower Kenai Peninsula Deferral	Alternative IV – Barren Islands Deferral
Air Quality (cont.)		
operators would apply to meet the appropriate Environmental Protection Agency regulations and permit requirements for any development and production activities. **Effects of an Unlikely Large Oil Spill/Natural Gas Release:** Concentrations of criteria pollutants would remain well within Federal air-quality standards. The overall effects on air quality would be minimal.		
Lower Trophic-Level Organisms		
Effects of Routine Activity: The presence of drill platform in the OCS area would cause very little benthic disturbance. This and other routine, anticipated activities during exploration, development, and production probably would not have measurable effects on local populations of lower trophic-level organisms. **Effects of an Unlikely Large Oil Spill/Natural Gas Release:** Potential contamination of 17-38 kilometers (10-24 miles) of shoreline, most likely in southwestern Cook Inlet or western Shelikof Strait. The risk to intertidal habitats on the east side of Cook Inlet would be low; for example, if a spill occurred at a hypothetical production platform in the lease area at any time during the year, the probability of contact with Clam Gulch within 30 days would be less than 4%. In any areas affected by a spill and the likely responses to it, populations of intertidal organisms would be depressed measurably for about a year, and small amounts of oil would persist in shoreline sediments for a decade. An accidental gas release is expected to produce no measurable effects.	The effects are essentially identical to those for Alternative I. The presence of drill platform in the OCS area near the Lower Kenai Peninsula would cause very little benthic disturbance, so, its absence from the deferred area would cause very little change. Further, the deferral would reduce only slightly the risk that a large oil spill would contact the adjacent shoreline because the spill would drift to the southwest with or without the deferral. In addition, the Lower Kenai Peninsula Deferral would not eliminate entirely the risk because spills could drift into the area from operations elsewhere in Cook Inlet.	The effects are essentially identical to those for Alternative I. The deferral area appears to be biologically productive. However, a lease sale with the Barren Islands Deferral would have similar effects on lower trophic-level organisms as leasing the whole area. The estimated chance of an unlikely large oil spill would be about the same. The chance of contact to the Barren Islands would be about the same with or without the deferral because any spills from the deferred area would drift mainly to the southwest toward the Alaska Peninsula rather than toward the Barren Islands. Offshore facilities in the rest of Lower Cook Inlet would pose a very small risk to the Barren Islands even with the Barren Islands deferral.

Table II.B-2 (continued)
Impact Summary for Lease Sales 191 and 199

Alternative I – Proposed Action	Alternative III – Lower Kenai Peninsula Deferral	Alternative IV – Barren Islands Deferral
Fisheries Resources		
Effects of Routine Activity: Fishes could be disturbed and displaced from the immediate vicinity of drilling discharges, within a radius probably not to exceed 100 meters. Displacement of demersal fishes very likely would be limited to only the short time periods of the discharge. Offshore construction also could temporarily disturb and/or displace fishes proximate to the construction activity. Any disturbance or displacement is expected to be short term (hours to days) and limited to only the time of construction activity and shortly thereafter. Although seismic surveys may kill or injure eggs and fry of some fishes, this injury is limited to within 1 or 2 meters from the airgun-discharge ports. Thus, seismic surveys probably would have no appreciable adverse effects on fish subpopulations. **Effects of an Unlikely Large Oil Spill/Natural Gas Release:** Oiled intertidal areas could lead to considerable mortality of eggs and juvenile stages in the affected areas. Elevated levels of developmental malformations and physiological aberrations in eggs and juvenile stages can cause reduced survival to adulthood, thereby delaying recovery of subpopulations affected by an oil spill. Eggs and fry of some bentho-pelagic and demersal fishes may suffer lethal and sublethal effects from oil contact. Although multiple small spills or a single large spill may cause declines of multiple species' subpopulations. However, they are not expected to cause a measurable decline in abundance requiring three or more generations for an indicated population of the central Gulf of Alaska to recover to its former status. An accidental gas release is expected to produce no measurable effects.	The effects are essentially identical to those for Alternative I. The deferral would eliminate any effects due to drilling discharges, offshore construction activities, and seismic surveys within the deferral area. However, drilling discharges, offshore construction activities, and seismic surveys are not expected to have measurable effects on fish resources anywhere in the sale area.	The effects are essentially identical to those for Alternative I. The deferral would eliminate any effects due to drilling discharges, offshore construction activities, and seismic surveys within the deferral area. However, drilling discharges, offshore construction activities, and seismic surveys are not expected to have measurable effects on fish resources anywhere in the sale area.

Table II.B-2 (continued)
Impact Summary for Lease Sales 191 and 199

Alternative I – Proposed Action	Alternative III – Lower Kenai Peninsula Deferral	Alternative IV – Barren Islands Deferral
Essential Fish Habitat		
Effects of Routine Activity: Effects on essential fish habitat from seismic surveys, turbidity, and pipeline construction (both offshore and onshore) are considered low. In most cases, impacts would be localized and habitats would recover within months to years. **Effects of an Unlikely Large Oil Spill/Natural Gas Release:** Beach and intertidal fish habitats could be affected because oil could remain in the area contacted or prey could be impacted for more than a decade (three or more generations for some species, a significant effect). However, such habitat degradation would likely be limited to a very small proportion of habitat and the habitat of only subpopulations would be affected. Oil-spill effects on estuarine and marine essential fish habitats would generally be low because fish habitat would be expected to recover within a month or so. These effects are considered unlikely given the chance of a spill occurring and contacting the resources. An accidental gas release is expected to produce no measurable effects.	The effects are essentially identical to those for Alternative I. This deferral does not decrease the maximum risk in the estuarine essential fish habitats because the highest risk of contact is from oil spills on the east side of lower Cook Inlet or east of the Barren Islands In this alternative, the maximum risk remains 44.8% in Kamishak Bay, the Barren Islands, Kennedy Entrance, and the upper Shelikof Strait. The greatest effect of this deferral on marine waters outside of Cook Inlet is to slightly lower the maximum risk in areas that are already at low risk. Assuming an oil spill occurs, Oil-Spill-Risk-Assessment modeling indicates the maximum risk of a summer oil spill contacting the resource area decreases from 3.9% without the deferral compared to 3.1% with the deferral east of the Kenai Peninsula toward Prince William Sound. The maximum risk for a winter oil spill contacting the resource area is reduced from 2% without the deferral to 1.5% with the deferral. The average annual maximum risk of an oil contacting the resource area decreases from 2.9% without the deferral to 2.2% with the deferral.	The effects are essentially identical to those for Alternative I. Although the difference between the relative effects of the alternatives is minor, the effects of an oil spill on essential fish habitat would be the least under the Barren Islands Deferral. Effects of a low-probability, large oil spill on the intertidal areas could persist over a decade, but habitat and populations would be expected to recover. All of the other effects of exploration and development would be similar to those of the other alternatives.
Endangered and Threatened Species		
Effects of Routine Activity: Adverse effects to threatened and endangered species from routine and common activities of exploration, development, or production should not exceed the significance thresholds. Effects to individuals (for example, displacement due to noise or other disturbance, collisions with structures, etc.) and effects that are relatively localized (for example due to pipeline placement or due to small oil spills) and short-term in impact could occur due to such activities. Because they are currently in serious decline, displacement of	Reduction of potential impacts on beluga whales from noise and disturbance and from spilled oil originating in the deferral area that traveled north from Kachemak Bay. Reduced noise and disturbance impacts to important Steller sea lion habitat and to seasonal beluga whale habitat. The deferral removes a portion of the Stellar sea lion critical habitat exposed to noise and disturbance. Reduction in the chance of exposure from extremely fresh oil to individual sea lions, and possibly humpbacks or beluga whales that might occur there.	Probable beneficial effects of the Barren Island deferral for several species of marine mammals that are designated as threatened, endangered or a candidate for listing under the ESA. These include the western stock of Steller sea lions, humpback whales, and possibly, but less likely, fin whales, all of which are listed as endangered under the ESA. Sea lions from the eastern stock of Steller sea lions could also benefit from deferral of this area. Another species for which deferral of this area could be beneficial is the Cook Inlet stock of the beluga whale, which is currently a candidate

Table II.B-2 (continued)
Impact Summary for Lease Sales 191 and 199

Alternative I – Proposed Action	Alternative III – Lower Kenai Peninsula Deferral	Alternative IV – Barren Islands Deferral
Endangered and Threatened Species (cont.)		
western population Steller sea lions from important critical habitats, such as important feeding areas, could potentially result in a significant effect on the population if alternative equally valuable food areas were unavailable to them or their shift to alternative areas displaced other Steller sea lions. A significant effect on the western population of Steller sea lions could also occur if such sea lions were disturbed and potentially killed as a result of aircraft (primarily helicopter) disturbance near important rookeries or haulouts. This type of disturbance should be avoided by compliance with NMFS-specified flight practices that ensure that such noise does not affect sea lions on these terrestrial critical habitats. Individual American peregrine falcons could potentially suffer some adverse effect from disturbance. Such effects are unlikely due to their distribution and relative rarity in the area. For a more extensive description of potential effects, please see section IV.B.1.f(2). **Effects of an Unlikely Large Oil Spill/Natural Gas Release:** Sea otters from the southwest Alaska stock and Steller sea lions (particularly from the western population) could suffer significant effects. However, while the vulnerability of sea otters to oil spills is clear, the level of vulnerability of Steller sea lions is less certain. Steller's eiders could be adversely affected by a spill during the late autumn, winter, or early spring. Fin whales are vulnerable if an unlikely large spill entered Shelikof Strait at any time of the year whereas humpbacks are primarily vulnerable only during the summer and late autumn months. Beluga whales could be adversely impacted in the non-summer months.	The deferral of this area could also reduce potential oil-spill impacts to Steller sea lions at Cape Douglas and sea otters from the southwest Alaskan stock. Deferral removes an area that has a relatively high probability of an unlikely large oil spill impacting important habitat for the endangered western stock of the Steller sea lion and probable year-round habitat for the southwest stock of Alaska sea otters.	species under the ESA and listed as depleted under the MMPA. The deferral reduces noise and disturbance related effects to ESA-list species resident in this area, primarily Steller sea lions, but also beluga and humpback whales. The deferral removes a portion Stellar sea lion critical habitat exposed to noise and disturbance. Deferral reduces the amount and level of noise detected by any deep water, large threatened and endangered cetacean in the Shelikof Strait and especially in the Gulf of Alaska.

Table II.B-2 (continued)
Impact Summary for Lease Sales 191 and 199

Alternative I – Proposed Action	Alternative III – Lower Kenai Peninsula Deferral	Alternative IV – Barren Islands Deferral
Endangered and Threatened Species (cont.)		
The likelihood that there would be oil spill effects on cetaceans, even in the unlikely event of a large spill is uncertain. Potential effects on fin whales or humpback whales are likely to be local and not have population-level effects. A significant effect on the Alaska breeding population of Steller's eiders is unlikely. Individual American peregrine falcons could suffer adverse effects by catching and eating oiled prey. Such effects are unlikely due to their distribution and relative rarity in the area. An accidental gas release is expected to produce no measurable effects.		
Marine and Coastal Birds		
Effects of Routine Activity: Effects of helicopter flights (such as abandonment of roosting or foraging areas, nest abandonment, and lowered reproductive success) on those relatively few nesting or roosting individuals directly under or in close proximity (a few hundred feet) to the flight path. These impacts could continue for 1-2 years if birds adapt to the flights or the life of the project if birds fail to adapt. A few birds nesting within one-quarter mile of pipeline-landfall construction sites could suffer impacts during one breeding season. A limited number of birds could also be lost to small oil spills; recovery from small spills would probably require no more than 1 year. A limited number of birds could also be lost to small oil spills; recovery from small spills would probably require no more than 1 year. **Effects of an Unlikely Large Oil Spill/Natural Gas Release:** Loss of hundreds of birds to possibly tens of thousands of birds, depending on the size, timing (summer versus winter), and movement of the spill in relation to seasonal patterns of bird abundance and distribution.	This Alternative could reduce oil-spill impacts to marine and coastal birds, particularly in Kachemak Bay and in waters off the lower Kenai Peninsula. Bird resources in these areas are probably most vulnerable in spring and summer, when waterfowl, seabirds (especially alcids and tubenoses), and shorebirds are present in great numbers, with densities of 200 birds per square kilometer or greater having been recorded in Kachemak Bay. Although densities are lower in winter, Kachemak Bay is an important wintering area for waterfowl and alcids, and densities of more than 100 birds per square kilometer have been observed. Although no exploration or development would occur in the deferral area, vessel and helicopter traffic and pipeline construction would be the same as for Alternative I.	This Alternative could reduce the risk that marine and coastal birds in the Barren Islands area would be contacted by fresh oil, because an oil spill would have to occur farther offshore, providing additional time for the oil to weather and for cleanup vessels to reach the spill. The largest concentration of seabirds in the lower Cook Inlet occurs on the Barren Islands, where current estimates indicate that the breeding population may number more than 500,000 birds. At-sea densities of more than 100 birds per square kilometer have been recorded in the area. Although no exploration or development would occur in the deferral area, vessel and helicopter traffic and pipeline construction would be the same as for Alternative I.

Table II.B-2 (continued)
Impact Summary for Lease Sales 191 and 199

Alternative I – Proposed Action	Alternative III – Lower Kenai Peninsula Deferral	Alternative IV – Barren Islands Deferral
Marine and Coastal Birds (cont.)		
Depending on the number of birds involved, recovery could require a few years to two generations. However, recovery could be even longer for a few species. These effects are considered unlikely given the chance of a spill occurring and contacting the resources. A natural gas release and ignition could result in mortality to birds in the immediate vicinity. Blowouts of natural gas condensates that did not burn would be dispersed very rapidly at the blowout site; thus, it is unlikely that toxic fumes would affect birds or their food sources, except those very near the blowout source. Bird mortality associated with a blowout could range from a few to hundreds of individuals. However, such a loss would be expected to involve several species of marine and coastal birds, with no one population suffering losses that would not be replaced within about 1 year.		
Nonendangered Marine Mammals		
Effects of Routine Activity: No measurable effects to regional populations or migrant populations of nonendangered marine mammals. Noise and disturbance effects could include temporary displacement within 1 mile of air traffic (caused by up to 78 helicopter flights per month) and vessel traffic (caused by up to 40 round trips per month). Habitat alteration would include about 50 acres. **Effects of an Unlikely Large Oil Spill/Natural Gas Release:** Loss of an estimated 20-100 harbor seals, a few fur seals, and small numbers (approximately 10-20) of cetaceans would be expected. Total recovery from these losses likely would take place within one year to less than 5 years. No measurable effects to regional populations or migrant populations of nonendangered marine mammals that occur within	The effects are expected to be essentially the same as for Alternative I. Reduced effects to the local habitat and population since no activities would take place and no oil would be produced from the deferral area, and an oil spill would have to occur farther offshore.	The effects are expected to be essentially the same as for Alternative I. Reduced effects to the local habitat and population since no activities would take place and no oil would be produced from the deferral area, and an oil spill would have to occur farther offshore.

Table II.B-2 (continued)
Impact Summary for Lease Sales 191 and 199

Alternative I – Proposed Action	Alternative III – Lower Kenai Peninsula Deferral	Alternative IV – Barren Islands Deferral
Nonendangered Marine Mammals (cont.)		
the Cook Inlet area are expected. Varying mortality to south central Alaska stock in Kachemak Bay could occur. These effects are considered unlikely given the chance of a spill occurring and contacting the resources. An accidental gas release is expected to produce no measurable effects.		
Terrestrial Mammals		
Effects of Routine Activity: Regional populations of river otters, brown bears, Sitka black-tailed deer, and other terrestrial mammals likely would not be affected by the exploration and development activities. Noise and disturbance effects from air traffic (60 helicopter flights per month) and marine-vessel traffic (18-38 boat trips per month during exploration and 20-40 boat trips per month during development) are expected to have short-term (a few minutes to less than 1 hour) displacement effects on brown bears, moose, and other terrestrial mammals within about 1 mile of the traffic routes when near shore. **Effects of an Unlikely Large Oil Spill/Natural Gas Release:** Regional populations of river otters, brown bears, Sitka black-tailed deer, and other terrestrial mammals likely would not be affected by the oil spill. The spill could cause an estimated loss of a small number of river otters (approximately 10-30), a small number of brown bears (approximately 10-30), and some Sitka black-tailed deer (100 or fewer). Recovery could take more than 1 year (perhaps 3 years) for river otter and brown bear intertidal habitats and prey and 1 year for deer. These effects are considered unlikely given the chance of a spill occurring and contacting the resources. An accidental gas release is expected to produce no measurable effects.	The effects are expected to be essentially the same as for Alternative I. Reduced effects to the local habitat and population since no activities would take place and no oil would be produced from the deferral area, and an oil spill would occur farther offshore.	The effects are expected to be essentially the same as for Alternative I. Reduced effects to the local habitat and population since no activities would take place and no oil would be produced from the deferral area, and an oil spill would occur farther offshore.

Table II.B-2 (continued)
Impact Summary for Lease Sales 191 and 199

Alternative I – Proposed Action	Alternative III – Lower Kenai Peninsula Deferral	Alternative IV – Barren Islands Deferral
Cook Inlet Economy		
Effects of Routine Activity: Estimated increases in Kenai Peninsula Borough property tax revenue of approximately 6% (approximately $2.7 million per year for 15 years during production). Estimated revenue increases to the State of Alaska of less than 0.01% (approximately $2 million per year for 15 years during production). No measurable change in employment and personal income over the 2000 baseline for the Kenai Peninsula Borough, although the activities will create jobs during exploration, development, and production. **Effects of an Unlikely Large Oil Spill/Natural Gas Release:** Estimated employment to clean up an unlikely large oil spill ranges from 60 to 190 cleanup workers for 6 months in the first year, declining to zero by the third year following the spill. These effects are considered unlikely given the chance of a spill occurring. An accidental gas release is expected to produce no measurable effects.	The effects are expected to be essentially the same as for Alternative I.	The effects are expected to be essentially the same as for Alternative I.
Commercial Fisheries		
Effects of Routine Activity: Drilling discharges from exploration are not expected to affect commercial fishing due to the limited area affected near the platform-discharge point. Offshore construction, platforms, and pipelines are expected to result in some space-use conflicts; however, these are expected to be few in number and minor in scope. Seismic surveys, planned and coordinated with the commercial-fishing industry, are expected to have a minimal effect on the Cook Inlet commercial-fishing industry. Small oil spills are not expected to result in closures, or reduced market values over the life of the proposal. **Effects of an Unlikely Large Oil Spill/Natural Gas Release:** Based on the losses from a closure and	The effects are expected to be essentially the same as for Alternative I. The deferral would eliminate any effects due to drilling discharges, offshore construction activities, and seismic surveys within the deferral area. However, these activities are not expected to have measurable effects on commercial fishing anywhere in the sale area. We do not expect that precluding activity in the deferral area would measurably benefit commercial fishing.	The effects are expected to be essentially the same as for Alternative I. The deferral would eliminate any effects due to drilling discharges, offshore construction activities, and seismic surveys within the deferral area. However, these activities are not expected to have measurable effects on commercial fishing anywhere in the sale area. We do not expect that precluding activity in the deferral area would measurably benefit commercial fishing.

Table II.B-2 (continued)
Impact Summary for Lease Sales 191 and 199

Alternative I – Proposed Action	Alternative III – Lower Kenai Peninsula Deferral	Alternative IV – Barren Islands Deferral
Commercial Fisheries (cont.)		
average annual value of the Cook Inlet commercial fishery (about $41 million), the unlikely 4,600-barrel-oil pipeline spill in lower Cook Inlet could cause closure of the fishery over tainting concerns and result in an estimated to loss of about 22% to 37% per year for 2 years. It is possible that fishery could be closed for a whole year resulting in a 100% loss for that year, not including losses due to damaged to boats and gear. Losses of such magnitude constitute a significant effect on the Cook Inlet and Kodiak commercial fishing industry. Losses to the commercial fishing industry from a spill of this size occurring in winter may be much reduced. These effects are considered unlikely given the chance of a spill occurring. An accidental gas release is expected to produce no measurable effects.		
Subsistence-Harvest Patterns		
Effects of Routine Activity: Short-term, local disturbance from routine activities associated with exploration, development, and production could periodically affect subsistence resources and subsistence-harvest patterns, but no resource or harvest area would become unavailable, no resource would experience an overall decrease in population, and no harvest would be curtailed for the harvest season. Construction disturbance and noise could briefly disturb subsistence species that include beluga whales, seals, sea lions, fish, birds, moose, bears, and Sitka black-tailed deer, and only a few actual animals would be temporarily displaced. **Effects of an Unlikely Large Oil Spill/Natural Gas Release:** The subsistence resources (including shellfish), harvest areas, and harvest patterns in traditional communities could be affected for at least one harvest season with some resource populations requiring longer to recover. Some harvest	Reduces potential noise and disturbance from routine exploration, development, and production activities in the deferral area. However, noise and disturbance from these activities would create only local and short-term impacts to subsistence resources and practices. The deferral could provide some protection from oil spills by eliminating potential platform spill locations from the vicinity, thus providing a buffer to onshore, nearshore, and coastal subsistence resources and subsistence harvest areas. Additionally, any potential spill would occur farther offshore which could provide additional time for cleanup vessels to reach the spill before it reached these critical use areas. Even though the likelihood of a large oil spill would decrease slightly under this alternative, overall, effects to subsistence resources and harvest patterns are expected to be the same as describe under Alternative I.	Reduces potential noise and disturbance from routine exploration, development, and production activities to harbor seal haulouts, Steller sea lion habitat, and possibly beluga whales passing through the Kennedy Entrance. However, noise and disturbance from these activities would create only local and short-term impacts to subsistence resources and practices. The deferral could provide some protection from oil spills by eliminating potential platform spill locations from the vicinity, thus providing a buffer to onshore, nearshore, and coastal subsistence resources and subsistence harvest areas. Additionally, any potential spill would occur farther offshore which could provide additional time for cleanup vessels to reach the spill before it reached these critical use areas. Even though the likelihood of a large oil spill would decrease slightly under this alternative, overall, effects to subsistence resources and harvest patterns are

Table II.B-2 (continued)
Impact Summary for Lease Sales 191 and 199

Alternative I – Proposed Action	Alternative III – Lower Kenai Peninsula Deferral	Alternative IV – Barren Islands Deferral
Subsistence-Harvest Patterns (cont.)		
areas and resources in these areas could be too contaminated to harvest. Some resource populations could suffer losses and, as a result of tainting, an even larger array of resources could be rendered unavailable for use. Tainting concerns in communities nearest the spill could seriously curtail traditional practices for harvesting, sharing, and processing resources and threaten pivotal practices of traditional Native culture. Harvesting, sharing, and processing of subsistence resources would continue but would be hampered to the degree these resources were contaminated. In the case of extreme contamination, harvests would cease until such time as local subsistence hunters perceived resources as safe. These effects are considered unlikely given the chance of a spill occurring and contacting the resources. An accidental gas release is expected to produce no measurable effects.		expected to be the same as describe under Alternative I.
Sociocultural Systems		
Effects of Routine Activity: Exploration, development, and production activities contribute to the continuation of an important, longtime economic characteristic of the area. No qualitatively "new" activities are introduced to the area that alter existing sociocultural systems. Similarly, the relatively small number of new residents that come to the area should not alter the existing sociocultural systems. Analysis identified no measurable effects to subsistence harvest resources from routine operations. As such, sociocultural systems of Native Alaskan villages should not be affected. **Effects of an Unlikely Large Oil Spill/Natural Gas Release:** No effects were identified from a natural gas release. While subsistence harvest resources could be affected	The effects are expected to be essentially the same as for Alternative I. Deferral of the blocks from mid-Kachemak Bay and offshore the coast from south of Homer to Port Graham reduces the potential for oil-spill effects from potential production sites in the deferral area. That result should reduce, to an unknown extent, threats to subsistence resources and the attendant sociocultural effects to the Native Alaskan communities of Seldovia, Nanwalek, and Port Graham. Moving potential production sites farther offshore also increases the time available to respond to a production spill, should one occur.	The effects are expected to be essentially the same as for Alternative I. Deferral of the blocks around the Barren Islands reduces the potential for oil-spill effects from production sites in the deferral area. This should reduce, to an unknown extent, threats to subsistence resources and the attendant sociocultural effects on the Native Alaskan communities that use the area for subsistence harvest. Moving potential production sites farther offshore also increases the time available to respond to a production spill, should one occur.

Table II.B-2 (continued)
Impact Summary for Lease Sales 191 and 199

Alternative I – Proposed Action	Alternative III – Lower Kenai Peninsula Deferral	Alternative IV – Barren Islands Deferral
Sociocultural Systems (cont.)		
by an unlikely large oil spill, the analysis identified no long-term measurable effects to subsistence harvest resources that would fundamentally displace or alter sociocultural practices in the villages. Towns or cities could experience some short-term adverse effects. These effects are considered unlikely given the chance of a spill occurring.		
Recreation, Tourism, and Visual Resources		
Effects of Routine Activity: Space-use conflicts may arise. In the Cook Inlet area, these activities usually take place in different locations or at different times. When recreation and tourism activities coincide with routine oil activity, the duration normally will be very short. Visual resources will not be significantly affected. **Effects of an Unlikely Large Oil Spill/Natural Gas Release:** Potentially significant effects to coastal-dependent and coastal-enhanced recreation and tourism values limited to those areas where oil made contact and would last the duration of the cleanup. The Oil-Spill-Risk Analysis indicates that the chance of an oil spill contacting most land segments in recreation areas is a maximum of 26%, but is usually much less. An accidental gas release is expected to produce no measurable effects.	Moving the potential platform sites farther offshore reduces the area of the lower Kenai Peninsula that would be encompassed by the visual resource impact area (within a 5-mile radius of the platform). In addition, the action may reduce visual effects to passengers and potential space-use conflicts for charter vessels from Homer and Seldovia that transit the area en route to the Kennedy Entrance, Barren Islands, and Chugach Islands for wildlife viewing.	Moving the potential platform sites farther offshore reduces the area of the Barren Islands that would be encompassed by the visual resource impact area within a 5-mile radius of the platform. In addition, the action may reduce visual effects to passengers and potential space-use conflicts for charter vessels from Homer and Seldovia that transit the area en route to the Kennedy Entrance, Barren Islands, and Chugach Islands for wildlife viewing.
Sport Fisheries		
Effects of Routine Activity: Disturbance, displacement, or injury as a result of drilling or seismic activities also would not be measurable. We do not expect the various effects to sport fisheries taken altogether would cause population-level changes in sport fisheries resources and consequently in sport fisheries activities.	The effects are expected to be essentially the same as for Alternative I. The Oil-Spill-Risk Analysis shows some probability of spilled oil contacting land segments along the western side of the Kenai Peninsula, which result in effect similar to those for Alternative I.	The effects are expected to be essentially the same as for Alternative I. The Oil-Spill-Risk Analysis shows some probability of spilled oil contacting land segments along the western side of the Kenai Peninsula, which result in effect similar to those for Alternative I.

Table II.B-2 (continued)
Impact Summary for Lease Sales 191 and 199

Alternative I – Proposed Action	Alternative III – Lower Kenai Peninsula Deferral	Alternative IV – Barren Islands Deferral
Sport Fisheries (cont.)		
Effects of an Unlikely Large Oil Spill/Natural Gas Release: The Oil-Spill-Risk Analysis shows some probability of spilled oil contacting land segments along the western side of the Kenai Peninsula. Oil contacting the beaches could affect the clam gathering, particularly for razor clams and other types of clams along the east and west side of Cook Inlet and mussels and steamer clams in small bays off Kachemak Bay. A potentially significant impact could occur in any area contacted by oil, because populations of the intertidal organisms could be depressed measurably for about a year, and small amounts of oil likely would persist in the shoreline sediments for more than a decade. The spill could limit the ability of sport halibut and salmon fishers from setting out from oiled locations as long as such locations were oiled. The fishers could use alternate locations, but some of the charter operators would lose business. The loss of business could be 20% or $6 million in 2000 dollars for one year. These effects are considered unlikely given the chance of a spill occurring and contacting the resources. An accidental gas release is expected to produce no measurable effects.		
Environmental Justice		
Effects of Routine Activity: Noise and disturbance from routine activities are not expected to produce effects on the Native minority populations residing in the subsistence-based communities. **Effects of an Unlikely Large Oil Spill/Natural Gas Release:** If spill occurred and contaminated essential subsistence harvest areas major effects could occur when impacts from contamination of the shoreline, tainting concerns, cleanup disturbance, and disruption of subsistence practices are factored	Overall, effects to subsistence resources and harvest patterns would be expected to be essentially the same as described under Alternative I. Environmental Justice would be enhanced because the deferral protects subsistence resources in the Lower Kenai Peninsula.	Overall, effects to subsistence resources and harvest patterns would be expected to be essentially the same as described under Alternative I. Environmental Justice would be enhanced because the deferral protects subsistence resources in the Barren Islands.

Table II.B-2 (continued)
Impact Summary for Lease Sales 191 and 199

Alternative I – Proposed Action	Alternative III – Lower Kenai Peninsula Deferral	Alternative IV – Barren Islands Deferral
Environmental Justice (cont.)		
together. Such impacts would be considered disproportionately high adverse effects on Alaskan Natives. Any potential effects to subsistence resources and subsistence harvests from a large oil spill are expected to be mitigated, though not eliminated, to some extent. These effects are considered unlikely given the chance of a spill occurring and contacting the resources. An accidental gas release is expected to produce no measurable effects.		
Archaeological Resources		
Effects of Routine Activity: Potential damage to historic and prehistoric resource sites from activities that cause physical disturbance to the seafloor or coastal areas such as the placement of rigs and anchors, drilling wells, and pipeline construction. Small oil spills and gas releases are expected to have little effect. **Effects of an Unlikely Large Oil Spill/Natural Gas Release:** Potential significant impacts from damage to an archaeological site. Accidental oil spills could affect beached shipwrecks, or shipwrecks in shallow waters, and coastal historic and prehistoric archeological sites. Oil spills and their subsequent cleanup could affect the archaeological resources of the Cook Inlet area directly and/or indirectly. Gross crude oil contamination of shorelines is a potential direct impact that may affect archaeological site recognition. Heavy oiling conditions could conceal intertidal sites that may not be recognized until they are inadvertently damaged during cleanup. Crude oil may also contaminate organic material used in dating. The major source of potential impacts from oil spills is the indirect effects that result from unmonitored shoreline cleanup	Archaeology resources could be affected by any activities that cause physical disturbance to the seafloor or coastal areas, such as the placement of rigs and anchors, drilling wells, pipeline construction and oil spill clean up after an unlikely large oil spill. Small oil spills and gas releases are expected to have little effect. The deferral area contains none of the blocks we identified as possibly containing prehistoric archaeological resources. The Alternative does eliminate some blocks identified as possibly containing potential historic resources, specifically, the wrecks of the vessels *Seldovia* and *Dynamite Kid*. (If the area is leased, these potential historic resources should be detected during the archaeological surveys.) Potential effects on onshore resources due to disturbance from oil spill clean-up activities do not differ from Alternative I.	The effects are expected to be essentially the same as for Alternative I.

Table II.B-2 (continued)
Impact Summary for Lease Sales 191 and 199

Alternative I – Proposed Action	Alternative III – Lower Kenai Peninsula Deferral	Alternative IV – Barren Islands Deferral
Archaeological Resources (cont.)		
activities. Unmonitored booming, cleanup activities involving vehicle and foot traffic, mechanized cleanup involving heavy equipment, and high pressure washing on or near archaeological sites pose risks to the resource. Unauthorized collecting of artifacts by cleanup crewmembers is also a concern. These effects are considered unlikely given the chance of a spill occurring and contacting the resources. An accidental gas release is expected to produce no measurable effects.		
National and State Parks and Special Areas		
Effects of Routine Activity: No effects are expected during exploration. During development, onshore construction may cause the disruption and diminishment of recreational values of State recreational areas located along the Kenai Peninsula coast. Such effects, however, would be transient, encompassing two seasons, and could be mitigated. **Effects of an Unlikely Large Oil Spill/Natural Gas Release:** Significant impacts could result from a large spill to either the coastlines of Katmai National Park and Preserve or Lake Clark National Park and Preserve. Actual effects on the intrinsic of the parks' coastline would be less than 3 years; however, public perception of damage could last for a greater time. These effects are considered unlikely given the chance of a spill occurring and contacting the resources. An accidental gas release is expected to produce no measurable effects.	The effects are expected to be essentially the same as for Alternative I. The deferral may reduce some effects to park and recreation area resources; however, the effects of this deferral will not substantively change from those effects forecast for the Proposed Action. The probability of an oil-spill event occurring, the probability of it contacting certain segments, and the effects of spilled oil will be the same as analyzed for the Proposed Action.	The effects are expected to be essentially the same as for Alternative I. The deferral may reduce some effects to parks and recreational area resources; however, the effects of this deferral will not substantively change from those forecast for the Proposed Action. The probability of an oil spill event occurring, the probability of it contacting certain segments, and the effects of spilled oil will be the same as analyzed for the Proposed Action.
Coastal Zone Management		
No conflicts with the Alaska Coastal Management Program or the related district policies are anticipated. The MMS regulatory requirements and	The effects are expected to be essentially the same as for Alternative I.	The effects are expected to be essentially the same as for Alternative I.

Table II.B-2 (continued)
Impact Summary for Lease Sales 191 and 199

Alternative I – Proposed Action	Alternative III – Lower Kenai Peninsula Deferral	Alternative IV – Barren Islands Deferral
Coastal Zone Management (cont.)		
the implementation of the mitigating measures effectively address the consistency of the activities herein hypothesized with the Statewide standards of the Alaska Coastal Management Program and the enforceable policies of the Kenai Peninsula Borough and the Kodiak Island Borough Coastal Management Plans. The Coastal Zone Management Act requires that OCS exploration and development and production plans be consistent with the Alaska Coastal Management Program, including district enforceable policies.		

Table II.B-3
Impact Summary for Agency-Preferred Alternative

Water Quality
Effects of Routine Activity: Discharge of drilling muds and cuttings and other discharges associated with exploration drilling are not expected to have any measurable effect on the overall quality of the Cook Inlet water. The remaining activities—exploration discharges, small spills, and construction activities—would not significantly affect water quality. Construction activities would increase the turbidity in the water column along segments of the 40-km pipeline corridors for up to a few months, but no significant water quality degradation would occur. Drilling fluids and produced waters are not anticipated to be discharged during production. **Effects of an Unlikely Large Oil Spill/Natural Gas Release:** Would not significantly degrade the quality of Cook Inlet water. Concentrations of hydrocarbons in water would be less than the acute criterion within three days of spillage and concentrations above the chronic criterion would persist less than thirty days. These effects are considered unlikely given the chance of a spill. **Difference in Effects of the Agency-Preferred Alternative Compared to Alternative I:** The agency-preferred alternative avoids the effects from routine activities in the area deferred, shown on Figure I.A-2. However, these activities were not expected to have a measurable effect.
Air Quality
Effects of Routine Activity: The effects of exploration, 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 Class II limits (and Class I limits where they apply) and National Ambient Air Quality Standards. The air-quality analysis is based on the specific emission controls and emission limitations that the operators would apply to meet the appropriate Environmental Protection Agency regulations and permit requirements **Effects of an Unlikely Large Oil Spill/Natural Gas Release:** Concentrations of criteria pollutants would remain well within Federal air-quality standards. The overall effects on air quality would be minimal. **Difference in Effects of the Agency-Preferred Alternative Compared to Alternative I:** None, effects are essentially the same.
Lower Trophic-Level Organisms
Effects of Routine Activity: The presence of drill platform in the OCS area would cause very little benthic disturbance. This and other routine, anticipated activities during exploration, development, and production probably would not have measurable effects on local populations of lower trophic-level organisms. **Effects of an Unlikely Large Oil Spill/Natural Gas Release:** Potential contamination of 17 to 39 kilometers of shoreline in southwestern Cook Inlet or western Shelikof Strait. The risk to intertidal habitats on the east side of Cook Inlet would be low. For example, if a spill occurred at a hypothetical production platform in the lease area at any time during the year, the probability of contact with Clam Gulch within 30 days would be less than 4%. In any affected area, populations of intertidal organisms could be depressed measurably for about a year, and small amounts of oil could persist in shoreline sediments for more than a decade. These effects are considered unlikely given the chance of a spill occurring and contacting the resources. **Difference in Effects of the Agency-Preferred Alternative Compared to Alternative I:** The agency-preferred alternative avoids the effects from routine activities in the area deferred, shown on Figure I.A-2. However, these activities were not expected to have a measurable effect. For an unlikely oil spill, it avoids some of the risk to organisms in the area deferred, shown on Figure I.A-2.
Fisheries Resources
Effects of Routine Activity: Disturbance, displacement, or injury as a result of drilling or seismic activities would not be measurable. Although seismic surveys may damage eggs and fry of some fishes, this injury is limited to 1 or 2 meters from the airgun-discharge ports. Thus, seismic surveys probably would have no appreciable adverse effects on fish populations. Offshore/onshore construction could cause disturbance to pelagic fish and displacement from their preferred habitat, as a result of increased turbidity. Any disturbance or displacement should be short term (hours to days), limited to only the time of construction and shortly thereafter. Offshore structures may attract and protect some species. Drilling discharges could cause disturbance on demersal fishes and displacement from the immediate vicinity, within a radius probably not to exceed 100 meters. These effects very likely would be limited to only the short time periods of the discharge. **Effects of an Unlikely Large Oil Spill/Natural Gas Release:** Effects of a spill on fisheries resources would not be measurable at the population level. The likely effects would include the loss of some demersal fishes, and some eggs and fry of pink salmon, and some semidemersal fishes. Effects (short or long-term) that could be measured at even the stream population level are not likely. **Difference in Effects of the Agency-Preferred Alternative Compared to Alternative I:** The agency-preferred alternative avoids effects due to drilling discharges, offshore construction activities, and seismic surveys within the area

Table II.B-3 (continued)
Impact Summary for Agency-Preferred Alternative

deferred, shown on Figure I.A-2. However, drilling discharges, offshore construction activities, and seismic surveys are not expected to have measurable effects on fish resources anywhere in the sale area. For an unlikely oil spill, it avoids some of the risk to organisms in the area deferred, shown on Figure I.A-2.
Essential Fish Habitat
Effects of Routine Activity: Effects on essential fish habitat from seismic surveys, turbidity, and pipeline construction (both offshore and onshore) are considered low. The generally low effects of this lease sale on essential fish habitats are not expected to affect the ecosystem at a level that could be measured. **Effects of an Unlikely Large Oil Spill/Natural Gas Release:** Beach and intertidal fish habitats could be affected because oil could remain in the area contacted or prey could be impacted for more than a decade (three or more generations for some species, a significant effect). However, such habitat degradation would likely be limited to a very small proportion of habitat and the habitat of only small populations or subpopulations would be affected. Oil-spill effects on estuarine and marine essential fish habitats would generally be low because fish habitat would be expected to recover within approximately a month. These effects are considered unlikely given the chance of a spill occurring and contacting the resources. **Difference in Effects of the Agency-Preferred Alternative Compared to Alternative I:** The agency-preferred alternative avoids effects from routine activities within the area deferred shown on Figure I.A-2. For an unlikely oil spill, it slightly lowers the maximum risk in areas that are already at low risk (marine waters outside of Cook Inlet). Although the difference between the relative effects is minor, the effects of an oil spill on essential fish habitat would be the least in the area around the Barren Islands which the agency-preferred alternative defers, as shown on Figure I.A-2
Endangered and Threatened Species
Effects of Routine Activity: Adverse effects to threatened and endangered species from routine and common activities of exploration, development, or production should not exceed the significance thresholds. Effects to individuals (for example, displacement due to noise or other disturbance, collisions with structures, etc.) and effects that are relatively localized (for example due to pipeline placement or due to small oil spills) and short-term in impact could occur due to such activities. Because they are currently in serious decline, displacement of western population Steller sea lions from important critical habitats, such as important feeding areas, could potentially result in a significant effect on the population if alternative equally valuable food areas were unavailable to them or their shift to alternative areas displaced other Steller sea lions. A significant effect on the western population of Steller sea lions could also occur if such sea lions were disturbed and potentially killed as a result of aircraft (primarily helicopter) disturbance near important rookeries or haulouts. This type of disturbance should be avoided by compliance with NMFS-specified flight practices that ensure that such noise does not affect sea lions on these terrestrial critical habitats. Individual American peregrine falcons could potentially suffer some adverse effect from disturbance. Such effects are unlikely due to their distribution and relative rarity in the area. For a more extensive description of potential effects, please see section IV.B.1.f(2). **Effects of an Unlikely Large Oil Spill/Natural Gas Release:** Sea otters from the southwest Alaska stock and Steller sea lions (particularly from the western population) could suffer significant effects. However, while the vulnerability of sea otters to oil spills is clear, the level of vulnerability of Steller sea lions is less certain. Steller's eiders could be adversely affected by a spill during the late autumn, winter, or early spring. Fin whales are vulnerable if an unlikely large spill entered Shelikof Strait at any time of the year whereas humpbacks are primarily vulnerable only during the summer and late autumn months. Beluga whales could be adversely impacted in the non-summer months. The likelihood that there would be oil spill effects on cetaceans, even in the unlikely event of a large spill is uncertain. Potential effects on fin whales or humpback whales are likely to be local and not have population-level effects. A significant effect on the Alaska breeding population of Steller's eiders is unlikely. Individual American peregrine falcons could suffer adverse effects by catching and eating oiled prey. Such effects are unlikely due to their distribution and relative rarity in the area. **Difference in Effects of the Agency-Preferred Alternative Compared to Alternative I:** The agency-preferred alternative reduces potential effects to several species of marine mammals in the area deferred, shown on Figure I.A-2 that are designated as threatened, endangered or a candidate for listing under the ESA including the western stock of Steller sea lions, humpback whales, beluga whales, and possibly, but less likely, fin whales. The reduction in effects comes from the decrease in noise and disturbance primarily to Steller sea lions, but also beluga and humpback whales; noise and disturbance effects to important Steller sea lion habitat and to seasonal beluga whale habitat; and by decreasing the amount and level of noise detected by any deep water, large threatened and endangered cetacean in the Shelikof Strait and especially in the Gulf of Alaska. For an unlikely oil spill, it reduces the chance of exposure from extremely fresh oil to individual sea lions, and possibly humpbacks or beluga whales that might occur in the area deferred, shown on Figure I.A-2. It could also reduce potential oil-spill impacts to Steller sea lions at Cape Douglas and sea otters from the southwest Alaskan stock. The agency-preferred alternative removes an area that has a relatively high probability of an unlikely large oil spill impacting important habitat for the endangered western stock of

Table II.B-3 (continued)
Impact Summary for Agency-Preferred Alternative

the Steller sea lion and probable year-round habitat for the southwest stock of Alaska sea otters.
Marine and Coastal Birds
Effects of Routine Activity: Effects of helicopter flights (such as abandonment of roosting or foraging areas, nest abandonment, and lowered reproductive success) on those relatively few nesting or roosting individuals directly under or in close proximity (a few hundred feet) to the flight path. These impacts could continue for 1-2 years if birds adapt to the flights or the life of the project if birds fail to adapt. A few birds nesting within one-quarter mile of pipeline-landfall construction sites could suffer impacts during one breeding season. A limited number of birds could also be lost to small oil spills; recovery from small spills would probably require no more than 1 year. A limited number of birds could also be lost to small oil spills; recovery from small spills would probably require no more than 1 year. **Effects of an Unlikely Large Oil Spill/Natural Gas Release:** Loss of hundreds of birds to possibly tens of thousands of birds, depending on the size, timing (summer versus winter), and movement of the spill in relation to seasonal patterns of bird abundance and distribution. Depending on the number of birds involved, recovery could require a few years to two generations. However, recovery could be even longer for a few species. These effects are considered unlikely given the chance of a spill occurring and contacting the resources. A natural gas release and ignition could result in mortality to birds in the immediate vicinity. Blowouts of natural gas condensates that did not burn would be dispersed very rapidly at the blowout site; thus, it is unlikely that toxic fumes would affect birds or their food sources, except those very near the blowout source. Bird mortality associated with a blowout could range from a few to hundreds of individuals. However, such a loss would be expected to involve several species of marine and coastal birds, with no one population suffering losses that would not be replaced within about 1 year. **Difference in Effects of the Agency-Preferred Alternative Compared to Alternative I:** The agency-preferred alternative reduces some potential noise and disturbance effects from routine operations in the area deferred, shown on Figure I.A-2. It could reduce effects from an unlikely oil to marine and coastal birds in the area deferred, shown on Figure I.A-2, particularly in Kachemak Bay and in waters off the lower Kenai Peninsula, and in the Barren Islands because an oil spill would occur farther offshore, providing additional time for the oil to weather and for cleanup vessels to reach the spill.
Nonendangered Marine Mammals
Effects of Routine Activity: No measurable effects to regional populations or migrant populations of nonendangered marine mammals. Noise and disturbance effects could include temporary displacement within 1 mile of air traffic (caused by up to 78 helicopter flights per month) and vessel traffic (caused by up to 40 round trips per month). Habitat alteration would include about 50 acres. **Effects of an Unlikely Large Oil Spill/Natural Gas Release:** Loss of an estimated 20-100 harbor seals, a few fur seals, and small numbers (approximately 10-20) of cetaceans would be expected. Total recovery from these losses likely would take place within one year to less than 5 years. No measurable effects to regional populations or migrant populations of nonendangered marine mammals that occur within the Cook Inlet area are expected. Varying mortality to south central Alaska stock in Kachemak Bay could occur. These effects are considered unlikely given the chance of a spill occurring and contacting the resources. **Difference in Effects of the Agency-Preferred Alternative Compared to Alternative I:** The agency-preferred alternative reduces effects from routine activities to local habitat and populations within the area deferred, shown on Figure I.A-2. For an unlikely oil spill, it reduces effects to habitat and populations in the area deferred, shown on Figure I.A-2, because an oil spill would occur farther offshore providing additional time for the oil to weather and for cleanup vessels to reach the spill.
Terrestrial Mammals
Effects of Routine Activity: Regional populations of river otters, brown bears, Sitka black-tailed deer, and other terrestrial mammals likely would not be affected by the exploration and development activities. Noise and disturbance effects from air traffic (60 helicopter flights per month) and marine-vessel traffic (18-38 boat trips per month during exploration and 20-40 boat trips per month during development) are expected to have short-term (a few minutes to less than 1 hour) displacement effects on brown bears, moose, and other terrestrial mammals within about 1 mile of the traffic routes when near shore. Effects of an Unlikely Large Oil Spill/Natural Gas Release: Regional populations of river otters, brown bears, Sitka black-tailed deer, and other terrestrial mammals likely would not be affected by the oil spill. The spill could cause an estimated loss of a small number of river otters (approximately 10-30), a small number of brown bears (approximately 10-30), and some Sitka black-tailed deer (100 or fewer). Recovery could take more than 1 year (perhaps 3 years) for river otter and brown bear intertidal habitats and prey and 1 year for deer. These effects are considered unlikely given the chance of a spill occurring and contacting the resources. A natural gas release will have little effect since the gas is likely to disperse before reaching coastal habitats of terrestrial mammals.

Table II.B-3 (continued)
Impact Summary for Agency-Preferred Alternative

Difference in Effects of the Agency-Preferred Alternative Compared to Alternative I: The agency-preferred alternative reduces effects from routine activities to local habitat and populations within the area deferred, shown on Figure I.A-2 from diminished activity. For an unlikely oil spill, it reduces effects to habitat and populations in the area deferred, shown on Figure I.A-2, because an oil spill would occur farther offshore providing additional time for the oil to weather and for cleanup vessels to reach the spill.

Cook Inlet Economy

Effects of Routine Activity: Estimated increases in Kenai Peninsula Borough property tax revenue of approximately 6% (approximately $2.7 million per year for 15 years during production). Estimated revenue increases to the State of Alaska of less than 0.01% (approximately $2 million per year for 15 years during production). No measurable change in employment and personal income over the 2000 baseline for the Kenai Peninsula Borough, although the activities will create jobs during exploration, development, and production.

Effects of an Unlikely Large Oil Spill/Natural Gas Release: Estimated employment to clean up an unlikely large oil spill ranges from 60 to 190 cleanup workers for 6 months in the first year, declining to zero by the third year following the spill. These effects are considered unlikely given the chance of a spill occurring.

Difference in Effects of the Agency-Preferred Alternative Compared to Alternative I: None, effects are essentially the same.

Commercial Fisheries

Effects of Routine Activity: Drilling discharges from exploration are not expected to affect commercial fishing due to the limited area affected near the platform-discharge point. Offshore construction, platforms, and pipelines are expected to result in some space-use conflicts; however, these are expected to be few in number and minor in scope. Seismic surveys, planned and coordinated with the commercial-fishing industry, are expected to have a minimal effect on the Cook Inlet commercial-fishing industry. Small oil spills are not expected to result in closures, or reduced market values over the life of the proposal.

Effects of an Unlikely Large Oil Spill/Natural Gas Release: Based on the losses from a closure and average annual value of the Cook Inlet commercial fishery (about $41 million), the unlikely 4,600-barrel-oil pipeline spill in lower Cook Inlet in spring could cause an estimated to loss of about 22% to 37% per year for 2 years. It is possible that fishery could be closed for a whole year resulting in a 100% loss for that year, not including losses due to damaged to boats and gear, and a loss of this magnitude likely would have a significant effect on the Cook Inlet and Kodiak commercial fishing industry. Losses to the commercial fishing industry from a spill of this size occurring in winter are likely to be much reduced. These effects are considered unlikely given the chance of a spill occurring.

Difference in Effects of the Agency-Preferred Alternative Compared to Alternative I: The agency-preferred alternative avoids effects due to drilling discharges, offshore construction activities, and seismic surveys within the area deferred, shown on Figure I.A-2. However, these activities are not expected to have measurable effects on commercial fishing anywhere in the sale area.

Subsistence-Harvest Patterns

Effects of Routine Activity: Short-term, local disturbance from routine activities associated with exploration, development, and production could periodically affect subsistence resources and subsistence-harvest patterns, but no resource or harvest area would become unavailable, no resource would experience an overall decrease in population, and no harvest would be curtailed for the harvest season. Construction disturbance and noise could briefly disturb subsistence species that include beluga whales, seals, sea lions, fish, birds, moose, bears, and Sitka black-tailed deer, and only a few actual animals would be temporarily displaced.

Effects of an Unlikely Large Oil Spill/Natural Gas Release: The subsistence resources (including shellfish), harvest areas, and harvest patterns in traditional communities could be affected for at least one harvest season with some resource populations requiring longer to recover. Some harvest areas and resources in these areas could be too contaminated to harvest. Some resource populations could suffer losses and, as a result of tainting, an even larger array of resources could be rendered unavailable for use. Tainting concerns in communities nearest the spill could seriously curtail traditional practices for harvesting, sharing, and processing resources and threaten pivotal practices of traditional Native culture. Harvesting, sharing, and processing of subsistence resources would continue but would be hampered to the degree these resources were contaminated. In the case of extreme contamination, harvests would cease until such time as local subsistence hunters perceived resources as safe. These effects are considered unlikely given the chance of a spill occurring and contacting the resources.

Difference in Effects of the Agency-Preferred Alternative Compared to Alternative I: The agency-preferred alternative reduces potential noise and disturbance from routine exploration, development, and production activities to harbor seal haulouts, Steller sea lion habitat in the area deferred, shown on Figure I.A-2 and possibly to beluga whales passing through Kennedy Entrance. However, noise and disturbance from these activities would create only local and short-term impacts to subsistence resources and practices. For an unlikely oil spill, it reduces potential effects from oil

Table II.B-3 (continued)
Impact Summary for Agency-Preferred Alternative

spills by eliminating potential platform spill locations from the area deferred, shown on Figure I.A-2, thus providing a buffer to offshore, nearshore, and coastal subsistence resources and subsistence-harvest areas. Additionally, any potential spill would occur farther offshore and in this way provide additional time for cleanup vessels to reach the spill before it reached these critical-use areas.

Sociocultural Systems

Effects of Routine Activity: Exploration, development, and production activities contribute to the continuation of an important, longtime economic characteristic of the area. No qualitatively “new” activities are introduced to the area that alter existing sociocultural systems. Similarly, the relatively small number of new residents that come to the area should not alter the existing sociocultural systems. Analysis identified no measurable effects to subsistence harvest resources from routine operations. As such, sociocultural systems of Native Alaskan villages should not be affected.

Effects of an Unlikely Large Oil Spill/Natural Gas Release: No effects were identified from a natural gas release. While subsistence harvest resources could be affected by an unlikely large oil spill, the analysis identified no long-term measurable effects to subsistence harvest resources that would fundamentally displace or alter sociocultural practices in the villages. Towns or cities could experience some short-term adverse effects. These effects are considered unlikely given the chance of a spill occurring.

Difference in Effects of the Agency-Preferred Alternative Compared to Alternative I: The agency-preferred alternative reduces potential effects from mid-Kachemak Bay and offshore the coast from south of Homer to the Barren Islands which should reduce, to an unknown extent, threats to subsistence resources and the attendant sociocultural effects to the Native Alaskan communities of Seldovia, Nanwalek, and Port Graham. For an unlikely oil spill, moving potential production sites farther offshore also increases the time available to respond to a production spill.

Recreation, Tourism, and Visual Resources

Effects of Routine Activity: Space-use conflicts may arise. In the Cook Inlet area, these activities usually take place in different locations or at different times. When recreation and tourism activities coincide with routine oil activity, the duration normally will be very short. Visual resources will not be significantly affected.

Effects of an Unlikely Large Oil Spill/Natural Gas Release: Potentially significant effects to coastal-dependent and coastal-enhanced recreation and tourism values limited to those areas where oil made contact and would last the duration of the cleanup. The Oil-Spill-Risk Analysis indicates that the chance of an oil spill contacting most land segments in recreation areas is a maximum of 26%, but is usually much less. Effects to recreation, tourism, and visual resources are not expected from accidental releases of natural gas.

Difference in Effects of the Agency-Preferred Alternative Compared to Alternative I: The agency-preferred alternative eliminates possibility of significant visual impacts by moving the platforms further offshore from public viewing areas in the Lower Kenai Peninsula and reduces potential space-use conflicts for charter vessels from Homer and Seldovia that transit the area en route to the Kennedy Entrance, Barren Islands, and Chugach Islands for wildlife viewing.

Sport Fisheries

Effects of Routine Activity: Disturbance, displacement, or injury as a result of drilling or seismic activities also would not be measurable. We do not expect the various effects to sport fisheries taken altogether would cause population-level changes in sport fisheries resources and consequently in sport fisheries activities.

Effects of an Unlikely Large Oil Spill/Natural Gas Release: The Oil-Spill-Risk Analysis shows some probability of spilled oil contacting land segments along the western side of the Kenai Peninsula. Oil contacting the beaches could affect the clam gathering, particularly for razor clams and other types of clams along the east and west side of Cook Inlet and mussels and steamer clams in small bays off Kachemak Bay. A potentially significant impact could occur in any area contacted by oil, because populations of the intertidal organisms could be depressed measurably for about a year, and small amounts of oil likely would persist in the shoreline sediments for more than a decade. The spill could limit the ability of sport halibut and salmon fishers from setting out from oiled locations as long as such locations were oiled. The fishers could use alternate locations, but some of the charter operators would lose business. The loss of business could be 20% or $6 million in 2000 dollars for one year. These effects are considered unlikely given the chance of a spill occurring and contacting the resources. No effects anticipated from the unlikely large release natural gas during exploration or production.

Difference in Effects of the Agency-Preferred Alternative Compared to Alternative I: The agency-preferred alternative reduces potential space-use conflicts for sport-fishing vessels in the area deferred, shown on Figure I.A-2.

Environmental Justice

Effects of Routine Activity: Noise and disturbance from routine activities are not expected to produce effects on the Native minority populations residing in the subsistence-based communities.

Effects of an Unlikely Large Oil Spill/Natural Gas Release: If spill occurred and contaminated essential subsistence

Table II.B-3 (continued)
Impact Summary for Agency-Preferred Alternative

harvest areas major effects could occur when impacts from contamination of the shoreline, tainting concerns, cleanup disturbance, and disruption of subsistence practices are factored together. Such impacts would be considered disproportionately high adverse effects on Alaskan Natives. Any potential effects to subsistence resources and subsistence harvests from a large oil spill are expected to be mitigated, though not eliminated, to some extent. These effects are considered unlikely given the chance of a spill occurring and contacting the resources. **Difference in Effects of the Agency-Preferred Alternative Compared to Alternative I:** The agency preferred alternative enhances Environmental Justice because the area deferred, shown on Figure I.A-2, protects subsistence resources in the Lower Kenai Peninsula and Barren Islands.
Archaeological Resources
Effects of Routine Activity: Potential damage to historic and prehistoric resource sites from activities that cause physical disturbance to the seafloor or coastal areas such as the placement of rigs and anchors, drilling wells, and pipeline construction. Small oil spills and gas releases are expected to have little effect. **Effects of an Unlikely Large Oil Spill/Natural Gas Release:** Potential significant impacts from damage to an archaeological site. Accidental oil spills could affect beached shipwrecks, or shipwrecks in shallow waters, and coastal historic and prehistoric archeological sites. Oil spills and their subsequent cleanup could affect the archaeological resources of the Cook Inlet area directly and/or indirectly. Gross crude oil contamination of shorelines is a potential direct impact that may affect archaeological site recognition. Heavy oiling conditions could conceal intertidal sites that may not be recognized until they are inadvertently damaged during cleanup. Crude oil may also contaminate organic material used in dating. The major source of potential impacts from oil spills is the indirect effects that result from unmonitored shoreline cleanup activities. Unmonitored booming, cleanup activities involving vehicle and foot traffic, mechanized cleanup involving heavy equipment, and high pressure washing on or near archaeological sites pose risks to the resource. Unauthorized collecting of artifacts by cleanup crewmembers is also a concern. These effects are considered unlikely given the chance of a spill occurring and contacting the resources. **Difference in Effects of the Agency-Preferred Alternative Compared to Alternative I:** The agency-preferred alternative defers the area shown on Figure I.A-2 which we identified as possibly containing potential historic resources, specifically, the wrecks of the vessels Seldovia and Dynamite Kid. (If the area is leased, these potential historic resources should be detected during the archaeological surveys.)
National and State Parks and Special Areas
Effects of Routine Activity: No effects are expected during exploration. During development, onshore construction may cause the disruption and diminishment of recreational values of State recreational areas located along the Kenai Peninsula coast. Such effects, however, would be transient, encompassing two seasons, and could be mitigated. **Effects of an Unlikely Large Oil Spill/Natural Gas Release:** Significant impacts could result from a large spill to either the coastlines of Katmai National Park and Preserve or Lake Clark National Park and Preserve. Actual effects on the intrinsic of the parks' coastline would be less than 3 years; however, public perception of damage could last for a greater time. These effects are considered unlikely given the chance of a spill occurring and contacting the resources. **Difference in Effects of the Agency-Preferred Alternative Compared to Alternative I:** The agency-preferred alternative may reduce some effects to park and recreation area resources; however, the effects of this deferral will not substantively change from those effects forecast for Alternative I.
Coastal Zone Management
No conflicts with the Alaska Coastal Management Program or the related district policies are anticipated. The MMS regulatory requirements and the implementation of the mitigating measures effectively address the consistency of the activities herein hypothesized with the Statewide standards of the Alaska Coastal Management Program and the enforceable policies of the Kenai Peninsula Borough and the Kodiak Island Borough Coastal Management Plans. The Coastal Zone Management Act requires that OCS exploration and development and production plans be consistent with the Alaska Coastal Management Program, including district enforceable policies. **Difference in Effects of the Agency-Preferred Alternative Compared to Alternative I:** None. While the area deferred by the agency-preferred alternative, shown of Figure IA-2, provides additional protection to the Port Graham-Nanwalek Area Meriting Special Attention identified in the Kenai Peninsula Borough Coastal Management Plan, it does not change the conclusion of no conflicts with ACMP or related district policies.

Table III.A-1
Summary of Data for Streams and Rivers Flowing into Cook Inlet

Discharge Area and Stream or River	Mean Annual Discharge (m^3/sec)	Mean Discharge May to October (m^3/sec)	Mean Suspended Sediment Concentration May to October (mg/L[ppm])	Mean Suspended Sediment Discharge May to October (tonnes/day)	Drainage Area (km^2)	Percent of Drainage Area Covered by Glaciers	Stream Length (km)
Knik Arm							
Knik River (near Palmer)	192	349	1,130	41,340	3,055	54	69
Matanuska River (near Palmer)	110	201	1,564	32,960	5,359	12	124
Peters Creek (near Birchwood)	3	—	—	—	227	—	—
Eagle River (at Eagle River)	14	26	128	347	497	—	31
Ship Creek (near Anchorage)	5	—	—	—	24	—	31
Chester Creek (at Arctic Blvd.)	1	—	—	—	70	0	21
Turnagain Arm							
Campbell Creek (near Spenard)	2	—	—	—	180	0	31
Glacier Creek (at Girdwood)	7	—	—	—	161	11	18
Portage Creek (at Portage Lake outlet)	24	—	—	—	105	—	—
Resurrection Creek (near Hope)	7	—	—	—	386	0	32
Cook Inlet (east side)							
Kenai River	168	—	—	—	5,439	11	190
Kasilof River (near Kasilof)	67	—	—	—	1,911	28	34
Ninilchik (at Ninilchik)	3	4	58	22	339	0	88
Anchor River (at Anchor Point)	8	—	—	—	585	0	45
Kachemak Bay							
Bradley River (near Homer)	12	—	—	—	140	36	21
Seldovia River (near Seldovia)	6	—	—	—	68	—	—
Barabara Creek (near Seldovia)	3	—	—	—	54	—	—
Cook Inlet (west side)							
Paint River (near Kamishak)	37	—	—	—	531	—	—
Chuitna River (near Tyonek)	10	—	—	—	339	—	—
Chakachatna River (at Tyonek)	102	—	—	—	2,900	30	88
Susitna River (at Gold Creek)	282	546	796	45,481	15,948	5	304
Susitna River (at Susitna Station)	1,437	—	—	—	—	—	—
Little Susitna River (near Palmer)	6	—	—	—	160	5	23
Totals	**2,223**[1]	—	—	**119,777**[2]	**38,687**[3]	—	—

Notes:
[1]Susitna River at Susitna Station (70.1 billion cubic meters per year).
[2]Sediment discharge for Knik, Matanuska, and Susitna River (at Gold Creek) (39,189,000 tonnes per year).
[3]Cook Inlet Basin ~ 98,000 square kilometers (km^2).
Estimated drainage area ~ 50,000 km^2.

Key:
— = no data available
km = kilometers
km^2 = square kilometers
m^3/sec = cubic meters per second
mg/L = milligrams per liter
ppm = parts per million
tonnes/day = tonnes per day

Source:
USDOI, MMS, Alaska OCS Region (1995).

Table III.A-2
Metal Concentrations in Sedimentary, Volcanic, and Plutonic Rocks Surrounding Cook Inlet in Suspended Sediment from the Susitna-Knik-Matanuska River System and in Average Continental Crust

Metal	Concentrations in Average Continental Crust	Concentration Range in Alaskan Rock	Concentration Range in Suspended Sediment from the Susitna-Knik-Matanuska River System
Silver (ppm)	0.07	—	0.10-0.66
Aluminum (%)	7.96	2.67-7.81	6.61-12.90
Arsenic (ppm)	1.7	8-39	23.1-38.5
Barium (ppm)	584	383-983	897-1540
Beryllium (ppm)	2.4	—	0.60-3.44
Calcium (%)	3.85	0.82-8.24	1.33-2.37
Cadmium (ppm)	0.10	—	0.19-0.58
Chromium (ppm)	126	47-84	103-182
Cobalt (ppm)	24	7.4-17.5	—
Copper (ppm)	25	16-75	47-78
Iron (%)	4.32	1.59-6.66	5.15-6.90
Lead (ppm)	14.8	6-25	16-56
Magnesium (%)	2.20	0.67-2.34	3.02-4.30
Manganese (ppm)	716	351-1,710	995-1,308
Mercury (ppm)	0.04	—	0.111-0.428
Nickel (ppm)	56	19-47	43-94
Potassium (%)	2.14	0.81-2.06	2.26±0.63
Antimony (ppm)	0.30	—	0.93-2.88
Selenium (ppm)	0.12	—	<0.1
Tin (ppm)	2.3	—	1.22-3.59
Titanium (%)	0.40	0.25-0.41	0.607±0.0.059
Thallium (ppm)	0.52	—	0.53-0.98
Vanadium (ppm)	98	55-278	106-209
Zinc (ppm	65	96-288	84-267

Key:
% = percent
ppm = parts per million
— = not applicable
< = less than

Source:
Boehm (1998, 2001a).

Table III.A-3
Estimates of Natural and Anthropogenic Inputs of Metals to Cook Inlet

Input Type	As	Ba	Cd	Cr	Cu	Hg	Pb	Zn
Natural Inputs								
Dissolved (Susitna-Knik-Matanuska River System)								
(in tonnes/year)	70	2,100	140	70	140	7	70	700
(in ppb wet weight = μg/L)	1	30	2	1	2	0.1	1	10
Particulate (Susitna-Knik-Matanuska River System)								
(in tonnes/year)	930	28,000	8	5,900	2,500	2.5	1,600	5,900
(in ppm = μg/L)	23.5	683	0.2	147	60	0.06	40	146
Total (in tonnes/year)	**1,000**	**30,100**	**148**	**5,970**	**2,640**	**9.5**	**1,670**	**6,600**
Anthropogenic Inputs								
Drilling Muds								
(in tonnes/year)	0.03	1,445	0.01	0.90	0.12	0.004	0.14	0.78
(in ppm)	3-7	370,000	1-3	130-240	19-30	0.1-1	23-35	200
Produced Water								
(in tonnes/year)	0.16	300	0.12	0.005	2.4	0.001	1.0	0.24
(in ppb wet weight = μg/L)	30	56,000	23	1	445	0.2	195	45
Wastewater								
(in tonnes/year)	0.35	—	0.41	1.4	3.7	0.03	0.70	4.9
Total (in tonnes/year)	**0.54**	**1,745**	**0.54**	**2.3**	**6.2**	**0.035**	**1.8**	**5.9**

Key:
— means not measured
μg/g = micrograms per gram
μg/L = micrograms per liter
As = Arsenic
Ba = Barium
Cd = Cadmium
Cr = Chromium
Cu = Copper
Hg = Mercury
Pb = Lead
ppb = parts per billion
ppm = parts per million
Zn = Zinc

Source:
Boehm (1998).

Table III.A-4
Summary of Published Data on Trace Metals (Percent or Parts per Million Dry Weight) in Suspended-Particulate Matter from Cook Inlet and Shelikof Strait

Parameter	Reference	Concentration	Locality
Antimony	UAA, ENRI (1995)	ND-8.22 ppm	Cook Inlet
Arsenic		1.17-10 ppm	
Barium		26.3-698 ppm	
Cadmium		0.17-61.3 ppm	
Chromium		28.7-108 ppm	
Copper		40.1-230 ppm	
Iron		1,780-50,100 ppm	
Lead		17-388 ppm	
Mercury		ND-0.42 ppm	
Nickel		20.8-56.1 ppm	
Silver		ND-0.28 ppm	
Thallium		0.31-0.93 ppm	
Vanadium		8.9-142 ppm	
Zinc		111-1,220 ppm	
Magnesium	Feely and Massoth (1982)	1.68-3.69%	Kamishak Bay Kachemak Bay Kennedy and Stevenson Entrances Northwest Shelikof Strait
Aluminum		3.91-9.84%	
Silicon		27.82-34.82%	
Potassium		0.65-2.09%	
Calcium		1.36-1.77%	
Titanium		0.205-0.483%	
Iron		2.03-5.31%	
Magnesium	Feely et al. (1981; 5 meters off the bottom)	3.59-4.01%	Lower Cook Inlet Shelikof Strait
Aluminum		8.88-9.49%	
Silicon		38.09-44.71%	
Potassium		2.19-2.24%	
Calcium		2.08-2.23%	
Titanium		0.53-0.58%	
Chromium		115-116 ppm	
Manganese		1,460-4,174 ppm	
Iron		6.39-6.50%	
Nickel		77-81 ppm	
Copper		100-112 ppm	
Zinc		343 ppm	
Lead		69-76 ppm	

Key:
% = percent
ND = not detected
ppm = parts per million
ENRI = Environment and Natural Resources Institute
UAA = University of Alaska Anchorage

Source:
Boehm (2001a).

Table III.A-5
Municipal Wastewater Discharges into Cook Inlet

Munici-pality	Popula-tion	Treatment	Receiving Waters	Permitted Discharge Rates: Wastewater (thousand cubic meters per day)	Permitted Discharge Rates: Wastewater (cubic meters per day)	Biochemi-cal Oxygen Demand (kilogram per day)[MAL]	Total Suspended Solids (kilogram per day)[MAL]
Anchorage	226,338	Primary[1]	Knik Arm	167	—	21,762	18,137
Eagle River[A]	—	Secondary[2]	Eagle River	6.1	—	161	241
English Bay[CDP]	158	Primary[3]	English Bay	—	38	—	—
Girdwood[A]	—	Secondary[4]	Glacier Creek	3.2	—	—	—
Homer	3,660	Secondary[5]	Kachemak Bay	2.3	—	77	77
Kenai	6,327	Secondary[6]	Cook Inlet	1.9	—	161	161
Palmer	2,866	Secondary[7]	Matanuska River	1.9	—	49	49
Port Graham[CDP]	166	Primary[8]	Port Graham	—	113	—	—
Seldovia	316	Primary[9]	Seldovia Bay	—	53	—	—
Tyonek[CDP]	154	Primary[10]	Cook Inlet	—	117	—	—
Totals[11]				**182.4**	**321**	**22,210**	**18,665**

Notes:
[1]EPA NPDES Permit AK0022551.
[2]EPA NPDES Permit AK0022543.
[3]ADEC Permit.
[4]EPA NPDES Permit AK0047856.
[5]EPA NPDES Permit AK0021245.
[6]EPA NPDES Permit AK0021377.
[7]EPA NPDES Permit AK0022497.
[8]ADEC Permit 8923-DB001.
[9]ADEC Permit 8923-DB003.
[10]ADEC Permit 8923-DB007.
[11] Total of both thousand cubic meters and cubic meters per day wastewater discharges is 182.7.

Key:
— = not applicable
[A] = Eagle River and Girdwood populations are included in the Anchorage census
ADEC = Alaska Department of Environmental Conservation
[CDP] = Census-designated place
EPA = U.S. Environmental Protection Agency
[MAL] = Monthly average limitation
NPDES = National Pollutant Discharge Elimination System

Source:
USDOI MMS, Alaska OCS Region (1995).

Table III.A-6
Anchorage Water and Wastewater Utility Point Woronzof Wastewater Treatment Facility Effluent Monitoring Data – November 1992 through October 1993

Discharge or Substance[1]	Average Concentration (ppb wet weight [µg/L])	Daily Output (kilograms)	Yearly Output		Minimum and Maximum Concentratio ns1986-1993 (ppb wet weight [µg/L])	Maximum Allowable Effluent Concentrations[2] (ppb wet weight [µg/L])
			Kilograms	Tonnes		
Metals						
Arsenic	5	0.57	207.95	0.21	<1 - 13	12,700
Cadmium	6	0.68	248.34	0.25	<0.5 - 30	112
Copper	54	6.13	2,238.39	2.24	38 - 120	100
Lead	10	1.13	413.90	0.41	<1 - 50	625
Mercury	0.4	0.05	16.56	0.02	<0.2 - 0.7	0.625
Nickel	26	2.95	1,077.80	1.08	<1 - 60	177
Silver	8	0.91	331.12	0.33	0.9 - 98	57
Zinc	71	8.06	2,942.02	2.94	41 - 240	1,450
Chromium (total)	21	2.39	870.53	0.87	<1 - 120	450
Beryllium	0.1	0.01	4.97	<0.01	—	275
Nonmetals	**(ppm wet weight [mg/L])**	**Kilograms**	**Kilograms**	**Tonnes**	**ppm wet weight (mg/L)**	**Avg. ppm wet weight (mg/L)**
Dissolved Oxygen	6.8	772.14	281,826.58	281.83	2.1 - 8.6	2
Biological Oxygen Demand	103	11,695.65	4,268,840.30	4,268.84	68 - 132	120 (monthly average) 140 (daily average)
Total Suspended Solids Average	49	5,563.95	2,030,806.98	2,030.81	39 - 86	100 (monthly average) 130 (daily average)
Oil and Grease Average	21.4	2,429.97	886,924.67	886.92	8.2 - 30.1	2

Notes:
[1]Effluent Discharge 110,000 cubic meters/day (Range 1986 to 1993—87 to 140 thousand cubic meters/day)
[2]Effluent water-quality criteria were determined by assuming a dilution of 25:1 at the Zone of Initial Dilution boundary. Pollutant concentrations in the effluent should not exceed these values.
[3]No requirements for these substances.

Key:
< = less than
µg/L = micrograms per liter
Avg. = average
mg/L = milligrams per liter
ppb = parts per billion
ppm – parts per million

Source:
Kinnetic Laboratories (1994).

Table III.A-7
Fishery Harvests and Wastes in Cook Inlet

Resource	Years	Harvest Range (million kilograms/year)		Percent Waste	Waste Range (million kilograms/year)	
		From	To		From	To
Salmon (all species)	1980-90	2.30	5.02	27.5	0.63	1.37
Herring	1980-90	1.22	6.28	92	1.12	5.77
Crab (Dungeness)	1980-90	>0.05	0.9	45	0.02	0.4
Halibut	1989-91	3.01	4.09	25	0.75	1.03
Totals	—	**6.59**	**16.30**	—	**2.52**	**8.58**

Key:
— means not applicable
> = greater than

Source:
USDOI MMS, Alaska OCS Region (1995).

Table III.A-8
Oil and Gas Production Facilities – Cook Inlet Region

Facility Name	Operator	Facility Type	Latitude/ Longitude	Distance to Shore (km/st. mi)*	Water Depth (meters MLLW)	No. of Oil-Service Wells	No. of Gas Wells	Oil Production (bpd)	Gas Production (1,000xCFD)	Muds and Cuttings (bbl/well)	Produced Water (bbl/day)		Produced Water Discharge Location
											Peak	Average	
Anna	Unocal	Production Platform	60°51'37"N151°18'46"W	4.0/2.5	23	20 oil, 8 injection	0	2,700	210	15,000	2,000	1,500	Platform
Baker	Unocal	Production Platform	60°49'45"N151°29'01"W	12.1/7.5	31	11 oil, 4 service	1	1,000	280	26,000	55	30	Platform
Bruce	Unocal	Production Platform	60°59'46"N150°17'52"W	2.4/1.5	19	11 oil, 8 injection	0	600	370	15,000	700	160	Platform
Dillon[1]	Unocal	Production Platform	60°44'08"N151°31'45"	6.0/3.7	28	10 oil, 3 service	0	400	150	27,000	3,000	2,650	Platform
NCIU Tyonek "A"	Phillips	Production Platform	61°04'36"N151°56'54"W	8.9/5.5	21	0	12	0	165,000	—	185	170	Platform
SWEPI "A"	Shell Western	Production Platform	60°47'45"N 151°29'44"W	9.5/5.9	30	16	1	3,100	1,000	—	2,700	1,700	E. Foreland Facility
SWEPI "C"	Shell Western	Production Platform	60°45'50"N151°30'08"W	7.1/4.4	21	15	0	3,000	1,000	11,600	2,400	1,400	E. Foreland Facility
Granite Point	Unocal	Production Platform	60°57'30"N151°19'53"W	5.8/3.6	23	11 oil, 6 water injection	0	2,600	1,900	26,500	1,000	300	Granite Pt. Facility
Spark[2]	Marathon	Production Platform	60°55'42"N151°31'50"W	2.9/1.8	18	4, with 1 shut-in	0	300	—	—	5,000	3,900	Granite Pt. Facility
Spurr[3]	Marathon	Production Platform	60°55'10"N 151°33'26"W	2.6/1.6	20	5, with 1 shut-in	1 shut-in	300	—	—	500	200	Granite Pt. Facility
Grayling	Unocal	Production Platform	60°50'13"N151°36'47"W	5.8/3.6	41	24 oil, 10 service, 1 abandoned	2	6,800	9,200	20,000	39,000	37,000	Trading Bay Facility
Dolly Varden	Unocal	Production Platform	60°48'28"N151°37'58"W	6.4/4.0	34	24	1, with 1 shut-in	6,700	Platform use only	13,500	33,800	31,300	Trading Bay Facility
King Salmon	Unocal	Production Platform	60°51'54"N151°36'18"W	3.9/2.4	24 (MSL)	19	1	5,000	6,000	15,000	42,000	40,300	Trading Bay Facility
Monopod	Unocal	Production Platform	60°53'49"N151°34'44"W	2.4/1.5	19	29 oil, 2 service	0	2,800	2,500	5,800	6,800	4,800	Trading Bay Facility

Table III.A-8 (continued)
Oil and Gas Production Facilities—Cook Inlet Region

Facility Name	Operator	Facility Type	Latitude/ Longitude	Distance to Shore (km/st. mi)*	Water Depth (meters MLLW)	No. of Oil-Service Wells	No. of Gas Wells	Oil Production (bpd)	Gas Production (1,000xCFD)	Muds and Cuttings (bbl/well)	Produced Water (bbl/day)		Produced Water Discharge Location
											Peak	Average	
Steelhead	Unocal	Production Platform	60°40'54"N15 1°36'08"W	7.1/4.4	56	3	11	2,000	165,000	13,500	1,000	800	Trading Bay Facility
Osprey	Forest Oil	Production Platform	60°41'46"N15 1°40'10"W	2.9/1.8	14	In develop-ment	In develop-ment	In develop-ment	In develop-ment	In develop-ment[4]	In develop-ment	In develop-ment	To be reinjected
Granite Point[3]	Unocal	Onshore Separation	60°01'14"N15 1°25'14"W	3.1/1.9**	14***	—	—	—	—	—	5,200	4,400	Spark Platform
Trading Bay	Unocal	Onshore Separation	60°49'05"N15 1°46'59"W	3.1/1.9**	11***	—	—	—	—	—	120,000	115,000	Outfall
East Forelands	Shell Western	Onshore Separation	60°44'09"N 151°21'13"W	0.24/0.15**	11***	—	—	—	—	—	5,100	3,100	Outfall

Notes:
* = Distance from nearest shore measured from low water.
** = Distance of discharge point from shore. Location of Trading Bay facility is at the Spark Platform.
*** = Water depth at location of discharge outfall.
[1]Dillon Platform Shutdown June 1992 (*Alaska Report*, 1992d).
[2]Spark Platform Shutdown January 1992 (*Alaska Report*, 1992a; 1992c).
[3]Spurr Platform and Granite Point Production Facility Shutdown May 1992 (*Alaska Report*, 1992b).
[4]Osprey Platform muds and cuttings will be injected into underlying formation.

Key:
— = not applicable
bbl/day = barrels per day
bbl/well = barrels per well
km = kilometers
MLLW = mean level low water
MSL = mean sea level
st. mi = statute miles

Sources: USDOI, MMS, Alaska OCS Region (1995); Environmental Protection Agency (2002; 2002).

Table III.A-9
Chemical Analyses of Produced Water Samples: The Cook Inlet Discharge Monitoring Study

Facility	Field D.O. (ppm)	Field pH	Lab pH	Oil & Grease Spec[1] (ppm = mg/L)	Oil & Grease Grav[2] (ppm =mg/L)	BOD (ppm = mg/L)	COD (ppm = mg/L)	Salinity (°/oo)	Ammonia (ppm N =mg/L N)	TOC (ppm = mg/L)	96-hr LC_{50}[3]	Zinc (ppm =mg/L)	Total Aromatic[4] Hydrocarbons (ppm = mg/L)	Total Naph-thalenes[5] Hydro-carbons (ppm = mg/L)
Onshore Production Treatment Facilities														
Granite Point														
Mean	1.0	6.5	7.4	147.0	36.2	413	1,071	33.74	11.28	238	13.50	0.038	12.226	2.177
Minimum	0.0	6.3	7.1	52.0	24.8	340	865	31.40	9.60	224	5.81	0.025	10.028	0.357
Maximum	1.8	6.9	7.6	209.0	50.7	504	1,290	36.30	12.90	251	19.36	0.100	15.205	5.765
Trading Bay														
Mean	3.6	6.7	6.8	46.0	36.0	518	963	25.83	5.14	255	17.99	0.038	8.428	2.003
Minimum	0.1	6.5	6.5	28.0	3.2	315	731	25.10	0.82	126	9.43	0.025	6.593	0.312
Maximum	8.1	7.0	7.1	58.0	70.1	780	1,100	25.56	7.70	367	25.00	0.100	11.739	5.480
East Foreland														
Mean	0.3	7.5	7.8	12.3	18.9	470	962	20.60	10.55	306	21.66	0.101	13.091	4.190
Minimum	0.0	6.9	7.4	11.0	10.3	360	731	19.38	8.50	234	13.15	0.025	10.077	0.293
Maximum	0.8	8.5	7.9	14.0	41.4	630	1,240	21.59	13.00	393	30.88	0.170	24.044	15.525
Oil-Production Platforms														
Baker														
Mean	1.1	7.5	8.0	52.7	34.0	435	800	9.76	4.98	208	23.98	0.416	21.213	1.443
Minimum	0.6	7.0	7.8	25.2	7.7	120	400	7.76	0.05	10	8.84	0.025	8.197	0.173
Maximum	2.0	8.2	8.3	96.4	131.0	758	1,154	13.00	7.70	749	41.61	4.300	31.622	2.847
Bruce														
Mean	1.7	6.7	7.3	73.3	52.6	1,480.8	2,995.8	13.80	13.68	1,154.8	0.90	3.688	41.287	4.108
Minimum	1.4	6.1	7.1	67.0	28.5	1,170.0	2,950.0	13.50	10.90	967.0	0.27	0.430	22.130	0.764
Maximum	2.1	7.3	7.5	82.0	81.3	1,860.0	3,050.0	14.16	17.00	1,430.0	2.47	8.000	62.335	13.277
Gas-Production Platform														
Phillips "A"														
Mean	2.0	7.3	7.5	1.3	3.8	105	438	4.97	2.09	172	63.69	0.031	0.704	0.609
Minimum	1.6	6.8	7.4	0.7	1.2	58	200	0.40	1.70	86	47.56	0.025	0.358	0.078
Maximum	2.5	7.6	7.7	2.1	7.0	124	533	9.90	2.41	209	82.47	0.60	1.271	0.400

Key:
°/oo = practical salinity unites
BOD = Biological Oxygen Demand
COD = Chemical Oxygen Demand
D.O. = dissolved oxygen
mg/L = milligrams per liter
N = nitrogen
ppm = parts per million
TOC = total organic carbons

Source:
EBASCO Environmental (1990a).

Notes:
LC_{50}[3] = lethal concentration at which half the organisms die
[1]Environmental Protection Agency Method 413.2 - infrared, spectrophotometric method was used.
[2]Environmental Protection Agency Method 413.1 - gravimetric method was used.
[3]*Mysidopsis bahia* was the test organism. LC_{50}'s are in percent of effluent.
[4]Total aromatic hydrocarbons is the total of all parameters using Environmental Protection Agency Methods 602, 603, and 610. These include all the mono-, di-, and polycyclic aromatic hydrocarbons.
[5]Total naphthalenes is the total of all the diaromatic hydrocarbons.

Table III.A-10
Chemical Analyses of Produced Water Samples: Source Samples from Shelikof Strait Sediment Quality Study and Produced Water Sample from the Trading Bay Production Facility Outfall

Parameters	Net Weight (parts per million wet weight)
Total PAH	0.380
Total PHC	6.20
Silver	<0.0001
Arsenic	0.0024
Barium	20.7
Beryllium	<0.0001
Cadmium	0.0001
Chromium	0.0032
Copper	0.0060
Iron	0.76
Mercury	<0.0005
Manganese	1.71
Nickel	0.0075
Lead	0.0001
Antimony	0.0001
Selenium	<0.0002
Tin	0.008
Thallium	0.00025
Vanadium	0.067
Zinc	0.0030

Key:
< = less than
PAH = polycyclic aromatic hydrocarbons
PHC = petroleum hydrocarbons

Source:
Boehm (2001a).

Table III.A-11
Estimates of Oil and Grease, Biological Oxygen Demand, and Zinc in Cook Inlet Petroleum-Production Discharges

		Oil and Grease (Gravimetric)						BOD[2]			Zinc[2]		
		Permit—Monthly Average			Monitoring Study[2]			Monitoring Study			Monitoring Study		
Facility	Produced Water Discharge Rate[1] (bbl/day)	Concen-tration (ppm =mg/L)	Daily (kg)	Year (kg)	Mean Concen-tration. (mg/L)	Daily (kg)	Year (kg)	Mean Concen-tration (ppm =mg/L)	Daily (kg)	Year (kg)	Mean Concen-tration (ppm =mg/L	Daily (kg)	Year (kg)
Onshore Production-Treatment Facilities													
Granite Point	4,400	48	33.05	1,226	36.2	25.31	9,241	413	291.32	106,331	0.038	0.03	9.7
Trading Bay	115,000	48	877.37	320,240	36.0	658.03	240,180	518	9,468.28	3,455,922	0.038	0.69	253.5
East Foreland	3,100	48	23.65	8,633	18.9	9.31	3,399	470	231.58	84,527	0.101	0.05	18.1
Oil-Production Platforms													
Baker	30	48	0.23	84	34.0	0.16	59	435	2.07	757	0.416	0.00	0.7
Bruce	160	48	1.22	446	52.6	1.34	488	1,480.8	37.68	13,745	3.688	0.10	34.2
Gas-Production Platform													
Phillips "A"	170	48	1.29	473	3.8	0.10	37	105	2.83	1,036	0.031	0.00	0.3
Totals	122,860	—	937.34	342,128	—	694.26	253,404	—	10,033.7	3,662,232	—	0.87	312.6

Notes:
[1]Table III.A.4-8
[2]Table III.A.4-9a

Key:
— = not applicable
—
bbl/day = barrels per day
BOD = Biological Oxygen Demand
kg = kilogram
mg/L = milligrams per liter
ppm = parts per million

Table III.A-12
Drilling Muds and Cuttings – MMS Estimates

Weight Estimates and Composition of Drilling Muds and Cuttings		
Weight Estimates		
Well Type	**Drilling Mud Components (Dry Weight – Tonnes)**	**Cuttings Produced (Dry Weight – Tonnes)**
Development	70 to 340	510
Delineation	330	400
Exploration	30	400

Composition of Discharged Mud	
Component	**Weight Percent**
Barite	63.0
Clay	24.0
Lignosulfonate[1]	2.0
Lignite	1.5
Sodium Hydroxide	1.5
Other	8.0

Note:
[1]Chrome or ferrochrome lignosulfonates are the primary source of chromium in drilling muds. Two of the drilling muds authorized by the 1986 General National Pollutant Discharge Elimination System Permit (Environmental Protection Agency, 1986) allow up of 15 pounds per barrel of chrome or ferrochrome lignosulfonates to be added to the drilling mud. For drilling in Federal and State waters of Alaska, the petroleum industry has voluntarily replaced chrome lignosulfonates with deflocculants that do not contain chromium (Neff, 1991).

Source:

USDOI, MMS, Alaska OCS Region (1995).

Table III.A-13
Estimates of Drilling Muds and Cuttings Discharged into Cook Inlet

		Drilling Muds		Drilling Cuttings	
Well Type	**Number of Wells**	**Amount of Muds Used per Well (tonnes)**	**Total Amount of Muds Used (tonnes)**	**Amount of Cuttings Produced per Well (tonnes)**	**Total Amount of Cuttings Produced (tonnes)**
Exploration[1]	87	330	28,700	400	34,800
Development and Service (1966-1970)[2]	221	70	15,500	510	112,700
Development and Service[3]	238	340	80,920	510	121,400
Totals	**546**	**NA**	**125,120**	**NA**	**268,900**

Notes:
[1] Includes cost well.
[2] For the development and service wells drilled between 1966 and 1970, it was assumed the drilling muds were recycled, and the amount of mud used per well was 70 tonnes.
[3] For the development and service wells drilled before 1966 and after 1970, it was assumed the drilling muds were not recycled, and the amount of mud used per well was 340 tonnes.

Key:

NA = not applicable

Source:
USDOI, MMS, Alaska OCS Region (1995).

Table III.A-14
Selected Effluent Characteristics: Tesoro Refinery and Union Chemical for 1 Year

Effluent Characteristics	Discharge Limitations	
	Monthly Average (kilograms/day)	Maximum Daily (kilograms/day)
Tesoro Refinery		
Biochemical Oxygen Demand (5-day)	92.5	168.5
Chemical Oxygen Demand	599	1,118
Total Suspended Solids	75.43	118.6
Oil and Gas	21.9	39.4
Ammonia (as N)	39.0	86.2
Union Chemical		
Ammonia (as N)	873	1,717
Organic Nitrogen (as N)	1.349	2,521
Oil and Gas	—	6.8

Notes:
[1]EPA Permit No. AK-000084-1
[2]EPA Permit No. AK-000050-7

Source:
USDOI, MMS, Alaska OCS Region (1995).

Table III.A-15
Estimates of Selected River and Point-Source Discharges into Cook Inlet for 1 Year

Discharge Source	Total Discharges (million cubic meters)	Suspended Sediments (tonnes)	BOD or Organic Wastes (tonnes)	Oil and Grease (tonnes)	Settable Solids (tonnes)
Rivers (Total Table III.A.4-1)	70,100	36,343,000	—	—	—
Knik, Matanuska, Susitna (Gold Creek)	54,820				
Susitna River (Gold Creek)	8,900				
(Minimum)	(5,000)				
(Maximum)	(11,630)	3,370			
Ninilchik	1,080				
Municipalities					
Permitted Discharge Rates-MAL[2]	67.6	6,264	7,443		
Anchorage-Point Woronzof MAL[2]	60.8	6,078	7,294		—
Anchorage-Point Woronzof-1993[3]	41.4	2,032	4,268	889	
Seafood Processing[4]	—	—	2,520-8,580	—	—
Produced Waters[5]	7.36	—	3,670	250	—
Drilling Muds and Cuttings (11 wells/year)[6]	—	930	—	—	8,351
Refinery[7]	—	30	30	—	—

Notes:
[2] = Table III.A.4-5
[3] = Table III.A.4-6
[4] = Table III.A.4-7
[5] = Table III.A.4-10
[6] = Section III.A.4a(3)(c)3)c)
[7] = Table III.A.4-13

Key:

BOD = Biological Oxygen Demand
MAL = monthly average limitation

Table III.A-16
Selected Summary of the Average and Range of Low-Molecular-Weight Aliphatic Hydrocarbon Concentrations Measured in Various Alaskan Marine Environments

Region	Methane Range			Ethane Range			Ethane Range			Propane Range			Propane Range		
	Avg.	From	To	Avg.	From	To	Avg.	From	To	Avg.	From	To	Avg.	From	To
Beaufort Sea	210	15	1,151	0.8	0.4	1.6	1.2	1.2	15	0.3	T	0.9	1.0	0.1	8.7
Chukchi Sea	243	87	2,851	0.8	0.1	3.1	1.8	0.6	5.9	0.4	0.1	2.3	0.4	T	0.8
Bering Sea	217	48	2,222	0.9	0.1	8.3	2.3	0.2	6.4	0.4	T	2.9	0.8	T	9.5
Gulf of Alaska	212	12	2,075	0.4	0.1	13	0.9	0.1	3.4	0.2	T	5.9	0.4	T	1.7
Upper Cook Inlet	375 (±395)	55	3,072	0.6	T	4.2	1.7	T	6.9	0.3	T	2.0	0.6	T	2.4
Lower Cook Inlet	1,089 (±900)	138	4,085	4.1	0.2	21	0.4	0.1	1.7	2.1	T	11	0.1	T	0.7

Key:
± = plus or minus
Avg. = average
T = indicates that values are less than 0.1 nanoliters per liter

Source:

Katz and Cline (1981).

Table III.A-17
Summary of Published Data on Petroleum, Combustion, and Biogenic Contaminant Trends in Cook Inlet Area Marine Sediments

Chemical	Locality	Concentration	Reference
Total Organic Carbon	Cook Inlet	0.04-0.58%	Brown et al. (1995)
	Cook Inlet/Shelikof Strait	0.47-0.65%	Kinnetic Laboratories and Texas A&M, GERG (1997)
	Cook Inlet	0.13-1.59%	Kinnetic Laboratories (1996b)
	Cook Inlet, Kachemak & Kamishak bays	0.6-1.3%	Atlas et al. (1983)
	Cook Inlet	0.12-0.77%	Hyland et al. (1995)
	Lower Cook Inlet/Shelikof Strait	0.26-1.49%	Boehm (2001a)
	Cook Inlet, intertidal Kachemak Bay	0.09-4.48%	Shaw and Terschak (1998)
	Cook Inlet, intertidal	0.026-0.98%	Lees et al. (2002)
Total Hydrocarbons	Cook Inlet/Shelikof Strait	1.8-14.8 ppm	Kinnetic Laboratories and Texas A&M, GERG (1997)
	Cook Inlet	2.7-69.0 ppm	Brown et al. (1995)
	Cook Inlet	15-44 ppm	Hyland et al. (1995)
	Upper Cook Inlet	1.9-4.5 ppm	Kinnetic Laboratories (1996b)
	Lower Cook Inlet	0.9-39 ppm	Venkatesan, Kaplan, and Ruth (1983)
	Lower Cook Inlet	2.1-53.3 ppm	Kinnetic Laboratories (1996b)
	Lower Cook Inlet/Shelikof Strait	6.8-71.0 ppm	Boehm (2001a)
Aromatics	Cook Inlet	0.363-23.8 ppm	Science Applications (1979)
Total PAH	Cook Inlet	8.3-110 ppb	Brown et al. (1995)
	Cook Inlet	18-116 ppb	Hyland et al. (1995)
	Cook Inlet/Shelikof Strait	99.4-123 ppb	Kinnetic Laboratories and Texas A&M, GERG (1997)
	Lower Cook Inlet	30.1-130 ppb	Kinnetic Laboratories (1996b)
	Upper Cook Inlet	5.9-64.4 ppb	Kinnetic Laboratories (1996b)
	Katmai Bay	0.4-60.7 ppb	O'Clair, Short, and Rice (1996)
	Hallo Bay	36.7-80.1 ppb	O'Clair, Short, and Rice (1996)
	Larson Bay	1.6-18.3 ppb	O'Clair, Short, and Rice (1996)
	Spiridon Bay	2.2-13.8 ppb	O'Clair, Short, and Rice (1996)
	Kodiak/Alaska Peninsula 1989, subtidal	1-203 ppb	Gilfillan et al. (1995)
	Kodiak/Alaska Peninsula 1990, subtidal	0-227 ppb	Gilfillan et al. (1995)
	Cook Inlet	<2-958 ppb	UAA, ENRI (1995)
	Cook Inlet	10-300 ppb	Venkatesan and Kaplan (1982)
	Trading Bay Outfall	93.3-116 ppb	Neff and Douglas (1994)
	Cook Inlet, intertidal Kachemak Bay	10.8-914 ppb	Shaw and Terschak (1998)
	Cook Inlet, intertidal	<2-80 ppb	Lees et al. (2002)
	Cook Inlet/Shelikof Strait	82.4-135 ppb	Kinnetic Laboratories and Texas A&M, GERG (1997)
	Cook Inlet/Shelikof Strait Zone 0	0.066-.490 ppb	Boehm (2001a)
	Cook Inlet/Shelikof Strait Zone 1	0.120-1.080 ppb	Boehm (2001a)
Total PAH	Cook Inlet/Shelikof Strait Zone 2	0.221-0.957 ppb	Boehm (2001a)

Table III.A-17 (continued)
Summary of Published Data on Petroleum, Combustion, and Biogenic Contaminant Trends in Cook Inlet Area Marine Sediments

Chemical	Locality	Concentration	Reference
(continued)	Cook Inlet/Shelikof Strait Zone 3	0.314-0.857 ppb	Boehm (2001a)
	Cook Inlet/Shelikof Strait Zone 4	0.537-0.650 ppb	Boehm (2001a)
Total Naphthalenes	Cook Inlet	6-38 ppb	Brown et al. (1995)
	Cook Inlet	1.0-53 ppb	Hyland et al. (1995)
	Lower Cook Inlet	0-19 ppb	Kinnetic Laboratories (1996b)
Total Fluoranthenes	Cook Inlet	0.38-5.1 ppb	Brown et al. (1995)
	Cook Inlet	1.2-29 ppb	Brown et al. (1995)
	Cook Inlet	4.0-26 ppb	Hyland et al. (1995)
	Lower Cook Inlet	0-13 ppb	Kinnetic Laboratories (1996b)
Perylene	Cook Inlet	1-48 ppb	Kinnetic Laboratories (1996b)
	Cook Inlet	2.5-41 ppb	Hyland et al. (1995)
	Cook Inlet	3.8-27 ppb	Brown et al. (1995)
Aliphatics	Cook Inlet	121-16,100 ppb	Science Applications, Inc. (1979)
Total n-alkanes	Hallo Bay	173-283 ppb	O'Clair, Short, and Rice (1996)
	Katmai Bay	ND-591 ppb	O'Clair, Short, and Rice (1996)
	Larson Bay	ND-71.3 ppb	O'Clair, Short, and Rice (1996)
	Spiridon Bay	21.5-180 ppb	O'Clair, Short, and Rice (1996)
	Cook Inlet	62-5,388 ppb	UAA, ENRI (1995)
Tetradecane to dotriacontane F1	Lower Cook Inlet, Kasitsna Bay	4.5 ppm	Venkatesan, Kaplan, and Ruth (1983); Shaw and Lotspeich (1977)
	Lower Cook Inlet, Coal (Mud) Bay	0.45 ppm	Venkatesan, Kaplan, and Ruth (1983); Shaw and Lotspeich (1977)
	Lower Cook Inlet, Dogfish Bay	32.6 ppm	Venkatesan, Kaplan, and Ruth (1983); Shaw and Lotspeich (1977)
	Lower Cook Inlet, Douglas River	8.8 ppm	Venkatesan, Kaplan, and Ruth (1983); Shaw and Lotspeich (1977)
n-C15-n-C34 alkanes	Cook Inlet	<10-3600 ppb	Venkatesan and Kaplan (1982)
	Cook Inlet/Shelikof Strait	907-2150 ppb	Kinnetic Laboratories and Texas A&M, GERG (1997)

Key:
< = less than
PAH = polycyclic aromatic hydrocarbons
ppb = parts per billion
ppm = parts per million

Source:
Boehm (1998); USDOI, MMS, Alaska OCS Region.

Table III.A-18
Summary of Cook Inlet Bioassays – 1993

Station Locations	Sediment/Pore Water					
	Total PAH (parts per billion dry weight)	Total Alkanes (parts per billion dry weight)	TOC (%)	Bioassays		
				Amphipod Survival[1] (%)	Fertilization[2] (%)	Microtox[3] EC50
Upper Cook Inlet – West Side						
East of Tyonek	0	1,615	0.49	100	98.4	>2
Trading Bay (North)	0	240	0.12	96	99.8	>2
Trading Bay (South)	0	876	0.61	**82**	96.6	—
Lower Cook Inlet – West Side						
Near West Foreland	0	62	0.05	99	99.8	>2
North of Kalgin Island	1	484	0.08	99	—	>2
West of Kalgin Island	2	854	0.37	91	**27.6**	**1.32**
West of Tuxedni Bay	0	457	0.58	92	**41.4**	**1.60**
Tuxedni Bay	2	856	0.17	99	**51.0**	**1.25**
Mouth of Chinitna Bay	6	1,613	0.58	94	100	**1.91**
Lower Cook Inlet – East Side						
West of Ninilchik	3	1,044	0.69	100	—	>2
West of Anchor Point	22	2,666	1.59	97	—	>2
Kachemak Bay (Outer)	100	1,369	1.43	**78**	98.8	**0.86**

Notes:
Bold numbers indicate possible contamination
[1] Amphipod 10-day static sublethal bioassay (*R. abronius)* in sediments. Survival rates differing by more than 20% from controls often are considered to be of concern.
[2] Mean fertilization rate of *D. excentricus* eggs in pore waters. Fertilization rates that are statistically different than controls could indicate toxic pore water.
[3] Values less than 2% can be considered to indicate possible contaminated sediment.

Key:
> = greater than
% = percent
TOC = total organic carbons
ECSP =
PAH = polycyclic aromatic hydrocarbons

Source:
UAA, ENRI (1995)

Table III.A-19
Summary of Published Data on Trace Metals in Marine Sediments from Cook Inlet and Shelikof Strait: Earlier Studies

Parameter	Concentration	Matrix	Locality	Reference
Cadmium	<0.25 ppm	Sediment	Lower Cook Inlet	Burrell, 1978 .
Copper	3.0-17.2 ppm			
Nickel	<1.2-7.9 ppm			
Zinc	5.2-34.3 ppm			
Iron	0.05-0.38%			
Manganese	40-420 ppm			
Aluminum	2.63-7.43%	Sediment	Cook Inlet	UAA, ENRI, 1995
Antimony	n.d.-0.63 ppm			
Arsenic	n.d.-19.3 ppm			
Iron	1.62-5.59%			
Mercury	n.d.-0.242 ppm			
Zinc	40.7-163 ppm			
Manganese	546-846 ppm	Sediment	Shelikof Strait, northwest of Trinity Islands	Burrell, 1977
Vanadium	72-108 ppm			
Arsenic	1.8-4.7 ppm			
Barium	460-560 ppm			
Cobalt	5-16 ppm			
Chromium	92-192 ppm			
Iron	1.32-3.72%			
Antimony	0.26-0.70 ppm			
Aluminum	1.56-2.21%	Sediment	Shelikof Strait	Kinnetic Laboratories and Texas A and M University, GERG, 1997
Arsenic	8.70-11.93 ppm			
Barium	57.94-100.6 ppm			
Cadmium	0.03-0.04 ppm			
Chromium	22.13-29.92 ppm			
Copper	25.55-30.33 ppm			
Nickel	6.47-26.72 ppm			
Lead	4.86-6.60 ppm			
Vanadium	62.41-76.07 ppm			
Zinc	55.73-71.00 ppm			
Arsenic	5-16 ppm	Sediment	Lower Cook Inlet	U.S. Geological Survey, 1995
Barium	310-700 ppm			
Chromium	27-87 ppm			
Copper	5-41 ppm			
Lead	4-10 ppm			
Nickel	14-39 ppm			
Vanadium	67-200 ppm			
Zinc	2-84 ppm			

Key:
% = percent
< = less than
CIRCAC = Cook Inlet Regional Citizens' Advisory Council
GERG= Geochemical and Environmental Research Group
NOAA = National Oceanic and Atmospheric Administration
OCSEAP = Outer Continental Shelf Environmental Assessment Program
ppm = parts per million
RU = Research Unit

Source:
Boehm (1998).

Table III.A-20
Summary of Published Data on Trace Metals in Marine Sediments from Cook Inlet and Shelikof Strait: Shelikof Strait Sediment Quality Study

Metal	Outermost Cook Inlet, including Kachemak and Kachemak Bay (Zone 0)	Barren Islands into Northern End of Shelikof Strait (Zone 1)	Central Shelikof Strait (Zone 2)	Southern Shelikof Strait (Zone 3)	South End of Shelikof Strait (Zone 4)
Aluminum	6.02-8.23%	6.57-9.37%	7.48-8.44%	5.64-8.17%	7.46-7.94%
Calcium	1.26-4.57%	1.87-2.91%	1.49-2.18%	1.51-1.97%	—
Iron	2.74-5.31%	3.37-4.48%	3.30-4.86%	4.18-4.71%	4.08-4.54%
Potassium	1.38-2.03%	1.39-2.03%	1.42-1.88%	1.50-2.02%	—
Magnesium	1.12-1.89%	1.21-1.82%	1.55-1.84%	1.64-2.01%	—
Silver	0.01-0.13 ppm	0.01-0.09 ppm	0.03-0.10 ppm	0.05-0.11 ppm	0.05-0.07 ppm
Arsenic	2.5-16.0 ppm	4.8-13.1 ppm	5.7-14.0 ppm	7.0-13.4 ppm	6.0-11.1 ppm
Barium	518-957 ppm	630-914 ppm	709-964 ppm	826-928 ppm	808-900 ppm
Beryllium	0.89-1.40 ppm	1.0-1.4 ppm	0.96-1.4 ppm	1.2-1.48 ppm	1.2-1.4 ppm
Cadmium	0.04-0.11 ppm	0.08-0.16 ppm	0.09-0.20 ppm	0.12-0.23 ppm	0.13-0.17 ppm
Chromium	42.8-95.3 ppm	46.0-77.1 ppm	58.7-90.0 ppm	65.1-85.7 ppm	71.8-84.0 ppm
Copper	20.3-52.0 ppm	19.9-21.4 ppm	29.4-41.2 ppm	33.0-41.5 ppm	30.9-34.4 ppm
Mercury	0.023-0.125 ppm	0.022-0.028 ppm	0.047-0.072 ppm	0.05-0.067 ppm	0.062-0.068 ppm
Manganese	610-1,000 ppm	664-1,220 ppm	564-2,140 ppm	72-1,570 ppm	689-1,209 ppm
Nickel	24.7-51.4 ppm	22.9-26.1 ppm	27.7-41.7 ppm	35.4-40.1 ppm	33.6-40.9 ppm
Lead	7.3-14.5 ppm	9.6-13.8 ppm	11.7-14.9 ppm	13.1-14.8 ppm	13.8-14.9 ppm
Antimony	0.46-1.74 ppm	0.63-1.11 ppm	0.80-1.11 ppm	0.95-1.22 ppm	0.90-1.15 ppm
Selenium	0.05-0.55 ppm	0.10-0.53 ppm	0.10-0.56 ppm	0.20-0.42 ppm	0.16-0.30 ppm
Tin	0.71-1.91 ppm	1.00-1.14 ppm	1.38-1.87 ppm	1.64-1.95 ppm	1.38-1.73 ppm
Thallium	0.32-0.51 ppm	0.33-0.50 ppm	0.39-0.50 ppm	0.44-0.52 ppm	0.44-0.47 ppm
Vanadium	87.0-180 ppm	106-145 ppm	94.3-167 ppm	129-160 ppm	137-153 ppm
Zinc	64.8-132 ppm	73.8-118 ppm	85.1-127 ppm	114-133 ppm	111-123 ppm

Note:
— = no analyses were performed.

Key:
% = percent
ppm = parts per million

Source:
Boehm (2001a).

Table III.A-21
Summary of Metal Concentrations in Mussel Tissues

Metal[1]	Location					
	Tuxedni Bay	Fossil Point	Chinitna Bay	Jakolof Bay	Kasitsna Bay	Homer
	(Measurements are in parts per million dry weight)					
Aluminum	1,380	456	2,030	101	78	254
Antimony	0.01	0.02	0.01	0.06	0.03	<0.0002
Arsenic	0.33	0.54	0.57	0.59	0.50	0.50
Barium	55.2	29.1	215.0	3.0	26.5	15.3
Beryllium	0.1	<0.009	0.2	<0.009	<0.009	<0.009
Cadmium	4.47	4.98	6.67	4.13	2.62	1.76
Chromium	15.5	19.3	192.0	9.3	13.3	14.6
Copper	11.0	11.4	22.9	7.7	10.8	11.4
Iron	841	298	1,440	42	59	182
Lead	12.8	48.7	68.6	29.7	48.3	70.4
Manganese	78.8	103.0	255.0	7.4	8.8	28.8
Mercury	0.13	0.14	0.11	0.11	0.14	0.09
Nickel	33.7	35.2	133.0	33.7	6.8	11.8
Silver	0.07	0.01	0.32	0.05	0.04	0.05
Titanium	0.04	0.02	0.09	<0.003	0.01	0.02
Vanadium	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Zinc	57.4	85.3	148.0	98.4	138.0	171.0

Note:
[1]Measurements are in parts per million dry weight.

Key:
< = less than

Source:
UAA, ENRI (1995).

Table III.A-22
Ambient Air-Quality Standards Relevant to the Cook Inlet Program Area

Pollutant[1]	Averaging Time Criteria**					
	Annual	24 hr	8 hr	3 hr	1 hr	30 min
Total Suspended Particulates[2]	60 [3]	150	*	*	*	*
Class I[4]	5 [3]	10	*	*	*	*
Class II[4]	19 [3]	37	*	*	*	*
Carbon Monoxide	*	*	10,000	*	40,000	*
Ozone[5]	*	*	*	*	235 [6]	*
Nitrogen Dioxide	100 [7]	*	*	*	*	*
Class I[4]	2.5 [7]	*	*	*	*	*
Class II[4]	25 [7]	*	*	*	*	*
Inhalable Particulate Matter (PM10)[8]	50 [9]	150 [10]	*	*	*	*
Class I[4]	4 [7]	8 [7]	*	*	*	*
Class II[4]	17	30	*	*	*	*
Lead	1.5[11]	*	*	*	*	*
Sulfur Dioxide	80 [7]	365	*	1,300	*	*
Class I[4]	2 [7]	5	*	25	*	*
Class II[4]	20 [7]	91	*	512	*	*
Reduced Sulfur Compounds[2]	*	*	*	*	*	50

Notes:
[1]All-year averaging times not to be exceeded more than once each year, except that annual means may not be exceeded.
[2]State of Alaska air-quality standard (not national standard).
[3]Annual geometric mean.
[4]Class I and II standards refer to the Prevention of Significant Deterioration Program. The standards are the maximum increments in pollutants allowable above previously established baseline concentrations.
[5]The State ozone standard compares with national standards for photochemical oxidants, which are measured as ozone.
[6] The 1-hour standard for ozone is based on a statistical, rather than a deterministic, allowance for an "expected exceedance during a year."
[7]Annual arithmetic mean.
[8]PM10 is the particulate matter less than 10 micrometers in aerodynamic diameter.
[9]Attained when the expected annual arithmetic mean concentration, as determined in accordance with 40 CFR 50 subpart K, is equal to or less than 50 micrograms per cubic meter.
[10]Attained when the expected number of days per calendar year with a 24-hour average concentration above 150 micrograms per cubic meter, as determined in accordance with 40 CFR 50, subpart K, is equal to or less than 1.
[11]Maximum arithmetic mean averaged over a calendar quarter.

Key:
* = indicates that no standards have been established
** = measurements are in micrograms per cubic meter
hr = hour
min = minute

Sources:
State of Alaska, Dept. of Environmental Conservation (1982); 18 AAC 50.010; 18 AAC 50.020; 40 CFR 52.21 (43 *FR* 26388); 40 CFR 50.6 (52 *FR* 24663); 40 CFR 51.166 (53 *FR* 40671).

Table III.B-1
Federally Managed Fisheries Resources and Important Forage Fishes in the Gulf of Alaska

Species	Scientific Name	Habitat Depth or Distribution
Groundfish		
Pacific Cod[2]	*Gadus macrocephalus*	Shore to 500 m
Atka Mackerel[2]	*Pleurogrammus monopterygius*	Kodiak Banks
Walleye Pollock[2]	*Theragra calcogramma*	<300 m
Sablefish or Black Cod[2]	*Anoplopoma fimbria*	>200 m Shelikof Strait and Kodiak Banks
Shallow Water Flatfish – (Mostly Bycatch)		
Yellowfin Sole*[2]	*Limanda Aspera*	Entire Area South of Ninilchik
Rock Sole*[2]	*Lepidopsetta bileneatis*	Entire Area South of Ninilchik
Starry Flounder[2]	*Platichthys stellatus*	—
Butter Sole[2]	*Isopssetta bileneatus*	—
English Sole[2]	*Parophrys vetulus*	—
Alaska Plaice[2]	*Pleuronectes quadrituberulatus*	<150 m
Sand Sole[2]	*Psettichthys melanostictus*	—
Rex Sole[2]	*Glyptocephalus zachirus*	Off Shelf
Flathead Sole[2]	*Hippoglossoides elassodon*	Entire Planning Areas of Ninilchik
Deep Water Flatfish		
Greenland Turbot (Greenland Halibut)[2]	*Reinhardtius hippglossoides*	—
Dover Sole*[2]	*Microstomaus pacificus*	Shelikof Strait and Off Shelf
Deep Sea Sole[2]	*Embassicthys bathbius*	—
Arrowtooth Flounder (mostly by-catch)[2]	*Atheresthes stomias*	Entire Planning Area
Rockfish		
Thornyhead Rockfish*[2]	*Sebastolobus sp.*	Demersal Shelf Rockfish Complex
Yelloweye Rockfish*[2]	*Sebastes ruberrimus*	100- to 200-m Slope Rockfish Complex
Shortraker Rockfish[2]	*Sebastes borealis*	>25 m
Rougheye Rockfish[2]	*Sebastes aleutianus*	>25 m
Pacific Ocean Perch[2]	*Sebastes alutus*	Summer 180-250 m
Northern Rockfish[2]	*Sebastes pollyspinis*	75- to 125-m Pelagic Shelf Rockfish Complex
"Light" Dusky Rockfish*[2]	*Sebastes ciliatus*	Shelikof Strait and Banks
Other Managed Species (Mostly Bycatch)		
Capelin[2]	*Mallotus villosus*	Beach to 200 m
Eulachon[2]	*Thaleichthys pacificus*	50-1,000 m and in rivers
Skates[2]	*Rajidae*	50-300 m
Sculpin[2]	*Cottidae*	Mostly Shallow
Sharks[2]	*Lamnidae and Squalidae*	Near Coast to Outer Shelf, Particularly Kodiak
Octopus[2]	*Octopoda gilbertianis*	to 500 m
Red Squid[2]	*Berryteuthis magister*	30-1500 m
Weathervane Scallop[2]	*Patinopectin caurinus*	Intertidal to200 m
Salmonids		
Pink Salmon[2]	*Oncorhynchus gorbuscha*	Aquatic and marine waters of the region
Chum Salmon[2]	*Oncorhynchus keta*	Aquatic and marine waters of the region
Coho Salmon[2]	*Oncorhynchus kisutch*	Aquatic and marine waters of the region
Sockeye Salmon[2]	*Oncorhynchus nerka*	Aquatic and marine waters of the region
Chinook Salmon[2]	*Oncorhynchus tshawytscha*	Aquatic and marine waters of the region
Forage Fish Complexes in Lower Cook Inlet Region Identified as Prey of managed fishes in the Gulf of Alaska		
Herrings	*Clupeidae*	Intertidal to Off Shelf (see below)
Pacific Herring[1, 3]	*Clupea pallasii*	Intertidal to Off Shelf
Deep Sea Smelts[2]	*Bathylagidae*	Off Shelf (see below)
Northern Smoothtongue	*Leuroglossus schmidti*	Mostly Off Shelf
Stout Blacksmelt	*Pseudobathylagus milleri*	Off Shelf

Table III-B-1 (continued)
Managed Fisheries Resources and Important Forage Fishes in the Gulf of Alaska

Species	Scientific Name	Area
Forage Fish (continued)		
Slender Blacksmelt	*Bathylagus pacificus*	Off Shelf
Smelts	*Osmeridae*	(See below)
Capelin[1 2]	*Mallotus villosus*	Beach to 200 M
Surf Smelt	*Hypomesus pretiosus*	Beach Surf Spawners
Rainbow Smelt[1]	*Osmerus mordax*	Freshwater Spawn to 150 m
Bristlemouth [2]	*Gonostomatidae*	—
Black Bristlemouth	*Cyclothone atraria*	Off Shelf
Lanternfish [2]	*Myctophidae*	Probably Offshelf (see below)
Bigeye Lanternfish	*Protomyctophum thompsoni*	Usually Off Shelf
Blue Lanternfish	*Tarletonbeania crenularis*	Probably Off Shelf
California Headlightfish	*Diaphus theta*	Probably Off Shelf
Brokenline Lanternfish	*Lampanyctus jordane*	Probably Off Shelf
Pinpoint Lampfish	*Nannobrachium regale*	Probably Off Shelf
Cods	*Gadidae*	30-300 m (see below)
Walleye Pollock[1 2]	*Theragra chalcogramma*	30-300 m
Pricklebacks [2]	*Stichaeidae*	(See below)
Arctic Shanny	*Stichaeus punctatus*	Subtidal to 50 m
Mosshead Warbonnet	*Chirolophis nugator*	Intertidal, Subtidal
Decorated Warbonnet	*Chirolophis decoratus*	Subtidal to 90 m
Longsnout Prickleback	*Lumpenella longirostris*	Outer Shelf, Upper Slope
Daubed Shanny	*Leptoclinus maculates m*	Bottom, Usually <170 m
Whitebarred Prickleback	*Poroclinus rothrocki*	Bottom 46-128 m
Stout Eelblenny	*Anisarchus medius*	Nearshore to 150 m
Slender Eelblenny	*Pumpenus fabricii*	Intertidal to 100 m
Snake Prickleback	*Lumpenus sagitta*	Shore to 200 m
Blackline Prickleback	*Acantholumpenus mackayi*	Nearshore to 56 m
Lesser Prickleback	*Alectridium aurantiacum*	Intertidal and Subtidal
High Cockscomb	*Anoplarchus purpurescens*	Mostly Intertidal
Slender Cockscomb	*Anoplarchus insignis*	Mostly Subtidal
Ribbon Prickleback	*Phytichthys chirus*	Intertidal to 12 m
Black Prickleback	*Xiphister atropurpureus*	Kodiak Island, Intertidal to 8 m
Gunnels [2]	*Pholidae*	(See below)
Penpoint Gunnel	*Apodichthys flavidus*	Kodiak Island Intertidal
Cresent Gunnel	*Pholis laeta*	Intertidal and Subtidal
Sand Fish* [2]	*Trichodontidae*	Intertidal to 150 m (see below)
Pacific Sand Fish	*Trichodon trichodon*	Intertidal to 150 m
Sand Lance [2]	*Ammodytidae*	Intertidal to 100 m (see below)
Pacific Sand Lance	*Amodytes hexapterus-*	intertidal to 100 m
Euphausiids (krill) [2]	*Euphausiacea*	Intertidal into pelagic waters

Notes:
[1] Indicates the four major forage species for which there is more abundant knowledge.
Off shelf indicates species inhabits deep areas not analyzed in this EIS.
Indented shows species; nonindented with light shading indicates major taxonomic group.
[2] Species or species assemblages for which EFH has been described and identified (North Pacific Fishery Management Council, 1998, 1999).
[3] The Pacific herring is managed by the state of Alaska. Hence, EFH has not been described or identified for this species. However and importantly, Pacific herring is a *ecologically significant* prey species for many other fish, seabird, and marine mammal species populations in the region.

Key:
*Most abundant in its group or complex; NPFMC uses it to represent habitat for group or complex.
— means no data are available
< = less than
> = greater than

m = meters
NPFMC = North Pacific Fisheries Management Council

Sources:
Initial family listing of forage fish from North Pacific Fishery Management Council (1999) Species in forage fish families, distribution and some habitat were derived from Mecklenburg, Mecklenburg, and Thorsteinson (2002)

Table III.B-2
Endangered, Threatened, and Candidate Species in Cook Inlet

Common Name	Scientific Name	Endangered Species Act Status
Steller Sea Lion (Western U.S. Stock)	*Eumetopias jubatus*	Endangered
Steller Sea Lion (Eastern U.S. Stock)	*Eumetopias jubatus*	Threatened
Blue Whale	*Balaenoptera musculus*	Endangered
Fin Whale	*Balaenoptera physalus*	Endangered
Humpback Whale	*Megaptera novaeangliae*	Endangered
Northern Right Whale (Eastern North Pacific Stock)	*Eubalaena japonica*	Endangered
Sei Whale	*Balaenoptera borealis*	Endangered
Sperm Whale	*Physeter macrocephalus*	Endangered
Beluga Whale (Cook Inlet Stock)	*Delphinapterus leucas*	Candidate
Steller's Eider (Alaska Breeding Population)	*Polysticta stelleri*	Threatened
Short-Tailed Albatross	*Phoebastria albatrus* (formerly *Diomedea albatrus)*	Endangered
Northern Sea Otter (Southwest Alaska Stock)	*Enhydra lutris kenyonii*	Candidate
Aleutian Canada Goose	*Branta canadensis leucopareia*	Delisted 2001
American Peregrine Falcon	*Falco peregrinus anatum*	Delisted 1999

Table III.B-3
Estimated Abundances of Belugas by Year and Location in Cook Inlet

Year	Northwest[1]	CV	Northeast[2]	CV	South[3]	CV	Total	CV
1994	580	47%	48	108%	25	19%	653	43%
1995	444	48%	31	43%	17	43%	491	44%
1996	542	30%	52	37%	0	—	594	28%
1997	362	9%	76	69%	2	43%	440	14%
1998	292	32%	55	60%	0	—	347	29%
1999	336	15%	31	25%	0	—	367	14%
2000	408	23%	27	82%	0	—	435	23%
2001	—	—	—	—	—	—	386	9%

Notes:
[1]Northwest is described as West Forelands to Anchorage, including Beluga River, Susitna Rivers, and Knik Arm.
[2]Northeast is described as Anchorage to East Forelands, including Turnagain Arm and Chickaloon Bay.
[3]South is anywhere south of the Forelands down to the mouth of Cook Inlet.

Key:
— = not given
CV = coefficient of variation

Source:
1994-2000 data: Hobbs, Rugh, and DeMaster (2000:42, Table 3); 2001 data: Mahoney (2002).

Table III.B-4
Reported Sightings of Right Whales Since 1900 in the Eastern North Pacific East and South of the Aleutian Islands and North of Latitude 50°N

Date Sighted	Latitude	Longitude	Location	Number	Source
11 May 1937	—	—	Ca 20 m SE of Twohead I. (Kodiak)	2	Reeves et al. (1985: Table 8)
14 May 1937	—	—	Ca 1 m SE of Twohead I. (Kodiak)	1	Reeves et al. (1985: Table 8)
1958-1964	—	—	Northwest Ground	88-189	Berzin and Rovnin (1966)
09 July 1960	54°05N	160°20'W	South of Alaska Peninsula	2	Japan Whaling Association
10 July 1960	54°49'N	158°06'W	South of Alaska Peninsula	2	Japan Whaling Association
12 July 1960	54°34'N	155°11'W	Northwest Ground	1	Japan Whaling Association
08 August 1961	58°04'N	149°24W	Gulf of Alaska	1	Japan Whaling Association
21 August 1961	58°04'N	152°14'W	Kodiak Island	4	Japan Whaling Association
22 August 1961	56°03'N	152°14'W	Kodiak Island	3	Japan Whaling Association
1961	NG	NG	Gulf of Alaska	1*	Omura and Ohsumi, 1964
1965	58°04'N	140-150ºW	Gulf of Alaska	1	Wada, 1975
1966	50-55ºN	150-160ºW	South of Alaska Peninsula	3	Wada, 1975
1966	55-60ºN	140-150ºW	Gulf of Alaska	1	Wada, 1975
1967	55-55ºN	150-160ºW	South of Alaska Peninsula	1	Wada, 1975
1976	50-55ºN	155-160ºW	Kodiak I.	1	Wada, 1978
Summer 1978	50-60ºN	140-160º	Northwest Ground Alaska Peninsula Area	2	Anonymous, 1980
14 July 1988	57°08'N	151°51'W	South of Kodiak I.	1	Waite, Wynne, and Mellinger (In press)*

Key:
Ca = approximately
I = Island
m = miles
SE = southeast

Source:
All Information extracted from Table 2.2 of Brownell et al. (2001).

Table III.B-5
Major Steller Sea Lion Rookery Sites

State of Alaska Region Site	Boundaries			
	Latitude	Longitude	Latitude	Longitude
Western Aleutians Agattu Island				
Cape Sabak[1]	52 23.5 N	173 43.5 E	52 22.0 N	173 41.0 E
Gillon Point[1]	52 24.0 N	173 21.5 E	—	—
Attu Island[1]	52 54.552 N	172 28.5 E	52 57.5 N	172 31.5 E
Buldir Island[1]	52 20.5 N	175 57.0 E	52 23.5 N	172 51.0 E
Central Aleutian Islands				
Adak Island[1]	51 36.5 N	176 59.0 W	51 38.0 N	176.59.5 W
Agligadak Island[1]	52 06.5 N	172 54.0 W	—	—
Amchitka Island[1]				
Column Rock[1]	51 32.5 N	178 49.5 E	—	—
East Cape[1]	51 22.5 N	179 28.0 E	51 21.5 N	179 25.0 E
Ayugadak Island[1]	51 45.5 N	178 24.5 E	—	—
Gramp Rock[1]	51 29.0 N	178 20.5 W	—	—
Kasatochi Island[1]	52 10.0 N	175 31.5 W	52 10.5 N	175 29.0 W
Kiska Island				
Lief Cove[1]	51 57.5 N	177 21.0 E	51 56.5 N	177 20.0 E
Cape St. Stephen[1]	51 52.5 N	177 13.0 E	51 53.5 N	177 12.0 E
Seguam Island/Saddleridge[1]	52 21.0 N	172 35.0 W	52 21.0 N	172 33.0 W
Semisopochnoi Island				
Pochnoi Point[1]	51 58.5 N	179 45.5 E	51 57.0 N	179 46.0 E
Petrel Point[1]	52 01.5 N	179 37.5 E	52 01.5 E	179 39.0 E
Tag Island[1]	51 33.5 N	178 34.5 W	—	—
Ulak Island[1]	51 20.0 N	178 57.0 W	51 18.5 N	178 59.5 W
Yunaska Island[1]	52 42.0 N	170 38.5 W	52 41.0 N	170 34.5 W
Eastern Aleutian Islands				
Adugak Island[1]	52 55.0 N	169 10.5 W	—	—
Akun Island/Billings Head[1]	54 18.0 N	165 32.5 W	—	165 31.5 W
Akutan Island/Cape Morgan[1]	54 03.5 N	166 00.0 W	54 18.0 N	166 05.0 W
Bogoslof Island[1,2]	53 56.0 N	168 02.0 W	54 05.5 N	—
Ogchul Island[1]	53 00.0 N	168 24.0 W	—	—
Sea Lion Rocks (Amak)[1]	55 28.0 N	163 12.0 W	—	—
Ugamak Island[1]	54 14.0 N	164 48.0 W	54 13.0 N	164 48.0 W
Bering Sea				
Walrus Island[1]	57 11.0 N	169 56.0 W	—	—
Western Gulf of Alaska				
Atkins Island[1]	55 03.5 N	159 18.5 W	—	—

Table III.B-5 (continued)
Major Steller Sea Lion Rookery Sites

State of Alaska Region Site	Boundaries			
	Latitude	Longitude	Latitude	Longitude
Chernabura Island[1]	54 47.5 N	159 31.0 W	54.454.5 N	159 33.5 W
Clubbing Rocks (N)[1]	54 43.0 N	162 26.5 W	—	—
Pinnacle Rock[1]	54 46.0 N	161 46.0 W	—	—
Central Gulf of Alaska				
Chirikof Island[1]	55 46.5 N	155 39.5 W	55 46.5 N	155 43.0 W
Chowiet Island[1]	56 00.5 N	156 41.5 W	56 00.5 N	156 42.0 W
Marmot Island[1-] West of Afognak	58 14.5 N	151 47.5 W	58 10.0 N	151 51.0 W
Outer Island[1]	59 20.5 N	150 23.0 W	59 21.0 N	150 24.5 W Near Nuka Bay
Sugarloaf Island[1,](Barrens Islands)	58 53.0 N	152 02.0 W	—	
Eastern Gulf of Alaska				
Seal Rocks[1]Outside Resource	60 10.0 N	146 50.0 W	—	—
Fish Island[1]	59 53.0 N	147 20.5 W	—	—
Southeast Alaska				
Forrester Island	54 51.0 N	133 32.0 W	54 52.5 N	133 35.5 W
Hazy Island	55 52.0 N	134 34.0 W	55 51.5 N	134 35.0 W
White Sisters	57 38.0 N	136 15.5 W	—	—
Oregon				
Rogue Reef Pyramid Rock	42 26.4 N	124 28.1 W	—	—
Orford Reef	—	—	—	—
Long Brown Rock	42 47.3 N	124 36.2 W	—	—
Seal Rock	42 47.1 N	124 35.4 W	—	—
California				
Ano Nuevo Island	37 06.3 N	122 20.3 W	—	—
Southeast Farallon Island	37 41.3 N	123 00.1 W	—	—
Sugarloaf Island and Cape Mendocino.	40 26.0 N	124 24.0 W	—	—

Notes:
Where two sets of coordinates are given, the baseline extends in a clockwise direction from the first set of geographic coordinates along the shoreline at mean lower-low water to the second set of coordinates. Where only one set of coordinates is listed, that location is the base point.
[1]Includes an associated 20 nautical-mile aquatic zone.
[2]Associated 20 nautical-mile aquatic zone lies entirely within one of the three special foraging areas.

Key:
— = not applicable

Table III.B-6
Major Steller Sea Lion Haulout Sites in Alaska

State of Alaska Region Site	Boundaries			
	Latitude	Longitude	Latitude	Longitude
Western Aleutians				
Alaid Island[1]	52 45.0 N	173 56.5 E	52 46.5 N	173 51.5 E
Attu Chirikof Point[1]	52 30.0 N	173 26.7 E	—	—
Shemya Island[1]	52 44.0 N	174 09.0 E	—	—
Central Aleutians				
Amatignak Island[1]	51 13.0 N	179 08.0 E	—	—
Amatignak Island, East[1]	52 05.0 N	172 58.5 W	52 06.0 N	172 57.0 W
Sviech Harbor[1]	52 02.0 N	173 23.0 W	—	—
Amukta Island and Rocks[1]	52 31.5 N	171 16.5 W	52 26.5 N	171 16.5 W
Anagaksik Island[1]	51 51.0 N	175 53.5 W	—	—
Atka Island[1]	52 23.5 N	174 17.0 W	52 24.5 N	174 07.5 W
Bobrof Island[1]	51 54.0 N	177 27.0 W	—	—
Chagulak Island[1]	52 34.0 N	171 10.5 W	—	—
Chuginadak Island[1]	52 46.5 N	169 44.5 W	52 46.5 N	169 42.0 W
Great Sitkin Island[1]	52 06.0 N	176 10.5 W	52 07.0 N	176 08.5 W
Kagamil Island[1]	53 02.5 N	169 41.0 W	—	—
Kanaga Island				
Kanaga Island, North Cape[1]	51 56.5 N	177 09.0 W	—	—
Kanaga Island, Ship Rock[1]	51 47.0 N	177 22.5 W	—	—
Kavalga Island[1]	51 34.5 N	178 51.5 W	51 34.5 N	178 49.5 W
Kiska Island, Sirius Point[1]	52 08.5 N	177 36.5 E	—	—
Kiska Island, Sobaka and Vega[1]	51 50.0 N	177 20.0 E	51 48.5 N	177 20.5 E
Little Sitkin Island[1]	51 59.5 N	178 30.0 E	—	—
Little Tanaga Island[1]	51 50.5 N	176 13.0 E	51 49.0 N	176 13.0 E
Sagigik Island[1]	52 00.5 N	173 08.0 E	—	—
Seguam Island				
Seguam Island, South[1]	52 19.5 N	172 18.0 W	52 15.0 N	172 37.0 W
Finch Point[1]	52 23.5 N	172 25.5 W	52 23.5 N	172 24.0 W
Segula Island[1]	52 00.0 N	178 06.5 E	52 03.5 N	178 09.0 E
Tanaga Island[1]	51 55.0 N	177 58.5 W	51 55.0 N	177 57.0 W
Tanadak Island (Amlia)[1]	52 04.5 N	172 57.0 W	—	—
Tanadak Island (Kiska)[1]	51 57.0 N	177 47.0 E	—	—
Ugidak Island[1]	51 35.0 N	178 30.5 W	—	—
Uliaga Island[1]	53 04.0 N	169 47.0 W	53 05.0 N	169 46.0 W
Unalga and Dinkum Rocks[1]	51 34.0 N	179 04.0 W	51 34.5 N	179 03.0 W
Eastern Aleutian Islands				
Akutan Island, Reef-Lava[1]	54 10.5 N	166 04.5 W	54 07.5 N	166 06.5 W
Amak Island[1]	55 24.0 N	163 07.0 W	55 26.0 N	163 10.0 W
Cape Sedanka and Island[1]	53 50.5 N	166 05.0 W	—	—
Emerald Island[1]	53 17.5 N	167 51.5 W	—	—
Old Man Rocks[1]	53 52.0 N	166 05.0 W	—	—
Polivnoi Rock[1]	53 16.0 N	167 58.0 W	—	—
Tanginak Island[1]	54 13.0 N	165 19.5 W	—	—
Tigalda Island[1]	54 08.5 N	164 58.5 W	—	—
Umnak Island Cape Aslik[1]	53 25.0 N	168 24.5 W	—	—
Bering Sea				
Cape Newenham[1]	58 39.0 N	162 10.5 W	—	—
Hall Island[1]	60 37.0 N	173 00.0 W	—	—
Round Island[1]	58 36.0 N	159 58.0 W	—	—

Table III.B-6 (continued)
Major Steller Sea Lion Haulout Sites in Alaska

State of Alaska Region Site	Boundaries			
	Latitude	Longitude	Latitude	Longitude
St. Paul Island				
Northeast Point[1]	57 15.0 N	170 06.5 W	—	—
Sea Lion Rock[1]	57 06.0 N	170 17.5 W	—	—
St. George Island				
S Rookery[1]	56 33.5 N	169 40.0 W	—	—
Dalnoi Point[1]	56 36.0 N	169 46.0 W	—	—
St. Lawrence Island				
S Punuk Island[1]	64 04.0 N	168 51.0 W	—	—
SW Cape[1]	63 18.0 N	171 26.0 W	—	—
Western Gulf of Alaska:				
Bird Island[1]	54 40.5 N	163 18.0 W	—	—
Castle Rock[1]	55 17.0 N	159 30.0 W	—	—
Caton Island[1]	54 23.5 N	158 54.0 W	—	—
Jude Island[1]	55 16.0 N	162 25.5 W	—	—
Lighthouse Rocks[1]	55 47.5 N	160 06.0 W	—	—
Nagai Island[1]	54 52.5 N	161 06.0 W	—	—
Nagai Rocks[1]	55 50.0 N	157 24.0 W	54 56.0 N	160 15.0 W
Sea Lion Rocks (Unga)[1]	55 04.5 N	160 14.0 W	—	—
South Rock[1]	54 18.0 N	155 46.0 W	—	—
Spitz Island[1]	55 47.0 N	160 31.0 W	—	—
The Whaleback[1]	55 16.5 N	162 43.5 W	—	—
Central Gulf of Alaska:				
Cape Barnabas[1]	57 10.0 N	152 55.0 W	57 07.5 N	152 55.0 W
Cape Chiniak[1]	57 35.0 N	152 09.0 W	57 37.5 N	152 09.0 W
Cape Gull[1,2]	58 13.5 N	154 09.5 W	58 12.5 N	154 10.5 W
Cape Ikolik[1,2]	57 17.0 N	154 47.5 W	—	—
Cape Kuliak[1,2]	58 08.0 N	154 12.5 W	—	—
Cape Sitkinak[1]	56 32.0 N	153 52.0 W	—	—
Cape Ugat[1,2]	57 52.0 N	153 51.0 W	—	—
Gore Point[1]	59 12.0 N	150 58.0 W	—	—
Gull Point[1]	57 21.5 N	152 36.5 W	57 24.5 N	152 39.0 W
Latax Rocks[1]	58 21.0 N	152 28.5 W	58 40.5 N	152 30.0 W
Long Island[1]	58 42.0 N	152 16.0 W	—	—
Nagahut Rocks[1]	57 45.5 N	151 46.0 W	—	—
Puale Bay[1,2]	59 06.0 N	155 23.0 W	—	—
Sea Lion Rocks (Marmot)[1]	57 41.0 N	151 48.5 W	—	—
Sea Otter[1]	58 31.5 N	152 13.0 W	—	—
Shakun Rock[1,2]	58 33.0 N	153 41.5 W	—	—
Sud Island[1]	58 54.0 N	152 12.5 W	—	—
Sutwik Island[1]	56 32.0 N	157 14.0 W	56 32.0 N	157 20.0 W
Takli Island[1,2]	58 03.0 N	154 27.5 W	58 03.0 N	154 30.0 W
Twoheaded Island[1]	56 54.5 N	153 33.0 W	56 53.5 N	153 35.5 W
Ugak Island[1]	57 23.0 N	152 15.5 W	57 22.0 N	152 19.0 W
Central Gulf of Alaska (continued)				
Ushagat Island[1]	58 55.0 N	152 22.0 W	—	—
Eastern Gulf of Alaska:				
Cape Fairweather	58 47.5 N	137 56.3 W	—	—
Cape St. Elias[1]	59 48.0 N	149 34.0 W	—	—
Chiswell Islands[1]	59 36.0 N	144 36.0 W	—	—
Graves Rock	58 14.5 N	136 45.5 W	—	—
Hook Point[1]	60 20.0 N	146 15.5 W	—	—

Table III.B-6 (continued)
Major Steller Sea Lion Haulout Sites in Alaska

State of Alaska Region Site	Boundaries			
	Latitude	Longitude	Latitude	Longitude
Eastern Gulf of Alaska: (continued)				
Middleton Island[1]	59 26.5 N	146 20.0 W	—	—
Perry Island[1]	60 39.5 N	147 56.0 W	—	—
Point Eleanor[1]	60 35.0 N	147 34.0 W	—	—
Point Elrington[1]	59 56.0 N	148 13.5 W	—	—
Seal Rocks[1]	60 10.0 N	146 50.0 W	—	—
The Needle[1]	60 07.0 N	147 37.0 W	—	—
Southeast Alaska				
Benjamin Island	58 33.5 N	134 54.5 W	—	—
Biali Rock	56 43.0 N	135 20.5 W	—	—
Biorka Island	56 50.0 N	135 34.0 W	—	—
Cape Addington	55 26.5 N	133 49.5 W	—	—
Cape Cross	57 55.0 N	136 34.0 W	—	—
Cape Ommaney	56 10.5 N	134 42.5 W	—	—
Coronation Island	55 56.0 N	134 17.0 W	—	—
Gran Point	59 08.0 N	135 14.5 W	—	—
Lull Point	57 18.5 N	134 48.5 W	—	—
Sunset Island	57 30.5 N	133 35.0 W	—	—
Timbered Island	55 42.0 N	133 48.0 W	—	—

Note:
Where two sets of coordinates are given, the baseline extends in a clockwise direction from the first set of geographic coordinates along the shoreline at mean lower-low water to the second set of coordinates. Where only one set of coordinates is listed, that location is the base point.
Key:
— means not applicable
[1] Includes an associated 20 nautical mile aquatic zone.
[2] Associated 20 nautical mile aquatic zone lies entirely within one of the three special foraging areas.

Table III.B-7
Counts of Adult and Juvenile (Nonpup) Stellar Sea Lions at Rookery and Haulout Sites by Region

Year	Gulf of Alaska			Aleutian Islands			Southeast Alaska
	Eastern	Central	Western	Eastern	Central	Western	
1975	—	—	—	19,769	—	—	—
1976	7,053	24,678	8,311	19,743	—	—	—
1977	—	—	—	19,195	—	—	—
1979	—	—	—	—	36,632	14,011	6,376
1982	—	—	—	—	—	—	6,898
1985	—	19,002	6,275	7,505	23,042	—	—
1989	7,241	8,552	3,800	3,032	7,572	—	8,471
1990	5,444	7,050	3,915	3,801	7,988	2,327	7,629
1991	4,596	6,273	3,734	4,231	7,499	3,085	7,715
1992	3,738	5,721	3,720	4,839	6,399	2,869	7,558
1994	3,369	4,520	3,982	4,421	5,790	2,037	8,826
1996	2,133	3,915	3,741	4,716	5,528	2,190	8,231
1997	—	3,352	3,633	—	—	—	—
1998	—	3,346	3,361	3,847	5,761	1,913	8,693
1999	1,952	—	—	—	—	—	—
2000	1,894	3,117	2,842	3,842	5,427	1,071	—

Notes:
Counts of Adults Juvenile (Nonpup) Steller Sea Lions at Rookery and Haulout Trend Sites by Region. For the Gulf of Alaska, the eastern sector includes rookeries from Seal Rocks in Prince William Sound to Outer Island; the central sector extends from Sugarloaf and Marmot Islands to Chowiet Island; and the western sector extends from Atkins Island to Clubbing Rocks. For the Aleutian Islands, the eastern sector includes rookeries from Sea Lion Rock (near Amak Island) to Adugak Island; the central sector extends from Yunaska Island to Kiska Island; and the western sector extends from Buldir Island to Attu Island.

Key:
— = no data are provided

Source:
Table 3.2 in National Marine Fisheries Service (2001b)

Table III.B-8
Common Marine and Coastal Birds that are Resident or Migrant in the Cook Inlet/Gulf of Alaska Area

Seabirds	Waterfowl	Shorebirds
Sooty Shearwater	Pintail	Dunlin
Short-tailed Shearwater	Long-tailed Duck	Black Oystercatcher
Leach's Petrel	Common Eider	Western Sandpiper
Forked-tailed Storm-Petrel	Common Goldeneye	Least Sandpiper
Glaucous-winged Gull	Common Merganser	Red-necked Phalarope
Black-legged Kittiwake	Red-breasted Merganser	Greater Yellowlegs
Common Murre	Harlequin Duck	Lesser Yellowlegs
Thick-billed Murre	Greater Scaup	Rock Sandpiper
Horned Puffin	Mallard	Common Snipe
Tufted Puffin	Gadwall	Short-billed Dowitcher
Northern Fulmar	American Wigeon	American Golden Plover
Pigeon Guillemot	Green-winged Teal	Black-bellied Plover
Pelagic Cormorant	Arctic Loon	Pectoral Sandpiper
Red-faced Cormorant	Common Loon	Wandering Tattler
Double-crested Cormorant	Red-throated Loon	Whimbrel
Marbled Murrelet	Horned Grebe	Hudsonian Godwit
Ancient Murrelet	Canada Goose	
Kittlitz's Murrelet	Pacific Black Brant	
Crested Auklet	Emperor Goose	
Rhinoceros Auklet	Red-necked Grebe	
Parakeet Auklet		
Cassin's Auklet		
Arctic Tern		
Aleutian Tern		
Mew Gull		
Pomarine Jaeger		
Parasitic Jaeger	—	—

Source:
USDOI, MMS, Alaska OCS Region (1993).

Table III.B-9
Seasonal Bird Densities in the Lower Cook Inlet

Season	Average Density in Square Kilometers
Spring (April-May)	
Lower Cook Inlet	192
Southern Kamishak Bay	417
Tuxedni Bay[1]	332
Inner Kachemak Bay[2]	262
Redoubt Bay[3]	210
Iniskin-Iliamna Bay	206
Summer (June-August)	
Lower Cook Inlet	130
Tuxedni Bay	538
Augustine Island	254
Kachemak Bay	200
Southwest Kamishak Bay	200
Outer Kachemak Bay	93
Iniskin-Iliamna Bay	96
Barren Islands	114
Shuyak	325
Fall (September-October)	
Lower Cook Inlet	66
Tuxedni Bay	111
Inner Kachemak Bay	152
Southwest Kamishak Bay	125
Northwest Kachemak Bay	105
Winter (November-March)	
Lower Cook Inlet	32
Eastern Cook Inlet	47
Western Cook Inlet	16
Tuxedni Bay	81
Inner Kachemak Bay	99
Outer Kachemak	62
Chugach Islands	48

Notes:
[1]Mainly black-legged kittiwakes on Chisik Island
[2]Mainly sea ducks, shorebirds, and gulls
[3]Mainly geese, ducks, and shorebirds

Sources:
Arneson (1980); USDOI, MMS, Alaska OCS Region (1984); Agler et al. (1995); Piatt (2002)

Table III.B-10
Counts of Steller's Eiders Observed During Boat Surveys in Kachemak Bay – 1999-2001

Year	Shoreline Stratum		<20 m Substratum		20-40 m Substratum		>40 m Substratum		Total Offshore Offshore		Overall Total	
	Count	Adj. Count	Count	Estimate	Count	Estimate	Count	Adj. Count	Count	Adj. Count	Count	Adj. Count
1999	141	160	56	740	2	23	5	54	63	817	201	—
2000	16	17	18	153	1	8	3	20	22	181	38	—
2001	17	NA	155	737	3	15	0	0	158	752	175	—
2002 (03/04/02)	85	NA	31	157	1	5	0	0	32	162	117	—
2002 (03/09/02)	—	—	281	1,336	0	0	5	28	286	1,364	—	—

Key:
— = data not available
< = less than
> = greater than
Adj = adjusted
m = meters
NA – not applicable

Source:
Petrula and Rosenberg (2002), Data provided are from a draft and are preliminary.

Table-III.B-11
Counts of Sea Otters in the Aleutian Islands

Island Group	1965[1]	1992[2]	2000
Near Islands	27	955	368
Rat Islands	3,147	1,461[2]	192
Delarof Islands	2,798	995	NG
Western Andreanof Islands	3,264	1,527	NG
Eastern Andreanof Islands	421	1,562	NG
Central Aleutians	NG	4,102[3]	1,190
Islands of Four Mountains	NS	72	52
Fox Islands[4]	43	1,449	NA
—	**NA**	**1,458**	**640**

Notes:
[1]1965 data are from Kenyon (1969) as presented in Table 2 of Evans et al (1997).[2] 1992 data are from Evans et al. (1997)[3] Data for 2000 and those 1992 values used for comparison with 2000 data are from USDOI, Fish and Wildlife Service (2000a:7, unnumbered figure entitled "Aleutian Islands sea otter aerial results").
[2]This likely is an underestimate, because the 1992 estimate for Amchitka Island probably is an underestimate due to survey conditions (Evans et al., 1997:8).
[3]Data for Central Aleutians in 1992 apparently include some island(s) not surveyed in 1965 and, thus, not included in one or more of the island group totals compared to Kenyon's (1969) data.
Inspection of the figure indicates the area called the Central Aleutians in the 2000 document is comprised of the Western and Eastern Andreanof Islands and the Delarof Islands.
[4]Data given for the Fox Islands that are compared to Kenyon's (1969) data apparently contain a subset of the total for Fox Islands; therefore, numbers comparable to Kenyon are not the same as those compared to 2000 data.

Key:
NG = not given
NS = not surveyed
NA = not applicable

Sources:
Evans et al. (1997), USDOI, Fish and Wildlife Service (2000a:7, unnumbered figure entitled "Aleutian Islands Sea Otter Aerial Results").

Table III.B-12
Counts or Estimates of Sea Otters in the Southwest Alaska Stock

General Region	Year	Count or Original Estimate	Adjusted Estimate	Coefficient of Variation
Lower Cook Inlet	1993[1]	5,914±3,094[a]	8,457[b]	NG
Kamishak Bay	2002[2]	NG	6,918[c]	0.315[c]
Kodiak Archipelago	1989[3]	13,526[d]	NG	NG
	1994[4]	9,817[c, d]	NG	NG
	2001[4]	5,893[d]	5,893[b,c]	0.228[b,c]
South Alaska Peninsula	1986[5]	15,346-17,835[d, f]	NA	NG
South Alaska Peninsula- Shoreline Seal Cape to Cape Douglas	2001[6]	2,190[b,c]	5,212[b,c]	0.087[c]
South Alaska Peninsula – Offshore	2001[7]	939[b] 1,005[c] 1,344[d]	2,235[b] 2,292[c] NG[d]	NG[b] 0.816[c] NG[d]
South Alaska Peninsula – Islands	2001[8]	405[c] (number recorded)	964[c]	0.087[c]
North Alaska Peninsula	1986[9]	9,061 (fall)- 13,091 (summer)[df]	NG	NG
	2000[10]	5,756[b] 4,728[c]	13,699[b] 11,253[c]	0.337[c]
Unimak Island	2001[11]	42[c] (number recorded)	100[c]	0.087[c]
Aleutian Islands Total	1992	8,044[d] 8,048[h]	19,104±3,272[e]	NG
	2000	8,742[b] 2,442[c]	8,742[c]	0.215[c]
Total	2000-2002 data	NG	41,474[c]	NG

Notes:
Some numbers provided on web site are given as "counts or estimates". Some, but not all, of these same numbers are given in other documents as "original estimates". Some numbers provided as "unadjusted estimates" are given as "number recorded" in the text of the originating document.

Survey Type:
[1] Summer boat survey; Included eastern and western Cook Inlet
[2] Aerial fixed-wing survey.
[3] Helicopter survey of shoreline.
[4] Aerial survey using strip transect method (Bodkin and Udevitz, 1995) to sample high and low sea otter density habitat.
[5] Area surveyed from Unimak Island to Pavlof Bay and shoreline of Pavlof and Shumagin Islands. In 2001, FWS reported they used the "same study design" (see source d above).
[6] Aerial survey of area from Seal Cape to Cape Douglas
[7] Aerial fixed-wing twin engine survey of offshore areas from False Area to Pavlov Bay.
[8] Aerial fixed-wing twin-engine survey (includes Sanak, Caton, and Deer Islands and the Shumagin and Pavlov island groups).
[9.] = Fixed-wing twin-engine aircraft survey.
[10.] = Fixed-wing twin-engine aircraft survey.
[11]. = Aerial fixed-wing shoreline survey; Includes Near, Rat, Andreanof, Delarof, Four Mountain and Fox Island Groups.

Key:
NA = not applicable
NG = not given

Sources:

a = Agler et al., 1995; b = (66 *FR* 55693); c = Southwest Alaska Stock Assessment, revised 08/20/2002; d = USDOI, Fish and Wildlife Service, (2002d); e = Evans, Burn, and DeGange (1997); f **=** Brueggeman et al. (1988).

Table III.B-13
Numbers of Sea Otters Reported Taken and/or Tagged in the Range of the Southwest Alaska Stock (North Side of Cook Inlet West to the End of the Aleutian Islands)

Community	1988-97	1998	1999	2000	2001	2002	Total
Adak	2	0	0	5	0	0	7
Akhiok	0	0	0	0	0	0	0
Akutan	11	0	0	0	0	0	11
Atka	2	0	0	0	0	0	2
Bethel	1	0	0	0	0	0	1
Chignik	20	0	0	0	0	0	20
Chignik Lake	2	0	0	0	0	0	2
Cold Bay	9	0	0	1	0	0	10
Egegik	1	0	0	0	0	0	1
False Pass	16	2	0	0	0	0	18
King Cove	53	1	2	5	12	0	73
King Salmon	1	0	1	0	0	0	2
Kodiak	315	20	45	41	35	14	470
Larsen Bay	155	15	0	6	6	0	182
Mekoryuk	0	0	0	0	0	0	0
Nelson Lagoon	1	1	1	0	0	0	3
Nikolski	1	0	0	0	0	0	1
Old Harbor	53	20	0	0	21	0	94
Ouzinkie	29	0	0	0	0	0	29
Perryville	4	0	0	0	0	0	4
Pilot Point	1	0	0	0	0	0	1
Port Heiden	17	1	4	4	0	0	26
Port Lions	54	5	3	1	0	0	63
Sand Point	21	2	8	0	0	0	31
Shishmaref	0	14	6	3	0	0	23
Unalaska	5	0	0	0	0	0	5
Total	**774**	**81**	**70**	**66**	**74**	**14**	**1,079**

Note:
Take reported from western Alaska is assumed to come from the southwestern Alaska stock.

Sources:
USDOI, Fish and Wildlife Service, Marine Mammal Marking, Tagging, and Reporting Program data. Revision date 4/11/02. .

Table III.B-14
Numbers of Sea Otters Reported Taken and/or Tagged in the Range of the Southcentral Alaska Stock (South Side of Cook Inlet around the Kenai Peninsula to Prince William Sound and South to Yakutat)

Community	1988-97	1998	1999	2000	2001	2002	Total
Anchorage	264	2	53	25	21	11	376
Chenega Bay	33	0	5	10	0	0	48
Cordova	616	293	79	213	108	162	1,471
English Bay	36	3	0	0	0	0	39
Homer	111	7	0	5	5	0	128
Kenai	66	2	0	0	0	0	68
Nuchek	0	0	0	0	7	7	14
Port Graham	182	10	4	4	1	0	201
Seldovia	69	11	0	0	0	0	80
Seward	0	0	0	0	0	1	1
Tatitlek	50	0	9	16	0	0	75
Valdez	654	111	78	69	75	0	987
Yakutat	59	31	1	24	9	0	124
Total	2,140	470	229	366	226	181	3,612

Source:
USDOI, Fish and Wildlife Service, Marine Mammal Marking, Tagging, and Reporting Program data. Revision date 4/11/02.

Table III.C-1
Wage and Salary Employment by Industry, 1990-1998 – Kenai Peninsula Borough

Industry Type	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Agriculture, Forestry, Fishing	193	233	419	419	91	70	81	74	69	82	90
Mining	1,175	1,156	1,051	1,071	1,146	1,105	978	1,152	1,088	1,076	1,311
Construction	701	713	623	689	813	846	867	886	915	917	989
Manufacturing	1,861	2,066	1,848	1,833	1,799	1,804	2,006	1,908	1,614	1,398	1,389
Seafood Processing	1,149	1,284	1,136	1,024	952	961	1,096	1,072	807	642	658
Transportation, Communication, Utilities	995	1,006	967	1,001	1,059	1,052	989	1,047	1,199	1,007	1,060
Trade	2,555	2,078	2,945	3,194	3,414	3,432	3,438	3,597	3,833	3,873	3,914
Wholesale Trade	403	379	414	441	472	445	447	465	478	478	424
Retail Trade	2,152	2,329	2,531	2,753	2,942	2,986	2,991	3,132	3,355	3,394	3,490
Finance, Insurance, Real Estate	281	278	300	323	352	366	360	368	377	394	364
Service and Miscellaneous	2,693	2,806	2,815	3,155	3,376	3,251	3,223	3,134	3,267	3,344	3,594
Government	3,421	3,398	3,479	3,728	3,768	4,181	4,168	4,162	4,228	4,245	4,275
Federal	285	289	308	357	374	374	405	415	406	390	436
State	1,077	1,051	1,029	1,031	1,033	1,040	1,047	1,041	1,041	1,027	1,027
Local	2,059	2,058	2,141	2,341	2,361	2,767	2,716	2,706	2,781	2,828	2,812
Total Employment[1]	**13,892**	**14,376**	**14,474**	**15,451**	**15,816**	**16,109**	**16,110**	**16,328**	**16,588**	**16,344**	**16,984**

Note:
[1] = Total may not add up exactly due to rounding.

Source:
State of Alaska, Dept. of Labor and Workforce Development, 2002.

Table III.C-2
Oil and Gas Industry Employment by Industry – 1990-2000, Kenai Peninsula Borough

Mining	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Oil and gas extraction	1,175	1,156	1,051	1,071	1,146	1,104	973	1,148	1,092	1,062	1,622
Manufacturing (total related to oil and gas)	444	450	463	454	466	482	499	494	418	392	408
Chemicals and allied products	—	—	—	—	—	—	—	—	—	—	—
Petroleum and coal products	—	—	—	—	—	—	—	—	—	—	—
Total	**1,619**	**1,606**	**1,514**	**1,525**	**1,612**	**1,586**	**1,472**	**1,642**	**1,510**	**1,454**	**2,030**

Key:
— = no data are available
Source:
State of Alaska, Dept. of Labor and Workforce Development, 2002.

Table III.C-3
Kenai-Soldotna Employment by Industry – 1990-1998

Industry Type	1990	1991	1992	1993	1994	1995	1996	1997	1998
Mining	1,034	1,036	1,047	1,068	1,141	1,100	972	1,148	1,092
Construction	327	490	489	543	619	595	592	588	624
Manufacturing	961	1,310	1,294	1,258	1,219	1,256	1,497	1,522	1,195
Food and Kindred	—	—	733	707	637	627	807	870	560
Transportation	560	598	557	548	565	524	498	534	526
Trade	1,652	1,722	1,939	2,201	2,348	2,226	2,175	2,236	2,524
Wholesale	303	288	3312	373	398	361	351	360	383
Retail	1,349	1,434	1,627	1,829	1,951	1,865	1,825	1,875	2,141
Finance	174	176	194	203	218	222	226	239	234
Services and Miscellaneous	1,862	1,974	1,965	2,176	2,315	2,147	2,074	2,054	2,090
Government	2,039	1,966	2,089	2,274	2,282	2,628	2,548	2,560	2,606
Federal	140	150	155	196	214	223	237	243	235
State	611	529	529	545	540	544	546	543	531
Local	1,355	1,287	1,405	1,533	1,528	1,861	1,764	1,774	1,840
Total Industries	**8,671**	**9,279**	**9,574**	**10,272**	**10,708**	**10,698**	**11,174**	**11,469**	**11,515**

Key:
— means no data are available.

Source:
State of Alaska, Dept. of Labor and Workforce Development, 2002.

Table III.C-4
Homer Employment by Industry – 1990-1998

Industry	1990	1991	1992	1993	1994	1995	1996	1997	1998
Mining	0	0	0	0	0	0	0	0	0
Construction	2,114	128	88	92	125	163	142	149	165
Manufacturing	304	414	296	261	301	242	280	190	167
Transportation	245	226	213	235	271	288	243	237	229
Trade	450	546	515	548	572	696	734	764	664
Finance	51	56	60	66	73	76	73	64	67
Services and Miscellaneous	375	410	451	486	501	527	535	555	587
Government	463	533	558	601	630	655	631	656	660
Federal	56	63	67	68	66	66	68	74	68
State	27	102	98	93	103	103	107	111	111
Local	380	368	393	439	460	487	456	471	481
Total Industries	**2,102**	**2,312**	**2,182**	**2,289**	**2,472**	**2,647**	**2,638**	**2,615**	**2,539**

Source:
State of Alaska, Dept. Labor and Workforce Development, 2002.

Table III.C-5
Tyonek Subsistence Salmon Harvest

Year	Number of Permits	Chinook	Sockeye	Coho	Pink	Chum	Total
1990	42	797	92	366	124	10	1,389
1991	57	1,105	25	80	0	0	1,210
1992	57	905	74	234	7	19	1,239
1993	53	1,247	43	36	11	9	1,346
1994	49	840	41	111	0	22	1,014
1995	55	1,271	45	123	14	15	1,468
1996	49	1,032	65	110	21	18	1,246
1997	42	642	94	127	0	8	871

Source:
Reusch and Fox (1998).

Table III.C-6
Communities, Households, and Subsistence Inventories

Community	1990 House-holds	2000 House-holds	Harvest Inventory Years															
			1981	1982	1983	1984	1986	1987	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
Upper Cook Inlet																		
Tyonek	55	66	—	—	X	—	—	—	—	—	—	—	—	—	—	—	—	—
Central Kenai Peninsula																		
Kenai	2,329	2,622	—	X	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Southern Kenai Peninsula																		
Fritz Creek	491	661	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	X
Homer	1,411	1,599	—	X	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Nanwalek	42	45	X	—	—	—	—	X	X	X	X	X	X	—	—	—	X	—
Nikolaevski	80	96	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	X
Ninilchik	185	320	—	X	—	—	—	—	—	—	—	—	—	—	—	—	—	X
Port Graham	60	70	X	—	—	—	—	X	X	X	X	—	X	—	—	—	X	—
Seldovia	129	134	—	X	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Kodiak Island																		
Akhiok	19	25	—	X	—	—	X	—	X	—	—	X	—	—	—	—	—	—
Chiniak	23	24	—	X	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Karluk	18	9	—	X	—	—	X	—	X	X	X	—	—	—	—	—	—	—
Kodiak	2,051	1,996	—	X	—	—	—	—	—	—	X	X	X	—	—	—	—	—
Kodiak Station	414	492	—	X	—	—	—	—	—	—	X	—	—	—	—	—	—	—
Larsen Bay	44	40	—	X	—	—	X	—	X	X	X	X	X	—	—	—	X	—
Old Harbor	87	79	—	X	—	—	X	—	X	—	X	—	—	—	—	—	X	—
Ouzinkie	68	74	—	X	—	—	X	—	X	X	X	X	X	—	—	—	X	—
Port Lions	73	89	—	X	—	—	X	—	X	—	—	—	X	—	—	—	—	—
Southern Alaska Peninsula																		
Chignik	46	29	—	—	—	X	—	—	X	—	X	—	—	X	X	X	—	—
Chignik Lagoon	17	33	—	—	—	X	—	—	X	—	—	—	—	X	X	X	—	—
Chignik Lake	34	40	—	—	—	X	—	—	X	—	X	—	—	X	X	X	—	—
Ivanof Bay	9	9	—	—	—	X	—	—	X	—	—	—	—	X	X	X	—	—
Perryville	31	33	—	—	—	X	—	—	X	—	—	—	—	X	X	X	—	—

Key:
X means a survey was conducted that year.
Blank spaces mean that no survey was performed those years.
Sources:
USDOC, Bureau of the Census (1992, 2002); State of Alaska, Dept. of Fish and Game (2002a).

Table III.C-7
Community Characteristics of Subsistence Harvests

Community	Year	Annual Harvest (in Pounds)	Per Capita Resources (% of Households)	Harvested Resources (% of Households)	Received Resources (% of Households)	Give-Away Resources (% of Households)
Upper Cook Inlet						
Tyonek	1983	260	NA	93	91	60
Central Kenai Peninsula						
Kenai	1982	38	NA	81	NA	NA
	1991	75	98	81	84	66
	1992	74	95	84	78	73
	1993	84	98	86	81	62
Southern Kenai Peninsula						
Fritz Creek	1998	105	100	94	94	85
Homer	1982	94	NA	86	NA	NA
Nanwalek	1987	285	97	94	94	94
	1989	141	100	100	100	94
	1990	181	100	100	100	97
	1991	259	100	100	100	100
	1992	279	100	100	100	94
	1993	305	100	100	100	97
	1997	254	100	100	100	90
Nikolaevsk	1998	133	100	89	78	73
Ninilchik	1982	77	NA	92	NA	NA
	1998	164	99	96	92	73
Port Graham	1987	229	100	100	98	82
	1989	122	96	94	92	65
	1990	214	100	100	98	89
	1991	281	100	96	98	88
	1992	273	100	100	100	98
	1993	212	100	98	100	90
	1997	253	100	98	96	86
Seldovia	1982	51	NA	94	NA	NA
	1991	205	99	92	96	85
	1992	145	99	94	95	85
	1993	184	95	95	86	79
Kodiak Island						
Akhiok	1982	519	100	100	86	76
	1986	162	92	83	33	58
	1989	298	100	100	100	100
	1992	322	100	100	96	83
Chiniak	1982	217	100	100	94	88
Karluk	1982	863	100	90	100	90
	1986	385	100	100	95	79
	1989	255	100	100	93	93
	1990	402	100	94	100	88
	1991	269	100	100	100	100

Table III.C-7 (continued)
Community Characteristics of Subsistence Harvests

Community	Year	Annual Harvest (in Pounds)	Per Capita Resources (% of Households)	Harvested Resources (% of Households)	Received Resources (% of Households)	Give-Away Resources (% of Households)
Kodiak	1982	148	100	96	90	79
	1991	123	100	91	95	84
	1992	159	99	90	94	80
	1993	151	99	88	97	84
Kodiak Station	1982	168	71	71	33	26
	1991	115	100	94	81	61
Larsen Bay	1982	426	100	100	97	88
	1986	211	97	81	87	60
	1989	212	100	91	97	82
	1990	345	100	97	94	83
	1991	295	100	92	97	92
	1992	353	100	89	89	95
	1993	451	100	93	100	88
	1997	370	96	89	77	81
Old Harbor	1982	489	100	100	NA	NA
	1986	425	100	98	82	80
	1989	272	100	98	96	88
	1991	391	100	100	98	95
	1997	300	100	100	95	79
Ouzinkie	1982	376	100	100	91	84
	1986	405	94	91	79	47
	1989	89	97	91	83	69
	1990	205	100	98	96	77
	1991	209	100	100	97	84
	1992	347	100	98	94	89
	1993	218	98	92	95	85
	1997	264	100	100	94	92
Port Lions	1982	280	100	98	84	76
	1986	334	99	94	86	75
	1989	147	97	92	89	72
	1993	331	100	100	100	91
Southern Alaska Peninsula						
Chignik	1984	188	100	84	95	79
	1989	209	97	94	94	74
	1991	357	100	90	100	73
Chignik Lagoon	1984	220	100	88	82	71
	1989	211	100	80	93	73
Chignik Lake	1984	279	100	100	96	83
	1989	453	100	100	95	81
	1991	442	100	100	100	92
Ivanof Bay	1984	456	100	100	100	83
	1989	490	100	100	100	100
Perryville	1984	391	100	100	100	100
	1989	394	100	100	93	85

Key:
% = percent
NA = not applicable
Sources:
Fall (1992); Paige, Scott, and Brown (1991); State of Alaska, Dept. of Fish and Game (2002b).

Table III.C-8
Resource Percent of Total Subsistence Harvest

Community	Year	Salmon	Nonsalmon Fish	Big Game	Marine Mammals	Birds and Eggs	Marine Invertebrates
Tyonek	1983	72	2	21	1	1	2
Kenai	1982	41	31	13	0	1	9
	1991	38	33	18	0	1	8
	1992	48	28	11	0	1	11
	1993	46	19	20	*	1	6
Fritz Creek	1998	30	28	28	0	2	7
Homer	1982	21	32	25	0	2	18
Nanwalek	1987	38	37	3	8	1	6
	1989	NA	NA	NA	NA	NA	NA
	1990	NA	NA	NA	NA	NA	NA
	1991	49	NA	NA	NA	NA	NA
	1992	NA	NA	NA	NA	NA	NA
	1993	49	30	3	6	1	8
	1997	62	16	5	9	1	1
Nikolaevsk	1998	50	25	17	0	0	3
Ninilchik	1982	18	28	25	0	2	18
	1998	26	23	40	0	1	7
Port Graham	1987	42	34	2	6	1	7
	1989	33	49	1	7	2	7
	1990	44	43	1	2	1	7
	1991	47	35	1	5	1	8
	1992	39	40	2	6	1	9
	1993	46	34	2	4	—	8
	1997	57	30	*	4	—	5
Seldovia	1982	35	23	14	0	3	17
	1991	31	33	14	0	1	15
	1992	40	28	10	1	1	12
	1993	35	24	13	1	1	19
Akhiok	1982	46	6	8	30	3	8
	1986	69	4	19	1	—	6
	1989	37	20	10	15	3	15
	1992	62	8	9	6	1	13
Chiniak	1982	34	27	24	2	1	11
Karluk	1982	67	12	8	10	1	1
	1986	66	11	12	7	1	3
	1989	77	6	11	2	1	2
	1990	73	13	7	1	1	3
Kodiak	1982	29	42	15	2	—	11
	1991	37	26	22	—	—	9
	1992	46	31	9	—	1	9
	1993	32	40	15	0	—	6
Kodiak Station	1991	28	48	13	NA	—	6

Table III.C-8 (continued)
Resource Percent of Total Subsistence Harvest

Community	Year	Salmon	Nonsalmon Fish	Big Game	Marine Mammals	Birds and Eggs	Marine Invertebrates
Larsen Bay	1982	42	18	15	14	1	9
	1986	49	17	19	2	—	12
	1989	32	18	19	10	2	16
	1990	30	31	12	7	1	16
	1991	37	15	22	3	2	18
	1992	52	19	8	1	1	16
	1993	45	19	17	2	—	14
	1997	58	21	15	1	—	3
Old Harbor	1982	48	14	15	16	1	6
	1986	44	10	14	25	1	5
	1989	55	14	10	9	2	10
	1991	53	19	7	7	2	9
	1997	37	17	20	14	4	6
Ouzinkie	1982	47	17	10	9	3	14
	1986	48	17	16	7	2	7
	1989	33	16	20	10	7	9
	1990	37	33	11	5	4	7
	1991	42	26	15	3	3	6
	1992	61	17	5	3	2	8
	1993	47	17	11	7	3	10
	1997	48	25	10	5	5	3
Port Lions	1982	35	35	12	3	1	13
	1986	48	17	21	2	1	10
	1989	41	23	18	*	2	11
	1993	48	19	16	1	1	9
Chignik	1984	73	12	7	3	1	4
	1989	54	26	7	2	2	7
	1991	48	31	7	1	1	11
Chignik Lagoon	1984	54	9	26	1	2	7
	1989	47	21	17	0	2	10
Chignik Lake	1984	50	6	40	1	1	1
	1989	34	9	48	1	3	4
	1991	46	9	34	1	3	5
Ivanof Bay	1984	58	4	25	5	2	6
	1989	38	13	28	6	3	9
Perryville	1984	55	11	24	5	2	3
	1989	51	18	15	6	2	5

Key:
***** less than 1%
— = Data are not available or no data exist.
NA = not applicable

Source:
State of Alaska, Dept. of Fish and Game (2002b).

Table III.C-9
Population by Community and Place

Community	Population 2000	Population 1990	Change in Number	Percent Change
Upper Cook Inlet				
Tyonek	193	154	39	25.3
Central Kenai Peninsula				
Clam Gulch	173	79	94	119.0
Cohoe	1,168	508	660	129.9
Kalifornsky	5,846	NA	—	—
Kasilof	471	383	88	23.0
Kenai	6,942	6,327	615	9.7
Nikiski	4,327	2,743	1584	57.7
Ridgeway	1,932	2,018	-86	-4.3
Salamatof	954	999	-45	-4.5
Soldotna	3,759	3,482	277	8.0
Sterling	4,705	3,802	903	23.8
Southern Kenai Peninsula				
Anchor Point	1,845	866	979	113.0
Fox River	616	382	234	61.3
Fritz Creek	1,603	1,426	177	12.4
Halibut Cove	35	78	-43	-55.1
Happy Valley	489	309	180	58.3
Homer	3,946	3,660	286	7.8
Kachemak	431	365	66	18.1
Nanwalek	177	158	19	12.0
Nikolaevsk	345	371	-26	-7.0
Ninilchik	772	456	316	69.3
Port Graham	171	166	5	3.0
Seldovia	286	316	-30	-9.5
Kodiak Island				
Akhiok	80	77	3	3.9
Chiniak	50	69	-19	-27.5
Karluk	27	71	-44	-62.0
Kodiak	6,334	6,365	-31	-0.5
Kodiak Station	1,840	2,025	-185	-9.1
Larsen Bay	115	147	-32	-21.8
Old Harbor	237	284	-47	-16.5
Ouzinkie	225	209	16	7.7
Port Lions	256	222	34	15.3
Womens Bay	690	620	70	11.3
Alaska Peninsula				
Chignik	79	188	-109	-58.0
Chignik Lagoon	103	53	50	94.3
Chignik Lake	145	133	12	9.0
Ivanof Bay	22	35	-13	-37.1
Perryville	107	108	-1	-0.9

Key:
— = no data are available
NA = not applicable

Source:
State of Alaska, Dept. of Community and Economic Development (2002).

Table III.C-10
Community Types by Demographic, Economic, and Sociocultural Characteristics

Characteristics	Villages	Towns	Cities
Demographic Characteristics			
Population	Low	Mid-Large	Mid-Large
Growth through In-migration	Low	High	High
Economic System Characteristics			
Wage Market Sector Development	Low	Moderate	High
Commercial Fisheries Development	Low-High	High	Low
Subsistence Sector Development	High	Moderate	Low
Wild Food Production (per capita)	High	Moderate	Low
Wild Food Distribution	High	Moderate	Low
Domestic Mode of Production	High	Moderate	Low
Sociocultural Characteristics			
Predominant Cultural Group	Native	Non-Native	Non-Native
Significant Native Population	Yes	Yes	No
Extended Kinship-Tribal Organization	High	Moderate	Low
Communities	Tyonek, Nanwalek, Port Graham, Seldovia Village, Karluk, Larsen Bay, Old Harbor, Ouzinkie, Port Lions Chignik, Chignik Lagoon, Chignik Lake, Ivanof Bay, and Perryville	City of Kodiak (including Chiniak, Womens Bay) and Seldovia	Kenai-Soldotna Area (including Nikiski, and the nearby residential areas such as Sterling, Ridgeway, Salamatof, and Kasilof, Cohoe,Clam Gulch, Ninilchik, Happy Valley). Homer (including Fritz Creek, Anchor Point, Nikolaevski, Ninilchik, and Kachemak)

Source:
Modified from Fall (2001).

Table III.C-11
Ethnic Composition of the Population 2000 Count and Percentage of Total Count by Community

Community	White		Native Alaskan		Asian		Other		Two or More	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Upper Cook Inlet										
Tyonek	9	4.66	184	95.34	0	0.00	0	0.00	0	0.00
Central Kenai Peninsula										
Clam Gulch	160	92.49	5	2.89	2	1.16	0	0.00	6	3.47
Cohoe	1,053	90.15	53	4.54	7	0.60	12	1.03	43	3.68
Kalifornsky	5,247	89.75	269	4.60	39	0.67	64	0.93	237	4.05
Kasilof	435	92.36	15	3.18	1	0.21	4	0.84	16	3.40
Kenai	5,745	82.76	607	8.74	115	1.66	118	1.84	347	5.00
Nikiski	3,771	87.15	327	7.56	31	0.72	63	1.46	135	3.12
Ridgeway	1,696	87.78	83	4.30	15	0.78	39	2.03	99	5.12
Salamatof	685	71.80	190	19.92	5	0.52	45	4.40	32	3.35
Soldotna	3,310	88.06	187	4.97	65	1.73	73	1.94	124	3.30
Sterling	4,361	92.69	153	3.25	25	0.53	1.07	0.60	116	2.47
Southern Kenai Peninsula										
Anchor Point	1,694	91.82	62	3.36	6	0.33	13	0.71	70	3.79
Fox River	614	99.68	0	0.00	0	0.00	1	0.16	1	0.16
Fritz Creek	1,490	92.95	38	2.37	9	0.56	17	1.06	49	3.06
Halibut Cove	34	97.14	0	0.00	0	0.00	0	0.00	1	2.86
Happy Valley	432	88.34	30	6.13	2	0.41	6	1.23	19	3.89
Homer	3,573	90.55	167	4.23	36	0.91	46	1.16	124	3.14
Kachemak	377	87.47	25	5.80	4	0.93	1	0.23	24	5.57
Nanwalek	12	6.78	158	89.27	0	0.00	0	0.00	7	3.95
Nikolaevsk	282	81.74	6	1.74	1	0.29	11	3.19	45	13.04
Ninilchik	635	82.25	108	13.99	4	0.52	1	0.13	24	3.11
Port Graham	19	11.11	145	84.80	0	0.00	1	0.58	6	3.51
Seldovia	210	73.43	50	17.48	2	0.70	5	1.75	19	6.64
Kodiak Island										
Akhiok	2	2.50	69	86.25	3	3.75	0	0.00	6	7.50
Chiniak	44	88.00	1	2.00	1	2.00	3	6.00	1	2.00
Karluk	0	0.00	26	96.30	1	3.70	0	0.00	0	0.00
Kodiak	2,939	46.40	663	10.47	2,010	31.73	379	5.98	343	5.42
Kodiak Station	1,617	87.88	36	1.96	19	1.03	119	6.07	49	2.66
Larsen Bay	24	20.87	90	78.26	0	0.00	0	0.00	1	0.87
Old Harbor	31	13.08	173	73.00	0	0.00	0	0.00	33	13.92
Ouzinkie	25	11.11	182	80.89	0	0.00	0	0.00	18	8.00
Port Lions	89	34.77	162	63.28	0	0.00	0	0.00	5	1.95
Womens Bay	592	85.80	42	6.09	10	1.45	4	0.58	42	6.09
Alaskan Peninsula										
Chignik	25	31.65	48	60.76	2	2.53	5	6.33	1	1.27
Chignik Lagoon	12	11.65	84	81.55	0	0.00	1	0.97	6	5.83
Chignik Lake	17	11.72	126	86.90	1	0.69	0	0.00	1	0.69
Ivanof Bay	1	4.55	21	95.45	0	0.00	0	0.00	0	0.00
Perryville	2	1.87	104	97.20	0	0.00	0	0.00	1	0.93

Source:
State of Alaska, Dept. of Community and Economic Development (2002).

Table III.C-12
Selected Characteristics of the Population

Community	Number of Households	Average Number Persons per Household	Median Age
Upper Cook Inlet			
Tyonek	66	2.92	28.3
Central Kenai Peninsula			
Clam Gulch	67	2.58	37.5
Cohoe	445	2.62	39.1
Kalifornsky	2,117	2.76	35.2
Kasilof	180	2.62	39.6
Kenai	2,622	2.65	32.3
Nikiski	1,514	2.86	34.2
Ridgeway	715	2.70	37.7
Salamatof	220	4.34	36.8
Soldotna	1,465	2.57	29.5
Sterling	1,676	2.81	36.4
Southern Kenai Peninsula			
Anchor Point	711	2.59	39
Fox River	122	5.05	14.8
Fritz Creek	661	2.43	38.1
Halibut Cove	18	1.94	47.3
Happy Valley	196	2.49	42
Homer	1,599	2.47	38.8
Kachemak	169	2.55	43.1
Nanwalek	45	3.93	21.5
Nikolaevsk	96	3.59	20.4
Ninilchik	320	2.41	42.5
Port Graham	70	2.44	37.8
Seldovia	134	2.13	45.3
Kodiak Island			
Akhiok	25	3.20	24
Chiniak	24	2.08	49
Karluk	9	3.00	30.3
Kodiak	1,996	3.17	33.5
Kodiak Station	492	3.74	23.5
Larsen Bay	40	2.88	29.3
Old Harbor	79	3.00	27.1
Ouzinkie	74	3.04	32.8
Port Lions	89	2.88	35.6
Womens Bay	251	2.75	35.1
Upper Alaska Peninsula			
Chignik	29	2.72	36.3
Chignik Lagoon	33	3.12	26.3
Chignik Lake	40	3.63	20.8
Ivanof Bay	9	2.44	40
Perryville	33	3.24	26.5

Source:
State of Alaska, Dept. of Community and Economic Development (2002).

Table III.C-13
Community Description – Cook Inlet Area, Alaska

Community	Culture/Economy
Upper Cook Inlet	
Tyonek	Tyonek is a Dena'ina Indian village practicing a subsistence lifestyle using salmon, moose, beluga whales, and waterfowl. Approximately 20 residents hold commercial fishing permits. Recreational fishing and hunting guiding are new economic activities. Some residents trap during winter.
Central Kenai Peninsula	
Clam Gulch	Clam Gulch is a geographic location with a lodge and post office serving the primarily non-Native population. Approximately 29 residents hold commercial fishing permits. The Kenai area economy provides a variety of employment opportunities to residents.
Cohoe	Cohoe is a geographic location. The Kenai area economy provides a variety of employment opportunities to residents.
Kalifornski	A geographic location with mostly non-Native residents. Kalifornsky Beach Road is well traveled by Kenai River sport fishing enthusiasts. The Kenai area economy provides a variety of employment opportunities to residents.
Kasilof	A geographic location with mostly non-Native residents. The Kenai area economy provides a variety of employment opportunities to residents.
Kenai	The Kenai River is a major sport-fishing location for Anchorage residents and tourists. The river is world renowned for trophy king and silver salmon. The City is the center of the oil and gas industry, providing services and supplies for Cook Inlet's oil drilling and exploration. Tourism is estimated as a $95 million per year industry on the Kenai Peninsula. Other important economic sectors include sport, subsistence, and commercial fishing; fish processing; timber and lumber production; agriculture; transportation services; construction; and retail trade. Approximately 234 area residents hold commercial fishing permits. In 2000, the estimated gross fishing earnings of residents neared $2.7 million.
Nikiski	Nikiski is the site of a Tesoro Alaska oil refinery, where Cook Inlet and some North Slope crude oil is processed into jet fuel, gasoline, and diesel. Agrium, Inc. employs 500 residents at its fertilizer plant, producing 1 million tons of urea and 600,000 tons of ammonia annually. Timber, commercial and sport fishing, government, retail businesses, and tourism-related services also provide employment. Approximately 56 residents hold commercial fishing permits.
Ridgewood	A geographic location with mostly non-Native residents. The Kenai area economy provides a variety of employment opportunities to residents.
Salamatof	A portion of the Salamatof population is a traditional Native village. Salamatof is attempting to develop a lake resort area.
Soldotna	The Kenai area economy provides a variety of employment opportunities to residents. Approximately 173 area residents hold commercial fishing permits. Soldotna is the site of the Central Peninsula General Hospital, the Kenai Peninsula Community College, the State Troopers' headquarters, the Kenai National Wildlife Refuge, and the Borough and School District offices.
Sterling	The community caters to the sport-fishing industry and summer influx of recreational enthusiasts. Approximately 16 residents hold commercial fishing permits. The Kenai area economy provides a variety of employment opportunities to residents.
Anchor Point	Many residents work in Homer in a variety of positions. The community caters to the sport-fishing industry, and several lodges provide services. A small sawmill helps to process timber from various Kenai Peninsula Borough sites. 80 residents hold commercial fishing permits. In 2000, the estimated gross fishing earnings of residents neared $2 million.
Fox River	Wood, fiberglass, and aluminum boats; handbags, and canvas bags for fishermen are manufactured at Fox River. The school also provides employment
Fritz Creek	A geographic location serving the primarily non-Native population. Approximately 13 residents hold commercial fishing permits.
Halibut Cove	Halibut Cove residents include many artists. Paintings, prints, pottery and batiks are produced and sold locally. There is a local community association. The summer population grows to around 160. Approximately eight residents hold commercial fishing permits.

Table III.C-13 (continued)
Community Description – Cook Inlet Area, Alaska

Community	Culture/Economy
Happy Valley	A geographic location with mostly non-Native residents. The Kenai area economy provides a variety of employment opportunities to residents.
Homer	Homer is primarily a fishing, trade and service center, and enjoys a considerable seasonal tourist industry and has a large community of artists. Approximately 10 cruise ships dock in Homer each summer. During summer months, the population swells with students and others seeking seasonal employment. Sport fishing for halibut and salmon contributes significantly to the economy. Approximately 541 area residents hold commercial fishing permits. In 2000, the estimated gross fishing earnings of residents neared $27 million. Homer is the "Halibut Capital of the World." A sawmill processes borough timber, and Circle De Pacific Corp. is exporting wood chips from Homer to Japan.
Kachemak	Kachemak is a non-Native community with nearby Homer offering a variety of employment opportunities. There are few businesses within the City boundaries.
Nanwalek	Nanwalek is a traditional Sugpiaq village. Subsistence activities are a large part of the culture. The school, subsistence activities, and summer employment at the Port Graham cannery provide income. Approximately seven residents hold commercial fishing permits.
Nikoloevski	The community includes Russian Orthodox, Russian Old Believers (Old Right Believers) and some non-Russians, living in three distinct settlements. The Old Believers in this area lead a family-oriented, self-sufficient lifestyle. They use modern utilities, and food sources are from gardening, small livestock, fishing and hunting. Families are typically very large (8 to 12 children.) Traditional clothing is worn, Russian is the first language. Boys typically marry at age 15 or 16, while girls are married at 13 or 14. Many residents are employed in the Anchor Point and Homer areas, primarily in fishing and construction. .Approximately 17 residents hold commercial fishing permits. Boat building also occurs.
Ninilchik	Ninilchik is a traditional Native village, although the majority of the population are non-Natives. There is a strong Russian Orthodox following, and an historical Church is located in Ninilchik. Subsistence activities, commercial fishing, some tourism, and timber harvests from Native lands occur in Ninilchik. The Kenai area economy provides a variety of employment opportunities to residents. Approximately 49 residents hold commercial fishing permits.
Port Graham	Port Graham is a traditional Sugpiaq village with a fishing and subsistence lifestyle. A new fish cannery and hatchery opened in 1999. The cannery provides seasonal employment for 70 Port Graham and Nanwalek residents. Red salmon fry are raised for area lakes, and pink salmon are raised for the cannery. Approximately 12 residents hold commercial fishing permits.
Seldovia	Commercial fishing and subsistence are an integral part of the local culture. Seldovia is a commercial fishing and processing center. Timber operations at Jakolof Bay and Seldovia Bay have affected the community economy. Tourism is increasing. Approximately 57 residents hold commercial fishing permits.
Southern Kenai Peninsula	
Akhiok	Akhiok is an Alutiiq (Russian-Aleut) village dependent upon fishing and subsistence activities. Public sector employment and seasonal work provide cash flow in the community. Approximately, five residents hold commercial fishing permits. Almost all of Akhiok's residents depend heavily on subsistence fishing and hunting for food supplies.
Chiniak	The school, post office and local roadhouses are the primary year-round employers. There are no stores or gas stations in Chiniak. Several residents commute to Kodiak for employment. Many work in construction, fishing, or other seasonal industries outside of the community. Two residents hold commercial fishing permits. A 27-acre low-Earth orbit launch complex, Kodiak Launch Facility, is south of Chiniak at Cape Narrow
Karluk	An Alutiiq (Russian-Aleut) village with a fishing and subsistence lifestyle. Fish processing is the primary source of livelihood. The village corporation shares ownership of a cannery with the corporations of Larsen Bay and Old Harbor, but operations have remained idle in recent years. Residents actively participate in subsistence hunting and fishing activities.

Table III.C-13 (continued)
Community Description – Cook Inlet Area, Alaska

Community	Culture/Economy
Kodiak	The local culture surrounds commercial and subsistence fishing activities. The Kodiak economy is based on fishing, seafood processing, retail services and government The Coast Guard comprises a significant portion of the community, and there is a large seasonal population. Kodiak is primarily non-Native, and the majority of the Native population are Alutiiq. Filipinos are a large subculture in Kodiak due to their work in the canneries. Adaptability and diversification in a variety of fisheries has enabled the Kodiak economy to develop and stabilize. In 1998, Kodiak was the nation's third highest port in seafood volume and value, with 358 million pounds of seafood landed, at a value of $79.7 million. Thirteen fish processing companies operate here year-round. Approximately 665 area residents hold commercial fishing permits
Kodiak Station	Kodiak Station is an U.S. Coast Guard Base, housing around 2,000 military personnel and their families. However, many Coast Guard families live off base in surrounding areas.
Larsen Bay	Larsen Bay is a traditional Alutiiq settlement with a large majority of the population depending on subsistence activities. The economy of Larsen Bay is primarily based on commercial fishing and work at Kodiak Salmon Packers. Approximately 17 residents hold commercial fishing permits. There are very few year-round employment positions.
Old Harbor	Old Harbor practices its traditional Alutiiq culture. Fishing provides income to the community, and tourism is an increasing part of the economy. Approximately 32 residents hold commercial fishing permits. Residents of Kaguyak, a summer fish camp, also live in Old Harbor.
Ouzinkie	Ouzinkie is an Alutiiq (Russian-Aleut) village. The economic base is primarily commercial salmon fishing. Approximately 26 residents hold commercial fishing permits.
Port Lions	The majority of the population are Alutiiq with all residents depending to some extent on subsistence activities for food sources. The economy of Port Lions is based primarily on commercial fishing, fish processing, and tourism. Approximately 24 residents hold commercial fishing permits.
Womens Bay	Due to its close proximity to Kodiak Station, many residents are Coast Guard families with many residents employed at the station.
Upper Alaska Peninsula	
Chignik	Historically a Kaniagmuit area with Russian and Scandinavian influences, the community is presently a mixture of non-Natives, Aleuts, and Eskimos. Subsistence is important to residents' livelihoods. Approximately 16 residents hold commercial fishing permits. Two fish-processing plants operate in Chignik. Between 600 to 800 people come to Chignik to fish or work in the plants each summer.
Chignik Lagoon	Chignik Lagoon is a traditional Koniag village. Fishing is the mainstay of the economy, which is dependent on the success of the salmon fleet. The village experiences an influx of fishermen during the summer months. The population swells by 200 during the fishing season. Approximately 29 residents hold commercial-fishing permits.
Chignik Lake	Chignik Lake is a predominantly Native village. Subsistence is important. Fishing is the mainstay of Chignik Lake's economy. Many residents leave the community during summer months to fish from Chignik Lagoon or work at the fish processors at Chignik. Approximately eight residents hold commercial fishing permits.
Ivanof Bay	Ivanof Bay has traditional Unangan influences. Subsistence is an important activity, In summer, most residents leave the community to live and fish near Chignik. Two residents hold commercial fishing permits. Many trap in the winter.
Perryville	The village maintains an Unangan culture. During the summer, the majority of residents leave Perryville to fish in Chignik or Chignik Lagoon. Only a few year-round jobs are available. Some trap during the winter, and all rely heavily on subsistence food sources. Commercial fishing provides cash income. Approximately 11 residents hold commercial fishing permits.

Source:
State of Alaska, Dept. of Community and Economic Development (2002).

Table III.C-14
Scenic Areas Identified in Kenai Peninsula Borough Coastal Plan

Area	Characteristics
Homer	High scenic value. Views of Homer Spit and Kachemak Bay.
Cape Starichkof	Outstanding scenic values. The beach at Cape Starichkof is characterized by a 1-mile-long sand spit with Stariski Creek forming an estuary immediately behind it. Gravel beaches occur north of the spit. The bluffs around Cape Starichkof are extremely high but decrease in height toward the southern portion of the area. Upland areas are vegetated with spruce-hemlock forest. This is the only location along the eastern coast of Cook Inlet south of Kenai and north of Homer with deep-water close offshore. Offshore oil and gas leases abut the area to the west.
Chuitna	Moderate to high scenic values. The area is characterized by relatively flat, poorly drained spruce forest with many small ponds and bogs. Tide flats and associated wetlands occur at Beluga and the mouths of the larger drainages. Deep water occurs nearest to shore at Granite Point, North Foreland, and Ladd. Oil and gas fields and related developments occur offshore adjacent to the area in the upper Cook Inlet.
Kasilof River	Moderately high scenic values. The area contains a large portion of the wetlands found at the mouth of the Kasilof River. Beach grasses and other salt-tolerant plant species are found in low-lying areas. Sandy beaches occur at the river mouth. Upland areas are relatively flat and vegetated with a spruce-hemlock forest interspersed with muskeg.
Nikiski Industrial Area	Unique scenic value. This area of focus from Lower Salamatof Lake to Boulder Point includes the Kenai Peninsula Borough's existing major oil- and gas-related industrial development, marine facilities, and the coastal bluff and tide flats in Nikiska Bay. Existing industrial development at Nikiski includes an oil terminal, two petrochemical refineries, a urea plant, a liquefied natural gas plant, and support services for oil and gas exploration and development. Additional lands are designated to the north and south for expansion of energy-related industries. These additional sites are in proximity of deep water, but the bluff is somewhat higher than at the existing sites. The Foreland lakes and related drainages serve as a scenic break between the Nikiska Bay and East Forelands industrial sites.
Ninilchik/Deep Creek	High scenic value. The Ninilchik River mouth includes a wide beach area and flat low-lying areas adjacent to the river and is separated from the uplands by a vegetation-covered bluff approximately 75 feet in height. The river mouth itself has been improved to create a small boat harbor and adjacent lands on either side cleared and filled for marine-related development.
Paint River and Chenik Lake Drainage	High scenic value.
Port Graham/English Bay	Outstanding scenic value.
Seldovia Watershed	Moderate to high scenic value. Steep slopes and alpine conditions in the upper watersheds. Along the lower elevations of the Fish Creek watershed, water-saturated alluvium, glacial drift deposits, and peaty soils form a thin mantle over the bedrock, and the stream gradient is gentle. Vegetation is characterized by spruce-hemlock forest interspersed with muskeg and bogs.

Source:
Kenai Peninsula Borough (1990)

Table III.C-15
Blocks Having Potential for Prehistoric and Historic Resources

Protraction Diagram	Blocks
Prehistoric Resources	
NO 05-01	6252-6254, 6301-6305, 6351-6355, 6404, 6405, 6453-6455, 6484-6486, 6504-6507, 6531-6536, 6551-6553, 6556-6559, 6580-6586, 6601-6603, 6606-6608, 6630-6636, 6651-6653, 6656, 6657, 6683-6686, 6701-6702, 6734-6736, 6751, 6786
NO 05-02	6783-6785, 6801, 6829, 6830, 6832-6836, 6879-6885, 6929-6935, 6979-6984, 7029-7034, 7080-7083, 7130-7132
NO 05-03	6333, 6334, 6382-6384
Historic Resources	
NP 05-08	6759, 6760, 6809-6811
NO 05-02	6210-6212, 6260-6262, 6310-6312, 6458-6460, 6508-6510, 6558-6560, 6912, 6913, 6962, 6963, 7012, 7013

Table III.C-16
Cook Inlet Shipwrecks

Vessel	Vessel Type	Date	Where Lost	Cause of Wreck
Washington	Bark	1/1/1871	At Kasilof, Cook Inlet	On voyage to catch and salt fish, vessel was blown ashore and lost. Capt. Slocum and men built a large whaleboat from her timbers and continued fishing. They acquired a cargo of fish that was taken to market by a hired craft.
Corea	Bark	4/23/1890	Sandbar 6 miles south of Kalgin Island, Cook Inlet	Stranded in heavy weather and strong tide.
Elizabeth Mary	Steamer wood	10/18/1892	In Cook Inlet	Stranded in gale and heavy seas.
Alice	Schooner	7/10/1894	Anchor Point, Cook Inlet	Parted hawser, drifted ashore, and stranded in moderate seas.
Anita	Steamer	1/1/1898	Cook Inlet	Lost.
Alton	Schooner	5/27/1898	At the mouth of Cook Inlet	Lost in gale near mouth of inlet.
Unnamed	Sloop	9/1/1898	Near Sunrise City, Turnagain Arm, Cook Inlet	Heavily loaded passenger and freight vessel was caught in tidal bore and swamped. Vessel and nine men (including seven Copper River prospectors) were lost near Sunrise City on Turnagain Arm. Captain's dog was the only survivor.
Emma and Louisa	Schooner	10/12/1900	1/8 mile from Hope City, Cook Inlet	Grounded at ebb tide, and broke in two when tide went out.
Farallon	Steamer wood	1/5/1910	Black Reef, north entrance of Illiamna Bay, Cook Inlet	Went aground and wrecked in snowstorm. Everyone escaped to shore in six lifeboats and were rescued by steamer *Victoria*.
Susitna	Gas boat	11/11/1915	South end of Kalgin Island, Cook Inlet	Stranded and lost.
Kate Davenport	Bark	1/10/1916	Anchor Point, Cook Inlet	Anchor chain parted from ice pressure, and vessel was stranded.
Bydarky	Coal barge	9/4/1916	Bluff Point Coal Mine, Cook Inlet	While anchored 1 mile off Bluff Point, vessel dragged both anchors to shore in storm and wind, stranded, and burned.
Outline	Gas screw	1/1/1920	In Cook Inlet	Lost.
On Time	Gas screw	1/1/1920	In Cook Inlet	Stranded and lost.
Tinea	Gas screw	7/1/1920	In Cook Inlet	Lost.
Agram	Gas cannery tender	10/12/1923	On beach between Chenik Bay and Amakeddori Village, Cook Inlet	Caught in one of Cook Inlet's worst storms and was swept ashore when her gas engine broke down. Crew and passengers reached the rocky north shore of the inlet and lived on clams and porcupines until they were rescued by the halibut boat *Jugo-Slav*.
Bolcom No. 8	Scow	1/1/1924	At Bluff Point, Cook Inlet	Stranded and lost.
Olaf	Gas screw	7/12/1924	5 miles north of Kenai River	Vessel foundered in Cook Inlet while taking salmon from Salmato fish trap to cannery at Kenai.
P.G. No. 4	Scow	8/1/1924	In Cook Inlet	Stranded and lost.
Acushla	Gas screw	9/1/1927	In Cook Inlet	Burned.
Minneapolis	Gas screw, one-masted	10/16/1927	in Cook Inlet, near Halibut Cove	Vessel sank in northwestern gale.
Delaware	Gas screw	6/14/1931	12 miles north of the Barren Islands, entrance to Cook Inlet	Struck submerged object and sank quickly. Wreckage went ashore at Kamishak Bay.
Libby, McNeill, and Libby	Scow	8/3/1932	Salamatof Beach, Cook Inlet	Vessel was anchored near the Salamatof fish trap when a heavy southwest gale sprang up, broke its moorings, and caused the vessel to

Table III.C-16 (continued)
Cook Inlet Shipwrecks

Vessel	Vessel Type	Date	Where Lost	Cause of Wreck
No. 9				go on the beach where it was pounded to pieces.
Discoverer	Diesel screw	12/23/1932	At Ninilchik, Cook Inlet	Foundered.
Kenai I	Diesel screw	8/3/1948	At mouth of Kasilof River, Cook Inlet	Burned.
Agate	Gas Screw	7/12/1951	In Cook Inlet	Foundered.
Thor	Diesel fishing tender	7/10/1952	in Cook Inlet, off Oil Bay	Struck a reef and sank. Five-man crew rescued by F/V *Alice* and taken to Snug Harbor where a military aircraft flew them to Seldovia.
Maggie	Gas screw	5/26/1953	Near Anchor Point, Cook Inlet	Burned.
Ferry Queen	Scow	10/7/1953	At Iliamna Bay, Cook Inlet	Foundered.
Winabob	Diesel screw	7/10/1954	Southwest of Kalgin Island, Cook Inlet	Foundered.
Donna Lee	Gas screw	7/16/1954	Off Kalgin Island, Cook Inlet	Foundered.
Lucky Boy	Gas screw	7/22/1955	On beach, northeast end of Kalgin Island, Cook Inlet	Stranded and lost.
Parks No. 2	Gas screw	8/27/1955	At Harriet Point, in Cook Inlet	Foundered.
A.S.P. No. 7	Scow steel	5/22/1958	Approximately 20 miles north of Seldovia, in Cook Inlet	Foundered.
Uncle Sam	Diesel screw	7/14/1958	At the north end of Kalgin Island, Cook Inlet	Foundered
Porifico No. 1	Gas screw	8/5/1959	At Ninilchik, Cook Inlet	Burned
Lew-Al	Oil screw	12/16/1959	Lower Cook Inlet	Stranded and lost
Peggy Foss	Tug	11/24/1961	Anchor Point, Cook Inlet	Destroyed by ice
Ketovia	Crabber	11/20/1962	In Cook Inlet, near Kalgin Island	The captain had lost his crab pots for the season because of Soviet trawlers; vessel engaged in seismic oil exploration to make some money. While in this employ, 50 pounds of ammonium nitrate exploded, killing two crewmen, and the crabber burned and sank.
Sandra	Gas screw	7/11/1963	Off Kalgin Island, Cook Inlet	Stranded and lost
Dynamite Kid	Oil screw	5/4/1964	16 miles off Pt. Pogibshi, Cook Inlet	Foundered
Virginia	Gas screw	7/10/1964	In Cook Inlet	Foundered
Rea	Gas screw	5/2/1965	In Sukoi Bay, north of Cape Douglas, west side of Cook Inlet	Collided with an unidentified object and sank
Polly	Gas screw	6/27/1965	About 5 miles north of Anchor Point, Cook Inlet	Foundered
Craig Foss	Diesel tug	11/7/1965	Mid-channel in Cook Inlet, 17 miles north of Kenai	Capsized and sank in mid-channel of Cook Inlet after the tug became fouled with an anchor cable of the pipelaying barge it was towing. The tug healed over and went down. All 10 crew members were rescued by nearby workboats. Originally called the *U.S. Army Maj. General Henry James*.
North Cape	Barge	11/1/1966	In Cook Inlet, near Anchorage	Sunk by a tidal wave.
Kandu	Marine survey vessel	12/1/1966	in Cook Inlet, north of Homer	Swamped and foundered in 10-foot seas; three lost. Formerly the USCG buoy tender *Rhododendron.*

Table III.C-16 (continued)
Cook Inlet Shipwrecks

Vessel	Vessel Type	Date	Where Lost	Cause of Wreck
South Wind	Tug	5/6/1967	In Cook Inlet	Struck mooring line of a barge it was approaching and capsized. 3-man crew rescued by USCG buoy tender *Sorrell*.
M.P.E. 110	Diesel screw	4/12/1968	Off Cook Inlet	Foundered.
Babs	Oil screw	9/16/1968	In Cook Inlet, near Anchorage	Foundered.
Yukon	Tanker	3/1/1969	In Cook Inlet	Struck an underwater object and ruptured four fuel tanks while outbound with 200,000 gallons of crude oil; some oil escaped before the rest was discharged at the Drift River Terminal. Went to Portland for repairs.
Skilak	Oil screw	8/26/1969	Between Chinitna Point and Anchor Point in Cook Inlet	Foundered.
Pete Tide	Oil rig supply boat	1/10/1970	Middle Ground Shoal, Cook Inlet	Collided with oil platform on Middle Ground Shoal, capsized, and sank; swept onto Middle Ground Shoal by incoming tide. Two ice pans later ran over the hull and sank it on January 15; all five aboard made it to safety.
Kevalaska	Barge	1/1/1971	In Cook Inlet, south of Anchorage	While southbound from Anchorage in tow of the tug *Daphne*, vessel collided with Japanese motor vessel *Shoyo Maru No. 5*; towed to Seattle for repairs.
Mr. George	Oil screw	7/20/1973	In Cook Inlet	Stranded and lost
Suzanna II	Oil screw	2/4/1974	In Kachemack Bay, Cook Inlet	Foundered
Anna Lee	Barge	5/12/1974	In Kennedy Entrance, 60 miles from Homer	Foundered in rough seas. The tug *Knik Wind* also being transported to Alaska on the *Anna Lee* went overboard and sank. The tug was salvaged, but all other cargo was lost.
David E. Day	Tanker	5/23/1974	In Cook Inlet	Fire in motor room disabled main propulsion engine.
Unnamed	Small boat	5/26/1974	In Cook Inlet	Capsized.
Tokyo Arctic	Tanker	7/3/1974	Nikiski dock, Cook Inlet	Malfunctioning bow thruster caused vessel to ram the dock.
Unnamed	River boat	7/20/1974	5 miles past Pt. McKenzie, Cook Inlet	Sank; cause unknown.
SS Galveston	Freighter	7/22/1974	At Port of Anchorage city dock, Cook Inlet	Rammed dock, damaging the pier.
Unnamed	Small boat	9/14/1974	Near Beluga River, Cook Inlet	Sank; cause unknown; two lost.
Unnamed	Cabin cruiser	10/13/1974	8.5 miles west of Fire Island, Cook Inlet	Vessel foundered from lost anchorage due to a clogged gas line.
David Foss	Tug	1/11/1975	Near Cape Kasilof, 20 miles south of Kenai, AK, Kenai Peninsula, Cook Inlet	Vessel sank in 60 feet of water after taking on water in stern while tending an oil rig 4 miles off Kasilof in icy conditions. Six crew members escaped. Tug was not salvaged.
Kevalaska	Barge	5/25/1975	Near Seldovia, Cook Inlet	Capsized.
George W. Ferris	Offshore drilling platform	5/5/1976	In Kachemak Bay, 3 miles from shore	Sank when all four jack-up legs stuck in the mud when rig was being moved to a wellsite in west Cook Inlet; later the legs were blasted free and the rig towed south. NOAA says rig is still at 60-19-38 N, 151-27-00 W.
Unnamed	Small boat	9/28/1976	In Chinitna Bay, across Cook Inlet from Homer	One of 2 boats, carrying 14 clam diggers, swamped; 1 lost.
Unnamed	Small boat	9/28/1976	In Chinitna Bay, across Cook Inlet from	One of 2 boats, carrying 14 clam diggers, swamped; 1 lost.

Table III.C-16 (continued)
Cook Inlet Shipwrecks

Vessel	Vessel Type	Date	Where Lost	Cause of Wreck
			Homer	
Sealift Pacific	US Navy fuel tanker	10/5/1976	3.5 miles north of Nikiski, east side of Cook Inlet	Grounded and 3,100 to 7,200 barrels of oil leaked into the inlet.
Winterwind	F/V	8/7/1981	10 miles off Clam Gulch, Cook Inlet	Began to take on water, floated into tow line of barge and then sank after being run over by the barge.
Norwegian Wood	Crabber	11/29/1981	45 miles southwest of Homer, Cook Inlet	Capsized and sank; cause unknown; one lost.
Miserable Skunk	Cabin cruiser	7/3/1982	5 miles east of Homer, Kachemak Bay, Cook Inlet	Crab pot motor quit while pot was in mid-transport and vessel capsized; two lost.
Unnamed	River boat	9/28/1982	1 mile north of Anchor Point, Cook Inlet	Vessel lost with four aboard.
Unnamed	Fiberglass skiff	7/6/1985	3/4 of a mile west of Ninilchik, Cook Inlet	Anchor snagged in choppy water as tide rose and vessel capsized; four lost. Boat was later salvaged.
Mari-Jana	F/V	7/26/1985	6 miles out in Cook Inlet, off the mouth of the Kenai River	Vessel sank after a wave swamped the boat's stern.
Unnamed	Skiff	7/25/1986	Near Point MacKenzie, Cook Inlet	Boat swamped in strong wind and a changing tide, and two were lost.
Night Owl	Gillnetter	8/12/1986	In Cook Inlet	Vessel sank after taking on water; the three crewmen were rescued by USCG helicopter.
Unnamed	Jonboat	6/6/1987	In Cook Inlet between mouth of Susitna River and Ship Creek	Sank in 8-foot swells. Of the 4 on board, only 2 could be saved by another group of passing sport fishermen.
Sea Turtle	Houseboat	6/29/1987	In western Cook Inlet	Sank while on a trip to western shore of Cook Inlet. Body of Willfried Stache, 52, and a few pieces of debris from the vessel were found on the beach at Dry Bay, 30 miles east of Iliamna, by a family beachcombing. Stache had intended to truck his houseboat up a haul road to his home in Nondalton on Lake Iliamna. Body of Rodney Launders, the other man on board the *Sea Turtle*, was never found.
Kitty Wake	Gillnetter	7/3/1988	In Cook Inlet	Burned
Yermon	Gillnetter	8/1/1988	12 miles west of Ninilchik, Cook Inlet	Sank; two lost. All that was found were two hats floating in the water.
Alaska Constructor	Supply barge	11/2/1988	100 yards offshore of Trading Bay, Cook Inlet	Supply barge loaded with gas and diesel exploded; three of the four on board were killed. The burned barge was later blown up and sunk.
Liberty	F/V	4/28/1989	In Cook Inlet	Sank; four lost.
Legend	F/V	4/28/1989	In lower Cook Inlet	Capsized; three lost.
Midnight Sun	F/V	7/22/1989	In Cook Inlet	Sank; all saved.
Lorna B	Tug	8/19/1989	In Cook Inlet, 9 miles south of Tyonek; 400-600 yards northeast of the Steelhead platform in 235 feet of water.	Capsized while helping anchor a barge next to the Steelhead oil and gas platform. All 11 crewmen escaped. Initially leaked about 500 gallons of fuel.
Coho	F/V	6/7/1990	In Cook Inlet	Capsized in heavy seas while loaded and foundered.
Debby Joann	F/V	7/7/1990	In Cook Inlet	Vessel sank in five fathoms.
Gladis M	F/V	6/12/1993	In Cook Inlet	Flooded and sank; four rescued.

Table III.C-16 (continued)
Cook Inlet Shipwrecks

Vessel	Vessel Type	Date	Where Lost	Cause of Wreck
Overseas Washington	Oil tanker	2/17/1994	Near Nikiski, Cook Inlet	Boat lost power when a water pump lost power and shut down. Pump fed water to a boiler that turned a turbine. The crew started a backup pump and dropped anchor as a precaution.
Spirit	Longliner	9/14/1994	Perl Island, at the mouth of Cook Inlet.	Vessel took on water in a storm and submerged; the five crewmen abandoned ship and were picked up from a life raft by the USCG cutter *Roanoke*.
Oregon	Crowley Barge	1/25/1997	In Cook Inlet, six miles west of Ninilchik	Took on water after tug *Sea Valor* punched a hole in the Oregon's ballast tank; barge overturned, spilling 12,500 tons of urea fertilizer. There were also 1,600 gallons of fuel on board. The barge was towed to Kachemak Bay. After attempts to right the barge failed, it was eventually towed south in an overturned position.
Machinator	Seiner	6/10/1999	Near Kenai River entrance, east side of Cook Inlet	Fire in the engine room; vessel saved.
Irene	Charter boat	7/8/1999	Near entrance of Cook Inlet; 8 miles south of Flat Island	Took on water and sank; USCG helicopters hoisted the 8 aboard to safety.

Key:
F/V = fishing vessel
NOAA = National Oceanic and Atmospheric Administration
USCG = U.S. Coast Guard
Source: http://www.mms.gov/alaska/ref/ships/index.htm

Table III.C-17
Lake Clark National Park and Preserve Incidental Business Permits

Numbers of Commercial Operators Offering Services																
Year	Air Taxi	Flight Seeing	Back-packing	Guided Day Hiking	Charter Boats	Group Camping	Big Game Trans-porters	Lake Touring	Kayak Touring	Photo-graphy	River Trips	Sport-fishing	Winter Recrea-tion	Mount-aineering	Walking Tours	Total Service Number	Total Number of Commercial Operators
2001	32	21	15	24	6	3	11	9	4	10	19	28	4	1	9	196	68
2000	31	21	15	16	—	5	9	8	3	6	19	26	2	—	8	169	81
1999	27	15	11	14	1	5	13	9	2	8	20	41	4	—	12	182	71
1998	27	12	9	13	3	2	14	8	3	9	21	32	3	—	13	169	68
1997	31	16	12	14	2	2	12	7	—	9	22	44	3	—	11	185	62
1996	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	42
1995	17	8	9	8	—	—	9	3	—	4	13	23	—	—	4	98	47
1994	25	11	11	8	—	—	12	5	—	5	17	32	1	—	5	132	56
1993	15	7	8	4	—	—	6	3	—	4	8	21	—	—	3	79	31
1992	16	12	7	5	—	—	8	1	—	5	—	—	3	—	2	59	32
1991	20	10	11	7	—	—	9	4	—	5	19	36	2	—	3	126	—
1990	20	8	11	4	—	—	—	2	—	5	16	32	1	—	3	102	—
1989	15	6	9	5	—	—	—	2	—	4	15	31	2	—	—	89	—
1988	18	18	25	25	—	—	—	26	—	18	31	37	5	—	18	221	—

Key:
— = no data are available

Table III.C-18
Katmai National Park and Preserve Incidental Business Permits (Commercial Operators) as of 12/03/01

Year	Air Taxi	Flight Seeing	Back Packing	Charter Boats	Group Camping	Guided Day Hiking	Big Game Transporters	Lake Touring	Kayak Touring	Photo-graphy	River Trips	Sport-fishing	Winter Recre-ation	Mountain-eering	Walking Tours	Total Service Number	Individual Commercial Operators
2002	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
2001	35	22	12	6	1	26	6	5	4	11	14	56	2	1	17	218	109[1]
2000	40	34	9	6	1	18	4	6	4	13	16	68	2	—	8	229	136
1999	37	25	10	6	1	20	11	16	4	17	18	62	1	—	16	244	124
1998	37	20	12	7	2	22	11	12	4	10	19	60	2	—	25	243	108
1997	40	30	15	8	1	24	13	12	4	18	23	64	2	—	26	280	119
1996	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	84
1995	22	15	7	1	—	14	9	5	—	11	13	36	1	—	6	140	65
1994	29	19	10	3	—	14	15	9	—	12	19	47	2	—	7	186	83
1993	15	11	6	—	—	7	7	5	—	10	10	34	—	—	5	110	—
1992	17	18	6	—	—	7	9	—	—	—	—	—	—	—	—	57	—
1991	25	18	12	2	—	14	11	3	—	14	20	51	2	—	7	179	—
1990	21	14	10	1	—	11		4	—	11	17	49	1	—	—	139	—
1989	19	10	10	9	1	—	—	—	—	9	15	50	2	—	1	126	—
1988	20	20	19	—	—	19	—	18	—	16	—	43	2	—	—	157	—

Notes:
Alagnak operators are included in 2000 and prior years
[1]Alagnak = 27 operators for 2001

Key:
Blank spaces mean no activity listed.

Table III.C-19
Kenai National Wildlife Refuge Commercial Vendors – 1997-2001

Type of Service	1997	1998	1999	2000	2001
Sportfishing Guide	47	67	81	96	98
Air Transporter	17	15	14	16	14
Tent Camps	4	4	3	4	2
Big Game Guide	4	3	5	6	6
Canoeing	13	14	19	9	9
Horse Transporter	3	3	3	3	5
Kayak	1	2	1	0	1
Winter Activities	1	1	1	1	1
Hiking	7	7	9	12	15
Total Permits[1]	**96**	**110**	**128**	**137**	**150**

Note:
[1]Total permits for the year does not necessarily equal the total of the activities because some permits cover more than one activity.

Table III.C-20
Kenai National Wildlife Refuge Visitor Use Summary

Activity[1]	FY 2001	FY 2000	FY 1999	FY1998
Recreation	222,750	125,950	127,380	124,155
Hunting	16,875	10,250	10,790	9,870
Fishing	174,000	97,850	98,300	96,750
Other	31,875	17,850	18,290	17,535
Environmental Education	7,055	4,615	4,473	4,405
Educational Outreach	16,700	13,750	14,050	13,100
Interpretation and Nature Observation	96,200	193,845	188,878	185,440
Wilderness Areas	18,000	0	0	0

Note:
[1]All figures given are visitor days.

Key:
FY = fiscal year

Source:
Summarized from Refuge Management Information System – public education and recreation portions.

Table III.C-21
Kodiak National Wildlife Refuge Commercial Vendors – 1997-2001

Type of Service	1997	1998	1999	2000	2001
Air Transporter	12	10	10	8	12
Big Game Guide	25	24	26	26	26
Sport Fishing Guide	21	22	21	20	35
Wildlife Viewing and Sightseeing Guide	15	17	20	20	25
Setnet/Commercial Fishing	28	28	28	28	28
Total Permits[1]	**101**	**101**	**105**	**102**	**126**

Note:
[1]Total permits for the year does not necessarily equal the total of the activities because some permits cover more than one activity.

Table III.C-22
Kodiak National Wildlife Refuge Visitor Use Summary

Activity[1]	FY 1998	FY 1999	FY 2000	FY 2001
Recreation	5,562	5,562	9,806	6,464
Hunting	1,158	1,158	5,594	5,110
Fishing	4,072	4,072	4,072	2,538
Other	332	332	140	170
Environmental Education	340	340	1,222	2,483
Educational Outreach	732	732	2,635	408
Interpretation and Nature Observation	3,325	3,325	3,056	4,038
Wilderness Areas	0	0	0	NA

Key:
FY = fiscal year
NA = not applicable

Note:
[1]All figures given are visitor days

Source:
Summarized from Refuge Management Information System – public education and recreation portions.

Table III.C-23
Alaska Maritime National Wildlife Refuge Commercial Vendors – 1997-2001

Type of Service	1997	1998	1999	2000	2001
Sport Fishing Guide	5	4	8	12	9
Big Game Guide	0	2	2	2	2
Wildlife Viewing and Sightseeing Guide	1	3	3	3	2
Cruise Ships with Photography and Birding Nature Walks	4	2	1	2	3
Air Transporter	1	2	1	1	1
Setnet/Commercial Fishing	2	2	4	6	6
Cattle Range Land Leasing	0	1	1	1	0
Total Permits	**13**	**16**	**20**	**27**	**23**

Note:
Total permits for the year does not necessarily equal the total of the activities because some permits cover more than one activity.

Table III.C-24
Alaska Maritime National Wildlife Refuge Visitor Use Summary

Activity[1]	FY1998	FY 1999	FY 2000	FY 2001
Recreation	2,500	5,290	18,790	2,100
Hunting	330	520	520	300
Fishing	2,500	2,850	2,850	1,200
Other	1,920	1,920	15,420	600
Environmental Education	1,281	2,050	1,558	2,742
Educational Outreach	3,680	5,250	5,250	1,900
Interpretation and Nature Observation	60,000	86,100	96,300	99,500
Wilderness Areas	540	600	600	500

Note:
[1]Figures given are number of visitor days per activity

Key:
FY = fiscal year

Source:
Summarized from Refuge Management Information System – public education and recreation portions.

Table III.C-25
Alaska Peninsula and Becharof National Wildlife Refuges Commercial Vendors – 1999-2001

Type of Service	1999	2000	2001
Air Transporter	14	13	27
Big Game Guide	18	18	18
Sportfishing Guide	17	21	22
Total Permits[1]	**49**	**52**	**67**

Note:
[1]Total permits for the year do not necessarily equal the total of the activities because some permits cover more than one activity.

Table III.C-26
Becharof National Wildlife Refuge Visitor Use Summary

Activity[1]	FY 2001	FY 2000	FY 1999	FY1998
Recreation	1,950	2,118	2,366	3,383
Hunting	970	1,186	1,282	1,633
Fishing	980	1,475	1,650	1,600
Other	0	100	150	150
Environmental Education	380	400	425	375
Educational Outreach	200	475	500	605
Interpretation and Nature Observation	6,842	7,426	6,557	7,851
Wilderness Areas	175	200	200	—

Note:
[1]Figures given are number of visitor days per activity.

Key:
— = no data available
FY = fiscal year

Source:
Summarized from Refuge Management Information System – public education and recreation portions.

Table III.C-27
Alaska Peninsula National Wildlife Refuge Visitor Use Summary

Activity[1]	FY 2001	FY 2000	FY 1999	FY 1998
Recreation	2,069	2,066	1,250	2,810
Hunting	999	911	990	1,210
Fishing	1,070	1,125	1,250	1,200
Other	0	255	400	400
Environmental Education	882	625	650	750
Educational Outreach	200	475	500	2,077
Interpretation and Nature Observation	6,992	7,363	6,669	8,026
Wilderness Areas	NA	0	0	NA

Note:
[1]Figures given are number of visitor days per activity.

Key:
FY = fiscal year
NA = not applicable

Source:
Summarized from Refuge Management Information System (RMIS)—public education and recreation portions.

Table III.C-28
State of Alaska Recreation and Tourism Near the Proposed Cook Inlet Sale Area

Item	Area	Location (Mile and Highway)	Item	Area	Location (Mile and Highway)
Kenai Peninsula					
1	Captain Cook SRA	End of Kenai Spur Road	17	Ciechanski	Ciechanski Road
2	Ninilchik SRA	135 Sterling Hwy.	18	Kenai River Flats	Bridge Access Road
3	Deep Creek SRA	138 Sterling Hwy.	19	Caines Head SRA	Access by boat
4	Stariski SRA	151 Sterling Hwy.	20	Bernice Lake SRS (closed in 1995)	23 Kenai Spur Road
5	Silver King SRA	157 Sterling Hwy.	21	Bishop Creek	36 Kenai Spur Road
6	Kachemak Bay SP/WP	Access by plane or boat	22	Stormy Lake Swim Beach	36 Kenai Spur Road
7	Kenai Keys	78 Sterling Hwy.	23	Stormy Lake Picnic and Boat Launch	36.5 Kenai Spur Road
8	Bings Landing	79 Sterling Hwy.	24	Swanson River Landing	38.5 Kenai Spur Road
9	Izaak Walton	81 Sterling Hwy.	25	Discovery Picnic Area	39 Kenai Spur Road
10	Morgans Landing	85 Sterling Hwy.	26	Crooked Creek SRS	Coho Loop Road
11	Scout Lake	85 Sterling Hwy.	27	Kasilof River SRS	109 Sterling Hwy.
12	Funny River	10 Funny River Road	28	Johnson Lake SRA	110 Sterling Hwy.
13	Nilmunga SHS	Funny River Road	29	Clam Gulch SRA	117 Sterling Hwy.
14	Kenai River Islands	River Miles 11-41	30	Anchor River SRA	157 Sterling Hwy.
15	Slikok Creek	Kalifornski Beach Road	31	Anchor River SRS (closed in 1995)	162 Sterling Hwy.
16	Big Eddy	Big Eddy Rd.			
Kodiak Area					
1	Ft. Abercrombie SHP	40 Rezanof Dr.	4	Shuyak Island SP	Access by plane or boat
2	Pasagshak SRS	40 Pasagshak River Road	5	Afognak Island SP	Access by plane or boat
3	Buskin River SRS	45 West Rezanof Dr.			

Key:
Dr. = Drive
Ft. = Fort
Hwy. = Highway
P = Preserve
SHP = State Historic Park
SHS = State Historic Site
SMP = State Marine Park
SP = State Park
SRA = State Recreation Area
SRS = State Recreation Site
ST = State Trail
WP = Wilderness Park

Source:
State of Alaska, Dept. of Natural Resources (1992).

Table III.C-29
Nutritional Contribution of Annual Wild Food Harvests to Kenai Peninsula Borough

Community	Survey Year	Annual Wild Food Harvest (lbs per person)	Daily Wild Food Harvest (lbs per person)	Percentage of Recommended Dietary Allowance of Protein (49 g/day)	Percentage of Recommended Energy Requirements (2,317 K cal/day)
Anchor Point	Est	98.0	0.268	63%	9%
Bear Creek	Est	52.1	0.143	34%	5%
Beluga	Est	259.9	0.712	168%	24%
Clam Gulch	Est	83.8	0.230	54%	8%
Cohoe	Est	83.8	0.230	54%	8%
Cooper Landing	1990	91.5	0.251	59%	8%
Crown Point	Est	110.7	0.303	72%	10%
Diamond Ridge	Est	93.8	0.257	61%	9%
Fox River	Est	105.4	0.289	68%	10%
Fritz Creek	98	105.4	0.289	68%	10%
Funny River	Est	83.8	0.230	54%	8%
Halibut Cove	Est	183.6	0.503	119%	17%
Happy Valley	Est	98.0	0.268	63%	9%
Homer	1982	93.8	0.257	61%	9%
Hope	1990	110.7	0.303	72%	10%
Kachemak City	Est	105.4	0.289	68%	10%
Kalifonsky	Est	83.8	0.230	54%	8%
Kasilof	Est	83.8	0.230	54%	8%
Kenai	93	83.8	0.230	54%	8%
Lowell Point	Est	52.1	0.143	34%	5%
Miller Landing	Est	93.8	0.257	61%	9%
Moose Pass	Est	110.7	0.303	72%	10%
Nikiski	Est	83.8	0.230	54%	8%
Nikolaevsk	1998	133.0	0.364	86%	12%
Ninilchik	1998	163.8	0.449	106%	15%
Primrose	Est	110.7	0.303	72%	10%
Ridgeway	Est	83.8	0.230	54%	8%
Salamatof	Est	83.8	0.230	54%	8%
Seward	Est	52.1	0.143	34%	5%
Soldotna	Est	83.8	0.230	54%	8%
Sterling	Est	83.8	0.203	54%	8%
Sunrise	Est	110.7	0.303	72%	10%
Nanwalek	1993	304.9	0.835	197%	28%
Port Graham	1993	212.3	0.582	137%	19%
Seldovia	1993	183.6	0.503	119%	17%
Tyonek	1983	259.9	0.712	168%	24%

Key:

Est = Estimated harvest based on information from surveyed communities, using methods in Wolfe and Walker (1987).
g/day = grams per day
K cal/day = kilocalories per day
lbs = pounds

Source:

State of Alaska, Dept. of Fish and Game, Div. of Subsistence (2002).

Table III.C.30
Nutritional Contribution of Annual Wild Food Harvests to Kodiak Island Borough

Community	Survey Year	Annual Wild Food Harvest (lbs per person)	Daily Wild Food Harvest (lbs per person)	Percentage of Recommended Dietary Allowance of Protein (49 g/day)	Percentage of Recommended Energy Requirements (2,317 K cal/day)
Akhiok	1992	321.7	0.881	208%	29%
Chiniak	1982	217.2	0.595	140%	20%
Karluk	1991	268.7	0.736	174%	24%
Kodiak City	1993	151.1	0.414	98%	14%
Kodiak Road	1991	168.1	0.461	109%	15%
Larsen Bay	1993	451.0	1.236	291%	41%
Old Harbor	1991	391.0	1.071	253%	38%
Ouzinkie	1993	218.4	0.598	141%	20%
Port Lions	1993	331.5	0.908	214%	30%

Note:
Estimated harvest based on information from surveyed communities, using methods in Wolfe and Walker (1987).

Key:
% = percent
g/day = grams per day
K cal/day = kilocalories per day
lbs = pounds

Source:
State of Alaska, Dept. of Fish and Game, Subsistence Div. (2002).

Table III.C-31
Nutritional Contribution of Annual Wild Food Harvests to Southern Alaska Peninsula Communities

Community	Survey Year	Annual Wild Food Harvest (lbs per person)	Daily Wild Food Harvest (lbs per person)	Percentage of Recommended Dietary Allowance of Protein (49 g/day)	Percentage of Recommended Energy Requirements (2,317 K cal/day)
Chignik Bay	1991	358	0.98	231%	33%
Chignik Lagoon	1989	211	0.58	137%	19%
Chignik Lake	1991	442	1.21	286%	40%
Egegik	1984	384	1.05	248%	35%
Ivanof Bay	1989	490	1.34	316%	45%
Perryville	1989	394	1.08	255%	36%

Note:
Estimated harvest based on information from surveyed communities, using methods in Wolfe and Walker (1987).

Key:
% = percent
Est = estimated
g/day = grams per day
K cal/day = kilocalories per day
lbs = pounds

Source:
State of Alaska, Dept. of Fish and Game, Subsistence Div. (2002).

Table IV.A-1
Large, Small, and Very Large Spill Sizes We Assume for Analysis in This EIS by Section

EIS Section	Source of Spill	Type of Oil	Size of Spill(s) in Barrels	Receiving Environment
Large Spills (≥1,000 barrels) – Offshore				
IV.B.1 IV.B.3 IV.B.4	Pipeline	Crude	4,600	Open Water Under Sea Ice On Top of Sea Ice Broken Sea Ice
	Platform Storage Tank	Crude or Diesel	1,500	
Large Spills (≥1,000 barrels) – Offshore				
IV.B.1 IV.B.3 IV.B.4	Pipeline	Crude	2,500	Ground Snow/Ice Fresh Water
Small Spills (<1,000 barrels) – Offshore and Onshore				
IV.B.1 IV.B.3 IV.B.4	Operational Spills from All Sources	Crude or Refined	0.7 2.8 17.8 87.0	Open Water Under Sea Ice On Top of Sea Ice Broken Sea Ice Snow/Ice Ground
Very Large Spills (≥120,000 barrels) – Offshore				
IV.F	Blowout from the Platform	Crude	120,000	Open Water Under Sea Ice On Top of Sea Ice Broken Sea Ice

Key:
≥ = greater than or equal to
< = less than
EIS = Environmental Impact Statement
IV = Roman Numeral Section number and Letter of this EIS where this information is presented

Source:
USDOI, MMS, Alaska OCS Region (2002).

Table IV.B-1
Types of Regulated Pollutants

Pollutant	Description
Conventional Pollutants	Conventional pollutants are contained in the sanitary wastes of households, commercial establishments, and industries. These wastes include human wastes, sand, leaves, trash, ground-up food from sink disposals, and laundry and bath wastes. Five specific pollutants are considered conventional pollutants, as listed below.
Biochemical Oxygen Demand	This parameter measures the quantity of oxygen used in aerobic oxidation of the organic matter in a sample of wastewater.
Total Suspended Solids	This parameter is a measure of the concentration of solid particles suspended in wastewater.
Fecal Coliform	The bacteriological quality of water is based on testing for nonpathogenic indicator organisms, principally the coliform group. Fecal coliform bacteria are used as a measure of health risk because they are more easily detected and pathogens. Fecal coliform bacteria are found in the digestive tracts of humans and animals. Their presence in water indicates the potential presence of pathogenic organisms.
pH	pH is a measure of acidity or alkalinity. pH is measured on a scale of 1 to 14:1 being extremely acidic, 7 neutral, and 14 extremely alkaline. Most healthy surface waters have nearly neutral pH; i.e., they are neither strongly acidic nor alkaline.
Oil and Grease	This parameter is a measure of the concentration of a variety of organic substances including hydrocarbons, fats, oils, waxes, and high-molecular fatty acids. These pollutants degrade receiving-water quality when present in excessive amounts. They also are a concern to municipal and industrial waste treatment because they reduce the biological treatability of the waste and produce sludge solids that are difficult to process.
Toxic Pollutants	Toxic pollutants represent a list of 126 pollutants that are particularly harmful to one or more forms of animal or plant life. They are primarily grouped into organics and metals.
Organic Pollutants	These pollutants include pesticides, solvents, polychlorinated biphenyls (PCB's), and dioxins.
Metals	The metals of concern include lead, silver, mercury, copper, chromium, zinc, nickel, and cadmium.
Nonconventional Pollutants	Non-conventional pollutants are any additional substances that are not in the grouping “conventional” or “toxic” that may require regulation. These include nutrients such as nitrogen and phosphorus.

Source:
Environmental Protection Agency (1990).

Table IV.B-2
Estimates of Exploration-Well Drilling Discharges, Additives, and Usage Rates in Alaska OCS Waters

Discharge Category	Discharge Rates (cubic meters per day)	Type of Compound Used	Usage Rates (liters per month)
Drill Cuttings and Washwater	760-830	—	—
Deck Drainage	4-95	All Purpose or General Cleaners (Biodegradable surfactants or aromatic hydrocarbon mixtures)	Range: 8-1,500 General: 57-570
		Water Purifiers	<11
		Corrosion Inhibitors	4-8
		Biocides	15-80
Sanitary Wastes	11-23	—	—
Domestic Wastes	15-26	—	—
Desalination Wastes	14-76	Cleaners	up to 1,100
		Water Purifiers	<8
		Acidifier/Scale Removers	<7 kilograms per month
Blowout-Preventer Fluid	0.2-0.4	—	—
Boiler Blowdown	0.4-0.8	Corrosion Inhibitors	6-11
		Oxygen Scavengers	6-11
Fire Control System Test Water	400 cubic meters – 12 times a month	Biocides	40
		Antifoam Additives	8
Noncontact Cooling Water	4,900-13,000	Biocides	15 to 910
		Water Purifiers	<8
		Oxygen Scavengers	1.4 kilograms per month
		Surfactants	100-200
Uncontaminated Ballast Water	8-300	—	—
Uncontaminated Bilge Water	30	—	—
Excess Cement Slurry	21-210 cubic meters – 4 times total	—	—
Muds, Cuttings, Cement at Seafloor	400-660 cubic meters	—	—

Key:
— = not applicable
< = less than
Source:
USDOI, MMS, Alaska OCS Region (1995).

Table IV.B-3
Produced Water Monitoring Requirements

Effluent Characteristics	Discharge Limitation (per well weight)	Measurement Frequency	Sample Type/Method	Reported Values
All Locations[1]				
Flow Rate (mgd)	NA	Weekly	Estimate	Monthly Average
Produced Sands	No discharge	—	—	—
pH flow rate <1 mgd	6-9	Monthly	—	Daily Maximum and Minimum
Flow rated <1 mgd	6-9	Weekly	—	Daily Maximum and Minimum
Cadmium and Mercury	NA	Monthly for one year, beginning the first month of permit coverage	Grab	Daily Maximum
Individual Discharges Granite Point Production Facility AKG285000				
Oil and Grease	42 ppm daily maximum 29 ppm monthly average	Weekly	Grab or average of 4 samples taken within 24 hour period	DMMA
Copper	238 ppb 163 ppb	Monthly	Grab	DMMA
Lead	543 ppb 372 ppb	Monthly	Grab	DMMA
Mercury	2.42 ppb 1.66 ppb	Monthly	Grab	DMMA
TAH	63,700 ppb 43,700 ppb	Monthly	Grab	DMMA
WET	133 Tu_c 91 Tu_c	Annual	Grab	DMMA

Table IV.B-3 (continued)
Produced Water Monitoring Requirements

	Discharge Limitation (per well weight)	Measurement Frequency	Sample Type/Method	Reported Values
Trading Bay AKG285000				
Oil and Grease	42 ppm daily maximum 29 ppm monthly average	Weekly	Grab or average of 4 samples taken within 24 hour period	DMMA
Copper	136 ppb 93.4 ppb	Weekly	Grab	DMMA
Lead	883 ppb 605 ppb	Weekly	Grab	DMMA
TAH	24,500 ppb 12,200	Weekly	Grab	DMMA
TAqH	36,800 ppb 18,300 ppb	Weekly	Grab	DMMA
WET	140 Tu_c 96 Tu_c	Quarterly	Grab	DMMA
East Forelands AKG2853003				
Oil and Grease	42 mg/L daily maximum 29 mg/L monthly average	Weekly	Grab or average of 4 samples taken within 24 hour period	DMMA
Copper	122 ppb 84 ppb	Monthly	Grab	DMMA
Arsenic	2900 ppb 1990 ppb	Monthly	Grab	DMMA
Silver	97 ppb 66 ppb	Monthly	Grab	DMMA
Lead	754 ppb 517 ppb	Monthly	Grab	DMMA
Mercury	3,37 ppb 2.31 ppb	Monthly	Grab	DMMA
TAH	61.800 42.400	Monthly	Grab	DMMA
TAqH	92.700 63.500	Monthly	Grab	DMMA
WET	115 TU_c 79 TU_c	Annual	Grab	DMMA

Table IV.B-3 (continued)
Produced Water Monitoring Requirements

Effluent Characteristics	Discharge Limitation (per well weight)	Measurement Frequency	Sample Type/Method	Reported Values
Anna AKG285004				
Oil and Gas	42 ppm daily maximum 29 ppm monthly average	Monthly	Grab	DMMA
Copper	209 ppb 143 ppb	Monthly	Grab	DMMA
Mercury	8.23 ppb 5.64 ppb	Monthly	Grab	DMMA
TAH	86.000 ppb 58.900 ppb	Monthly	Grab	DMMA
TAqH	129.000 ppb 88.400 ppb	Monthly	Grab	DMMA
WET	486 TU_c 333 TU_c	Annual	Grab	DMMA
Baker AKG285005				
Oil and Grease	42 ppm daily maximum 29 ppm monthly average	Weekly	Grab	DMMA
Zinc	16.700 ppb 5.330 ppb	Monthly	Grab	DMMA
Whole Effluent Toxicity (WET)	100 TU_c 72 TU_c	Annual	Grab	DMMA
Bruce AKG285006				
Oil and Grease	42 ppm daily maximum 29 ppm monthly average	Weekly	Grab	DMMA
Silver	766 ppb 525 ppb	Monthly	Grab	DMMA
TAH	298.000 ppb 205.000 ppb	Monthly	Grab	DMMA
WET	912 TU_c 625 TU_c	Annual	Grab	DMMA

Table IV.B-3 (continued)
Produced Water Monitoring Requirements

Effluent Characteristics	Discharge Limitation (per well weight)	Measurement Frequency	Sample Type/Method	Reported Values
Dillion AKG285006				
Oil and Grease	42 ppm daily maximum 29 ppm monthly average	Weekly	Grab	DMMA
Copper	244 ppb 167 ppb	Monthly	Grab	DMMA
Lead	1.030 ppb 706 ppb	Monthly	Grab	DMMA
Zinc	7,980 ppb 5.,470 ppb	Monthly	Grab	DMMA
WET	174 TU_c 119 TU_c	Annual	Grab	DMMA
Phillips A/Tyonek (gas) see Part III.F.6 AKG280511				
Oil and Grease	20 mg/L daily maximum 29 mg/L monthly average	Weekly	Grab or average of 4 samples taken within 24 hour period	DMMA
Arsenic	1,240 µg/L 851 µg/L	Monthly	Grab	DMMA
Copper	58 µg/L 40 µg/L	Monthly	Grab	DMMA
Lead	193 µg/L 132 µg/L	Monthly	Grab	DMMA
Phillips A/Tyonek (gas) see Part III.F.6 AKG280511				
Mercury	0.862 µg/L 0.591 µg/L	Monthly	Grab	DMMA
TAqH	4,530 µg/L 3,110 µg/L	Monthly	Grab	DMMA
WET	16 TU_c 11 TU_c	Annual	Grab	DMMA

Table IV.B-3 (continued)
Produced Water Monitoring Requirements

Effluent Characteristics	Discharge Limitation (per well weight)	Measurement Frequency	Sample Type/Method	Reported Values
Phillips A/Tyonek (crude) see Part III.F.6 AKG280511				
Oil and Grease	42 mg/L daily maximum 29 mg/L monthly average	Weekly	Grab or average of 4 samples taken within 24 hour period	DMMA
Silver	786 µg/L 525 µg/L	Monthly	Grab	DMMA
Mercury	21.9 µg/L 15.0 µg/L	Monthly	Grab	DMMA
Arsenic, Cadmium, Copper, Lead, Nickel, Zinc	NA	Monthly for one year	Grab	DMMA
TAH	298,000 µg/L 205,000 µg/L	Monthly	Grab	DMMA
WET	912 TU_c 625 TU_c	Quarterly	Grab	DMMA
Intern Limitations (Flow Rate <1 mgd)				
Oil and Grease	42 mg/L daily maximum 29 mg/L monthly average	Weekly	Grab or average 4 samples taken within 24 hour period	DMMA
Silver	766 µg/L 382 µg/L	Weekly	Grab	DMMA
Mercury	21.9 µg/L 10.9 µg/L	Weekly	Grab	DMMA
Arsenic, Cadmium, Copper, Lead, Nickel, Zinc	NA	Monthly for one year	Grab	DMMA
TAH	298,000 µg/L 149,000 µg/L	Weekly	Grab	DMMA
TAqH	448,000 µg/L 223,000 µg/L	Weekly	Grab	DMMA
WET	912 TU_c 625 TU_c	Quarterly	Grab	DMMA

Notes:
[1]Table IV.B-3 shows produced water.

Key:
— = no information available
< = less than
µg/L = micrograms per liter
DMMA = daily maximum monthly average
mg/L = milligrams per liter
mg/L = milligrams per liter
mgd = million gallons per day
NA = not applicable
ppb = parts per billion
ppm = parts per million
TAH = total aromatic hydrocarbons
TAqH = total aqueous hydrocarbons
TU_c = toxicity unites, chronic
WET = whole effluent toxicity

Source:
Environmental Protection Agency (1999).

Table IV.B-4
Estimates of Natural and Permitted Anthropogenic Inputs of Metals to Cook Inlet in Tonnes per Year

Natural Inputs	Suspended Sediments	BOD or Organic Wastes	Oil and Grease	Settable Solids	Arsenic	Barium	Cadmium	Chromium	Copper	Mercury	Lead	Zinc
Dissolved (Susitna-Knik-Matanuska River System)	—	—	—	—	70	2,100	140	70	140	7	70	700
Particulate (Susitna-Knik-Matanuska River System)	36,343,000	—	—	—	930	28,000	8	5,900	2,500	2.5	1,600	5,900
Total	**36,343,000**	**—**	**—**	**—**	**1,000**	**30,100**	**148**	**5,970**	**2,640**	**9.5**	**1,670**	**6,600**
Anthropogenic Inputs												
Municipal Wastewater	—	14,374	19,005	899	0.35	--	0.41	1.4	3.7	0.03	0.70	4.9
Seafood Processing	—	2,520-8,580	—	—	—	—	—	—	—	—	—	—
Refinery	30	30	—	—	—	—	—	—	—	—	—	—
State of Alaska Offshore												
Drilling Muds	2,520				0.03	1,445	0.01	0.90	0.12	0.004	0.14	0.78
Produced Water		3,662	253		0.16	300	0.12	0.005	2.4	0.001	1.0	0.24
Sale 191 Exploration and Delineation Drilling Muds	240	—	—	—	0.003	138	0.001	0.09	0.01	0.0004	0.013	0.07
Production (Peak Yearly) Drilling Muds	(960)	(40-870)[1,2]	(3-60)	—	(0.01)	(550)	(0.004)	(0.34)	(0.05)	(0.002)	(0.05)	(0.30)
Produced Water	—	—	—	—	(0.02-0.38)	(32-710)	(0.01-0.28)	(0.0005-0.01)	(0.26-5.7)	(0.0001-0.002)	(0.11-2.4)	(0.03-0.57)
Total	**2,790**	**20,586-26,646**	**19,258**	**899**	**0.54**	**1,883**	**0.54**	**2.4**	**6.2**	**0.035**	**1.9**	**6.0**

Key:
— = not measured
BOD = Biological Oxygen Demand
Sources:
Tables III.A-2, III.A-3, III.A-4, III.A-19, and III.A-20 and Section IV.B.1.a of this EIS.
[1]Calculated from BOD/oil and grease ratio for State of Alaska offshore.
[2]() indicates not expected to be discharged; therefore, they are not included in total.

Table IV.B-5
Summary of Petroleum Production Adverse Impacts to Essential Fish Habitat

Threat	Production Facility	Exploration	Oil Spill
Habitat Alteration			
Alteration of Original or Normal Habitat	X	X	X
Loss of Offshore Habitat	X	X	X
Pelagic Habitat Loss			
Loss of Nearshore Habitat	X	X	X
Loss of Benthic Habitat	X	X	X
Loss of Aquatic Vegetation	X	X	X
Loss of Wetland Value	X	X	X
Loss of Original Sediment Type	X	—	X
Detrital Matter Introduction	X	—	X
Topographic Alteration			
Change of Original Feature or Structure	X	X	—
Accretion/Overburden of Original Feature	X	X	—
Erosion/Dispersal of Feature	X	X	—
Organism Alteration			
Physical Damage to Organism	—	X	X
Mortality	X	X	X
Special Alteration	X	—	—
Gene Pool Deterioration	—	—	X
Introduction of Exotic Species	—	—	—
Introduction of Pathogens/Disease	X	X	X
Change in Photosynthetic Regime	X	X	X
Oceanographic Alteration			
Change in Temperature Regime	X	—	—
Change in Salinity	X	—	—
Change in Circulation Pattern	X	X	—
Water Quality Alteration			
Change in Dissolved Oxygen Content	—	—	X
Eutrophication, Nutrient Loading	—	—	—
Water Contamination	X	X	X
Suspended Sediments, Turbidity	X	X	X
Atmospheric Deposition	X	X	X

Key:
— = not considered adverse impact of petroleum development.

Source:
Environmental Assessment for Amendment 55 to the Fishery Management Plan for the Groundfish Fishery of the Bering Sea and Aleutian Islands Area; Amendment 55 to the Fishery Management Plan for Groundfish of the Gulf of Alaska; Amendment 8 to the Fishery Management Plan for the King and Tanner Crab Fisheries in the Bering Sea/Aleutian Islands; Amendment 5 to the Fishery Management for Scallop Fisheries off Alaska; Amendment 5 to the Fishery Management Plan for the Salmon Fisheries in the Exclusive Economic Zone off the Coast of Alaska; North Pacific Fishery Management Council (1999).

Table IV.B-6
Essential Species Habitat in Cook Inlet by Subanalysis Area

Species (Lifestage)	Not Present in Cook Inlet	Outer Strait LS's 1-15	Lower Strait LS's 16-20	Upper Strait LS's-21-25	Karnishak LS's-26-33	Northwest Lower Cook Inlet LS's-34-40	East Lower Cook Inlet LS's 41-49	Barren Islands LS's -51-50	West Kodiak LS's-81-92
Alaska Plaice General	—	X	X	X	X	X	X	X	X
Arrowtooth Flounder General	—	X	X	X	X	X	X	X	X
Atka Mackerel General	—	X	X	X	X	X	X	X	X
Blue King Crab	X	—	—	—	—	—	—	—	—
Capelin General	—	X	X	X	X	X	X	X	X
Deep Water Crabs	X	—	—	—	—	—	—	—	—
Dover Sole General	—	X	X	X	—	—	—	—	X
Dungeness Crab adults	—	—	X	X	—	—	—	—	X
Dusky Rockfish General	—	X	X	X	—	—	—	—	X
Eulachon General	X	—	—	—	—	—	—	—	—
Flathead Sole General	—	X	X	X	X	—	X	X	X
Flathead Sole Concentration	—	—	—	—	—	—	—	—	X
Golden King Crab	—	X	X	?	—	—	—	—	X
Greenland Turbot General	—	X	X	X	X	X	X	X	X
Grooved Tanner Crab	?	—	—	—	—	—	—	—	—
Northern Rockfish General	—	X	X	X	—	—	—	—	X
Octopus (Adult)	—	—	—	—	—	—	—	—	—
Pacific Cod General	—	X	X	X	X	X	X	X	—
Pacific Cod Concentration	?	X	X	X	—	—	—	—	X
Pacific Halibut Fishing Grounds	—	X	X	X	X	—	X	X	X

Table IV.B-6 (continued)
Essential Species Habitat in Cook Inlet by Sub-analysis Area

Species (Lifestage)	Not Present in Cook Inlet	Outer Strait LS's 1-15	Lower Strait LS's 16-20	Upper Strait LS's-21-25	Karnishak LS's-26-33	Northwest Lower Cook Inlet LS's-34-40	East Lower Cook Inlet LS's 41-49	Barren Islands LS's -51-50	West Kodiak LS's-81-92
Pacific Halibut Spawning	—	X	—	—	—	—	—	—	—
Pacific Herring	—	X	X	X	X	X	X	X	X
Pacific Ocean Perch General	—	X	X	X	—	—	—	X	X
Rainbow Smelt	—	X	X	X	X	X	X	X	X
Red King Crab	—	X	—	X	—	—	X	X	X
Rex Sole General	—	X	X	X	X	X	X	X	X
Rock Sole General	—	X	X	X	X	X	X	X	X
Rock Sole Concentration	X	—	—	—	—	—	—	—	—
Sablefish General	—	X	X	X	—	—	—	—	X
Sablefish Concentration	X	—	—	—	—	—	—	—	—
Scarlet King Crab	X	—	—	—	—	—	—	—	—
Sculpins General	—	X	X	X	X	X	X	X	X
Sharks	?	—	—	—	—	—	—	—	—
Shortraker and Rougheye Rockfish	—	X	X	X	—	—	—	—	X
Shortraker and Rougheye (Larvae)	—	—	—	—	—	—	—	—	—
Skates General	—	X	X	X	—	—	—	X	X
Squid General	—	—	—	—	—	—	—	—	—
Tanner Crab Minor Concentration	—	X	X	X	—	X	X	X	X
Tanner Crab Significant Concentration	—	—	—	X	—	—	X	—	X
Thornyhead Rockfish General	—	X	X	X	X	X	X	X	X

Table IV.B-6 (continued)
Essential Species Habitat in Cook Inlet by Sub-analysis Area

Species (Lifestage)	Not Present in Cook Inlet	Outer Strait LS's 1-15	Lower Strait LS's 16-20	Upper Strait LS's-21-25	Karnishak LS's-26-33	Northwest Lower Cook Inlet LS's-34-40	East Lower Cook Inlet LS's 41-49	Barren Islands LS's -51-50	West Kodiak LS's-81-92
Triangle Tanner Crab	X	—	—	—	—	—	—	—	—
Walleye Pollock General (Adult)	—	X	X	X	X	X	X	—	X
Walleye Pollock Concentration (Adult)	—	X	X	X	—	—	—	—	X
Walleye Pollock (Larvae)	—	X	X	X	—	—	—	—	X
Walleye Pollock General (Egg)	—	X	X	X	X	—	X	X	X
Yelloweye Rockfish (Larvae)	—	X	X	X	X	X	X	X	X
Yellowfin Sole General	—	—	—	X	X	—	X	X	X
Yellowfin Sole Concentration	—	—	—	—	—	—	—	—	X
Weathervane Scallop General	—	X	X	X	X	—	X	X	X
Weathervane Scallop Concentration	—	X	X	X	—	—	—	—	—

Note:
Map EFH A shows the sub analysis areas.
Blank cells mean no habitat for this species in this area of Cook Inlet.

Key:
? = Information not available from the National Marine Fisheries Service.
LS = Land Segment.
X = The species has habitat in this area of Cook Inlet.

Source:
National Marine Fisheries Service (1999); Mecklenburg, Mecklenburg, and Thorsteinson (2002).

Table IV.B-7
Annual Percentage Risk to Essential Fish Habitat on Cook Inlet Beaches and in Intertidal Areas if an Oil Spill Occurs

Geographic Region	LS	LA1	LA2	LA3	LA4	LA5	LA6	LA7	P1	P2	P3	P4	P5	P6
Northwest Lower Cook Inlet	34-40	—	—	—	—	—	1	1	—	—	—	—	—	1
Eastern Lower Cook Inlet	41-49	1-2	1-6	—	1	1-4	—	1	1-10	1-16	1-4	1-2	1	—
Kamishak Bay	26-33	1-18	2-13	1-17	3-14	4-10	11-5	1-2	1-8	2-13	5-14	2-9	2-16	1
Barren Islands	50-51	—	—	1	1	2	2	2-7	—	—	1	3	1	4
Upper Shelikof Strait	20-25	1	1-2	1-8	1-12	1-11	2-19	2-13	1	1-2	1-6	1-17	2-10	2-19
Lower Shelikof Strait	15-19	—	—	—	1	1	1-2	1-2	—	—	—	1	—	1-2
West Kodiak Island Coast	81-92	—	1	1-2	1-2	1-2	1-6	1-6	—	—	1	1-3	1-2	1-6
Outer Shelikof Strait	1-14	—	—	—	—	—	1	1	—	—	—	1	—	1-2

Key:
LA = Launch Area
LS = Land Segment
P = Pipeline

Table IV.B-8
Percentage Risk in Summer to Essential Fish Habitat on Cook Inlet Beaches and in Intertidal Areas if an Oil Spill Occurs

Geographic Region	LS	LA1	LA2	LA3	LA4	LA5	LA6	LA7	P1	P2	P3	P4	P5	P6
Northwest Lower Cook Inlet	34-40	1-16	1-13	1	1-2	1-3	—	1	1-27	2-9	1-4	1	1	—
Eastern Lower Cook Inlet	41-49	1-2	1-6	1	1-2	1-4	—	1-2	11-12	1-18	2-4	1-2	1	—
Kamishak Bay	26-33	1-19	1-13	1-17	4-16	4-12	1-5	1-2	1-6	1-14	5-115	2-10	2-18	1
Barren Islands	50-51	—	—	1	1	2	3	2-8	—	—	1	2	1	1-5
Upper Shelikof Strait	20-25	1	1	1-7	1-9	1-9	1-17	1-13	—	—.	1-3	1-17	1-7	3-19
Lower Shelikof Strait	15-19	—	—	—	—	—	2	2	—	—.	—	1	—	1-2
West and North Kodiak Island Coast	79-92	—	—	1-2	1-2	1-2	1-6	1-6	—	—.	1	1-2	1-2	1-6
Outer Shelikof Strait	1-14	—	—	—	—	—.	1	1	—	—	—.	—	—.	1

Key:
LA = Launch Area
LS = Land Segment
P = Pipeline

Table IV.B-9
Percentage Risk in Winter to Essential Fish Habitat on Cook Inlet Beaches and in Intertidal Areas if an Oil Spill Occurs

Geographic Region	LS	LA1	LA2	LA3	LA4	LA5	LA6	LA7	P1	P2	P3	P4	P5	P6
Northwest Lower Cook Inlet	34-40	1-16	1-11	—	—	—	—	—	4-21	1-6	2	—	—	—
Eastern Lower Cook Inlet	41-49	11-2	1-6	—	1	1-4	—	1	1-8	1-14	2-3	1	1	—
Kamishak Bay	26-33	1-18	2-14	2-17	1-12	3-9	1-5	1	1-11	4-13	5-13	1-9	1-19	1
Barren Islands	50-51	—	1	1	1	2	1	2-5	—	—	1	3	1	3
Upper Shelikof Strait	20-25	1-2	1-3	1-9	1-14	1-14	2-14	2-13	1	11-3	1-8	1-19	1-13	2-18
Lower Shelikof Strait	15-19	—	—	—	1	1	1-2	2-3	—	—	1	1	1	2
West Kodiak Island Coast	81-92	1	1	1-3	1-2	1-2	1-5	1-6	1	1	1-2	1-3	1-3	1-6
Outer Shelikof Strait	1-14	—	—	—	1	1	1	1	—	—	—	1	—	1

Key:
LA = Launch Area
LS = Land Segment
P = Pipeline

Table IV.B-10
Maximum Annual Percentage Risk to Essential Fish Habitat in Cook Inlet Estuarine and Marine Waters if an Oil Spill Occurs – By Spill Location

Geographic Region	LS	LA1	LA2	LA3	LA4	LA5	LA6	LA7	P1	P2	P3	P4	P5	P6
West Lower Cook Inlet	34-40	31.1	38.2	12.5	30.7	24.9	6.3	8.2	52.1	41.8	43.1	32.9	59.7	4.5
Eastern Lower Cook Inlet	41-49	20.9	38.2	12.5	30.7	32.6	6.3	13.8	52.1	62.3	60.9	45.7	54.2	5.5
Kamishak Bay	26-33	31.1	19.4	27	30.7	23.9	44.8	29.9	14.6	20.9	33.9	32.9	59.2	55.3
Barren Islands/Kennedy Entrance	50-51	3.1	4.0	17.6	27.2	21.3	44.8	32.5	1.7	3.8	11.4	43.5	20.8	62.4
Western Shelikof Strait	20.25	2.4	2.9	8.3	13.8	13.5	44.8	29.9	1.3	2.7	7.4	23.2	12.4	52.2
Outer Shelikof Strait	1-14	*	*	*	*	*	1.8	2.5	*	*	*	1.0	0.6	2.2
West Kodiak Island Coast	81-92	2.4	2.9	8.3	13.3	12.6	44.8	32.5	1.3	2.7	7.4	20.9	12.4	52.2
East Kodiak Island to Gulf of Alaska	—	*	*	*	*	*	*	6.8	*	*	*	*	*	0.7
Outer Kennedy Entrance to Gulf of Alaska	—	—	*	*	0.6	2.9	1.5	5.3	*	*	*	1.2	*	2.7
Outer Kenai to Prince William Sound	—	*	*	*	*	2.9	2.9	2.2	*	*	*	*	*	*
Southeast Outer Shelikof Strait to Gulf of Alaska	—	*	*	*	*	*	*	*	*	*	*	*	*	*

Key:
* = area has less than 0.5% chance of being oiled
— = no oil-spill model land segments
LA = Launch Area
LS = Land Segment
P = Pipeline

Source:
USDOI, MMS, Alaska OCS Region.

Table IV.B-11
Maximum Percentage Risk to Essential Fish Habitat in Cook Inlet Estuaries and Marine Waters if an Oil Spill Occurs in Winter – By Spill Location

Geographic Region	LS	LA1	LA2	LA3	LA4	LA5	LA6	LA7	P1	P2	P3	P4	P5	P6
West Lower Cook Inlet	34-40	32.2	41	11.1	35.7	29.6	4.9	7.9	49.6	43.2	40.2	38.1	58.6	4.3
Eastern Lower Cook Inlet	41-49	20	41	11.1	35.7	30.6	4.9	11.6	49.6	61.2	58.5	44.5	58.6	4.9
Kamishak Bay	26-33	32.2	21.7	30.7	35.7	29.6	46.2	31.0	18.9	24.7	31.9	38.1	58.6	49.1
Barren Islands/Kennedy Entrance	50-51	4.9	6.6	19.5	32.7	25.9	46.2	34.5	3.0	6.0	16.5	41.6	28.0	64.9
Western Shelikof Strait	20.25	3.9	4.9	9.0	16.9	16.6	46.2	31.6	2.0	4.0	10.4	26.4	15.2	55.3
Outer Shelikof Strait	1-14	*	*	*	1.0	1.0	2.2	3.1	*	*	*	1.5	1.1	2.4
West Kodiak Island Coast	81-92	3.9	4.9	9.0	16.6	15.8	46.2	36.2	2.3	4.0	10.4	24.3	15.2	55.3
East Kodiak Island to Gulf of Alaska	—	*	*	*	*	*	*	*	*	*	*	*	*	*
Outer Kennedy Entrance to Gulf of Alaska	—	—	*	*	*	2.0	*	3.8	*	*	*	0.7	*	1.1
Outer Kenai to Prince William Sound	—	*	*	*	*	2.0	*	1.5	*	*	*	*	*	*
Southeast Outer Shelikof Strait to Gulf of Alaska	—	*	*	*	*	*	*	*	*	*	*	*	*	*

Key:
* = area has less than 0.5% chance of being oiled
— = no oil-spill model land segments
LA = Launch Area
LS = Land Segment
P = Pipeline

Source:
USDOI, MMS, Alaska OCS Region.

Table IV.B-12
Maximum Percentage Risk to Essential Fish Habitat in Cook Inlet Estuaries and Marine Waters if an Oil Spill Occurs in Summer – By Spill Location

Geographic Location	LS	LA1	LA2	LA3	LA4	LA5	LA6	LA7	P1	P2	P3	P4	P5	P6
West Lower Cook Inlet	34-40	31.0	35.4	14.4	28.5	27.0	7.7	8.5	54.7	40.4	46.1	27.6	59.9	4.7
Eastern Lower Cook Inlet	41-49	21.8	35.4	14.1	28.1	34.5	7.7	16.1	54.7	63.3	63.4	47.0	59.9	6.1
Kamishak Bay	26-33	30.1	17.9	4.5	28.5	21.3	43.4	28.7	10.2	19.1	35.9	15.0	59.9	45.9
Barren Islands/Kennedy Entrance	50-51	1.2	1.6	15.7	21.7	17.8	43.4	30.6	*	1.9	7.0	45.4	15.1	60.0
Western Shelikof Strait	20-25	1.0	1.0	7.9	10.8	10.5	43.4	28.7	*	1.0	4.6	20.0	9.5	49.1
Outer Shelikof Strait	1-14	—	*	*	*	*	1.5	1.9	*	*	*	*	*	2.1
West Kodiak Island Coast	81-92	0.9	0.9	7.6	10.1	9.4	43.4	30.6	*	1.0	4.4	17.6	9.5	49.1
East Kodiak Island to Gulf of Alaska	—	1.3	*	*	*	*	*	1.2	*	*	*	*	*	1.1
Outer Kennedy Entrance to Gulf of Alaska	—	*	*	0.7	0.9	3.9	2.7	6.8	*	*	*	1.7	0.6	4.3
Outer Kenai to Prince William Sound	—	*	*	*	*	3.9	*	3.1	*	*	*	*	*	*
Southeast of Outer Shelikof Strait to Gulf of Alaska	—	*	*	*	*	*	*	*	*	*	*	*	*	*

Note:
Each region has areas within it that have less than 0.5% chance of being oiled.

Key:
* = less than 0.5% chance of being oiled
— = no oil-spill model land segments
LA = Launch Area
LS = Land Segment
P = Pipeline

Source:
USDOI, MMS, Alaska OCS Region.

Table IV.B-13
Percentage Risk after 30 Days to Essential Fish Habitat on Cook Inlet Marine Waters if an Oil Spill Occurs

Geographic Region	Bounded by Land Segments	Summer	Winter	Annual
West Lower Cook Inlet	34-40	0.1-8.5	0.05-7.9	0.1-8.2
Eastern Lower Cook Inlet	41-49	0.2-15.9	0.1-11.6	0.1-13.8
Kamishak Bay	26-33	0.1-24.2	0.05-21.2	0.1-22.7
Kennedy Entrance/Barren Islands	50-51	0.2-30.6	0.05-33.9	0.1-31.8
Western Shelikof Strait	15-25	0.1-26.6	0.1-31.6	0.1-29.1
West and North Kodiak Island Coast	79-92	0.05-30.6	0.05-34.5	0.1-32.5
Outer Shelikof Strait	1-14	0.05-1.9	0.05-3.1	0.1-2.5

Source:
USDOI, MMS, Alaska OCS Region.

Table IV.B-14
Percentage Risk after 10 Days to Essential Fish Habitat on Cook Inlet Marine Waters if an Oil Spill Occurs

Geographic Region	Bounded by Land Segments	Summer	Winter	Annual
West Lower Cook Inlet	34-40	0.05-8.1	0.05-7.8	0.05-7.9
Eastern Lower Cook Inlet	41-49	0.05-15.8	0.05-11.6	0.05-13.6
Kamishak Bay	26-33	0.05-27.4	0.05-30.8	0.05-29.1
Kennedy Entrance/Barren Islands	50-51	0.2-29.9	0.05-33.8	0.05-32.2
Western Shelikof Strait	15-25	0.05-25.2	0.1-31.4	0.1-28.3
West and North Kodiak Island Coast	79-92	0.05-29.9	0.05-34.4	0.05-32.2
Outer Shelikof Strait	1-14	0.05-0.8	0.1-2.9	0.05-1.6

Source:
USDOI, MMS, Alaska OCS Region.

Table IV.B-15
Percentage Risk after 3 Days to Essential Fish Habitat on Cook Inlet Marine Waters if an Oil Spill Occurs

Geographic Region	Bounded by Land Segments	Summer	Winter	Annual
West Lower Cook Inlet	34-40	0.05-4.7	0.05-6.1	0.05-5.4
Eastern Lower Cook Inlet	41-49	0.05-13.6	0.05-10.8	0.05-12.1
Kamishak Bay	26-33	0.05-17.5	0.05-27.0	0.05-22.2
Kennedy Entrance/Barren Islands	50-51	0.05-24.9	0.05-32.5	0.05-28.7
Western Shelikof Strait	15-25	0.05-14.4	0.05-26.8	0.05-20.6
West and North Kodiak Island Coast	79-92	0.05-24.9	0.05-32.5	0.05-26.7
Outer Shelikof Strait	1-14	0.05	0.05-0.1	0.05

Source:
USDOI, MMS, Alaska OCS Region.

Table IV.B-16
Alternatives Comparison for Maximum Annual Risk to Estuary and Marine Essential Fish Habitat after 30 Days if an Oil Spill Occurs – Lower Cook Inlet

Geographic Region	Land Segments	Alternative I – Proposed Action	Alternative III – Lower Kenai Peninsula Deferral	Alternative IV – Barren-Islands Deferral
Northwest Lower Cook Inlet	34-40	38.2[1]	NC	NC
Eastern Lower Cook Inlet	41-49	38.2	NC	NC
Kamishak Bay	26-33	44.8	NC	NC
Barren Islands/Kennedy Entrance	50-51	44.8	NC	NC
Upper Shelikof Strait	20-25	44.8	NC	NC
Outer Shelikof Strait	1-14	2.5	NC	1.8
West Kodiak Island Coast	81-92	44.8	NC	NC
East Kodiak Island to Gulf of Alaska	—	0.8	NC	*
Outer Kennedy Entrance to Gulf of Alaska	—	5.3	NC	2.9
Outer Kenai to Prince William Sound	—	2.9	2.2	NC
Southeast of Shelikof Strait to Gulf of Alaska	—	*	NC	NC

Note:
[1]Figures are in percentages

Key:
* = area has less than 0.5% chance of being oiled
— = no oil-spill model land segments
NC = no chance

Source:
USDOI, MMS, Alaska OCS Region.

Table IV.B-17
Alternatives Comparisons for Maximum Winter Risk to Estuary and Marine Essential Fish Habitat after 30 Days if an Oil Spill Occurs – Lower Cook Inlet

Geographical Region	Land Segments	Alternative I – Proposed Action	Alternative III – Lower Kenai Peninsula Deferral	Alternative IV – Barren-Islands Deferral
Northwest Lower Cook Inlet	34-40	41[1]	NC	NC
Eastern Lower Cook Inlet	41-49	41	NC	NC
Kamishak Bay	26-33	46.2	NC	NC
Barren Islands/Kennedy Entrance	50-51	46.2	NC	NC
Upper Shelikof Strait	20-25	46.2	NC	NC
Outer Shelikof Strait	1-14	3.1	NC	2.2
West Kodiak Island Coast	81-92	46.2	NC	NC
East Kodiak Island to Gulf of Alaska	—	*	NC	NC
Outer Kennedy Entrance to Gulf of Alaska	—	3.8	1.9	2.9
Outer Kenai to Prince William Sound	—	2.0	1.5	NC
Southeast of Shelikof Strait to Gulf of Alaska	—	*	NC	NC

Note:
[1]Figures are in percentages.

Key:
* = area has less than 0.5% chance of being oiled
— = no oil-spill model land segments
NC = no chance

Source:
USDOI, MMS, Alaska OCS Region.

Table IV.B-18
Alternatives Comparisons for Maximum Summer Risk to Estuary and Marine Essential Fish Habitat after 30 Days if an Oil Spill Occurs – Lower Cook Inlet

Geographical Region	Land Segments	Alternative I – Proposed Action	Alternative III – Lower Kenai Peninsula Deferral	Alternative IV – Barren-Islands Deferral
Northwest Lower Cook Inlet	34-40	35.4[1]	NC	NC
Eastern Lower Cook Inlet	41-49	35.4	NC	NC
Kamishak Bay	26-33	43.4	NC	NC
Barren Islands/Kennedy Entrance	50-51	43.4	NC	NC
West Shelikof Strait	20-25	43.4	NC	NC
Outer Shelikof Strait	1-14	1.9	NC	1.5
West Kodiak Island Coast	81-92	43.4	NC	NC
East Kodiak Island to Gulf of Alaska	—	1.2	NC	*
Outer Kennedy Entrance to Gulf of Alaska	—	6.8	NC	3.9
Outer Kenai to Prince William Sound	—	3.9	3.1	NC
Southeast of Shelikof Strait to Gulf of Alaska	—	*	NC	NC

Note:
[1]Figures are in percentages.

Key:
* = area has less than 0.5% chance of being oiled
— = no oil-spill model land segments
NC = no chance

Source:
USDOI, MMS, Alaska OCS Region.

Table IV.B-19
Employment and Personal Income Effects of Alternative I

Area of Residence/Phase of OCS Activity	Employment: Annual Average Jobs			Total Personal Income: Annual Average in Millions of Constant 1999 $		
	Direct	Indirect and Induced	Total	For Direct Workers	For Indirect and Induced Workers	Total
Kenai Peninsula Borough						
Exploration	30	10	40	2.4	0.3	2.8
Development	210	120	330	16.8	3.6	20.4
Production	70	30	100	5.6	0.9	6.5
Rest of Alaska						
Exploration	0	0	0	0	0	0
Development	40	30	70	3.2	0.9	4.1
Production	13	7	20	1.0	0.2	1.2

Source:
USDOI, MMS, "Sub-Arctic IMPAK: 1^{st} Step Model" and "Sub-Arctic IMPAK: 2^{nd} Step Model."

Table IV.B-20
Population Forecast for the Kenai Peninsula Borough

Year	Total Resident Population Without Sale
2006	54,564
2007	55,312
2008	56,110
2009	56,906
2010	57,714
2011	58,534
2012	59,365
2013	60,234
2014	61,023
2015	61,822
2016	62,632
2017	63,452
2018	64,305
2019	65,185
2020	66,079
2021	66,984
2022	67,901
2023	68,832
2024	69,775
2025	70,731
2026	71,700
2027	72,682
2028	73,678
2029	74,687
2030	75,710
2031	76,748
2032	77,799
2033	78,865

Source:
State of Alaska, Dept. of Labor, Research and Analysis Section Demographics Unit.
Middle Projection for 2006 through 2017. MMS extrapolation 2018-2033.

Table IV.B-21
Commercial Fishing Income for Cook Inlet Region – 1991 through 2001

Area and Fishery Type	CFEC Fishery Code	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Cook Inlet												
Crab	T09H	$320,626	$465,779	$558,719	$468,224	$0	$0	$0	$0	$0	$0	$0
	T91H	514,267	403,638	340,023	167,141	0	0	0	0	0	0	0
Herring	G01H	1,522,419	1,410,028	2,220,758	1,605,147	4,149,384	5,925,889	341,656	64,909	0	0	0
	G34H	17,664	17,808	0	0	0	0	0	4,480	3,714	8,956	3,101
Salmon	S01H	1,360,809	1,107,528	842,496	768,850	1,982,432	1,740,062	768,043	1,069,729	1,912,728	1,029,272	715,534
	S03H	8,099,133	66,362,059	16,537,133	18,766,136	13,909,931	17,736,374	17,448,054	4,303,378	12,134,809	4,438,593	3,694,886
	S04H	7,361,565	33,100,968	14,317,093	15,272,678	8,936,995	13,570,507	15,637,913	4,351,636	9,993,704	4,319,800	4,691,129
Halibut	—	19,927,188	11,091,827	11,905,725	19,362,765	7,161,128	10,094,783	12,115,945	20,890,344	23,096,639	22,079,180	28,288,937
Groundfish	(includes Sablefish)	635,719	1,439,331	1,080,916	769,315	1,425,278	1,590,927	1,907,997	1,729,404	2,177,604	1,424,963	842,055
Totals	**—**	**$39,759,390**	**$115,398,966**	**$47,802,863**	**$57,180,256**	**$40,983,419**	**$53,061,360**	**$50,641,037**	**$34,267,602**	**$51,615,281**	**$36,210,761**	**$41,479,084**
1995 to 2001 Average – $44,036,935												
Kodiak												
Crab	T09K	$1,719,027	$2,315,651	$1,406,831	$1,399,250	$0	$0	$0	$0	$0	$0	$862,373
	T91K	1,442,549	3,193,548	1,370,944	1,710,513	0	0	0	0	0	0	284,649
Herring	G01K	1,485,051	1,687,384	2,622,164	4,190,620	5,021,494	4,535,083	921,553	823,010	975,834	895,230	745,279
	G34K	625,910	495,044	404,030	790,739	1,039,278	2,270,812	209,494	36,733	36,111	44,249	172,706
	H01K	0	0	0	0	0	167,962	226,586	0	0	0	0
	H07K	0	0	0	0	0	125,528	81,530	0	0	0	0
Salmon	S01K	26,973,828	32,956,894	30,756,361	19,250,419	42,359,845	18,551	14,339,237	25,898,030	23,969,293	16,714,285	14,427,065
	S02K	89,363	65,237	74,073	46,961	115,100	17,723	42,093		0	0	0
	S04K	9,956,102	7,473,098	7,724,543	7,805,959	11,446,588	9,052,730	6,635,516	8,900,235	9,989,759	6,350,831	4,683,739
Halibut	—	NA	NA	NA	NA	14,133,154	15,058,976	21,969,393	15,666,137	18,621,898	18,980,538	16,179,608
Groundfish	(includes Sable Fish)	24,286,386	26,299,062	23,173,691	25,580,719	25,383,354	21,022,816	25,897,447	24,491,219	40,865,850	40,983,750	28,456,178
Totals	**—**	**$66,578,216**	**$74,485,918**	**$67,532,637**	**$60,775,180**	**$109,082,982**	**$59,850,752**	**$79,380,934**	**$80,179,495**	**$98,466,337**	**$89,068,730**	**$70,421,938**
1995 to 2001 Average – $83,778,738												

Sources :
Kenai Peninsula Borough, 1998
State of Alaska, Board of Fisheries, 2001
National Marine Fisheries Service, 2001c,d
State of Alaska, Commercial Fisheries Entry Commission, 2001

Table IV.B-22
2000 Census Income Data for the Kenai Peninsula, Kodiak Island, and the Lake and Peninsula Boroughs

Community	Median Household Income	Median Family Income	Per-Capita Household Income	Number of People in Poverty (Percent of Community Population)
Kenai Peninsula Borough				
Ninilchik	$36,250	$41,750	$18,463	105 (13.9%)
Kenai	$45,962	$58,856	$20,789	678 (9.8%)
Seldovia City	$45,313	$58,000	$23,669	23 (7.9%)
Seldovia Village	$31,250	$40,500	$21,396	27 (23.5%)
Nanwalek	$42,500	$45,750	$10,577	34 (17.5%)
Port Graham	$40,250	$43,438	$13,666	33 (18.8%)
Kodiak Island Borough				
Karluk	$19,167	$19,167	$13,736	0 (0%)
Larsen Bay	$40,833	$30,000	$16,227	18 (20.5%)
Old Harbor	$32,500	$26,000	$14,265	71 (29.5%)
Ouzinkie	$52,500	$54,375	$19,324	12 (6.0%)
Port Lions	$39,107	$42,656	$17,492	35 (12.1%)
Lake and Peninsula Borough				
Chignik Lagoon	$92,297	$99,054	$28,940	2 (1.8%)
Chignik Lake	$41,458	$40,938	$13,843	29 (22.0%)
Ivanof Bay	$91,977	$91,977	$21,983	0 (0%)
Perryville	$51,875	$54,583	$20,935	16 (16.0%)

Table IV.F-1
State of Alaska, Department of Environmental Conservation Response Planning Standards (18 AAC 75) for Cook Inlet Platforms

Company	Facility	Blowout Rate	Blowout Total
XTO Energy Inc.	Platform A and C	A<5 bbl/day	—
Unocal Alaska	Platform A and C	C<35 bbl/day	—
	Anna Platform	0	0
	Baker Platform	0	0
	Bruce Platform	0	0
	Dillon Platform	0	0
	Dolly Varden Platform	0	0
	Granite Point Platform	0	0
	Grayling Platform	1,000 bbl/day	15,000
	King Salmon Platform	8,000 bbl/day	120,000
	Monopod Platform	0	0
	Steelhead Platform	1,000 bbl/day	15,000
Forest Oil Corp.	Osprey Platform	1,500 bbl/day	21,375
Phillips 66	Tyonek Platform	5,500 bbl/day	82,500
Marathon	Spark Platform	0	0
	Spurr Platform	0	0

Note:
Spurr Platform is shut in, and Spark Platform has one producing gas well. The Response Planning Standard for both platforms is a 10-barrel diesel fuel spill.
Key:
< = less than
AAC = Alaska Administrative Code
bbl/day = barrels per day
Source:
XTO Energy Inc. (2001); Forest Oil Corporation (2001); Marathon Oil Company (1998); Phillips 66 (1998); Unocal Alaska (2001).

Table IV.F-2
Discharge Conditions for a Well Blowout to Open Water or Broken Ice

Discharge Category	Volume of Oil (Barrels)				
	Day 1	Day 2	Day 3	Day 15	15 Day Totals
Well's Discharge Volume	8,000	8,000	8,000	8,000	120,000
Evaporation (25%)	-2,000	-2,000	-2,000	-2,000	-30,000
Fall out to Platform Facility	3,000	3,000	3,000	3,000	45,000
Oil Remaining on Platform Facility	negligible	0	0	0	negligible
Oil Draining to the Sea from Platform Facility	3,000	3,000	3,000	3,000	45,000
Oil Falling to the Sea or Broken Ice	3,000	3,000	3,000	3,000	45,000
Total Oil to the Sea or Broken Ice	6,000	6,000	6,000	6,000	90,000

Notes:
Cook Inlet crude; constant wind speed of 10 to 16 knots; and sea surface temperature of 5 to 9 °C.
Key:
% = percent
Source:
USDOI, MMS (2002); Reedy et al. (2000).

Table IV.F-3
General Mass Balance of Oil from a 120,000-Barrel Open Water Winter or Summer Spill

Day[1]	Oil Remaining on Water (bbl)	Evaporated (bbl)	Dispersed (bbl)	Sedimented (bbl)	Onshore (bbl)
0	90,000	30,000	—	—	—
3	54,000	34,000	11,000	700	14,400
10	32,000	38,000	25,000	1,800	17,000
30	Negligible	42,000	53,000	2,800	24,000

Notes:
Based on a 120,000-barrel spill size with 25% evaporated during the blowout. Assumes Cook Inlet crude, constant wind speed of 10 to 16 knots, and water temperature 5 to 8 °C.

[1] We assume day 0 is 15 days after the start of the spill, when 90,000 barrels of oil is in the water.

Key:
— = not occurring
bbl = barrels

Source:
USDOI, MMS, Alaska OCS Region (2002); Calculated with the Reedy et al. (2000) weathering model assuming Cook Inlet Crude. Cook Inlet Crude analysis taken from S.L. Ross Environmental Research Ltd. (2000).

Table IV.F-4
Areas of Discontinuous and Thick Slicks from a 120,000-Barrel Open-Water Spill

Days after Spill Reaches Water Surface[1]	Discontinuous Slick Area (km^2)[1]	Area of Thick Slick (km^2)[2]
3	70	—
10	1,400	—
30	5,800	—
60	14,000	—

Notes:
[1]Calculated from Ford (1985) and Kirstein and Redding (1987).
[2] Based on ocean-ice weathering model of Kirstein and Redding (1987).

Key:
— = area of thick slick not known
km^2 = square kilometers

Source:
USDOI, MMS, Alaska OCS Region (2002).

Table IV.F-5
Length of Coastline a 120,000-Barrel Spill Might Contact Without Oil-Spill Response

Days	Amount of Coastline Contacted in Kilometers[1]	
	Winter Open Water	Summer Open Water
3	345	277
10	505	399
30	568	430

Note:
[1]Calculated from oil-spill-risk analysis conditional probabilities. We add the length of land segments with chance of contact greater than 0.5% to estimate the amount of coastline contacted. This calculation assumes no oil-spill response and includes land segments that have a very small chance of contact.

Source:
USDOI, MMS, Alaska OCS Region (2002)

Table IV.F-6
General Mass Balance of Oil from a 120,000-Barrel Broken Ice or Winter Spill

Day[1]	Oil Remaining on Water (bbl)	Evaporated (bbl)	Dispersed (bbl)	Sedimented (bbl)	Onshore (bbl)
0	90,000	30,000[2]	—	—	—
3	67,000	34,000	3,500	700	14,400
10	55,000	40,000	6,000	1,800	17,000
30	36,000	48,000	10,000	2,800	24,000

Notes:
Based on a 120,000-barrel spill size with 25% evaporated during the blowout. Assumes Cook Inlet crude, constant wind speed of 16 knots, and water temperature 5 °C.
[1] We assume day 0 is 15 days after the start of the spill, when 90,000 barrels of oil is in the water.
[2] Evaporation on day 0 attributable to evaporation during blowout or pooling between or on ice surface.

Key:
bbl = barrel
— = not occurring

Source:
USDOI, MMS, Alaska OCS Region (2002); Calculated with the Reedy et al. (2000) weathering model assuming an Cook Inlet Crude. Cook Inlet Crude analysis taken from S.L. Ross Environmental Research Ltd. (2000).

Table IV.F-7
Conditional Probabilities That an Oil Spill Starting at Launch Area 2 Will Contact Certain ERA's

ID	ERA Name	Annual[1]			Summer[1]			Winter[1]		
		3 Days	10 Days	30 Days	3 Days	10 Days	30 Days	3 Days	10 Days	30 Days
	Land	49	93	**	41	91	**	57	96	**
1	Tuxedni Bay	30	34	34	34	41	41	25	27	27
2	Chinitna Bay	9	13	13	7	12	13	11	13	13
3	Outer Kachemak Bay	18	20	20	18	21	21	18	20	20
4	Outer Kamishak Bay	13	24	25	5	17	18	21	31	32
5	Inner Kamishak Bay	3	8	8	1	5	6	4	11	11
6	Barren Islands	—	1	1	—	—	1	—	1	1
7	Cape Douglas	—	4	5	—	1	2	1	7	7
8	Shuyak Island	—	1	1	—	—	1	—	1	1
9	Hallo and Kukak Bays	—	1	1	—	—	1	—	2	2
10	Kupreanof Strait	—	—	1	—	—	—	—	1	1
11	Katmai Bay	—	—	1	—	—	—	—	1	1
12	Puale Bay	—	—	1	—		—	—	1	1
27	Forelands	—	—	1	—	1	1	—	—	—
28	S. Kalgin	10	13	13	14	18	19	7	7	8
29	S. Shelikof Strait	—	—	1	—	—	—	—	1	1
31	Kachemak Bay/Outer Peninsula	2	3	3	1	2	3	3	4	4

Note:
[1]Reflects the different probabilities of an oil spill occurring in the Cook Inlet multiple-sale area, depending on the season.

Key:
Blank spaces = less than 0.5%
** = greater than 99.5%
ID = identification
ERA = Environmental Resource Area

Table IV.F-8
Conditional Probabilities That an Oil Spill Starting at Launch Area 2 Will Contact Certain Land Segments

ID	Land Segment Name	Annual			Summer			Winter		
		3 Days	10 Days	30 Days	3 Days	10 Days	30 Days	3 Days	10 Days	30 Days
21	Kaflia Bay, Kukak Bay, Kuliak Bay, Missak Bay	—	—	—	—	—	—	—	1	1
22	Devils Cove, Hallo Bay	—	—	1	—	—	—	—	1	1
23	Cape Chiniak, Swikshak Bay	—	—	—	—	—	—	—	—	1
24	Fourpeaked Glacier	—	1	1	—	—	—	—	1	1
25	Spotted Glacier, Sukoi Bay	—	2	2	—	—	1	—	3	3
26	Douglas River	—	2	3	—	1	1	1	4	4
27	Akumwarvik Bay, McNeil Cove Nordyke Island	—	2	2	—	1	2	—	3	3
28	Amakdedulia Cove, Bruin Bay Chenik Head	—	2	2	—	1	1	1	2	2
29	Augustine Island	3	7	8	1	5	6	6	9	9
30	Rocky Cove, Tignagvik Point	2	5	5	—	3	4	3	6	7
31	Iiamna Bay, Iniskin Bay, Ursus Cove	1	4	5	1	4	5	2	4	4
32	Chinitna Point, Dry Bay	3	7	7	2	6	7	5	7	7
33	Chinitna Bay	8	13	13	6	12	13	11	14	14
34	Iliamna Point	8	11	12	7	12	13	9	11	11
35	Chisik Island, Tuxedni Bay	6	9	10	7	12	12	6	7	7
36	Redoubt Point	3	5	5	3	7	7	2	3	3
37	Drift River	—	—	—	—	1	1	—	—	—
38	Kalgin Island	1	3	3	2	5	5	1	1	1
43	Clam Gulch, Kasilof	1	1	2	1	2	2	—	1	1
44	Deep Creek, Ninilchik, Ninilchik River	1	2	2	1	3	3	1	1	1
45	Cape Starichkof, Happy Valley	5	6	6	5	6	6	5	6	6
46	Anchor Point, Anchor River	3	3	3	3	4	4	3	3	3
47	Seldovia	1	2	2	1	2	3	2	2	2
48	Nanwalek, Port Graham	1	1	1	—	1	1	1	2	2
50	Barren Islands, Ushagat Island	—	—	—	—	—	—	—	—	1
82	Bluefox Bay, Shuyak Island, Shuyak Strait	—	—	1	—	—	—	—	1	1
83	Foul Bay, Paramanof Bay	—	—	—	—	—	—	—	1	1

Note:
[1]Reflects the different probabilities of an oil spill occurring in the Cook Inlet multiple-sale area, depending on the season.

Key:
Blank spaces = less than 0.5%
ID = identification

Table V-1
Cook Inlet Basin Oil and Gas Discoveries and Production by Operator

ID	Name of Field	Location	Production Oil/Gas	Discovery	Unit	Operator	Production Began
Past Development and Production							
1	Albert Kaloa	Onshore	Gas	Jan-68	—	Anadarco	Shut-in 1971
2	Birch Hill	Onshore	Gas	Jun-65	Birch Hill	Phillips	Shut-in 1965
3	Moquawkie	Onshore	Gas	1967	—	Unocal	Shut-in 1970
4	North Trading Bay	Offshore	Oil	1967	—	Unocal	Shut-in 1992
5	Pretty Creek	Onshore	Gas	Feb-79	Petty Creek	Unocal	Shut-in 1998
6	West Fork	Onshore	Gas	Sep-60	—	Anadarco	Shut-in 1995
Present Development							
7	Beaver Creek	Onshore	Oil & Gas	Dec-72	Beaver Creek	Marathon	1973
8	Beluga River	Onshore	Gas	Dec-62	Beluga River	Phillips	1968
9	Cannery Loop	Onshore	Gas	Jun-79	Cannery Loop	Marathon	1988
10	Granite Point	Offshore	Oil & Gas	May-65	Granite Point	Unocal	1967
11	Ivan River	Onshore	Gas	Oct-66	Ivan River	Unocal	1990
12	Kenai	Onshore	Gas	Oct-59	Kenai	Marathon	1961
13	Lewis River	Onshore	Gas	Oct-75	Lewis River	Unocal	1984
14	Mc Arthur River	Offshore	Oil & Gas	Sep-65	Trading Bay	Unocal	1967
15	Middle Ground Shoal	Offshore	Oil & Gas	Jun-62	N&S Middle Ground Shoal	Unocal/ Shell	1967
16	Moquawkie	Onshore	Gas	Nov-65	—	Anadarco	Shut-in 1971
17	North Cook Inlet	Offshore	Gas	Aug-62	North Cook Inlet	Phillips	1970
18	North Trading Bay	Offshore	Gas	1968	North Trading Bay	Phillips	1968
19	Nicolai Creek	Onshore	Gas	Apr-66	Nicolai Creek	Aurora Gas	Shut-in 1977
20	Redoubt Shoal	Offshore	Oil	Sep-68	Redoubt Shoal	Forest Oil	proposed
21	Sterling	Onshore	Gas	Jul-61	—	Marathon	1962
22	Stump Lake	Onshore	Gas	May-78	—	Unocal	1990
23	Swanson River	Onshore	Oil & Gas	Jul-57	Swanson River	Unocal	1958
24	Trading Bay	Offshore	Oil & Gas	Jun-65	Trading Bay	Unocal	1967
25	West McArthur River	Offshore	Oil & Gas	Dec-91	—	Forest Oil	1994
26	Wolf Lake	Onshore	Gas	Nov-98	—	Marathon	2001
Reasonably Foreseeable Future Development and Production							
27	Falls Creek	Onshore	Gas	Apr-61	Falls Creek	Marathon	Shut-in 1961
28	Ninilchik	Onshore	Gas	2000	Ninilchik Unit	Marathon	Undeveloped
29	North Fork	Onshore	Gas	Dec-65	North Fork	Gas-Pro	Shut-in 1965
30	Starichkof	Offshore	Oil	Apr-67	Cosmopoli-tan	Phillips	Proposed
31	Tyonek Deep	Offshore	Oil & Gas	Nov-91	—	Phillips	Undeveloped
32	West Forelands	Onshore	Gas	Mar-62	—	Phillips	Shut-in 1962

Key:
— = Units not yet identified.
ID = identification

Source:
Field Information is taken from State of Alaska, Dept. of Natural Resources (2000*a*).

Table V-2
Cook Inlet Basin Oil and Gas Discoveries

ID	Field	Location of Field or Pool	Production 2001 Oil (MMbbl)	Production 2001 Gas (BCF)	Production Period	Reserves Oil (MMbbl)	Reserves Gas (BCF)
Past Development and Production							
1	Albert Kaloa	Onshore	—	0.11	1970-1971	—	—
2	Birch Hill	Onshore	—	0.06	1965	—	11
3	Moquawkie	Onshore	—	0.98	1967-1970	—	—
4	North Trading Bay	Offshore	23.70		1967-1992	—	—
5	Pretty Creek	Onshore	—	6.48	1986-1998	—	—
6	West Fork	Onshore	—	4.21	1978-1995	—	3
Total		—	**23.70**	**11.84**	—	—	**14**
Present Development							
7	Beaver Creek	Onshore	5.50	155,1	1972	—	97
8	Beluga River	Onshore	—	746.9	1963	—	600
9	Cannery Loop	Onshore	—	97.0	1988	—	20
10	Granite Point	Offshore	137.34	122.8	1967	5	19
11	Ivan River	Onshore	—	67.2	1990	—	—
12	Kenai	Onshore	—	2194.8	1961	—	225
13	Lewis River	Onshore	—	9.4	1964	—	—
14	McArthur River	Offshore	614.87	1129.4	1967	12	383
15	Middle Ground Shoal	Offshore	186.95	106.4	1966	4	8
16	Moquawkie	Onshore	—	—	2002[1]	—	—
17	North Cook Inlet	Offshore	—	1518.8	1969	—	917
18	North Trading Bay	Offshore	—	11.6	1968	—	19
19	Nicolai Creek	Onshore	—	—	2001	—	2
20	Redoubt Shoal	Offshore	—	—	2002	100	—
21	Sterling	Onshore	—	3.1	1962	—	30
22	Stump Lake	Onshore	—	5.6	1990	—	—
23	Swanson River	Onshore	228.84	241.0	1958	1	108
24	Trading Bay	Offshore	76.57	64.0	1967	2	27
25	West McArthur River	Offshore	7.95	1.8	1994	1	—
26	Wolf Lake	Onshore	—	0.1	2001	—	—
Total		—	**1,258.02**	**6,476.3**	—	**125**	**2,455**
Reasonably Foreseeable Future Development and Production							
27	Falls Creek	Onshore	—	—	—	—	13
28	Ninilchik	Onshore	—	—	December 2003[2]	—	90
29	North Fork	Onshore	—	0.10	—	—	12
30	Starichkof	Offshore	—	—	December 2003[3]	300	—
31	Tyonek Deep	Offshore	—	—	—	25	30
32	West Forelands	Onshore	—	—	—	—	20
Total		—	—	—	—	**325**	**167**

Notes:
West Fork had no production from 1986 to 1990. Redoubt Shoal recent oil discovery by Forest Oil is still being defined.
Swanson River – 2,812 billion cubic feet of gas from other fields was injected to facilitate oil production.
[1] Hartwell (2001).
[2] *PI/Dwight's Plus Drilling Wire* (2002).
[3] *Alaska Oil and Gas Reporter* (2002).

Key:
— = no dta available
bcf = billion cubic feet
MMbbl = million barrels

Sources:
Field Information is taken from State of Alaska, Department of Natural Resources (2000a*)*.
Reserves taken from State of Alaska, Department of Natural Resources (2000a) with State of Alaska, Oil and Gas Conservation Commission 2000 and 2001 Production for subtracted.
Redoubt Shoal scheduled for production by end of 2002 (*Petroleum News Alaska* 4/5/02).

Table V-3
Past Exploration Activities in Lower Cook Inlet and Shelikof Strait

Alaska OCS Region – Minerals Management Service Exploration Wells Lower Cook Inlet and Shelikof Strait					
Operator	**Location**	**Drilling Activity**	**Water Depth**	**Production**	**Drilling Unit**
Marathon	LCI	7/21/78 – 12/22/78	120 feet	No	Diamond M Dragon Drillship
Phillips	LCI	10/9/78 – 10/19/78	267 feet	No	Ocean Bounty Semi-submersible
Phillips	LCI	10/20/78 – 5/18/79	267 feet	No	Ocean Bounty Semi-submersible
Marathon	LCI	1/11/79 – 4/27/79	542 feet	No	Diamond M Dragon Drillship
Marathon	LCI	4/29/79 – 8/21/79	542 feet	No	Diamond M Dragon Drillship
Phillips	LCI	5/28/79 – 9/18/79	245 feet	No	Ocean Bounty Semi-submersible
Arco Alaska	LCI	7/15/79 – 1/21/80	133 feet	No	Dan Prince Jack-up
Phillips	LCI	9/24/79 – 4/26/80	513 feet	No	Ocean Bounty Semi-submersible
Arco Alaska	LCI	4/6/80 - 5/29/80	192 feet	No	Dan Prince Jack-up
Arco Alaska	LCI	5/9/80 – 6/24/80	202 feet	No	Ocean Bounty Semi-submersible
Chevron USA Inc.	LCI	9/19/84 – 11/12/84	115 feet	No	Key Hawaii Jackup
Chevron USA Inc.	LCI	11/21/84 – 12/18/84	550 feet	No	Sedco 712 Semi-submersible
Chevron USA Inc.	Shelikof Strait	12/18/84 – 3/13/85	546 feet	No	Sedco 712 Semi-submersible

Note:
No hydrocarbon discovery; all muds and cuttings discharged at the drill site.

Key:
LCI = Lower Cook Inlet

Source:
USDOI, MMS, Alaska OCS Region (2002).

Table V-4
Past and Present Operational Gas Pipelines in Cook Inlet and Cook Inlet Basin

ID	Current Operator	Location of Field or Pool	Location	Installed	Length In Miles[3]	Line Diameter In inches
Offshore Cook Inlet Pipelines						
a	Unocal	Offshore	Baker to Platform A	1965	2.5	8
b	Cross Timbers	Offshore	Platform A to C	1967	2.2	8
c	Cross Timbers	Offshore	Platform C to Dillon	1967	2.2	8
d	Unocal	Offshore	Dillion to shore	1966	5.6	8
e	Unocal	Offshore	Grayling to shore	1967	6.0	10
f	Unocal	Offshore	King Salmon to shore	1967	7.0	8
g	Unocal	Offshore	Dolly Varden to shore	1967	5.7	8
h	Unocal	Offshore	Steelhead to shore	1986	6.5 (13)	2-10” lines
i	Unocal	Offshore	Monopod to shore	1966	9.0	8
j	Unocal	Offshore	Spurr to shore	1968	8.4	6
k	Marathon	Offshore	Spark to shore	1968	7.2	6
l	Unocal	Offshore	Anna to Bruce	1966	1.6	8
m	Unocal	Offshore	Bruce to shore	1974	5	6
n	Unocal	Offshore	Granite Point to shore	1966	6.0	8
o	Phillips	Offshore	Tyonek “A” to shore	1968	13 (26)	2-10” lines
p	Marathon	Offshore	Marine CIGGS, Granite Point to Nikiski	1972	21 (42)	2-10” lines
Kenai Peninsula Pipelines						
q	Kenai Pipeline	Onshore	Swanson River to Nikiski	1960	19.2	16
r	Marathon	Onshore	Beaver Creek Field to Enstar Royalty Line	1982	4	12
s	Phillips	Onshore	Onshore continuation of Tyonek “A” to Nikiski	1968	26	16
t	Marathon	Onshore	Kenai Gas Field to Nikiski	1965	17	20
u	Enstar	Onshore	Kenai Mainline: Kenai Gas Field to Anchorage	Various[1]	71 (142)	2-12” lines
v	Military Pipeline (Enstar Lease)	Onshore	Anchorage to Whittier	1996[2]	47	8
w	Marathon	Onshore	Kenai Gas Field to Enstar Kenai Mainline	1965[4]	3	8
x	Enstar	Onshore	Enstar Royalty Line: Nikiski to Enstar Kenai Mainline	1978	25	8
West Cook Inlet Pipelines						
y	Unocal	Onshore	Stump Lake and Ivan River Fields to Enstar	1990	14	6 and 8
z	Forest Oil	Onshore	West Forelands #1 Well to Trading Bay	1994	5	6
aa	Enstar	Onshore	Lewis River Field to Enstar West cook Mainline	1984	4	4
bb	Enstar	Onshore	West Cook Mainline, Beluga Gas Field to Anchorage	1984	99	20
cc	Marathon	Onshore	West Side CIGGS, Trading Bay to Granite Point	1972	27	16
dd	Marathon	Onshore	Granite Point to Beluga	1990	16.1	16

Notes:
[1]Kenai Mainline pipeline: Segments placed into service in various years beginning in 1961. Latest initial pipeline pressure test occurred in 1978.
[2]Year of Enstar pressure test and operational assumption
[3.] Roughly estimated, there are 486 route miles for all gas pipelines off shore and on shore in the Cook Inlet region. Considering dual pipelines actual pipe length is approximately 598 miles. These figures do not include gathering and connection pipelines that are internal to a field. Pipeline mileage calculated only for those systems represented on Map 18.
[4]Pipeline not in use

Key:

CIGGS = Cook Inlet Gas Gathering System

Source:
Robertson (2000); Enstar (2001); USDOI, MMS, Alaska OCS Region (2002).

Table V-5
Past and Present Operational Oil and Liquid Petroleum Pipelines in Cook Inlet and Cook Inlet Basin

ID	Current Operator	Location of Field or Pool	Location	Installed	Length In Miles	Line Diameter in Inches
Offshore Cook Inlet Pipelines						
a	Cross Timbers	Offshore	A to shore	1965	7.0 (14)	2-8 lines
b	Cross Timbers	Offshore	C to A	1967	2.2	8
c	Unocal	Offshore	Baker to A	1965	2.5	8
d	Unocal	Offshore	Grayling to shore	1967	6.0	10
e	Unocal	Offshore	King Salmon to shore	1967	7.0	8
f	Unocal	Offshore	Dolly Varden to shore	1967	5.7	8
g	Unocal	Offshore	Steelhead to shore	1986	6.5	8
h	Unocal	Offshore	Monopod to shore	1966	9.0	8
i	Unocal[1]	Offshore	Spurr to shore[2]	1968	8.4	6
j	Marathon[1]	Offshore	Spark to shore[2]	1968	7.2	6
k	Unocal	Offshore	Anna to Bruce	1966	1.6	8
l	Unocal	Offshore	—	1966	1.6	8.625
m	Unocal	Offshore	Granite Point to shore	1966	6.0	8
Kenai Peninsula Pipelines						
n	Tesoro	Onshore	Tesoro Refinery to the Port of Anchorage	1974	70	10
0	Tesoro	Onshore	Nikiski Terminal to Tesoro Refinery	1983	<1	24
p	Kenai Pipeline	Onshore	Swanson River to Nikiski	1960	19.2	8
West Cook Inlet Pipelines						
q	Cook Inlet Pipeline	Onshore	Drift River loading lines	1966	3.6	30 and 42
r	Cook Inlet Pipeline	Onshore	Granite Point to Drift River	1966	42.0	20 and 12
s	Forest Oil	Onshore	West McArthur to Trading Bay	1994	3.12	8

Notes:
[1]Roughly estimated, there are 211 miles of actual pipeline route and 218 miles of actual pipe length. This estimate does not take into account gathering lines that are internal to a producing field.
[2]Spurr and Spark Oil Pipelines are shut in. Marathon only operates gas lines.

Key:
< = less than

Source:
Robertson (2000); USDOI, MMS, Alaska OCS Region.

Table V-6
Trans-Alaska Pipeline System and Future Natural Gas Projects

Name	Estimated Pipeline Length (miles)	Project Description and Route
Active Project		
Trans-Alaska Pipeline (TAPS)	800	TAPS is the key transportation link for all North Slope oil fields. It has been in operation since 1977 and to date has carried nearly 13 billion barrels of oil. Approximately 16.3 square miles are contained in the pipeline corridor that runs between Prudhoe Bay and Valdez. The Dalton Highway (or Haul Road) was constructed parallel to the pipeline between Prudhoe Bay and Fairbanks. The pipeline design capacity is 2 million barrels per day, and it reached near-peak capacity in 1988. Presently, TAPS is running at about 1.0 million barrels per day. The lower operational limit is generally thought to be between 200,000 and 400,000 barrels per day. If oil production from northern Alaska cannot be sustained above this minimum rate, the TAPS system will become nonoperational, and all oil production is likely to be shut in.
Future Natural Gas Projects		
Trans-Alaska Gas System (TAGS)	800	The TAGS plan consists of a gas-conditioning plant on the North Slope; an 800-mile, 42-inch pipeline; a liquefied natural gas (LNG) plant and marine terminal at Valdez; and a fleet of new LNG carriers. LNG would be transported to Japan and other Pacific Rim countries. The Yukon Pacific Corporation has obtained permits for construction of TAGS and export of Alaska North Slope gas to Asia. The LNG facility and marine terminal in Valdez has received the Final EIS prepared by the Federal Energy Regulatory Commission. Yukon Pacific believes the large scale of the project (2.05 billion cubic feet per day to yield 14 million metric tons of LNG annually) will make this project competitive with other new LNG projects. The project is currently stalled by the lack of commitments from the North Slope gas producers, delivery contracts to Asian buyers, and high construction costs.
Alaska Natural Gas Transportation System (ANGTS)[1]	2,102	The ANGTS plan is a pipeline system connecting Alaska North Slope gas production through Canada to the lower 48 states. The new pipeline would run parallel to TAPS from the North Slope to interior Alaska and then cross the Yukon Territory to connect to existing pipelines in Alberta. The primary market would be a consumer in the U.S. Numerous permits, rights-of-way, and approvals have been obtained for the proposed pipeline route through Alaska and Canada. Downward revisions to construction costs and the increase in gas prices to the \$3-\$4 per million-cubic-foot range make this project more appealing today. Currently, several variations to routes are being considered for the overland gas pipeline system.

Table V-6 (continued)
Trans-Alaska Pipeline Systems and Future Natural Gas Projects

Name	Estimated Pipeline Length (miles)	Project Description and Route
Arctic Resources, Northern Gas Pipeline Project	326 offshore 874 onshore	The ARC project involves a 52-inch, high-pressure gas pipeline running offshore from Prudhoe Bay in Alaska to the Mackenzie delta in the Northwest Territory and then south through the Mackenzie River Valley to the existing gas pipeline network in northern Alberta. The 326-mile offshore portion would be trenched in 30-60 feet of water. The 874-mile onshore portion would also be buried. It is expected to deliver 2.5 billion cubic feet per day to markets primarily in the U.S. The project would involve a consortium of gas producers, pipeline companies, and Native corporations in both Alaska and Canada. Commitments of gas producers and gas buyers have not yet been obtained nor have right-of-way permits been issued.
Natural Gas to Liquids Conversion[2]	Will use existing TAPS Pipeline	Atlantic Richfield Co. (ARCO) and Syntroleum Corp constructed a pilot-scale, natural gas to liquids (GTL) conversion facility in Puget Sound, Washington. More recently, BP-Amoco has begun design work on a GTL pilot project on the Kenai Peninsula in Alaska. As a result of the BP-Amoco-ARCO merger, BP-Amoco now holds an equal interest in the gas reserves in the Prudhoe Bay field. All of the major North Slope gas owners (BP-Amoco, Exxon-Mobil, and Phillips-Alaska) are studying the feasibility of various gas commercialization projects. GTL is an attractive option because it will use the existing TAPS pipeline (extending its life and lowering future tariffs) and produce clean-burning fuels to meet more stringent Environmental Protection Agency emission standards for vehicles. At the present time, the overall cost of a full-scale gas to liquids project is comparable to a similar-sized LNG project. As an emerging technology, new cost-reduction breakthroughs are expected for gas to liquids processing, improving the economic potential for future gas to liquid projects.

Notes:
[1]Thomas et al. (1996).
[2]*Alaska Report* (1997).

Table V-7
Future Cook Inlet Lease Sales

Sale	Proposed Sale Date(s)	Area/Description	Resources or Hydrocarbon Potential
Federal OCS			
5-Year Program – Cook Inlet Sales 191 and 199	May 2004, May 2006	The area consists of approximately 2.5 million acres. The area included only the Cook Inlet portion of the Cook Inlet/Shelikof Strait Planning Area (Federal Register, 2001c).	0.28 to 0.34 Billion barrels of oil and 0.38 to 0.58 trillion cubic feet of gas
State of Alaska			
Cook Inlet Basin	May 2002, May 2003, May 2004, May 2005, May 2006	The areawide sale will include uplands in the Matanuska and Susitna Valleys, the Anchorage Bowl, the western shore of Cook Inlet from the Beluga River to Harriet Point. The total proposed area is about 4.2 million acres.	Moderate to High
CIRI			
Cook Inlet Basin	—	As a result of its ANCSA land selections under the Alaska Native Claims Settlement Act, CIRI is the largest private landowner in Southcentral Alaska. CIRI promotes and actively encourages environmentally sensitive exploration of its properties by oil and gas and mining companies.	—

Key:
— = means that the dates are not established or are unknown.
ANCSA = Alaska Native Claims Settlement Act
CIRI = Cook Inlet Region, Inc.
OCS = Outer Continental Shelf

Source:
USDOI, MMS, Alaska OCS Region (2001); State of Alaska, Dept. of Natural Resources (2002).

Table V-8
Past and Present Oil and Gas Production: July 1957 to December 2001 for Cook Inlet Basin, Alaska

Production to Date	Oil (millions of barrels)	Gas (billions of cubic feet)	Reference
Onshore	242.30	3599	State of Alaska, DNR (2000) and State of Alaska, OGCC (2002)
Offshore	1,039.45	2889	
Total	1,281.75	6488	

Key:
OGCC = Oil and Gas Conservation Commission
DNR = Department of Natural Resources

Source:
USDOI, MMS, Alaska OCS Region (2002).

Table V-9
Summary of Reserve and Resource Estimates We Use for Analytical Purposes in the Cumulative Analysis

Production Activity	Oil (billions of barrels)	Contribution of Cook Inlet Lease Sale 191 by Volume of Oil (%)	EIS Reference Tables
Low End of the Range (Past, Present)	1.406	9.9	V-8, V-10
Middle Portion (Past, Present, and Reasonably Foreseeable)	1.978	7.0	V-8, V-10
High End (Past, Present, Reasonably Foreseeable, Speculative)	2.472	5.6	V-8, V-10

Key:
% = percent
EIS = Environmental Impact Statement

Source:
USDOI, MMS, Alaska OCS Region.

Table V-10
Detailed Reserve and Resource Estimates We Use for Analytical Purposes in the Cumulative Analysis

Activity	Oil (billions of barrels)	Gas (billions of cubic feet)	Reference Table
Present Production (total)	0.125	6488.1	V-2,V-8
Onshore	0.002	3599.1	V-2,V-8
Offshore	0.123	2889.0	V-2,V-8
Reasonably Foreseeable Future Production (total)	0.572	2645	V-2
Discovered Onshore	0.300[1]	1082	V-2
Discovered Offshore	0.025	1373	V-2
Undiscovered Onshore	0.011[2]	—	—
Undiscovered Offshore State Waters	0.096[2]	—	—
Undiscovered Offshore Cook Inlet Lease Sales 191 and 199	0.140	190	—
Speculative Production (total)	0.494	167	V-2
Undiscovered Onshore	0.021[2]	137	V-2
Undiscovered Offshore	0.473[2,3]	30	V-2
Total	**1.191**	**9110**	**Tables V-2, V-8, V-9**

Notes:
[1]Discovered Offshore includes recent discovery at Starichkof by Phillips estimated 300 million barrels (*Oil and Gas Reporter*, 2002).
[2] Undiscovered oil and gas resources in the Cook Inlet Basin are based on U.S. Geological Survey National Assessment, 199 Circular 1118. Undiscovered State of Alaska onshore and offshore resources were estimated based on past and present production distribution of onshore 10% and offshore 90% (Kirk Sherwood, personal communication).
[3] Undiscovered OCS resources are based on UDDOI, MMS 2002 (5-Year Final EIS).
Forest Oil new prospects of Corsai, Kokanee, Raptor, Sabre, Tutna, and Valkyrie included in above undiscovered reasonably foreseeable estimate.

Source:
State of Alaska, Dept. of Natural Resources (2001), USDOI, MMS, Alaska OCS Region.

Table V- 11
Past Major Projects Considered in the Cumulative Effects Assessment

Project Name	General Location	Resource Estimates	Infra-structure	Annual Production	Status and Comments
Sale 2001 (State)	Cook Inlet Basin – Areawide	NA	None	None	Sale 2001 held in May 2001; 29 tracts were leased, and $928,085 bonus received.
Sale 2000 (State)	Cook Inlet Basin – Areawide	NA	None	None	Sale 2000 held in August 2000; 27 tracts were leased and $919,750 bonus received.
Sale CI (OCS)	Lower Cook Inlet	No commercial discoveries	NA	NA	87 tracts leased in 1977. Ten wells drilled 12/78-06/80: nine wells in lower CI and one in Shelikof Straits. All wells plugged and abandoned and all leases relinquished.
Sale 88 (OCS)	Gulf Alaska Cook Inlet	Sale Cancelled	NA	NA	Sale cancelled May 1986 for lack of industry interest.
Sale 60 (OCS)	Lower Cook Inlet and Shelikof Strait	No commercial discoveries	NA	NA	13 tracts leased in September 1981. Three wells drilled between 11/84 and 4/85. All wells have been plugged and abandoned, and all leases relinquished.
RS-2 (OCS)	Lower Cook Inlet and Shelikof Strait	No discoveries	NA	NA	No tracts were leased in 1982. Reoffering sale.
Sale 114 (OCS)	Gulf of Alaska Lower Cook Inlet	Cancelled	NA	NA	Sale cancelled to assess damages from *Exxon Valdez* oil spill.
Sale 149 (OCS)	Lower Cook Inlet	Two leases	NA	Not Available	Starishkof Field in Cosmopolitan Unit (See Table V-13).
Treatment Facility	East Foreland Nikiski	NA	NA	NA	Facility operated by Unocal and Shell received crude oil from offshore platforms via three 8-inch pipelines. Facility is shut down.
Chevron Refinery	Nikiski	Capacity was 18,000 bbl/day	NA	Operated from 1963-1991	Plant has been disassembled and remediation begun.

Table V- 11 (continued)
Past Major Projects Considered in the Cumulative Effects Assessment

Project Name	General Location	Resource Estimates	Infra-structure	Annual Production	Status and Comments
Tesoro Export Tankering[1]	Nikiski to Valdez	Diesel Fuel	Storage tanks	1999 - 2001	Diesel fuel product exported via tanker to Valdez. PetroStar located near Valdez new contractor and involves no tanking.
Albert Kaloa	Onshore	—	—	1970-1971	Produced 0.118 bcf gas
Birch Hill	Onshore	11 bcf gas	—	1965	Produced 0.06 bcf gas
Moquawkie	Onshore	—	—	1967 - 1970	Produced 0.98 bcf gas
Pretty Creek	Onshore	—	—	1986 - 1998	Produced 6.37 bcf gas
West Fork	Onshore	3 bcf gas	—	1978 - 1995	Produced 4.21 bcf gas
North Trading Bay Unit	Offshore	—	—	1965 - 1992	Produced 23.70 MMbbl oil

Notes:
[1]Noel (2002, pers. commun.).

Key:
— =
bcf = billion cubic feet
CI = Cook Inlet
MMbbl = million barrels
NA = not applicable

Source:
USDOI, MMS, Alaska OCS Region (2002)

Table V-12
Present Major Projects Considered in the Cumulative Effects Assessment

Project Name	General Location	Resource Estimates	Infrastructure	Annual Production	Status and Comments
Ivan River, Lewis River, Pretty Creek, and Stumpy Lake Units	Located onshore along the north shore of Cook Inlet west of Susitna River	Gas reserves of 20 bcf	NA	3.79 bcf gas	Ivan River, Pretty Creek, and Stump River are in production. Produced gas is delivered to the Beluga Power Plant or pumped to Anchorage via the Enstar Pipeline.
Beluga River Unit	Located along the north coast of Cook Inlet just west of the Beluga River	Gas reserves of 600 bcf	Site of the Beluga electric power plant	35.98 bcf gas	Produced gas is burned for electricity.
Cannary Loop Oil Field	Kenai Peninsula	Gas reserves of 20 bcf	—	88.61 bcf gas	Production transported to Nikiski.
North Cook Inlet Unit	Far northern Cook Inlet	Gas reserves of 917 bcf	Field served by a single platform	51.60 bcf gas	Produced gas is piped to Nikiski for liquefaction and transported to Japan.
Granite Point Oil Field	Upper Cook Inlet	Oil reserves of 8 MMbbl; Gas reserves of 19 bcf	Served by three platforms and a production facility.	1.78 MMbbl	Produced crude is transported via a 20-inch pipeline to the Drift River Terminal.
Trading Bay Oil and Gas Field[1]	Trading Bay in Upper Cook Inlet	Oil reserves of 3 MMbbl; gas reserves of 27 bcf	Served by three platforms	0.64 MMbbl oil, 0.42 bcf gas	Trading Bay oil is shipped out through the Drift River Terminal. Gas is pipelined to Anchorage via the Enstar system or the Beluga Power Plant.
McArthur River Oil and Gas Field	Trading Bay in Upper Cook Inlet	Oil reserves of 22 MMbbl; gas reserves of 383 bcf	Served by four platforms	4.69 MMbbl oil, 67.77 bcf gas	Produced oil is carried by pipeline to Drift River Terminal. Gas is shipped to Anchorage via the Enstar system or the Beluga Power Plant.
Middle Ground Shoal Field	Central Upper Cook Inlet off the east Forelands	Oil reserves of 8 MMbbl; gas reserves of 8 bcf	Served by four platforms and production facility	1.96 MMbbl oil	Produced oil is pipelined to Nikiski.
North Trading Bay	Upper Cook Inlet	Gas reserves of 19 bcf	Served by a single platform	11.52 bcf gas	Operated by Phillips, produced gas is transported via pipeline to Nikiski.
Redoubt Shoal[2]	Kenai Peninsula south of Nikiski	Oil reserves of 100 MMbbl	Served by a single platform	Present resource est. at 100 MMbbl	Osprey offshore drill rig has drilled four wells with production expected to begin in late 2002.
Sterling	Kenai Peninsula	Gas reserves of 30 bcf	—	2.66 bcf gas	Produced gas transported to Anchorage via the Enstar gas pipeline system.

Table V-12 (continued)
Present Major Projects Considered in the Cumulative Effects Assessment

Project Name	General Location	Resource Estimates	Infrastructure	Annual Production	Status and Comments
Swanson River Unit	Kenai Peninsula	Oil reserves of 2 MMbbl; gas reserves of 108 bcf	Served by eight production wells	0.79 MMbbl oil; 2.81 bcf gas reinjected to preserve oil production	Produced oil is pipelined to Nikiski for processing at the Tesoro Refinery.
Beaver Creek Unit	Kenai Peninsula	Oil reserves of <1 MMbbl; gas reserves of 97 bcf	Served by three production wells	0.10 MMbbl oil; 1.40 bcf gas	The field's oil potential is nearly depleted. Produced crude is transported to Nikiski via tanker truck for processing and transshipment. Gas is pipelined to the Nikiski petrochemical complex.
Kenai Gas Field	Coastal Kenai Peninsula south of Kenai	Gas reserves of 225 bcf	Served by 47 production wells	9.91 bcf gas	The field's production has a variety of end users.
Drift River Oil Terminal[5]	West shore of Cook Inlet across from Kalgin Island	NA	Storage tanks and offshore loading	Loads and stores at least 8.2 MMbbl annually	Drift river crude oil is transported to the Tesoro Nikiski refinery. 25-30 tanker trips/year issue from the terminal with an avenge cargo of 280,000 bbl.
Alaska North Slope Crude[6]	—	—	—	7.3 MMbbl moved to the Tesoro Nikiski Refinery annually	North Slope crude has been shipped via tanker to Nikiski since 1986. Presently 25-30 trips/year. Any new oil production in CI will back-out these imports of North Slope Crude. CI crude is superior in quality to the present imports.
Import Tankering[6]	Nikiski	NA	Storage tanks and offshore loading	323,000 bbl imported from Australia in 1992	Foreign crude oil is intermittently imported to the Tesoro refinery, usually one shipment per year.
Export Tankering[6]	Nikiski to West Coast Ports	—	Storage tanks and offshore loading.	3,000 bbls/day refined product	Approximately 25% of annual production of refined product shipped to West Coast during winter months.
Agrium ammonia-urea plant	Kenai Peninsula at Nikiski	Supplied by natural gas from Cook Inlet	Most of product shipped to West Coast markets, plant employs over 300 workers.	800,000 tons urea and 1 million tons ammonia fertilizer annually	Plant has been in operation since 1968; in 1977, two additional plants were added which doubled plant capacity and employment.

Table V-12 (continued)
Present Major Projects Considered in the Cumulative Effects Assessment

Project Name	General Location	Resource Estimates	Infrastructure	Annual Production	Status and Comments
Phillips-Marathon LNG Plant[3]	Community of Nikiski on the Kenai Peninsula	NA	Two liquefaction trains; capacity 200 MMcf/day; process reduces volume by factor of 632	Liquefies 1.3 metric tons of natural gas annually or about 55,000 bbls/day	Natural gas is received from the North Cook Inlet and other fields. LNG is shipped to Japan 32-36 times a year with contract sales through 2009. Joint venture of Phillips and Marathon in plant and two LNG 80,000-m^3 tankers.
Chugach National Forest[4]	Eastern Kenai Peninsula, Prince William Sound	NA	NA	Annual average harvest from 1985-1999 is 2.0 mmbf/year	Average of 227 acres harvested annually on the Kenai Peninsula, mostly bark beetle infested. Reforestation program 22% natural seeding, 78% planting.
Anchor Point Harbor	Kenai Peninsula	NA	No existing boat harbor	NA	A small-boat harbor and dredging project is under consideration by the U.S. Army Corps of Engineers and the State.
Port of Homer	Kenai Peninsula, on Kachemak Bay	NA	Includes three deepwater piers. Two inner-harbor docks for vessels up to 120 feet.	NA	Two harbors provide protected moorage for 650 vessels up to 150 feet in length.
Port of Anchorage	Municipality of Anchorage	NA	Multiple-use dock facilities, including rail service and petroleum products storage	NA	Port moves an annual average of 3 million tons of cargo. Port routinely serves a variety of carriers including bulk carriers, tug escorted barges, passengers ships and occasional military vessels.

Notes:
[1] PI/Dwight's Plus Drillng Wire, 1/24/01
[2] Carlson, 2002 (pers. commun.)
[3] Donnelly (2002, pers. commun.)
[4] Stockdale (2002, pers. commun.)
[5] Miller (2002, pers. commun.)
[6] Noel (2002, pers. commun.)

Key:
— =
< = less than
bbl = barrels
bcf = billion cubic feet
CI = Cook Inlet
LNG = liquefied natural gas
m^3 = cubic meters
MMbbl = million barrels
mmbf = million board feet
MMcf/day = million cubic feet per day
NA = not applicable

Source:
USDOI, MMS, Alaska OCS Region (2002).

Table V-13
Reasonably Foreseeable Future – Major Projects Considered in Cumulative Effects Assessment

Project Name	General Location	Resource Estimates	Infrastructure	Annual Production	Status and Comments
State Areawide Lease Sales 2003, 2004, 2005, 2006	Cook Inlet basin – areawide	Moderate to High	N/A	—	Includes Cook Inlet and Matanuska and Susitna Valleys. Total area about 4.2 million acres.
Tyonek Deep (Sunfish)	North Cook Inlet Unit	25 MMbbl	Unknown	N/A	Sunfish Discovery wells 1 and 2 were drilled during the fall and winter of 1992. Development may occur in the reasonably foreseeable future (15-20 years).
Starishkof Oil Field	Cosmopolitan Unit	—	—	—	Offshore structure extending into federal waters being drilled from onshore. Production expected to come onljne in late 2003.[1]
Natural Gas Pipeline	Kenai to Ninilchik, then to Anchor Point and eventually to Homer.[3]	—	—	—	Planning stages by Kenai Peninsula Borough.
Southern Intertie Project	Kenai to Fairbanks via Anchorage	—	—	—	Electric power corridor either to go inland or along the coast of the Kenai Peninsula. Cumulative effects expected to be with wildlife and visual resources.
British Petroleum Gas-to-Liquids Test Facility	Kenai Peninsula near Nikiski	—	Construction estimated at $86 million. Long-term employment 15-30 persons.	300 barrels of synthetic crude or “white crude” per day	Process converts natural gas to a synthetic crude oil. Scheduled to begin operation in June. Will use fuel cell technology for power that is more efficient and produces fewer emissions than standard power systems.[2]
Federal Lease Sales 191 and 199	Lower Cook Inlet	—	N/A	N/A	Area consists of about 2.5 million acres in Cook Inlet and Shelikof Strait. Sales scheduled for May 2004 and May 2006.

Notes:
[1]*Petroleum News Alaska* (2002)
[2]Chappell (2002, pers. commun.)
[3]*PI/Dwight’s Drilling Wire* (2000)

Key:
— = unknown
NA = not applicable
MMbbl = million barrels

Source:
USDOI, MMS, Alaska OCS Region (2002)

Table V-14
Summary of Cumulative Effects by Resource Category

Resources	Summary of Effects[1]
Water Quality	The permitted, routine discharges, small oil spills, or possibly a large oil spill associated with the proposed oil and gas development are not expected to cause significant degradation of Cook Inlet water quality. In addition, a large oil spill is unlikely. A very large TAPS tanker spill in Prince William Sound or inshore Gulf of Alaska could partially enter Cook Inlet. Contamination from such a spill (i.e., the presence of hydrocarbons in amounts greater than 15 parts per billion) would be not expected and, therefore, such a spill would result in oil slicks but not toxic water concentrations of hydrocarbons. Because tanker spills tend to be larger than platform or pipeline spills, backing out of an equivalent tankering by the multiple sale production of 140 million barrels of oil would result in a reduction in total amount of projected spillage of oil into the inlet over the non-sale case. The permitted, routine discharges and small oil spills associated with municipal wastewaters, seafood processing, and other oil and gas development are also not expected to cause significant degradation of Cook Inlet water quality.
Air Quality	The effects associated with the cumulative analysis essentially would be the same, qualitatively, as those discussed for the Proposed Action. Effects on onshore air quality from cumulative-case emissions are expected to be 20.4% of the maximum allowable PSD Class I increments. Only the Tuxedni National Wilderness Area is designated Class I, with the remaining area in and adjacent to the sale area designated Class II. Therefore, the potential effects would be much less than the percentage of the Class I increments. These effects would not make the concentrations of criteria pollutants in the onshore ambient air approach the air-quality standards. Consequently, a minimal effect on air quality with respect to standards is expected. Principally because of the distance of emissions from land, the other effects of air-pollutant concentrations at the shore from exploration, development, and production activities, or accidental emissions would not be sufficient to harm vegetation. A light, short-term coating of soot over a localized area could result from oil fires.
Lower Trophic-Level Organisms	The overall cumulative effect of permitted discharges and construction on lower trophic-level organisms likely would be negligible or immeasurable. Small spills and the cleanup responses to them probably would affect a few coastal habitats, including lower trophic-level organisms. In the few affected areas, populations of some intertidal organisms probably would be depressed measurably for about a year, and small amounts of oil would persist in shoreline sediments for more than a decade. An unlikely large oil spill could contaminate up to 39 kilometers of shoreline, most likely in southwestern Cook Inlet or western Shelikof Strait. In the affected area, populations of some intertidal organisms would be depressed measurably for about a year, and small amounts of oil could persist in shoreline sediments for more than a decade.
Fishes	The estimated effects of an unlikely large oil spill would not be measurable on at the population level. The overall cumulative effect on fisheries resources may include reduced stocks of some fisheries resources (sockeye, coho, and Chinook salmon, some semidemersal fish such as pollock, and some shellfish), primarily due to the potential for over harvest of these stocks by commercial-fishing activities. This effect could persist for several generations, or longer. The proposed Lease Sale 191is not expected to contribute measurably to these adverse effects. While some individual fishes may be disturbed, injured, or killed, effects measurable at the population level are not likely.
Essential Fish Habitat	The primary cumulative effects of this lease sale are a small incremental increase in human, industrial, and commercial fishing effects of development in Cook Inlet. The input of petroleum hydrocarbons to essential fish habitats from the use of the oil (primarily as fuel) is estimated to be approximately 8 times

Table V-14 (continued)
Summary of Cumulative Effects by Resource Category

Resources	Summary of Effects[1]
	greater than the effects of producing and transporting the crude oil. Commercial fishing also removes up to 10% of the adult populations of important forage fish and bottom trawling causes an order of magnitude more damage to bottom habitats than the estimated disturbance from pipeline construction. In the unlikely event that a large oil spill occurs, the beach and intertidal fish habitats could be affected because oil could remain in these areas or prey could be impacted for more than a decade, which is three or more generations for some species, and as such a significant effect for those species. However, such habitat degradation would likely be limited to a very small proportion of habitat and the habitat of only small populations or subpopulations would be affected. The cumulative impacts of all activities also include those from both local and global human activities that contribute to global climate change. Because of the complexity of the ecosystem that constitutes essential fish habitat, there is considerable uncertainty about, the extent to which ecologically complex essential fish habitats are changed by small sublethal effects on that habitat from cumulative human development such as fishing, chronic urban contamination, numerous small fuel spills in Cook Inlet. Furthermore, both for essential fish habitat locally in Cook Inlet and globally, the cumulative effects depend in part on whether the changes occur at a crucial time period or in a critical location.
Endangered Species	Activities that contribute to cumulative effects include marine and terrestrial habitat contamination with harmful contaminants; habitat loss and degradation at important feeding, nursery, and other habitats due to increased noise, disturbance, and alteration related to human settlement, development, and activities such as fishing, mariculture, and tourism; human-related and other changes in the size and composition of marine fish populations; human harvest; take associated with commercial fishing; and global warming. Pollution of marine and terrestrial habitats occupied by these species occurs from many human-related sources, such as sewage inputs, petroleum hydrocarbons from sources related to oil use and oil spills, contaminants from industrial and agricultural activities, and many other sources. Cetaceans other than the Cook Inlet beluga whale have not likely been exposed to adverse effects of State oil and gas leasing in the Inlet. No serious adverse effects from this activity have been identified on beluga whales. Available data do not indicate previous OCS oil and gas related adverse effects on the cetacean stocks that could be affected by the proposed Cook Inlet Lease Sales. Sea otters in the region of the designated Southwest Alaska stock of sea otters and in other regions have previously suffered serious adverse effects from oil spills. The impacts of increased noise in the marine environment on the species at issue are mostly unknown but could potentially have adverse effects such as disruption of communication and avoidance of important habitats. We expect potential incremental cumulative effects attributable to the Proposed Action to be insignificant for blue whales, sperm whales, sei whales, North Pacific right whales, short-tailed albatross, American peregrine falcons, and Aleutian Canada geese. We would expect any incremental effects attributable to the proposed Cook Inlet Lease Sales to be insignificant for all of the aforementioned species, all ESA-listed and candidate cetaceans, for the eastern population stock of Steller's sea lions, for Steller's eiders, and for the southwest Alaska stock of sea otters. The primary potential for significant incremental contributions to cumulative adverse effects on threatened and endangered species from routine operations could result from incremental increases in noise and disturbance at key western Steller sea lion stock terrestrial and foraging critical and other habitats, that resulted in Steller sea lions avoiding important feeding habitats or to direct mortality. Any large displacement, particularly of juvenile, Steller sea lions from important foraging habitats could result in a significant cumulative adverse effect

Table V-14 (continued)
Summary of Cumulative Effects by Resource Category

Resources	Summary of Effects[1]
	on this species. Any such displacement from marine critical habitats could result in a significant adverse cumulative effect on that critical habitat. Displacement from important feeding habitats would not have to be years in duration to have a potentially significant cumulative effect, especially if juveniles were displaced. Such a cumulative effect is considered unlikely from routine operations unless Steller sea lions avoided important foraging areas due to noise or other disturbing activities that occurred within or very near their critical habitats. Any disturbance of the western population stock of Steller lions at their terrestrial critical habitats that resulted in mortality (for example, due to trampling) could result in a potentially significant negative adverse effect on both the western population stock of Steller sea lions and on that critical habitat. Any potential increase in mortality of Steller sea lion prey species in sea lion critical habitat that resulted in a large decrease in prey available to the western stock of Steller sea lions could result in potentially significant cumulative effect on both the stock and on the critical habitat. Such a significant effect on prey is probably possible only in the unlikely event of a large or very large oil spill that contacted critical habitat or other important feeding areas and reduced availability of Steller sea lion prey. Such a large or very large spill could also conceivable result in a significant cumulative effect if it resulted in the exposure to large amounts of fresh crude oil by Steller sea lions, particularly if it resulted in the oiling of pups. In the unlikely occurrence of a large or very large oil spill, the incremental impact on the Southwest Alaska population of sea otters, and less likely, on the American breeding population of Steller's eiders, could result in a significant cumulative effect on these two populations. There is a small possibility that a large oil or very large oil spill that occurred in the upper part of Cook Inlet could result in a significant cumulative effect on the Cook Inlet stock of beluga whales. However, existing data indicate that such an effect would be unlikely.
Marine and Coastal Birds	A major source of seabird mortality in the North Pacific, including Alaskan waters, is incidental bycatch in commercial fisheries; however, marine and coastal birds nesting in the Cook Inlet region probably have not been seriously affected by such bycatches. Introduced predators are also a serious threat to burrow-nesting seabirds on many islands in Cook Inlet. Other sources of cumulative effects on seabirds include offshore oil and gas activities, vessel and air traffic, and commercial timber harvests. The effects, including direct mortality, reduced reproductive success, and habitat loss, are relatively localized but long term. Recovery would be expected to require multiple generations and in some cases, such as with declining populations, might not occur at all. The greatest risk to seabirds in the Cook Inlet region would be from an oil spill occurring during the summer (April-September), when hundreds of thousands of birds may be present in the lower Cook Inlet and northern Shelikof Strait. Although unlikely, a large spill occurring here during the summer months could kill thousands to tens of thousands of birds. The magnitude of mortality would depend on the size, exact timing, and movement of the spill. Recovery from this level of impact could require multiple generations, and species in population decline would not be expected to recover if this situation continued, a significant cumulative effect.
Nonendangered Marine Mammals	The overall potential cumulative effect on nonendangered marine mammals—particularly harbor seals—is estimated to include reduced distribution and abundance persisting for more than 1 year to several years, with the primary source being competition or conflict with commercial fishing for the same food sources in the marine environment. Other sources of effect, such as air and vessel traffic and local habitat alteration, are expected to cause short-term (less than 1 hour) disturbance of harbor seals, the Southcentral Alaska Stock of sea otters, and nonendangered cetaceans and/or cause local reduction in habitat or reduced habitat use by local assemblages of seals but are not likely to affect

Table V-14 (continued)
Summary of Cumulative Effects by Resource Category

Resources	Summary of Effects[1]
	marine mammal populations. The contribution of the proposal is estimated to include 7% of the oil and gas activity long-term (life of the oil field) local effects on coastal habitats.
Terrestrial Mammals	The overall cumulative effect on terrestrial mammals is expected to be reduced distribution and/or reduced abundance of brown bears and, to a lesser extent, reduced numbers of river otters and Sitka black-tailed deer from habitat degradation due commercial logging and other onshore development. Total recovery likely would take several generations. The contribution of Lease Sales 191 to the cumulative case is estimated 7% of the oil and gas activity long-term (life of the oil field) local disturbance effects on terrestrial mammal habitat. No effect on regional populations likely would occur.
Economy	The reasonably foreseeable future projects identified in our cumulative analysis would generate increases in property taxes for the Kenai Peninsula Borough of 17%. These projects would generate revenue increases to the State of Alaska of less than 1.0% above the level without reasonably foreseeable future projects. We estimate a 1.5% increase of the 1999 work force of the Kenai Peninsula Borough and a corresponding percent increase for personal income for less than 5 years during development. We estimate that approximately 160 workers would be needed to clean up a 4,000-barrel spill; 520 workers for a 13,000-barrel spill, and 10,000 workers for a 250,000-barrel spill. For any given spill, they would work for 6 months in the first year the number would decline to zero by the third year following the spill. The above effects are additive. We anticipate no countervailing or synergistic effects.
Commercial Fishing	Drilling discharges, offshore construction, and seismic surveys that have occurred to date have not had a measurable effect on the commercial fishing industry of Cook Inlet, nor are the ones planned (including proposed Lease Sale 191) likely to have a measurable effect. While sportfishing reduces the number of fish in Cook Inlet, this reduction is not likely to have had a measurable cumulative effect on the commercial fishing industry, nor is it likely to unless current allocations between the sport and commercial fishing industries change substantially. If an unlikely oil spill of 4,600 barrels or greater that occurred in the spring caused State officials to close the fishery for a whole year over tainting concerns, this action could result in a 100% loss for that year, not including losses due to damaged to boats and gear. A loss of this magnitude likely would have a significant effect on the Cook Inlet and Kodiak commercial fishing industry.
Subsistence-Harvest Patterns	Cumulative effects on subsistence-harvest patterns include effects from Lease Sale 191 exploration and development activities and other past, present, and reasonably foreseeable projects in the Cook Inlet Region. Sources that could affect subsistence resources include potential oil spills, noise and traffic disturbance, and disturbance from construction activities associated with drilling, production facilities, pipelines, and landfalls. Subsistence communities in upper Cook Inlet, the central Kenai Peninsula, the lower Kenai Peninsula, Kodiak Island, and the southern Alaska Peninsula would potentially be most affected. Expected effects would be subsistence resources being affected for a period less than 1 year, with no resource becoming unavailable, becoming undesirable for use, or experiencing overall changes in distribution or reductions in population. In the unlikely event that a large oil spill occurred and contaminated essential subsistence resources and harvest areas, major additive (but not synergistic) significant effects could occur when impacts from contamination of the shoreline, food-tainting concerns, cleanup disturbance, and disruption of subsistence practices are factored together.

Table V-14 (continued)
Summary of Cumulative Effects by Resource Category

Resources	Summary of Effects[1]
	Effects would be one or more important subsistence resources becoming unavailable or undesirable for use for at least 1-2 years or longer, which would be a significant adverse effect.
Sociocultural Systems	The Proposed Action as part of the past, present, and reasonably foreseeable activities, should make a small, beneficial contribution to the continuation of an important economic activity which helps to maintain the existing sociocultural systems, while having little effect on Native Alaskan sociocultural practice associated with subsistence harvest activities. Given the importance of oil and gas to the Kenai Peninsula Borough and the sizeable infrastructure from past and present development, the Proposed Action will make a small contribution to the continuation of this important activity. Given the sizeable employment in the oil and gas sector, population growth caused by the reasonably foreseeable projects may be indistinguishable from the projected baseline population growth. Disruptions in existing sectors of the economy would tend to disrupt and produce stressful relations within families and within local public institutions. The reasonably foreseeable activities help maintain important existing sectors that should moderate potential disruptions from other sources. Cumulative sociocultural effects in villages that are caused by repeated significant disruption of subsistence-harvest activity and the attendant effects on wild-food consumption and distribution as the result of oil spills would be minimal. However, in the event of a significant impact to subsistence harvest activities, we would expect commensurate significant impacts to the Native Alaskan sociocultural system. Overall, the Proposed Action should have a small, beneficial effect to the continuation of an important economic and maintenance of the existing sociocultural systems without disrupting Native Alaskan sociocultural practice associated with subsistence harvest activities.
Recreation, Tourism, and Visual Resources	The contribution from Alternative 1 – Proposed Action to cumulative effects on tourism, recreation, and visual resources would be minimal and result from the introduction of offshore infrastructure from exploration and development. We estimate the incremental contribution from the Proposed Action to the cumulative effects on recreation and tourism to be approximately 7%. The industrial activities associated with the reasonably foreseeable projects, including those from the Proposed Action, will have little discernable effect on the supply or demand for recreational or tourism resources, will not modify a recreational site's characteristics (including its visual setting) or accessibility, and it will not foreclose opportunities for diversification or expansion of recreational and tourism activities. Potential population growth from the projects, which could increase demand for recreation services, is very small. Coastal policies of the State of Alaska and the Kenai Peninsula Borough prevent new facilities from degrading recreation and tourism uses. New offshore structures in Cook Inlet would be widely separated from each other and would either be placed outside the visual impact area or become an added element to an existing cluster of platforms when viewed from shore. The projects will have no effect on the identified opportunities for expansion of tourism or recreation nor will they aggravate the factors that would restrain the potential expansion. The cumulative effects of oil spills to recreation and tourism activities in the Cook Inlet could be significant if the area gained a reputation as being contaminated and that perception altered consumer choice of the area for recreation and tourism.
Sport Fishing	We anticipate some effects from unlikely large spills. The loss of business due to unlikely large or very large oil spills could be 20% or $6 million for 1 year in 2000 dollars. Oil contacting the beaches could affect clam gathering, particularly for razor clams and other types of clams for sport along the east and west sides of Cook Inlet and mussels and steamer clams in small bays off Kachemak Bay. In any area contacted by oil, populations of the intertidal organisms would be

Table V-14 (continued)
Summary of Cumulative Effects by Resource Category

Resources	Summary of Effects[1]
	depressed measurably for about a year, and small amounts of oil would persist in the shoreline sediments for more than a decade, a significant effect. The overall cumulative effect on fisheries resources may include reduced stocks of some fisheries resources, primarily due to the potential for over harvest of these stocks by commercial-fishing activities. This effect could persist for several generations or longer. If a very large oil spill occurred in the Gulf of Alaska (like the Exxon Valdez – 250,000 bbl) it could drift into lower Cook Inlet and could eliminate sportfishing in Cook Inlet for 1 year. Including the total of all modes of sportfishing, 198,000 person-days of fishing, could be lost for 1 year. This includes 79,000 person-days on charters in lower and central Cook Inlet; 91,000 on private or bare-boat charters; and 28,000 on shore. We estimate $35 million in year-2000 dollars would be lost in 1 year. Clam gathering would be affected by such a very large spill essentially the same as described in Section IV.F.3.o. Disturbance, displacement, or injury as a result of drilling or seismic activities also would not be measurable. We estimate the various effects to sport fisheries taken altogether would not cause population-level changes in sport fisheries resources and consequently in sport fisheries activities. We anticipate no effects from the release of natural gas during exploration or during development.
Archaeological Resources	Exploration, development and production, and crude-oil transportation activities in the Cook Inlet Planning Area, as well as State and civilian commercial activities, would cause a cumulative effect on onshore archaeological resources that would be higher than the effects expected for the Alternative I – Proposed Action. The cumulative effects on onshore archaeological resources of other than Federal activities would be additive. No effects on offshore archaeological resources from exploration or development activities are expected to occur. However, other non-Federal activities such as bottom trawl fishing, dredging, and anchoring may have a cumulative effect on offshore resources. Significant effects could result if significant archaeological resources were damaged.
National Parks and State Parks and Special Areas	The contribution from Lease Sale 191 to cumulative effects for National and State Parks and other special areas would come from spilled oil and related spill cleanup activity. The industrial and construction activities associated with the reasonably foreseeable projects will have little effect on the special areas under consideration and can be largely mitigated by the coastal management zone policies of the State of Alaska and the Kenai Peninsula Borough. These policies would prevent new facilities from degrading State and Borough Parks and other special-use areas. However, the cumulative effects of unlikely oil spills that contact National and State parks and other special areas could be significant. The public perception of damage caused by a spill could persist longer than the actual effects of the spill. The actual effects of any spilled oil would generally be the same as those forecast for the Proposed Action in Section IV.B.1.r.
Land Use Plans/CMP	The cumulative effects are not expected to generate conflicts with the Alaska Coastal Management Plan or the related district policies.
Environmental Justice	Cumulative Environmental Justice effects from the past present and reasonably foreseeable projects could be experienced by low-income, minority populations in the Cook Inlet/Shelikof Strait area and would focus on the Native, subsistence-based communities of the region. Cumulative effects on these communities could occur because of their reliance on subsistence foods and because overall cumulative effects may affect subsistence resources, subsistence-harvest practices, and sociocultural systems. Oil-spill contamination of subsistence foods is the main concern regarding potential effects on Native health. Potential cumulative effects would focus on the Native minority populations residing in the subsistence-based villages of upper Cook Inlet, Kenai Peninsula, Kodiak Island, and the Southern Alaska Peninsula. Sources for cumulative effects include

Table V-14 (continued)
Summary of Cumulative Effects by Resource Category

Resources	Summary of Effects[1]
	potential oil spills, noise and traffic disturbance, and disturbance from construction activities associated with drilling, production facilities, pipelines, and landfalls. Noise and disturbance from routine activities are not expected to produce cumulative Environmental Justice impacts. The contribution of Cook Inlet lease-sale activities to cumulative effects on Environmental Justice from oil spills is very small. In the unlikely event that a large accidental oil spill did occur and contaminate essential subsistence resources and harvest areas, major effects on subsistence-harvest patterns and sociocultural systems could occur when impacts from contamination of the shoreline, food-tainting concerns, cleanup disturbance, and disruption of subsistence practices are factored together. Effects from such an event would be one or more important subsistence resources becoming unavailable or undesirable for use for at 1-2 years or longer. Consequent sociocultural effects of distress, loss, and community disruption would accompany such an impact on subsistence practices. The additive subsistence and sociocultural impacts would be considered a significant adverse effect. This level of impact would be considered a disproportionate, high-adverse effect on Alaskan Natives. The occurrence of a large oil spill in the cumulative scenario is considered unlikely. Any potential cumulative Environmental Justice effects are expected to be mitigated to some extent though not eliminated.

Notes:
[1]Cumulative effects include effects from Lease Sales 191 and 199 under Alternative I exploration and development activities and other past, present, and reasonably foreseeable projects in the Cook Inlet region. Alternative I activities account for approximately 7% of the cumulative effects from offshore oil and gas projects.

Key:
PSD = Prevention of Significant Deterioration
CMP = Coastal Management Plan
TAPS = Trans-Alaska Pipeline System

Table V-15
Cumulative Oil-Spill-Occurrence Estimates Greater Than or Equal to 1,000 Barrels Resulting from Oil Development over the Assumed 15-20 Year Production Life of the Cook Inlet Lease Sale 191

Category	Crude-Oil Spills					
	Reserves and Resources (Bbbl)	Spill Rate (Spills/Bbbl)	Size Category (bbl)	Assumed Size (bbl)	Most Likely Number	Estimated Mean Number
Offshore						
Present and Reasonably Foreseeable	0.47		≥1,000	1,500 or 4,600	0	0.37
Platforms		0.13				
Pipelines		1.38				
Cook Inlet Sale 191	0.14	1.51	≥1,000	1,500 or 4,600	0	0.21
Total	**0.61**	**1.51**	**≥1,000**	**1,500 or 4,600**	**0**	**0.58**
Onshore						
Present and Reasonably Foreseeable	0.31	1.51	≥1,000	1,500 or 4,600	0	0.47
Cook Inlet Sale 191	0.14	1.38	≥1,000	1,500 or 4,600	0	0.17
Total	**0.43**		**≥1,000**	**1,500 or 4,600**	**0**	**0.66**
Cook Inlet Tanker						
Present and Reasonably Foreseeable	0.135	0.88	≥1,000	5,300 to 14,600	0	0.11
Cook Inlet Sale 191	0	0.88	≥1,000	5,300 to 14,600	0	0
Total	**0.135**	**0.88**	**≥1,000**	**5,300 to 14,600**	**0**	**0.11**

Note:
The OCS spill rate was assumed for onshore spills until further information is available. The Cook Inlet Lease Sale 191contributes to pipeline spills onshore. Cook Inlet tankering included production of oil shipped from Drift River to Nikiski and imports of Alaska North Slope crude oil from Valdez to Nikiski. Tankering spill rate is based on the Trans-Alaska Pipeline System tanker spill rate of Anderson and LaBelle (2000).

Key:
Bbbl = billion barrels
bbl = barrels
$\geq$ = less than or equal to

Source:
USDOI, MMS, Alaska OCS Region (2002).

Table V-16
Cumulative Employment and Personal Income Effects for Major Projects in the Reasonably Foreseeable Future[1]

Major Projects	Employment: Annual Average Jobs[2]			Total Personal Income Annual Average in Millions of Constant[3] 1999 $		
	Direct	Indirect and Induced	Total	For Direct Workers	For Indirect and Induced Workers	Total
State Areawide Lease Sales 2003-06 and Tyonek Deep[4]						
Exploration	15	5	20	1.2	0.2	1.4
Development	105	45	150	8.4	1.6	10
Production	35	15	50	2.8	0.3	3
Starichkof[5]						
Production	70	30	100	5.3	1.2	6.5
Natural Gas Pipeline[6]						
Development	38	12	50	1.07	.23	1.3
Production	6	2	8	.18	.06	.24
Southern Intertie Project[7]						
Development	45	15	60	4.5	1.5	6
Maintenance and Operations	6	2	8	.18	.06	.24
BP Gas to Liquids Plant[8]						
Maintenance and Operations	22	7	29	.66	.21	.87
Kenai Peninsula Borough Lease Sale 191[9]						
Exploration	30	10	40	2.4	0.3	2.8
Development	210	120	330	16.8	3.6	20.4
Production	70	30	100	5.6	0.9	6.5
Total						
Exploration	45	15	60	3.4	0.8	4.2
Development	398	192	590	30.9	6.8	37.7
Production (or M & O)	203	82	295	13.4	3.0	16.4

Notes:
[1] See Table V-13 for description of major projects and descriptive text in Section V.B.3. Table V-16 uses the framework of Table IV.B-19 discussed in Section IV.B.1.j. Totals may not sum exactly due to rounding.
[2] For definition of direct, indirect, and induced jobs, see Section IV.B.1.j.
[3] Constant dollars 1999 means the value of dollars for that year so that probable increases due to inflation in the future are held constant.
[4] We assume these projects generate employment and personal income one-half that of OCS Sale 191.
[5]We assume the employment and personal income from Starichkof production will be the same as from Sale 191 production. Starishkof is estimated to have 300 million barrels and Lease Sale 191, 140 million barrels. However, one platform is assumed for each and it requires approximately the same number of workers per year per platform. The number of years of Starichkof production may be as much as twice as long as from Sale 191.
[6] We estimate 38 direct jobs per year from USDOI, MMS, "Sub-Arctic IMPAK: 1st Step Model" 2000.
[7]For direct workers see U.S. Department of Agriculture (2001). We estimate maintenance and operations workers. We use USDOI, MMS, "Sub-Arctic IMPAK: 1st Step Model" 2000 for estimating indirect and induced workers and personal income.
[8] For direct workers, we take the average of long-term workers in Table V-13.
[9] We use USDOI, MMS, "Sub-Arctic IMPAK: 1st Step Model" 2000 and "Sub-Arctic IMPAK: 2nd Step Model" 2002 to estimate jobs and personal income for Sale 191. For further explanation and definitions see Section IV.B.1.j.

FIGURES

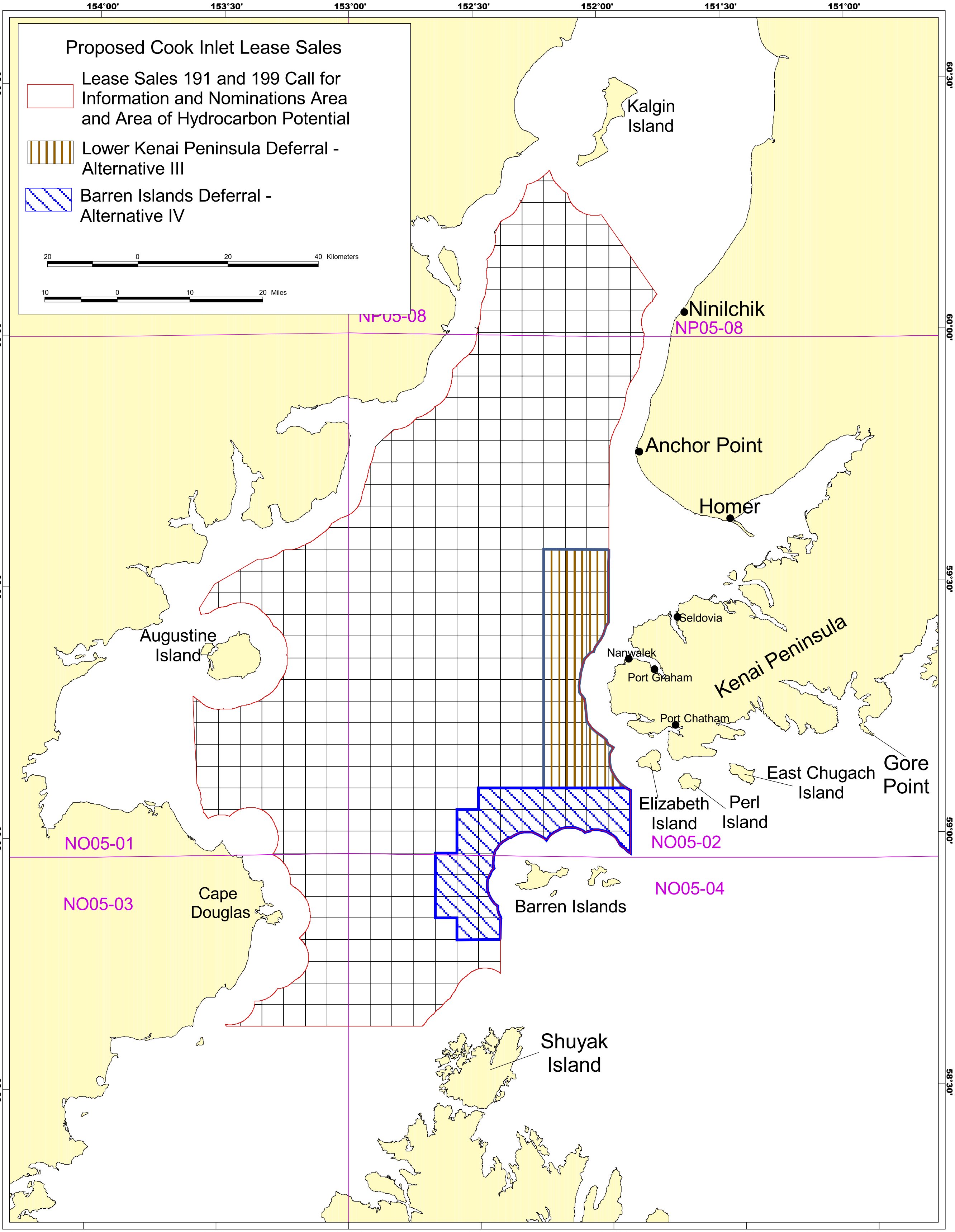


Figure I.A-1 Area of Proposed Cook Inlet OCS Lease Sales 191 and 199

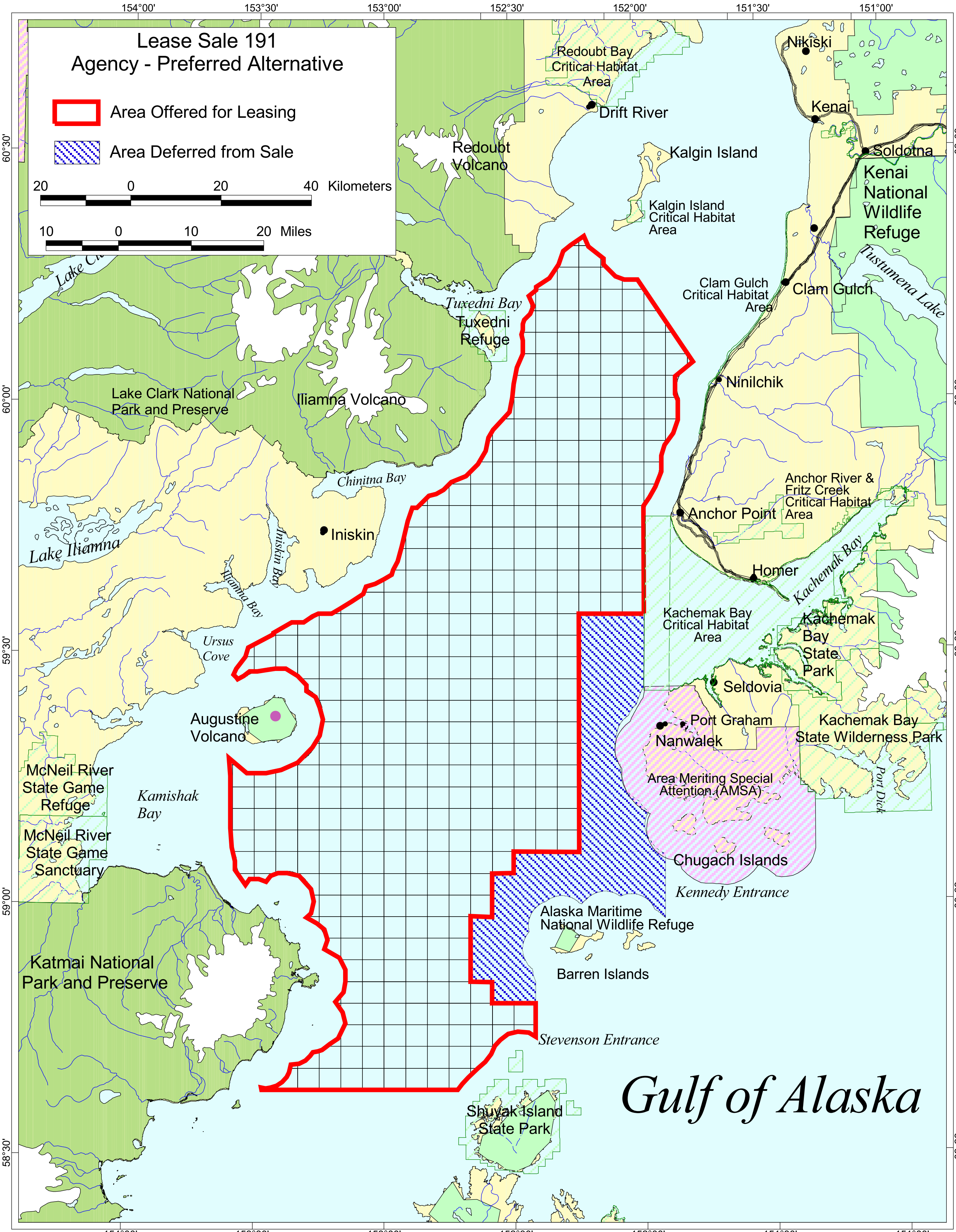
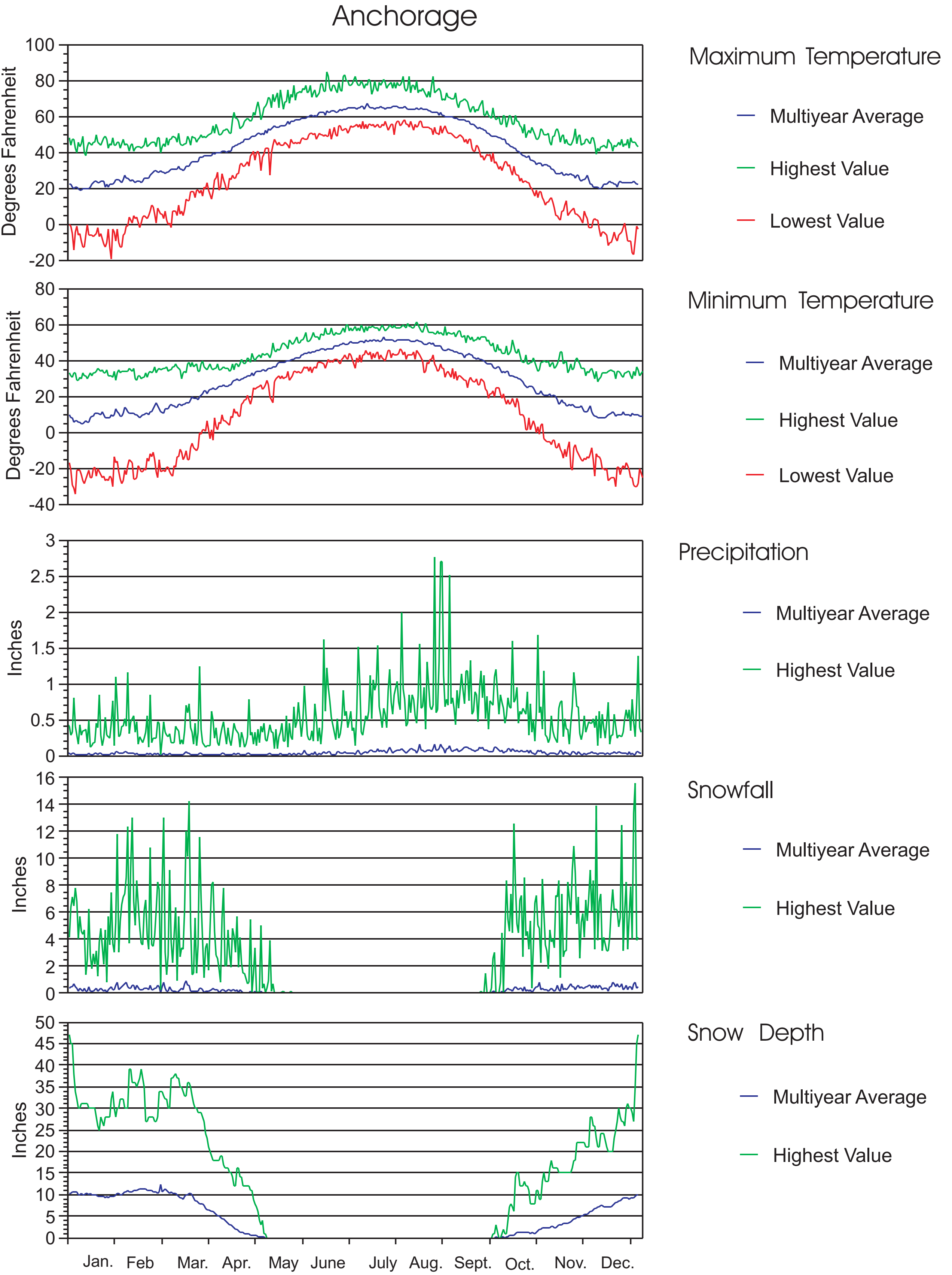
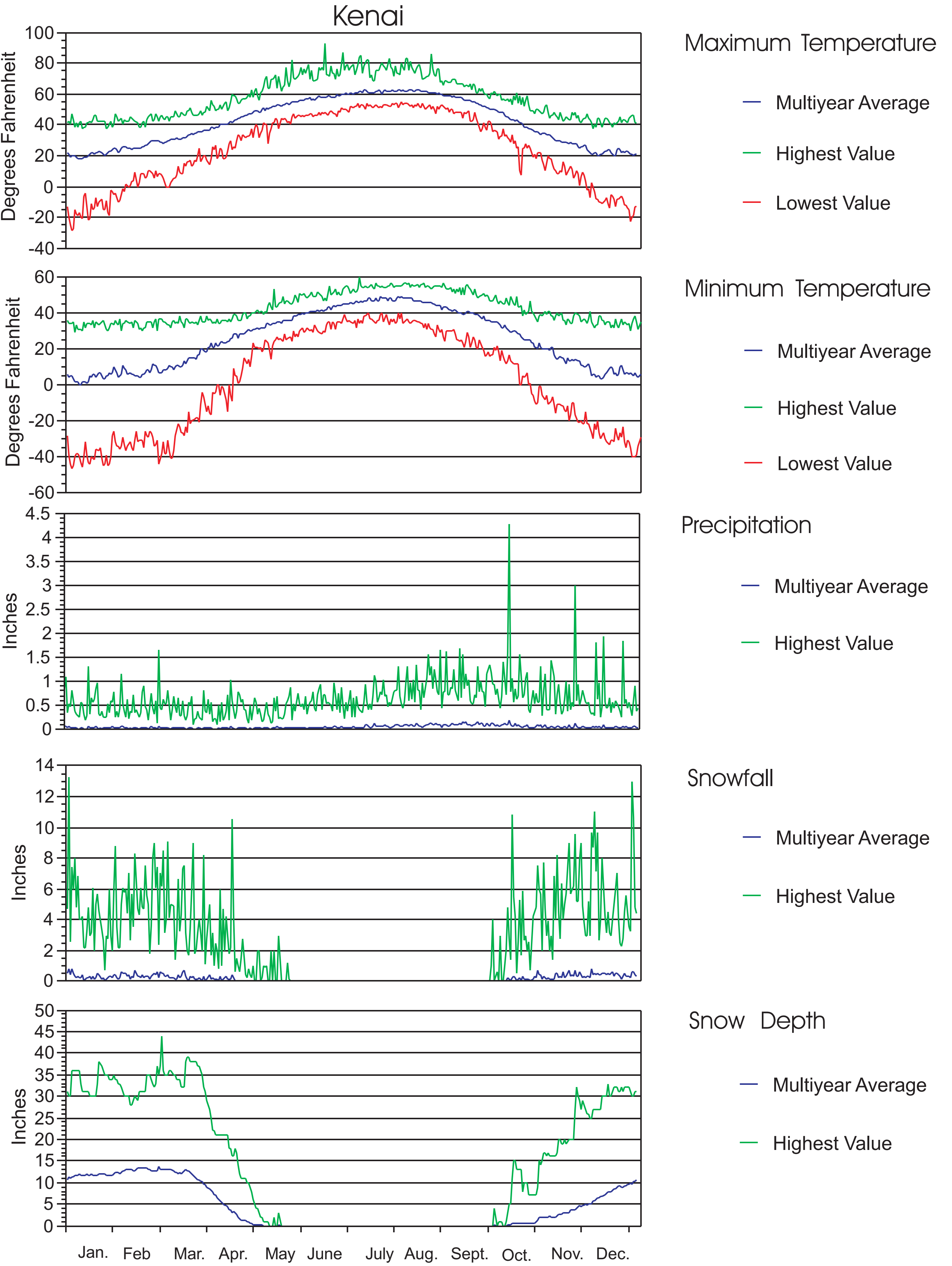


Figure I.A-2 Agency - Preferred Alternative



Source: http://www.wrcc.sage.dri.edu

Figure III.A-1 Maximum Temperature, Minimum Temperature, Precipitation, Snowfall and Snow Depth for a Particular Day of the Year for Anchorage Weather Station, Alaska, for the Period of Record April 1, 1952 - December 31, 2001



Source: http://www.wrcc.sage.dri.edu

Figure III.A-2 Maximum Temperature, Minimum Temperature, Precipitation, Snowfall and Snow Depth for a Particular Day of the Year for Kenai Weather Station, Alaska, for the Period of Record August 1, 1983 - December 31, 2001

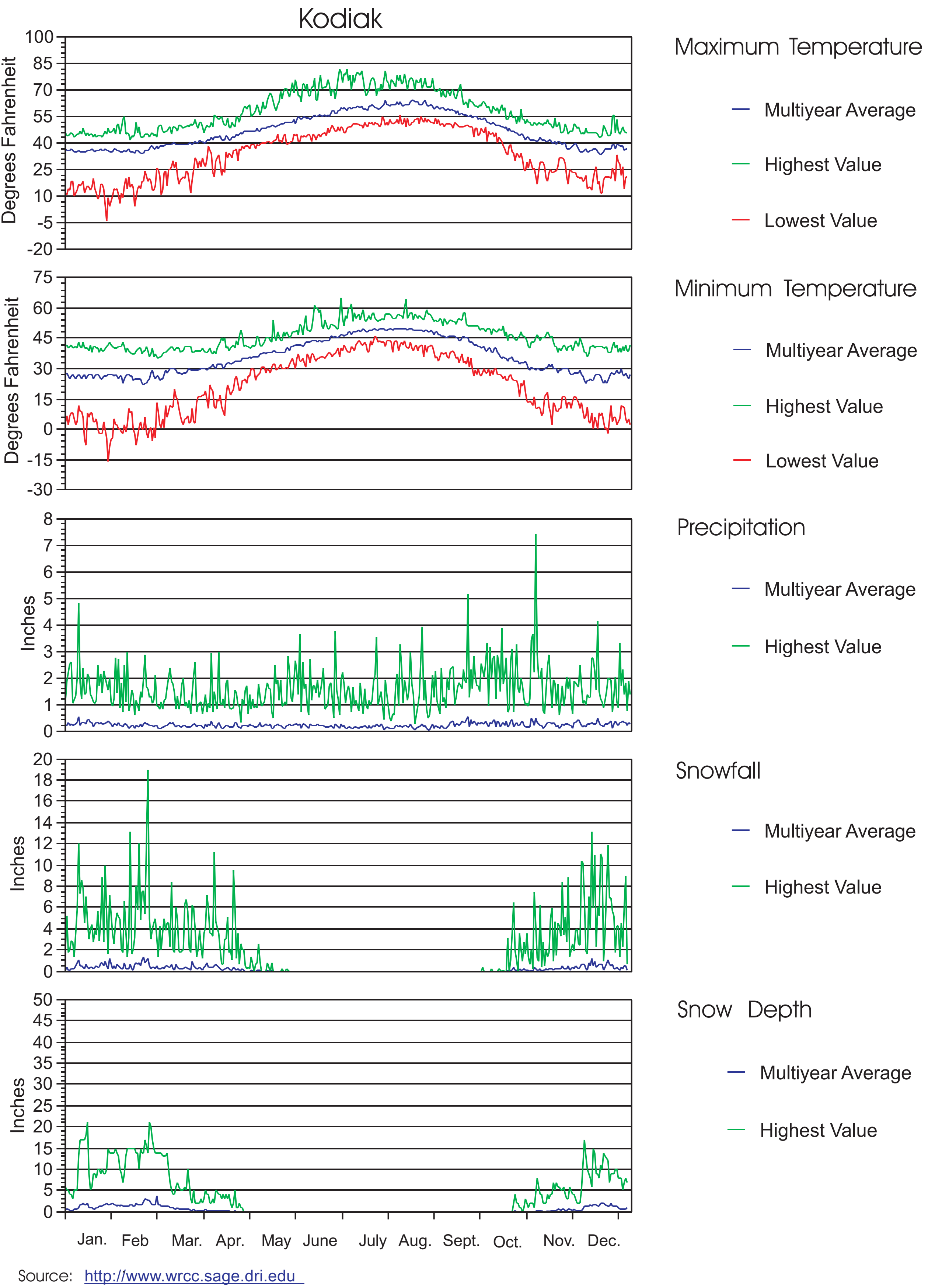
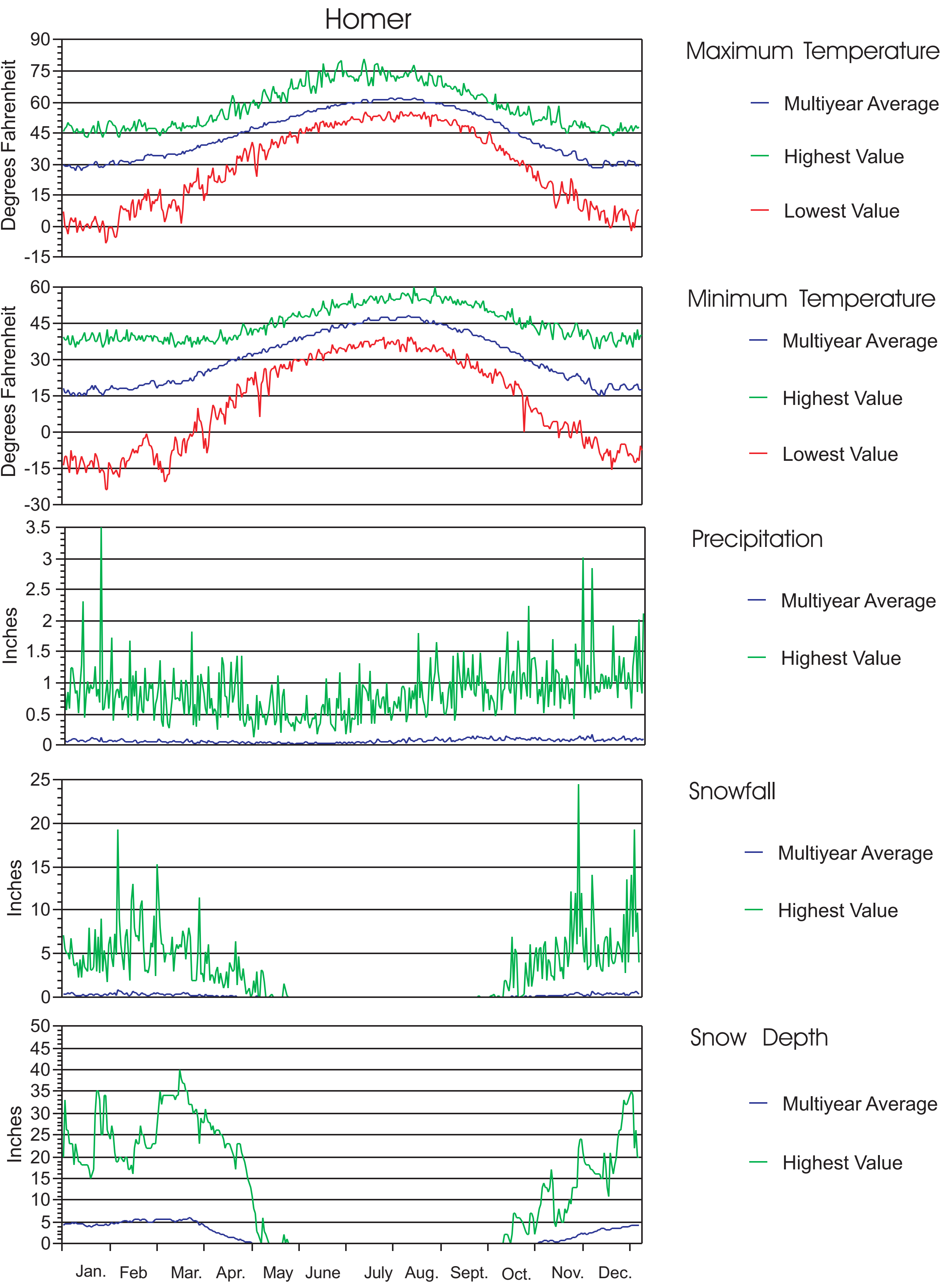
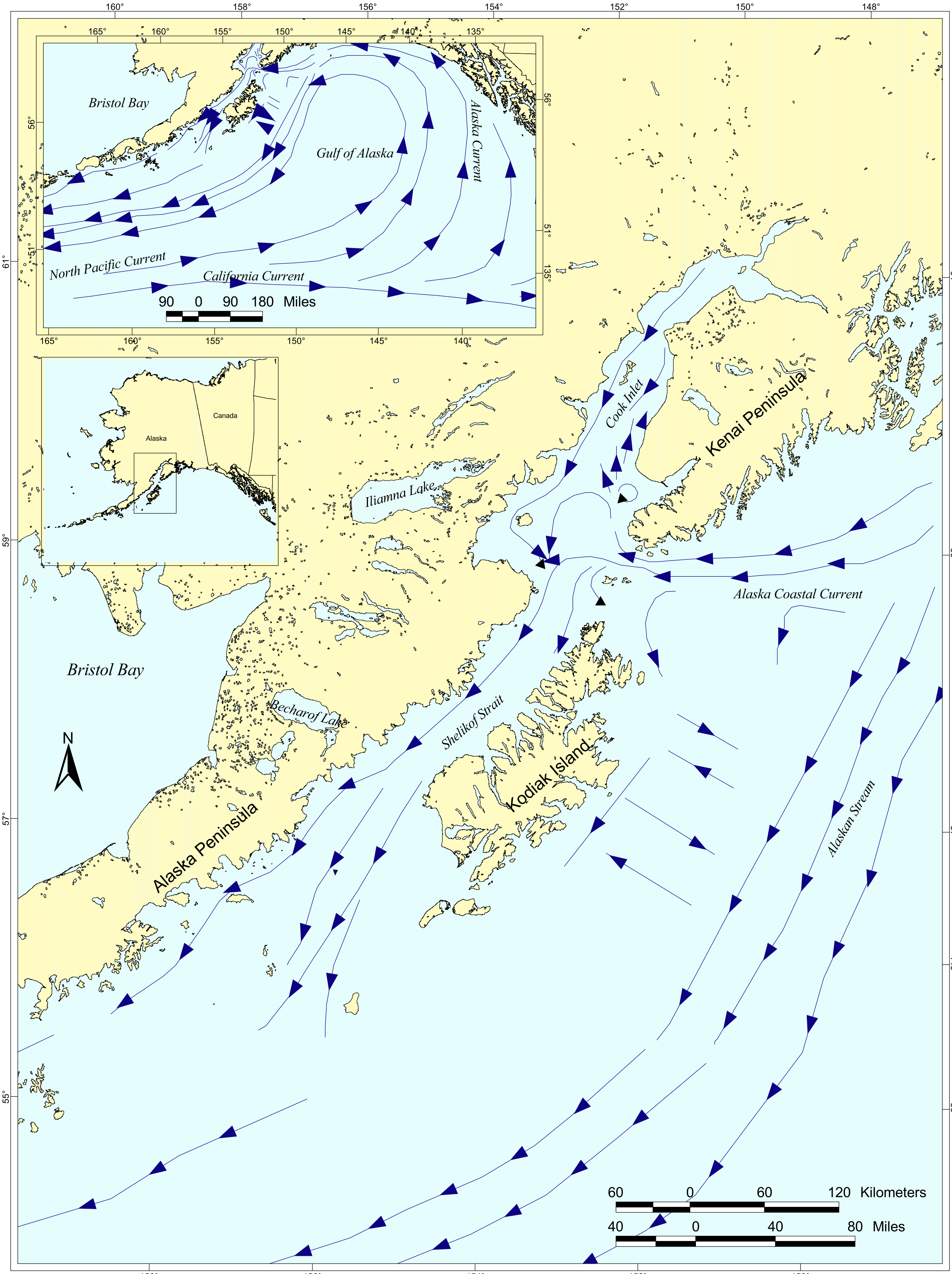


Figure III.A-3 Maximum Temperature, Minimum Temperature, Precipitation, Snowfall and Snow Depth for a Particular Day of the Year for Kodiak Weather Station, Alaska, for the Period of Record January 1, 1973 - December 31, 2001



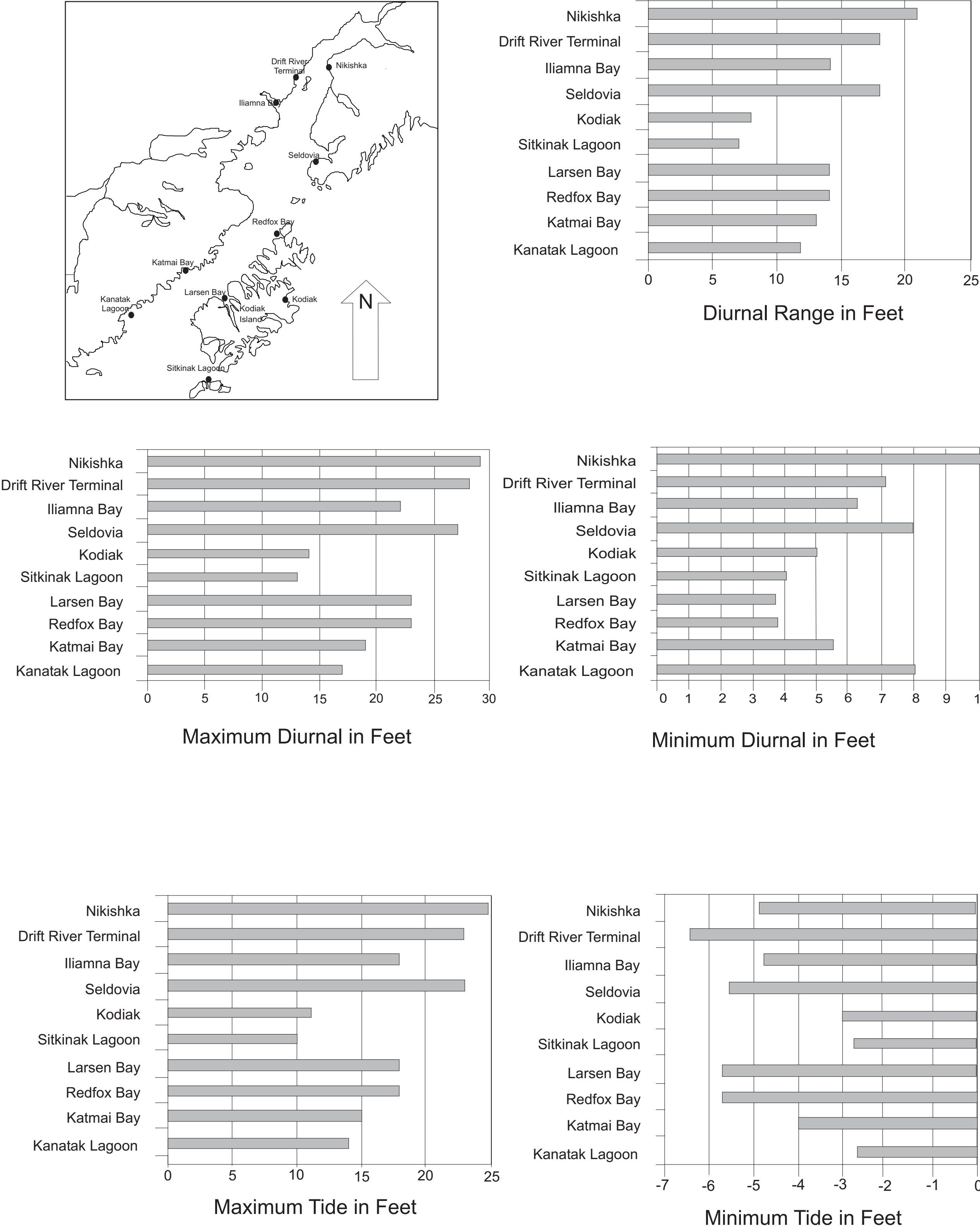
Source: http://www.wrcc.sage.dri.edu

Figure III.A-4 Maximum Temperature, Minimum Temperature, Precipitation, Snowfall and Snow Depth for a Particular Day of the Year for Homer Weather Station, Alaska, for the Period of Record October 1, 1977 - December 31, 2001



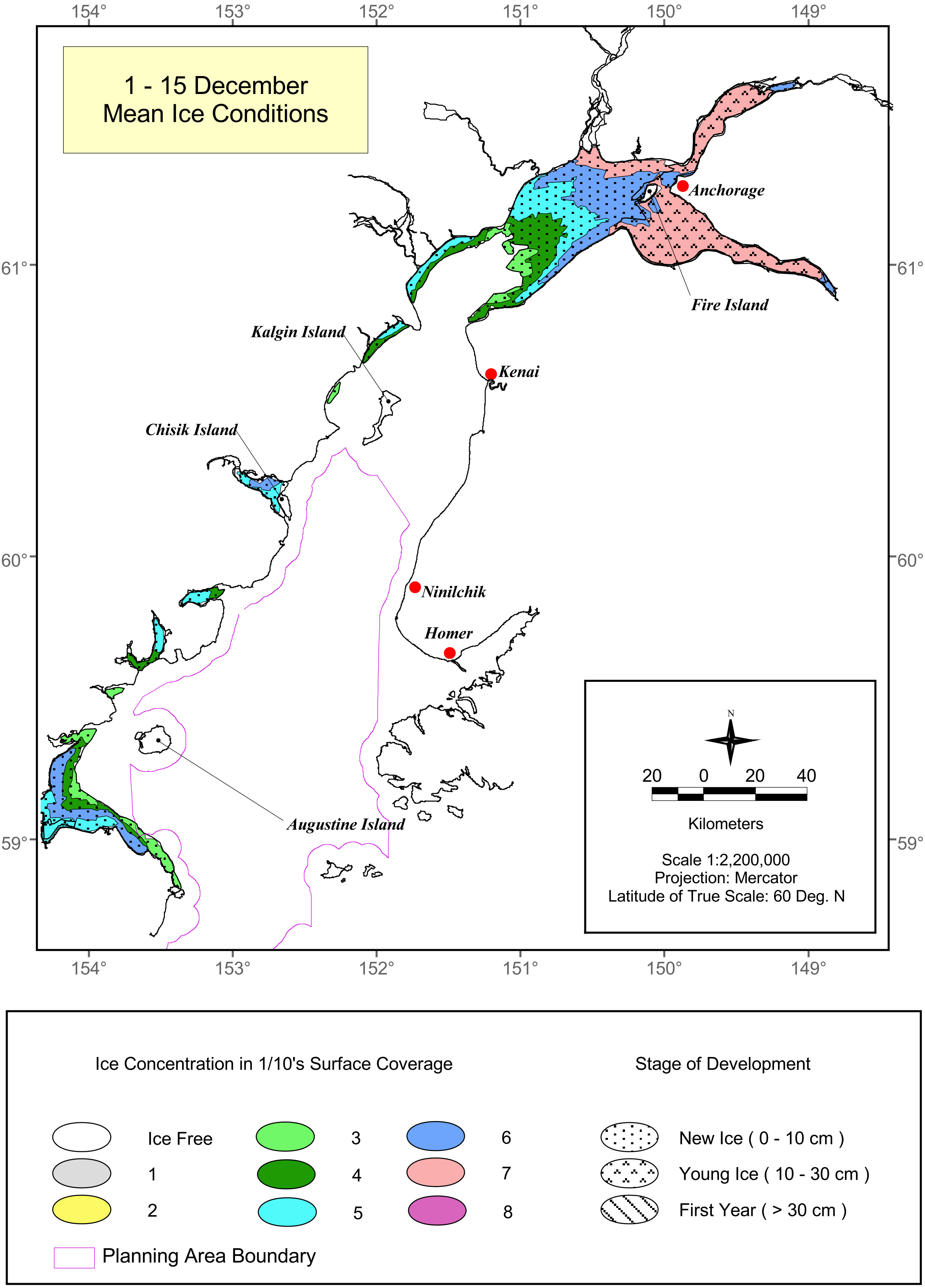
Source: USDOI, MMS, Alaska OCS Region

Figure III.A-5 Schematic of Mean Spring-Summer Surface Circulation in Lower Cook Inlet/Shelikof Strait Region.



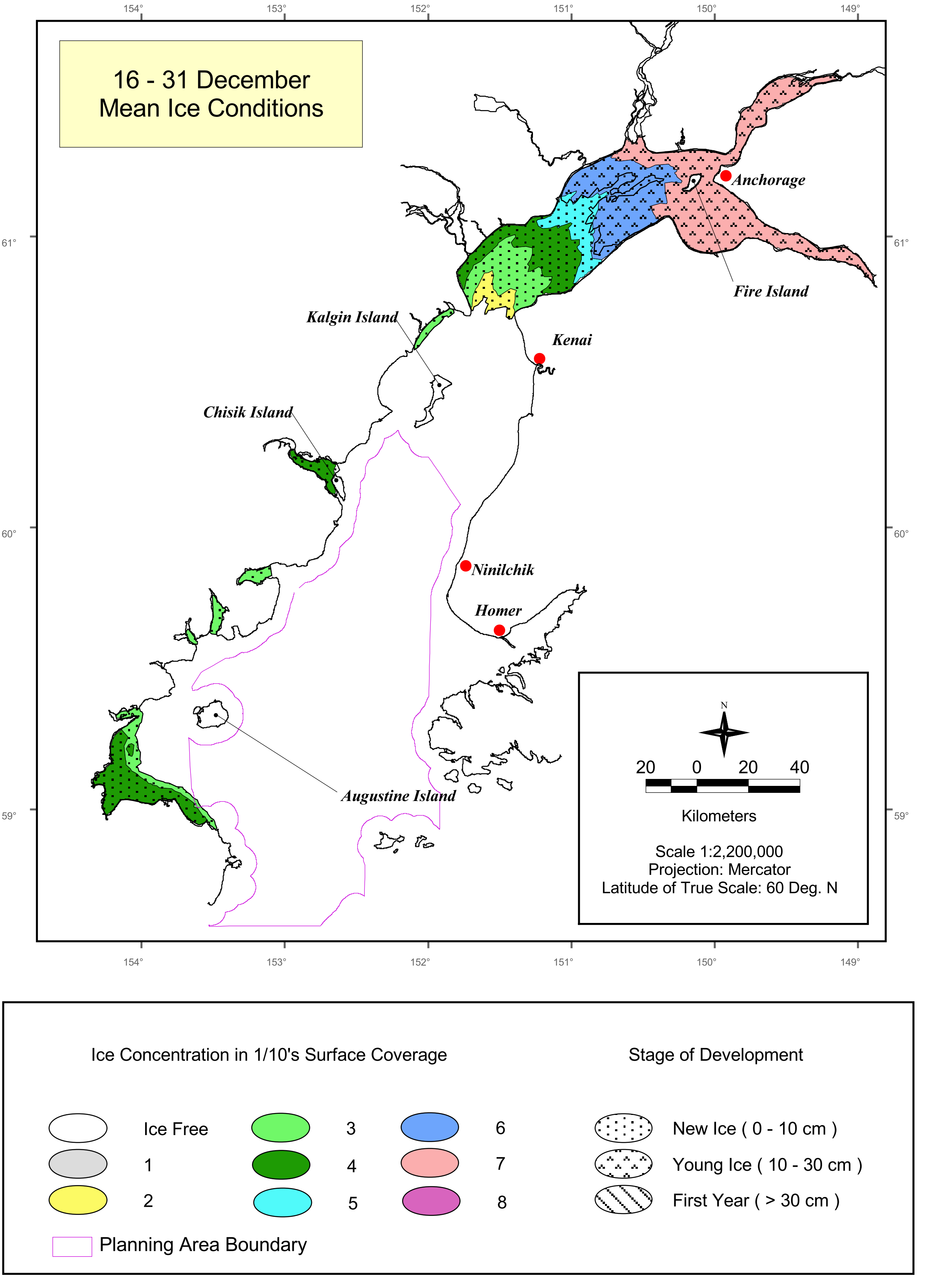
Source: Brower et al. (1998).

Figure III.A-6 Mean Diurnal Range, Maximum and Minimum Diurnal, and Maximum and Minimum Tide for Representative Tidal Stations in the Cook Inlet/Shelikof Strait Region.



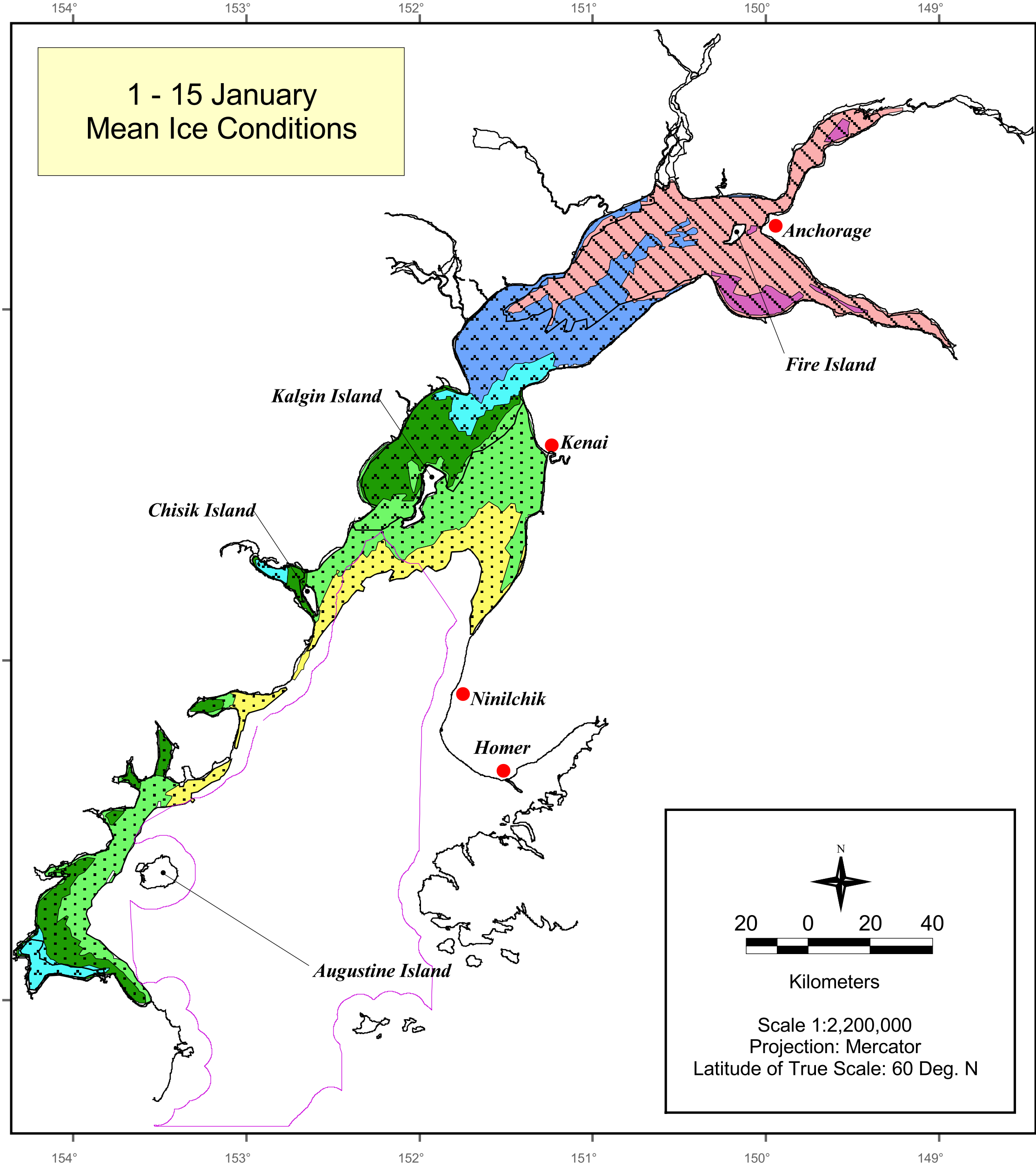
Source: Mulherin et al. (2001).

Figure III.A-7 Mean Ice Concentration and Stage of Development for Cook Inlet for December 1-15



Source: Mulherin et al. (2001).

Figure III.A-8 Mean Ice Concentration and Stage of Development for Cook Inlet for December 16-31



Ice Concentration in 1/10's Surface Coverage

Ice Free
1
2
3
4
5
6
7
8

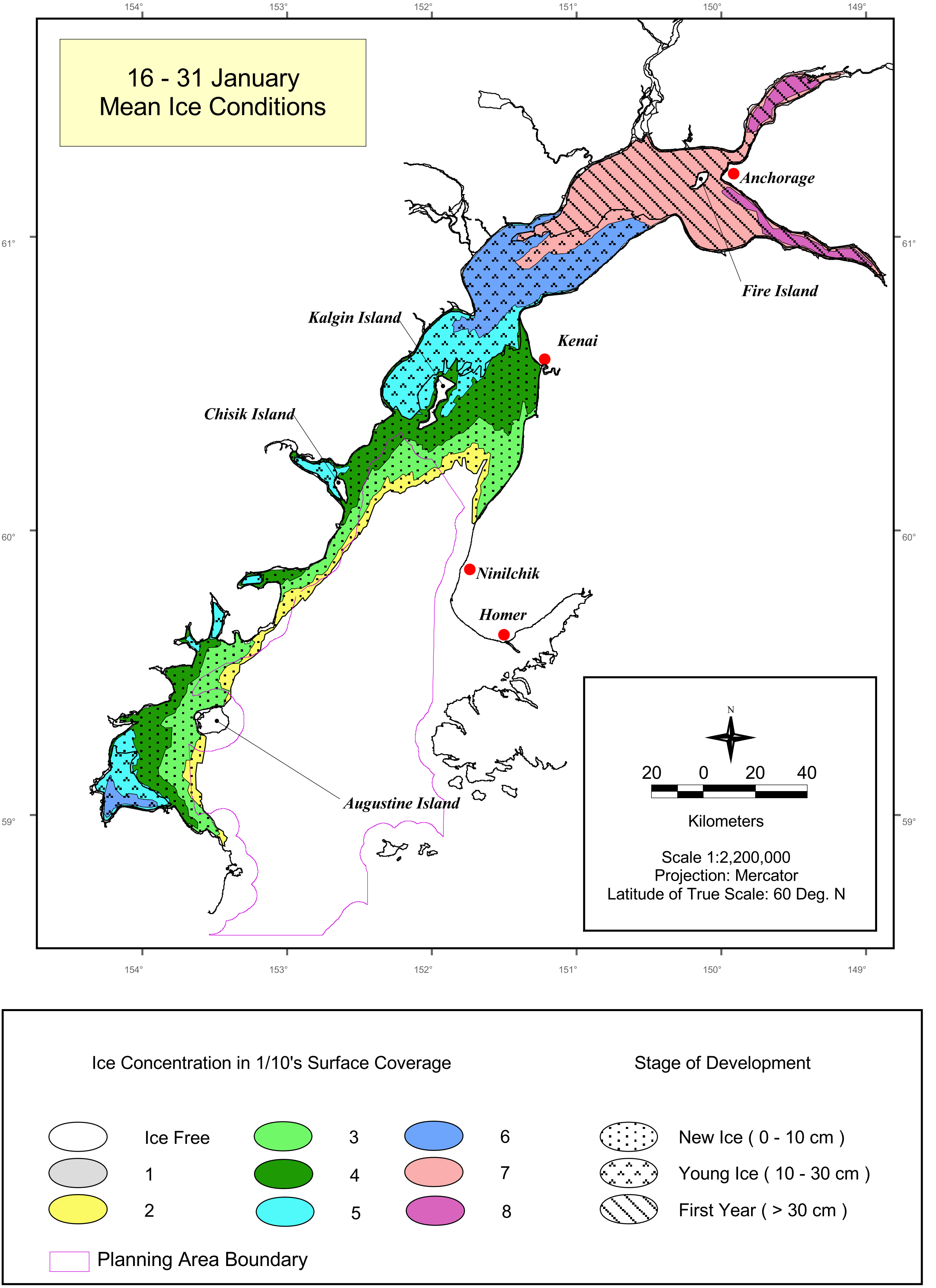
Stage of Development

New Ice (0 - 10 cm)
Young Ice (10 - 30 cm)
First Year (> 30 cm)

Planning Area Boundary

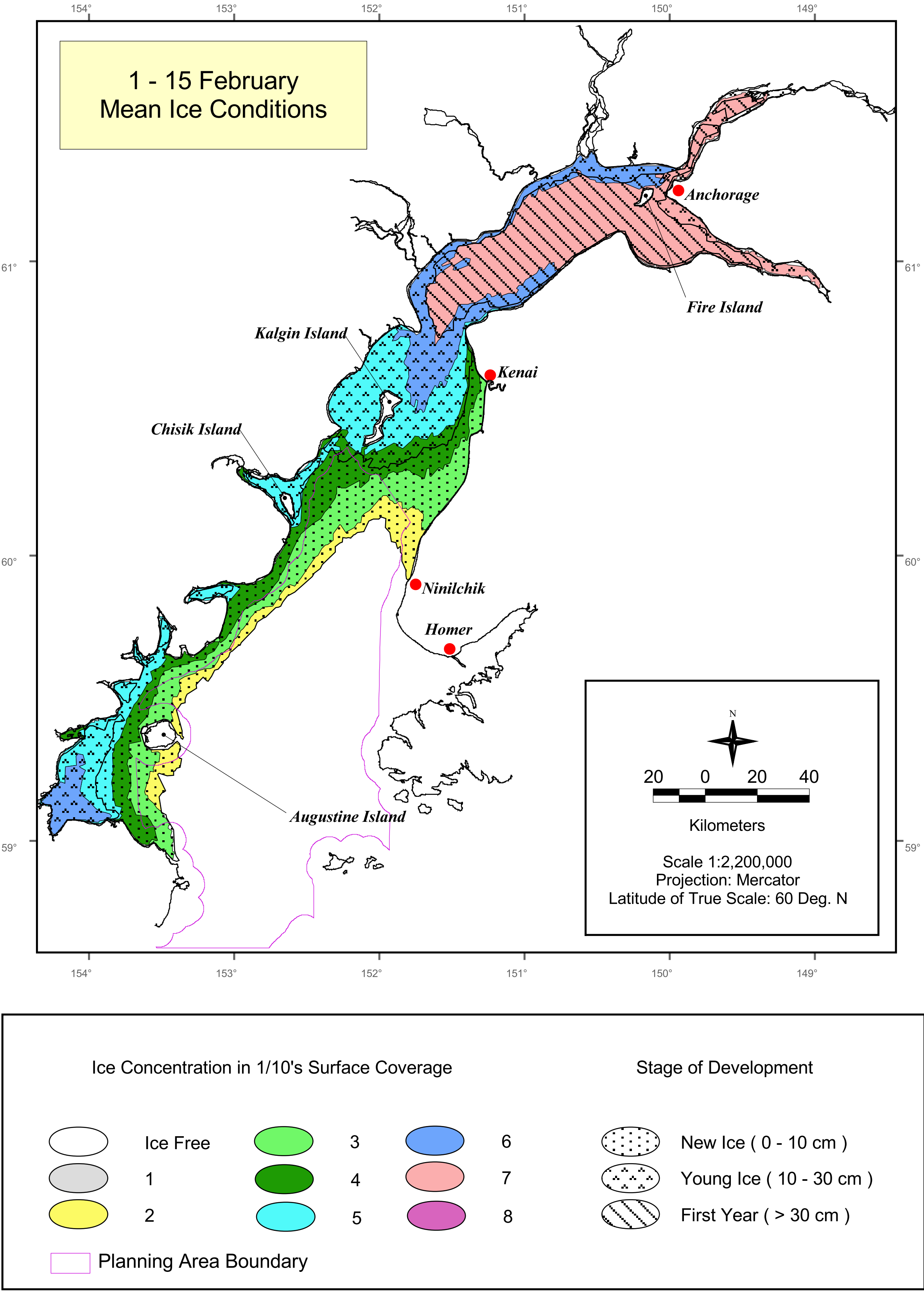
Source: Mulherin et al. (2001).

Figure III.A-9 Mean Ice Concentration and Stage of Development for Cook Inlet for January 1-15



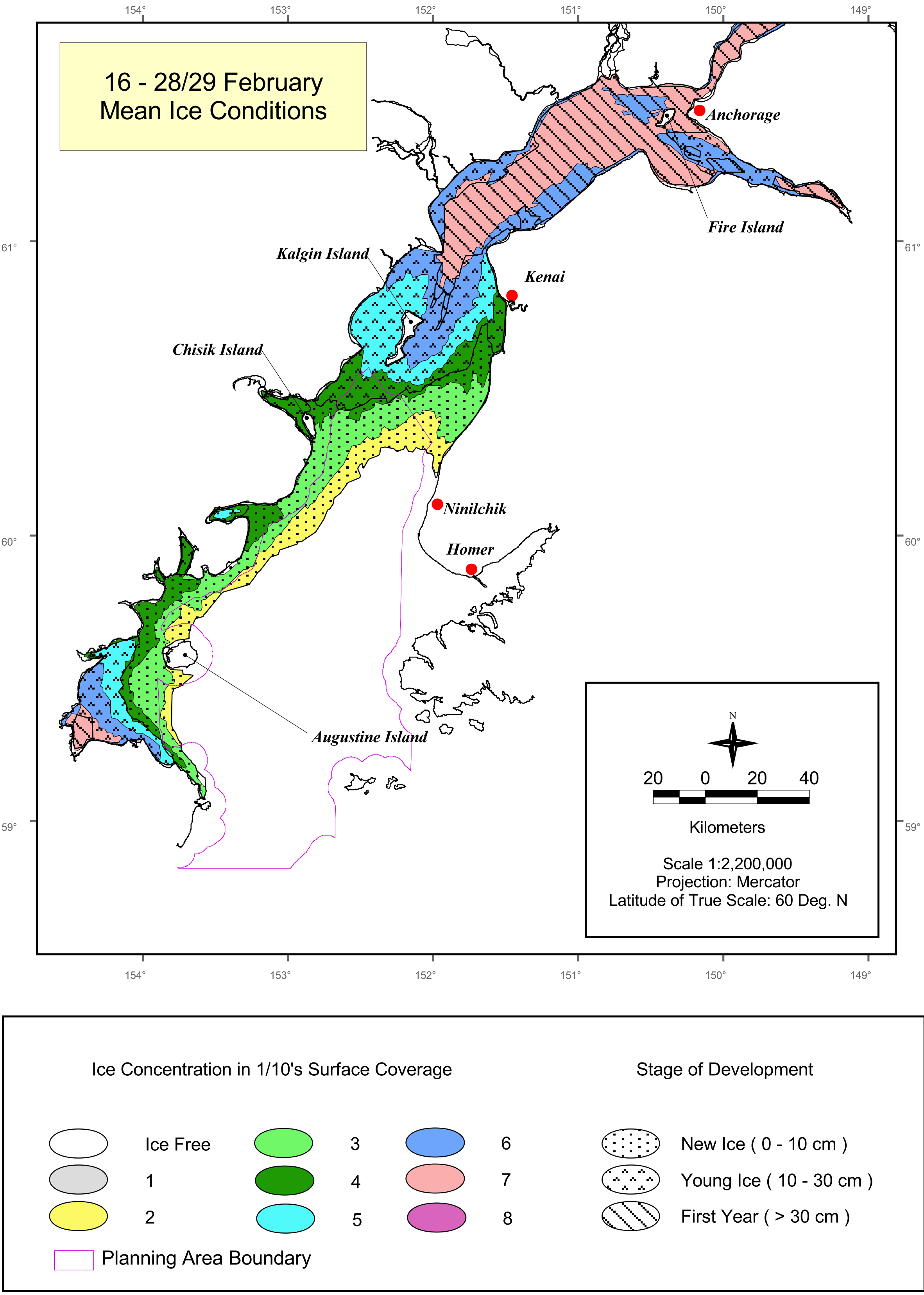
Source: Mulherin et al. (2001).

Figure III.A-10 Mean Ice Concentration and Stage of Development for Cook Inlet for January 16-31



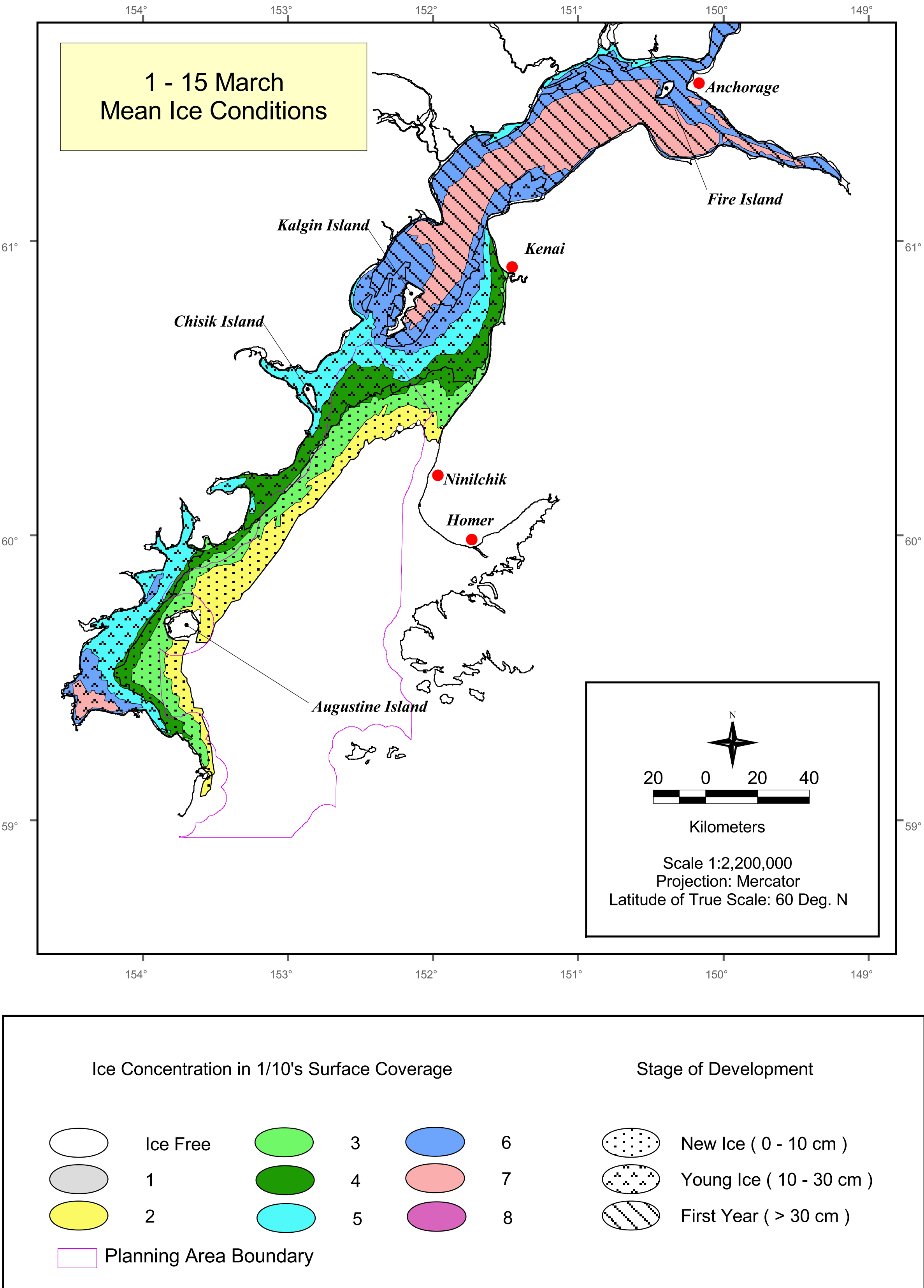
Source: Mulherin et al. (2001).

Figure III.A-11 Mean Ice Concentration and Stage of Development for Cook Inlet for February 1-15



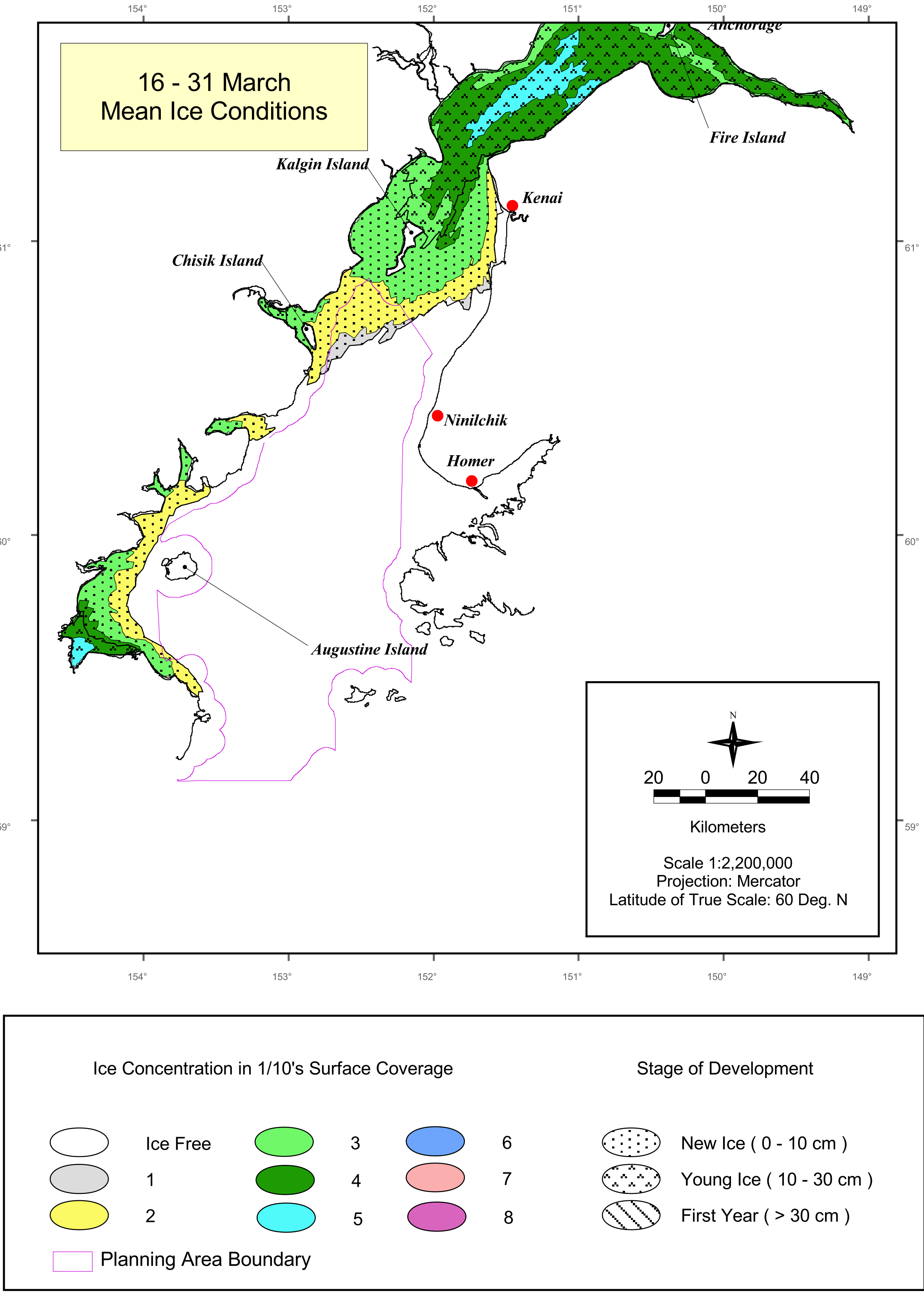
Source: Mulherin et al. (2001).

Figure III.A-12 Mean Ice Concentration and Stage of Development for Cook Inlet for February 16-28/29



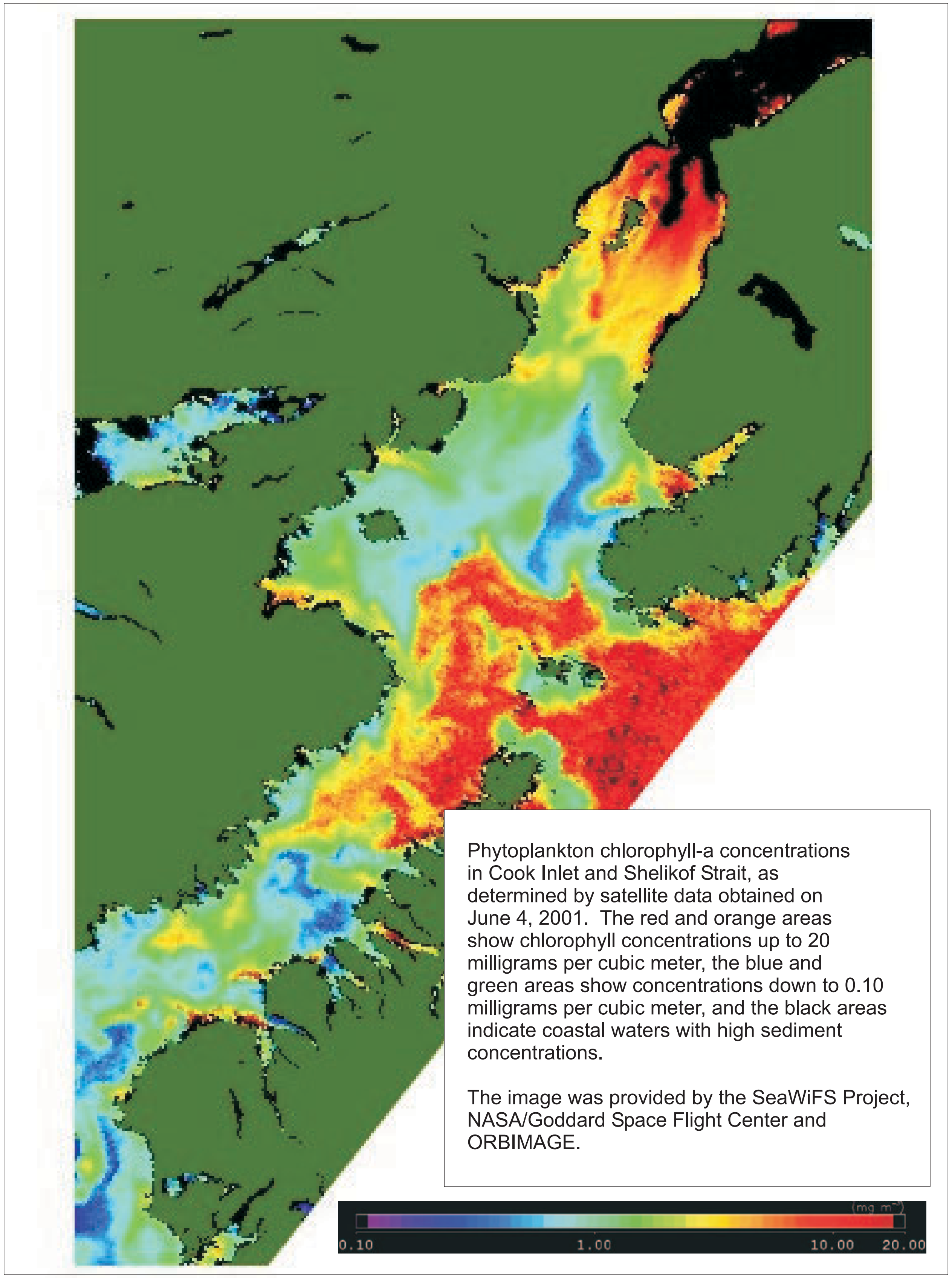
Source: Mulherin et al. (2001).

Figure III.A-13 Mean Ice Concentration and Stage of Development for Cook Inlet for March 1-15



Source: Mulherin et al. (2001).

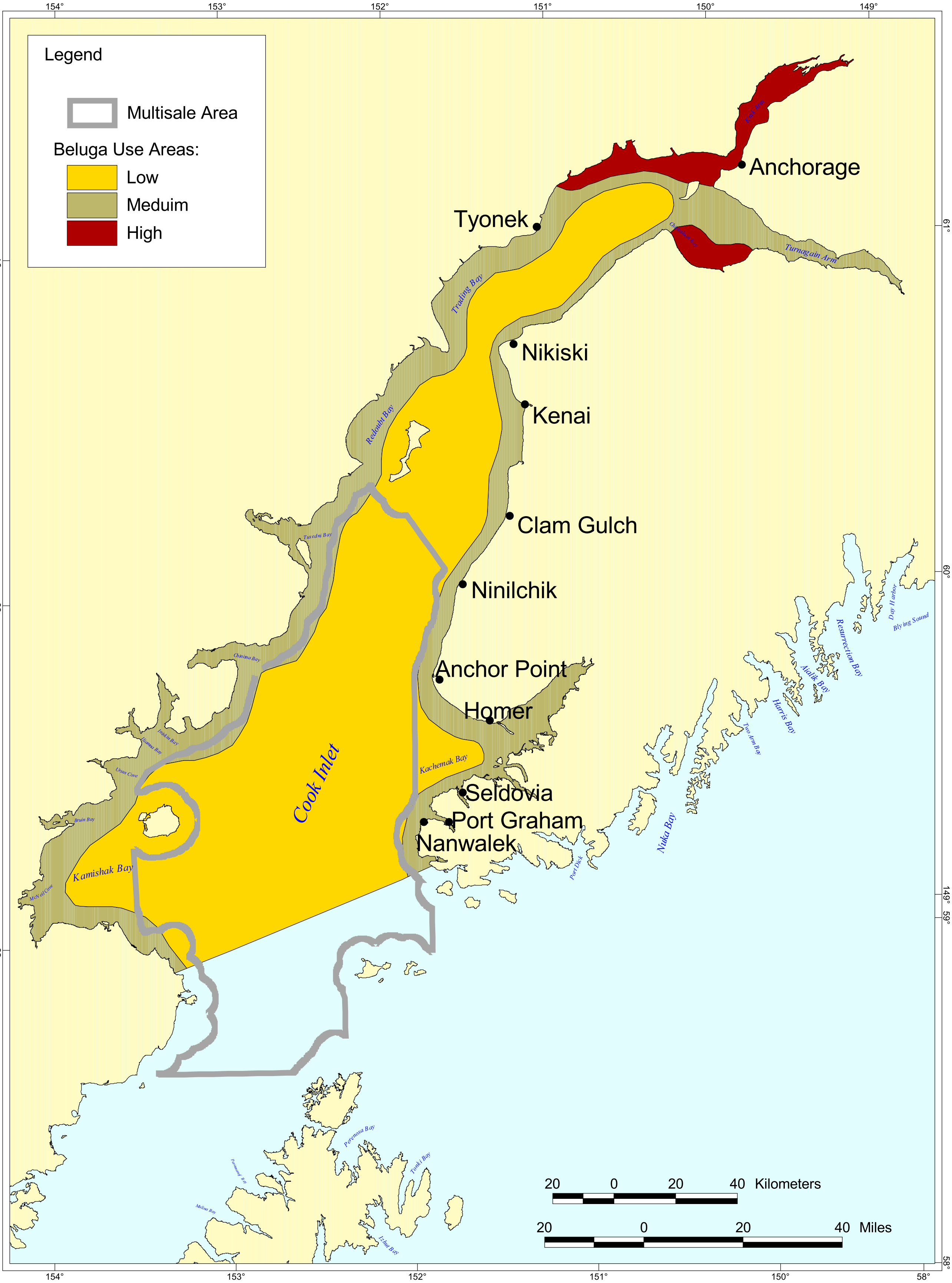
Figure III.A-14 Mean Ice Concentration and Stage of Development for Cook Inlet for March 16-31



Phytoplankton chlorophyll-a concentrations in Cook Inlet and Shelikof Strait, as determined by satellite data obtained on June 4, 2001. The red and orange areas show chlorophyll concentrations up to 20 milligrams per cubic meter, the blue and green areas show concentrations down to 0.10 milligrams per cubic meter, and the black areas indicate coastal waters with high sediment concentrations.

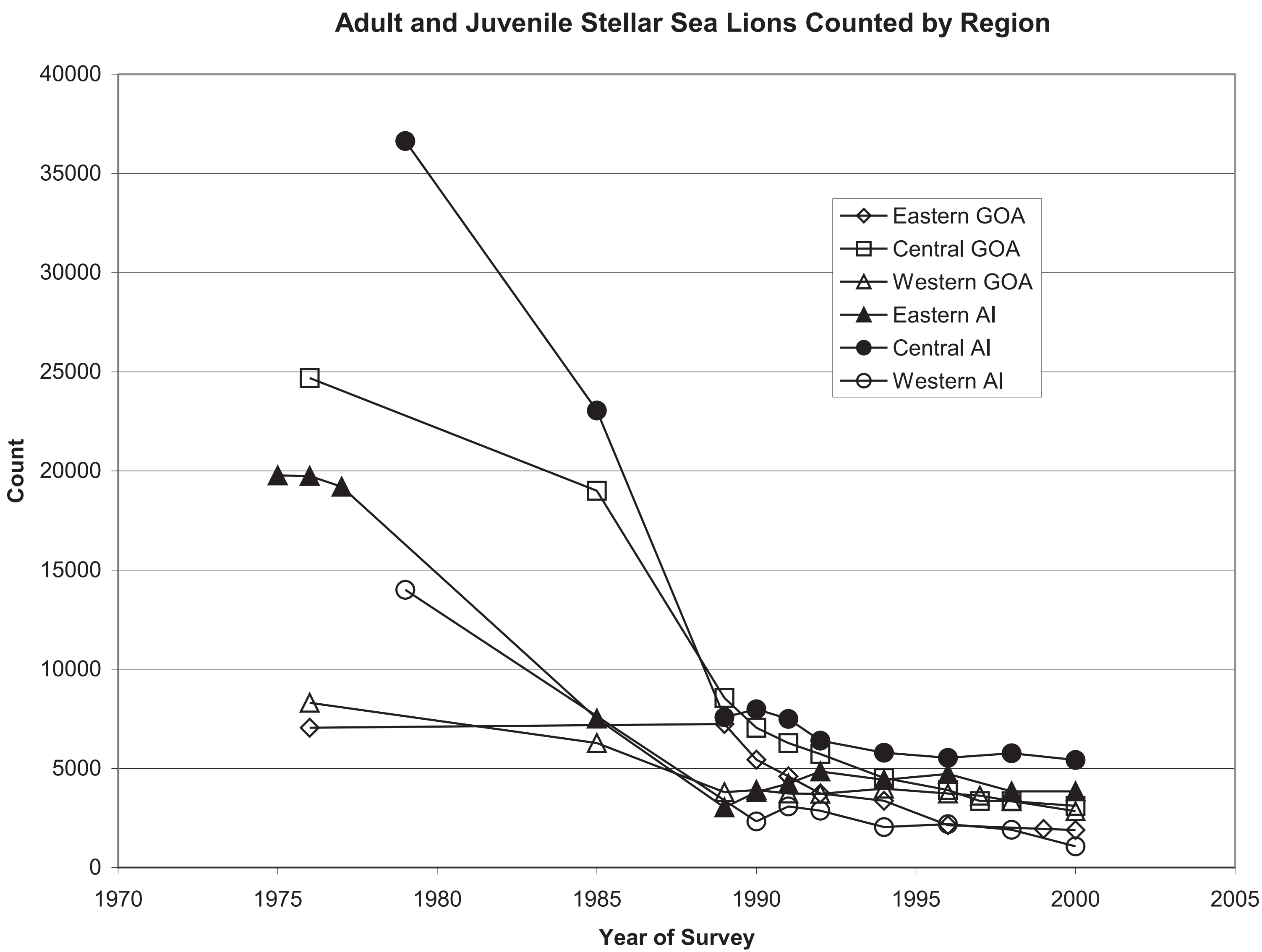
The image was provided by the SeaWiFS Project, NASA/Goddard Space Flight Center and ORBIMAGE.

Figure III.B-1 Phytoplankton Concentrations in Cook Inlet



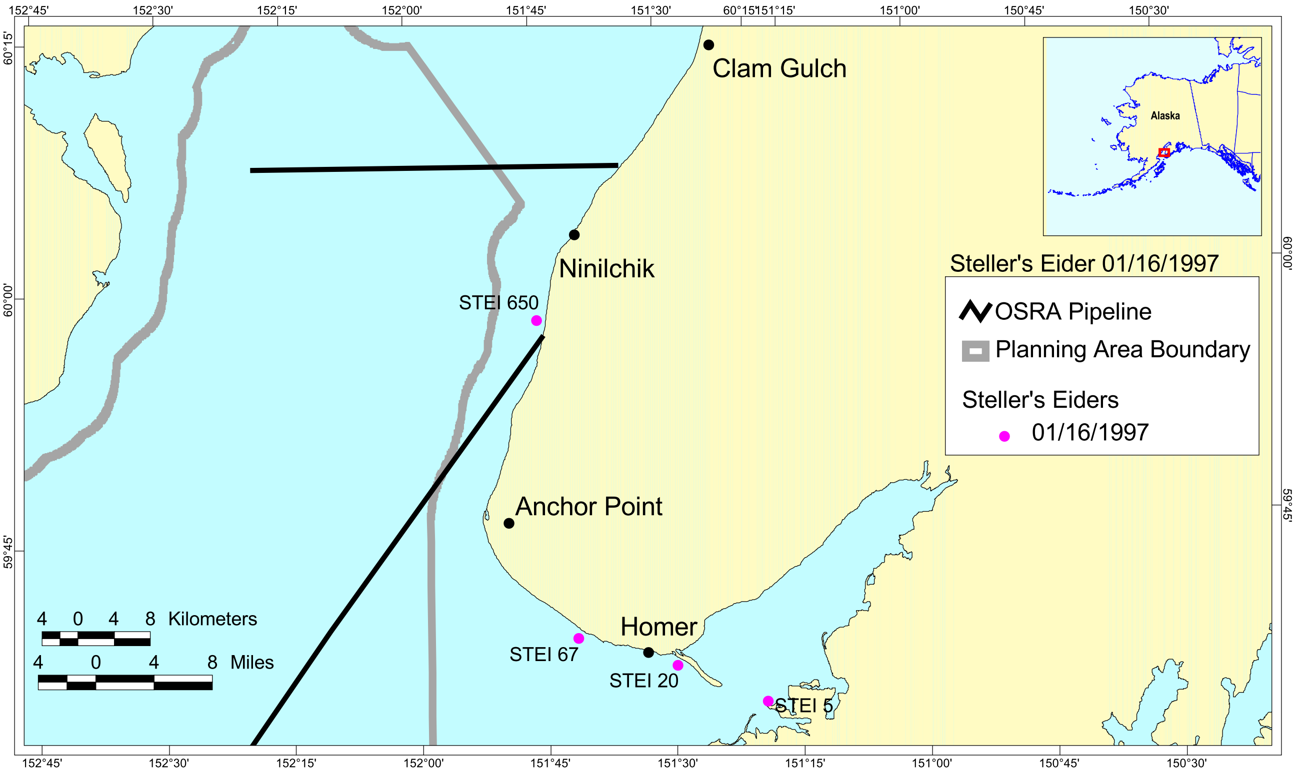
Source: Digitized from a figure presented by National Marine Fisheries Service (2002).

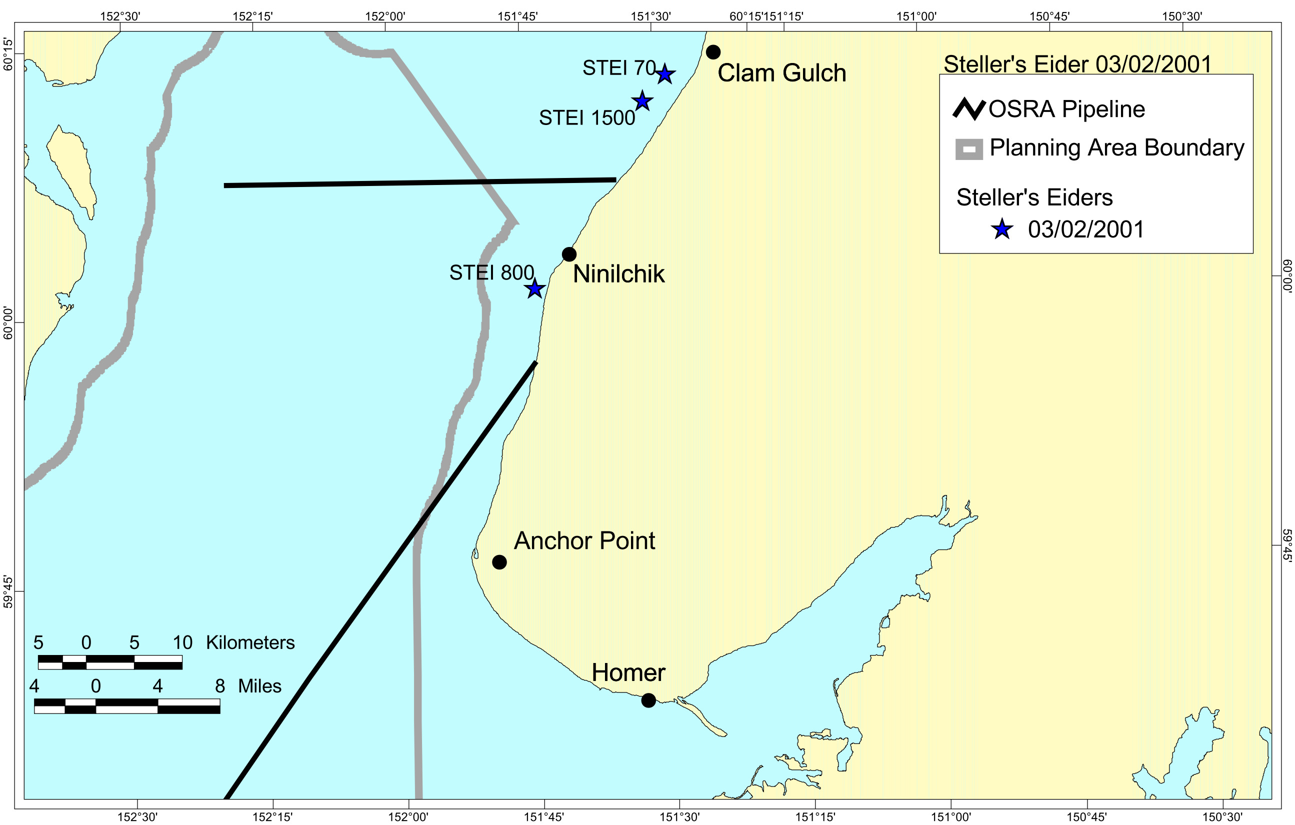
Figure III.B-2 Areas Used by Cook Inlet Belugas in June, July and August Based on 1993-1999 Aerial Surveys.



Source: Data taken from Table 4.6 in National Marine Fisheries Service (2000).

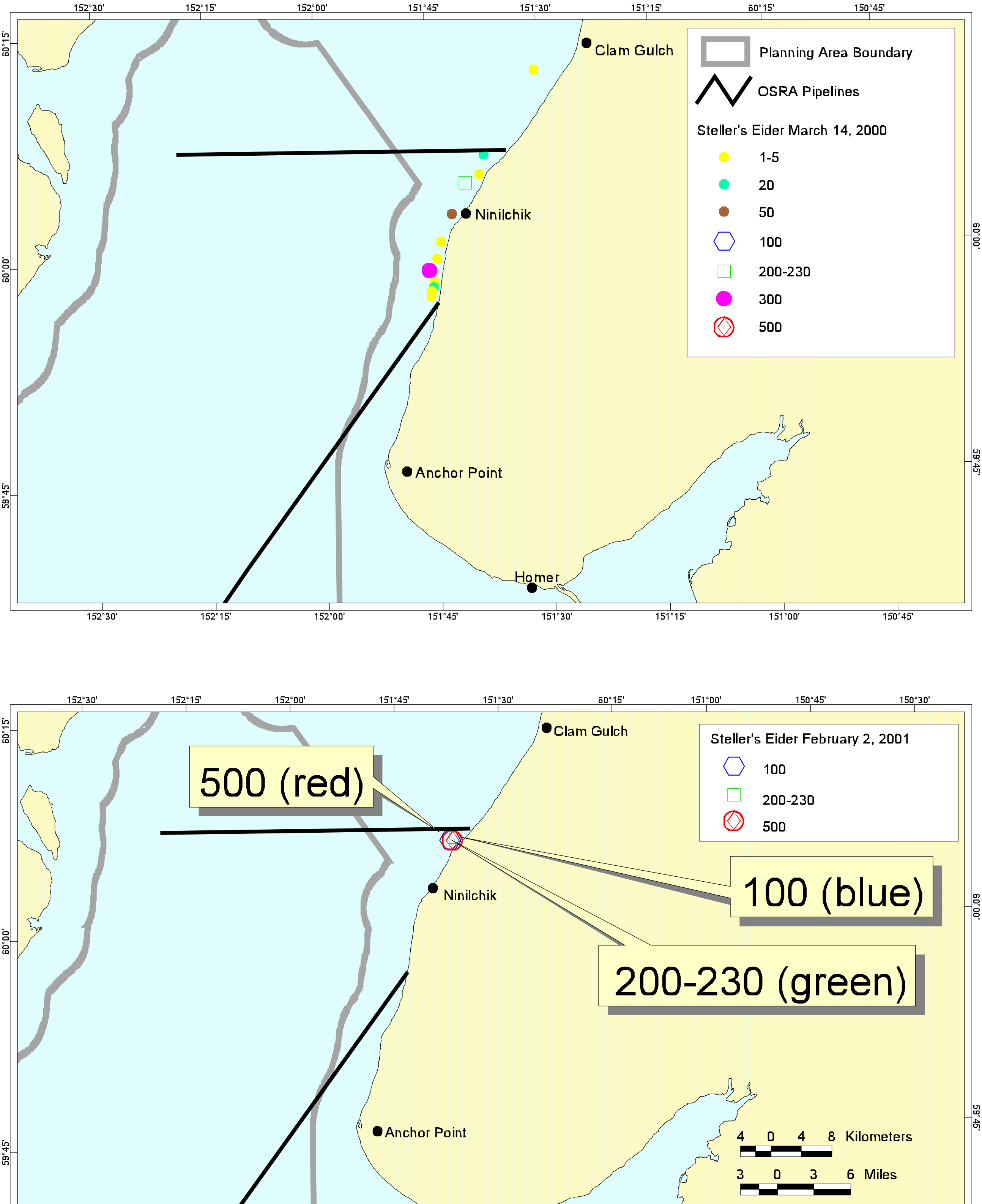
Figure III.B-3 Counts of Adult and Juvenile Steller Sea Lions in the Western Population (by Region) from the late 1970's to 2000





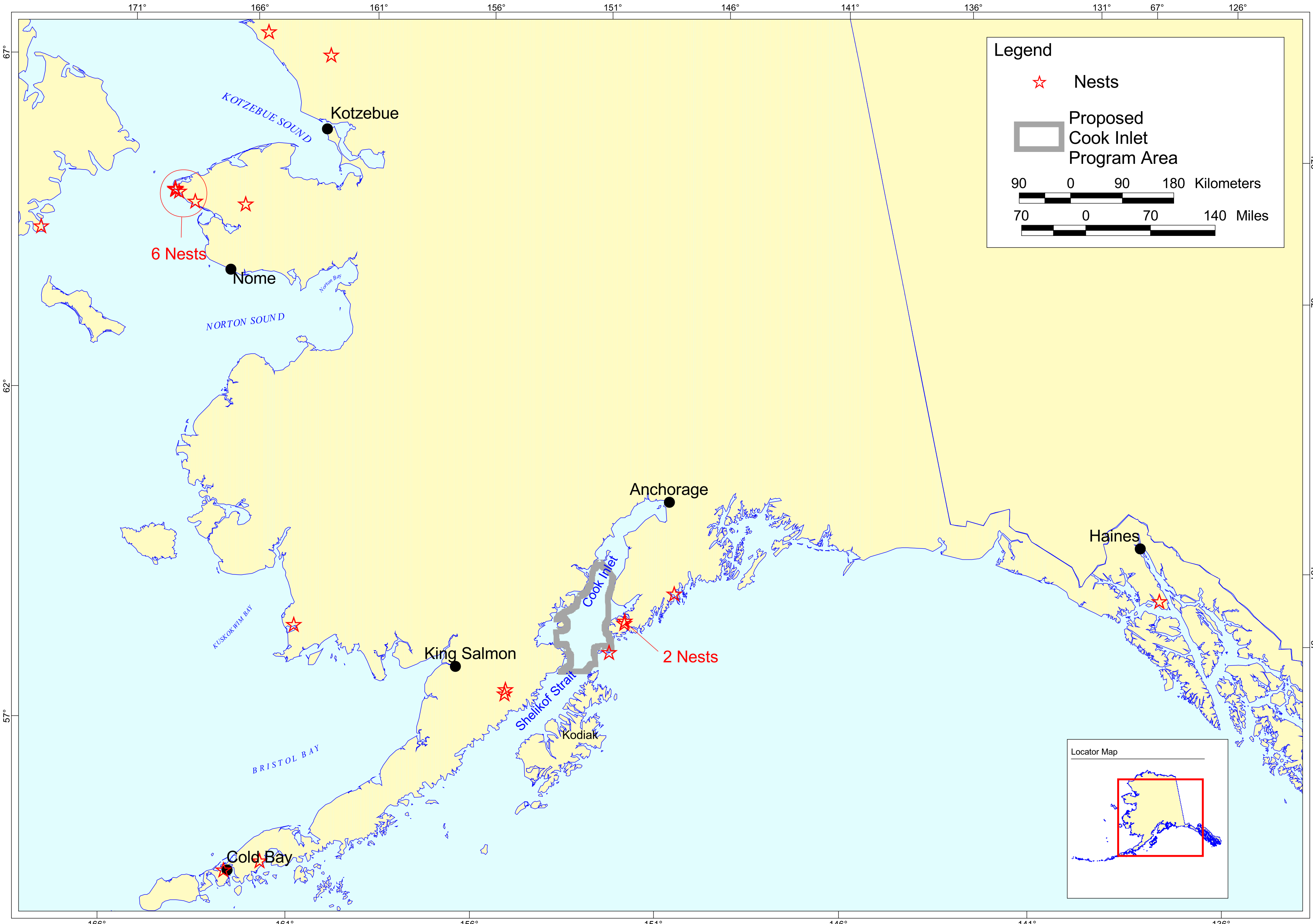
Source: W. Larned, Region 7, U.S. Fish and Wildlife Service.

Figure III.B-4 Sightings of Steller's Eiders Observed During Opportunistic Overflights - January 1997 and March 2001



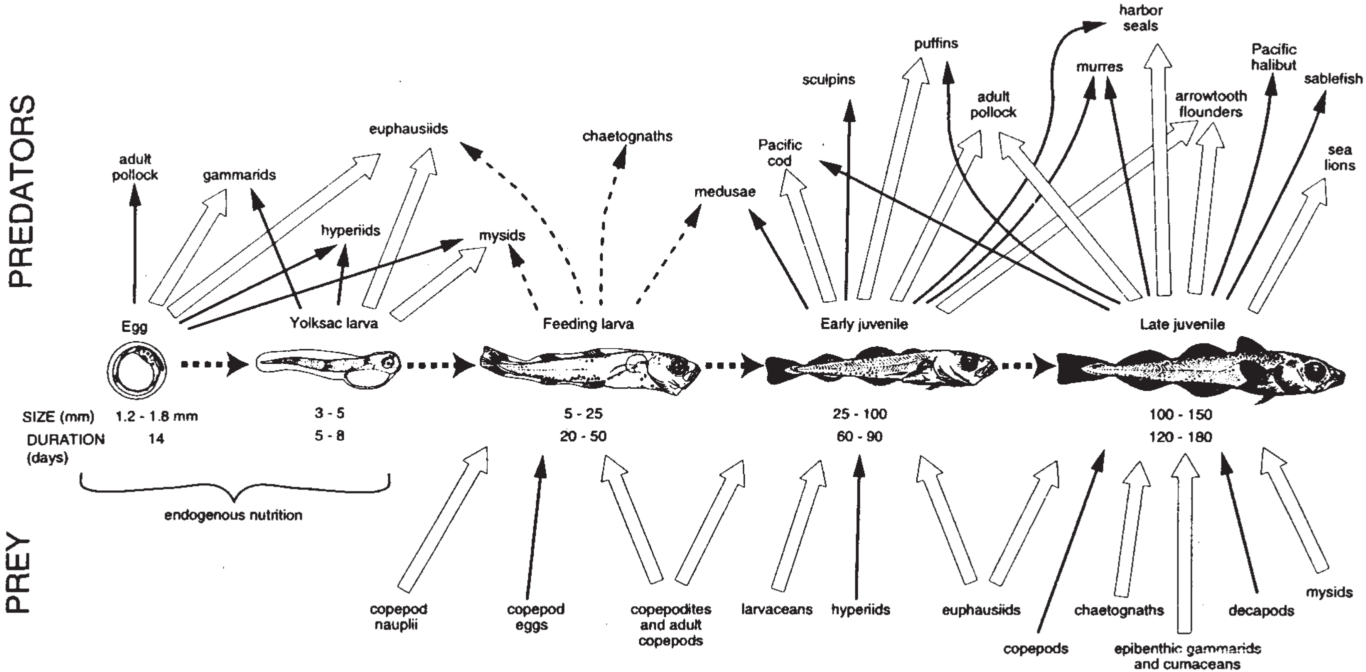
Source: W. Larned, Region 7, U.S. Fish and Wildlife Service.

Figure III.B-5 Sightings of Steller's Eiders Observed During Opportunistic Overflights - March 2000 and February 2001



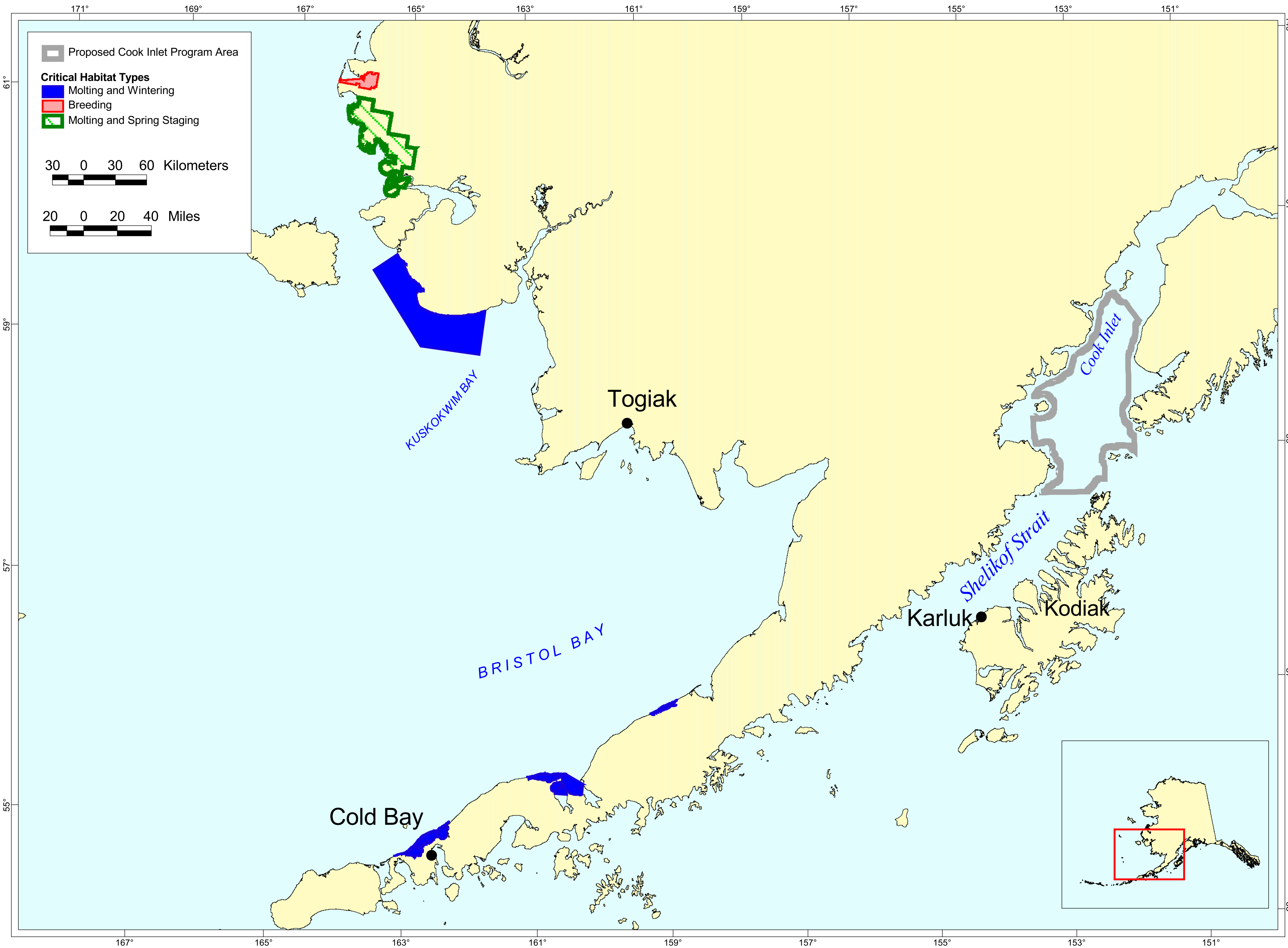
Source: Day, Kuletz, and Nigro (1990).

Figure III.B-6 Approximate Locations of Known Nest Sites of Kittlitz's Murrelets in Alaska



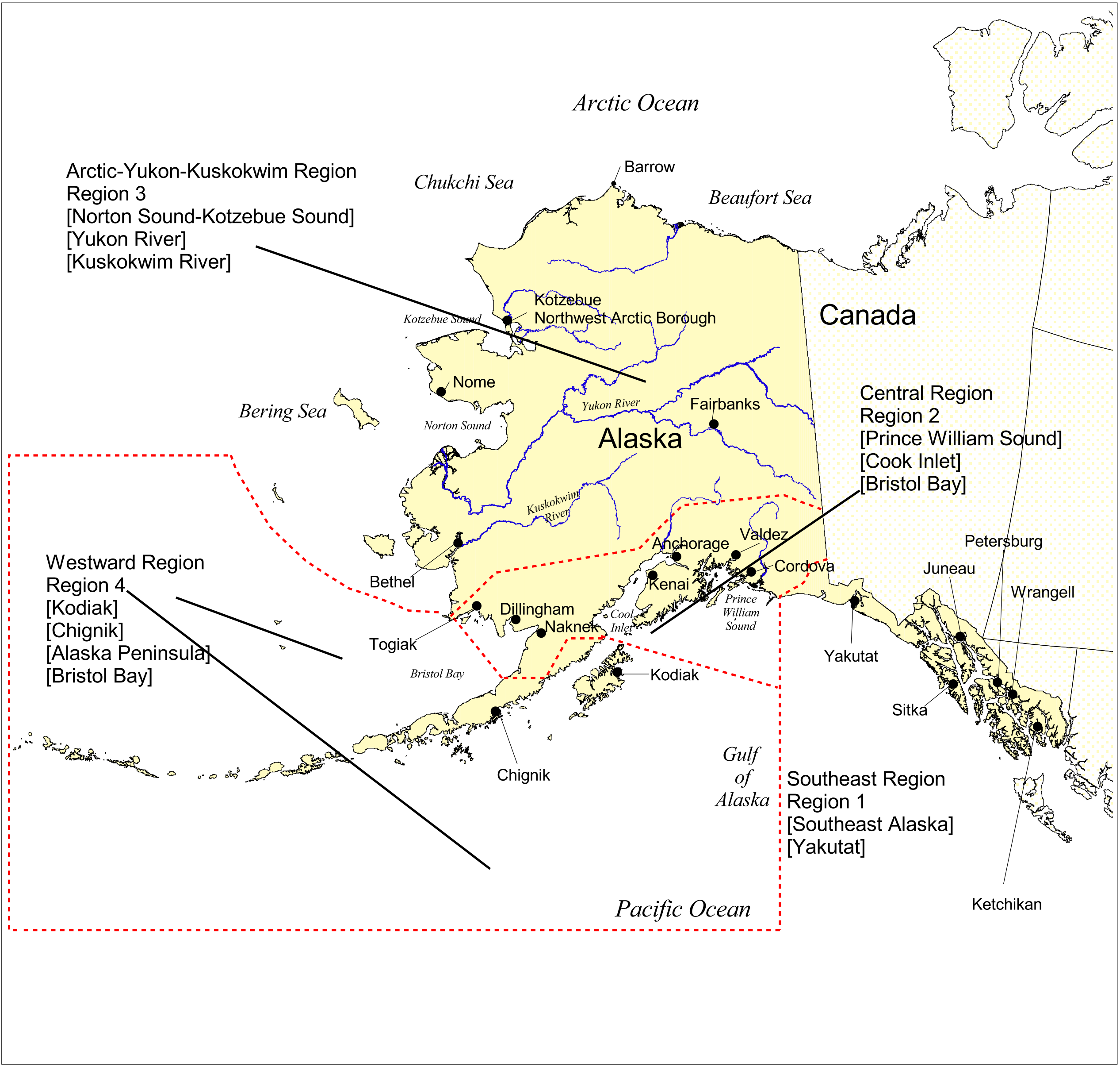
Source: Kendall et al. (1996); Brodeur and Wilson (1996).

Figure III.B-7 Prey and Predators of Early Life History Stages of Pollock in the Shelikof Strait Region. Width of Arrows Reflects the Relative Importance of the Taxon. Dashed Arrows Indicate Pathways not yet Demonstrated in Pollock From Shelikof Strait, But Shown in Other Populations.



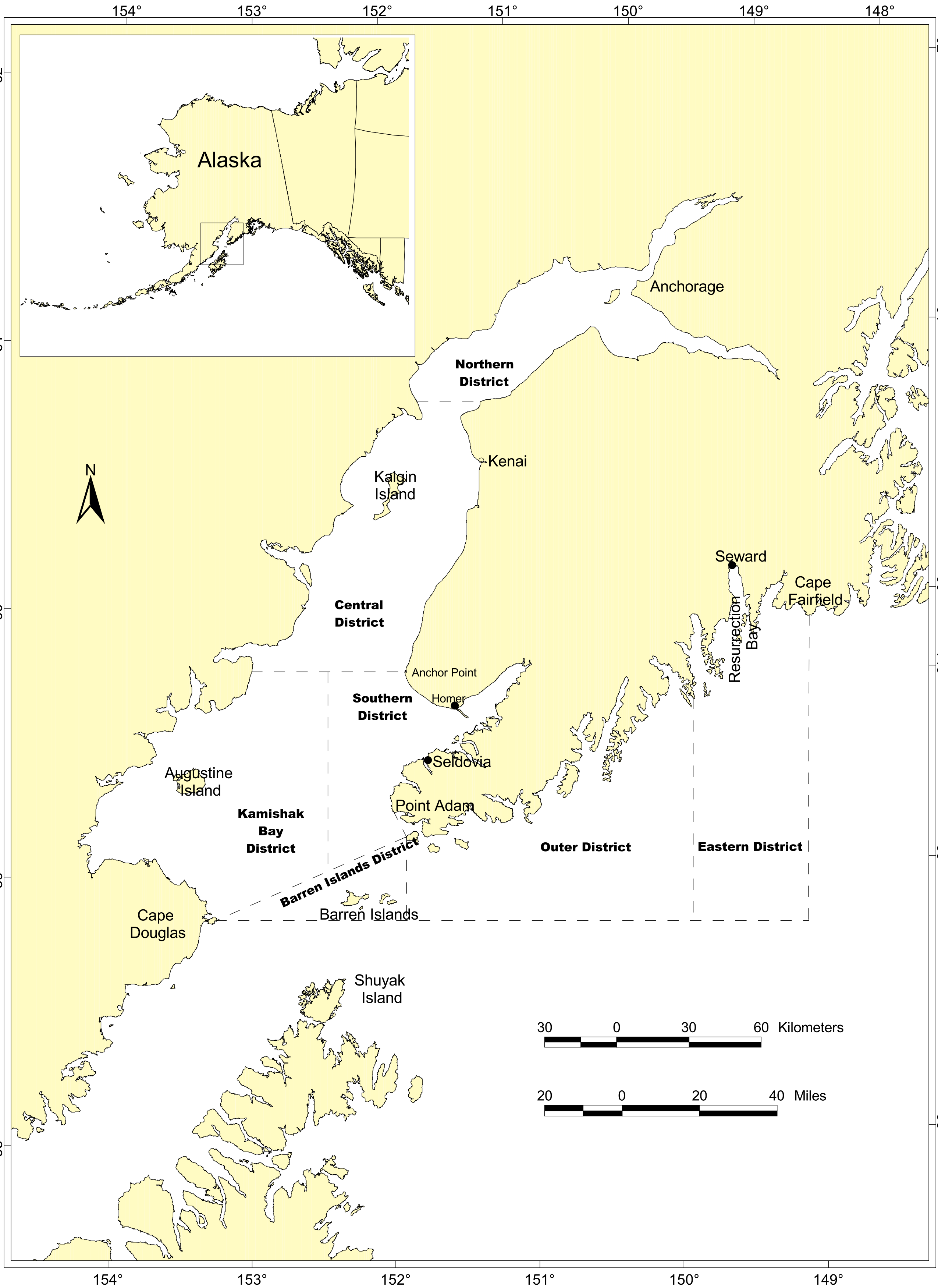
Source: C.Sterne, Region 7, U.S. D.O.I. Fish and Wildlife Service (66 FR 8850).

Figure III.B-8 Steller's Eider Critical Habitat



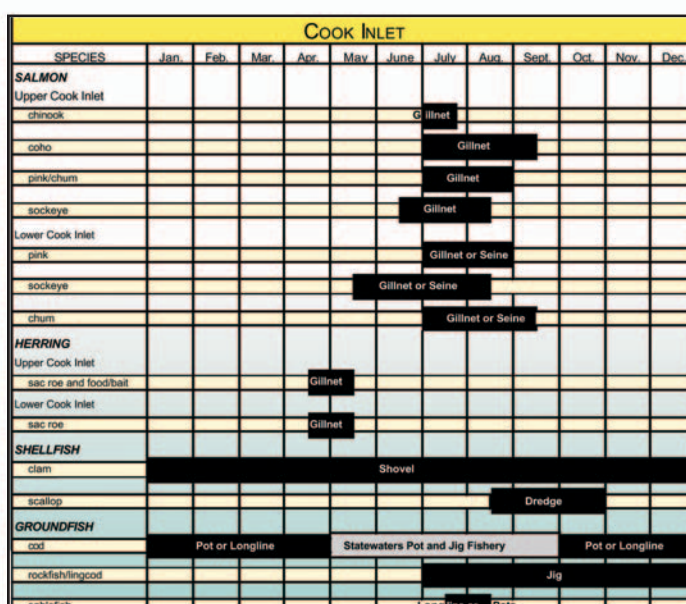
Source: State of Alaska, Department of Fish and Game Website (2002).

Figure III.C-1 Commercial Fisheries Management Regions (Red dashed lines indicate region boundaries.)



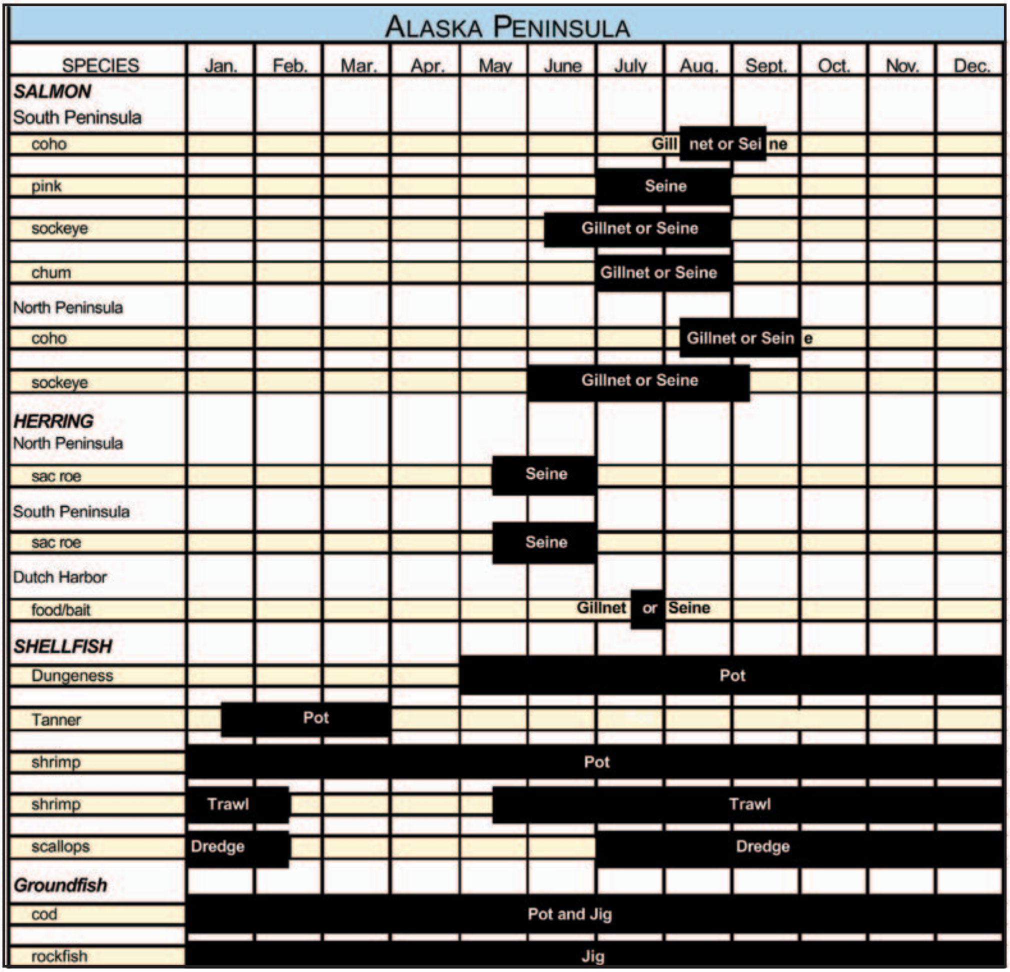
Source: State of Alaska, Department of Fish and Game.

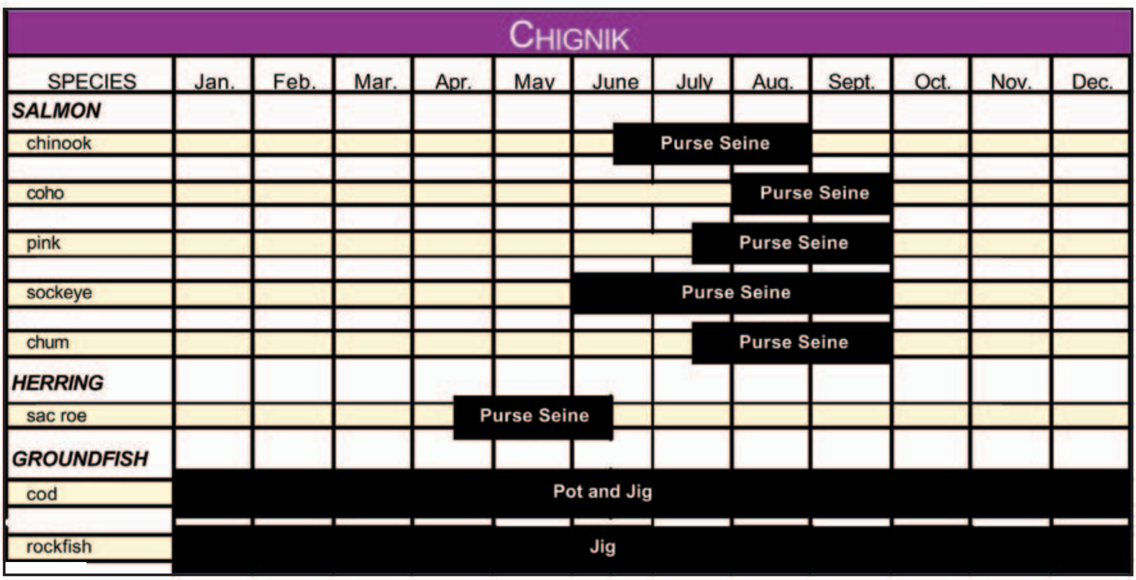
Figure III.C-2 Cook Inlet Area Districts Within the Central Region



Source: State of Alaska, Dept. Of Fish and Game Internet Web Page (2000).

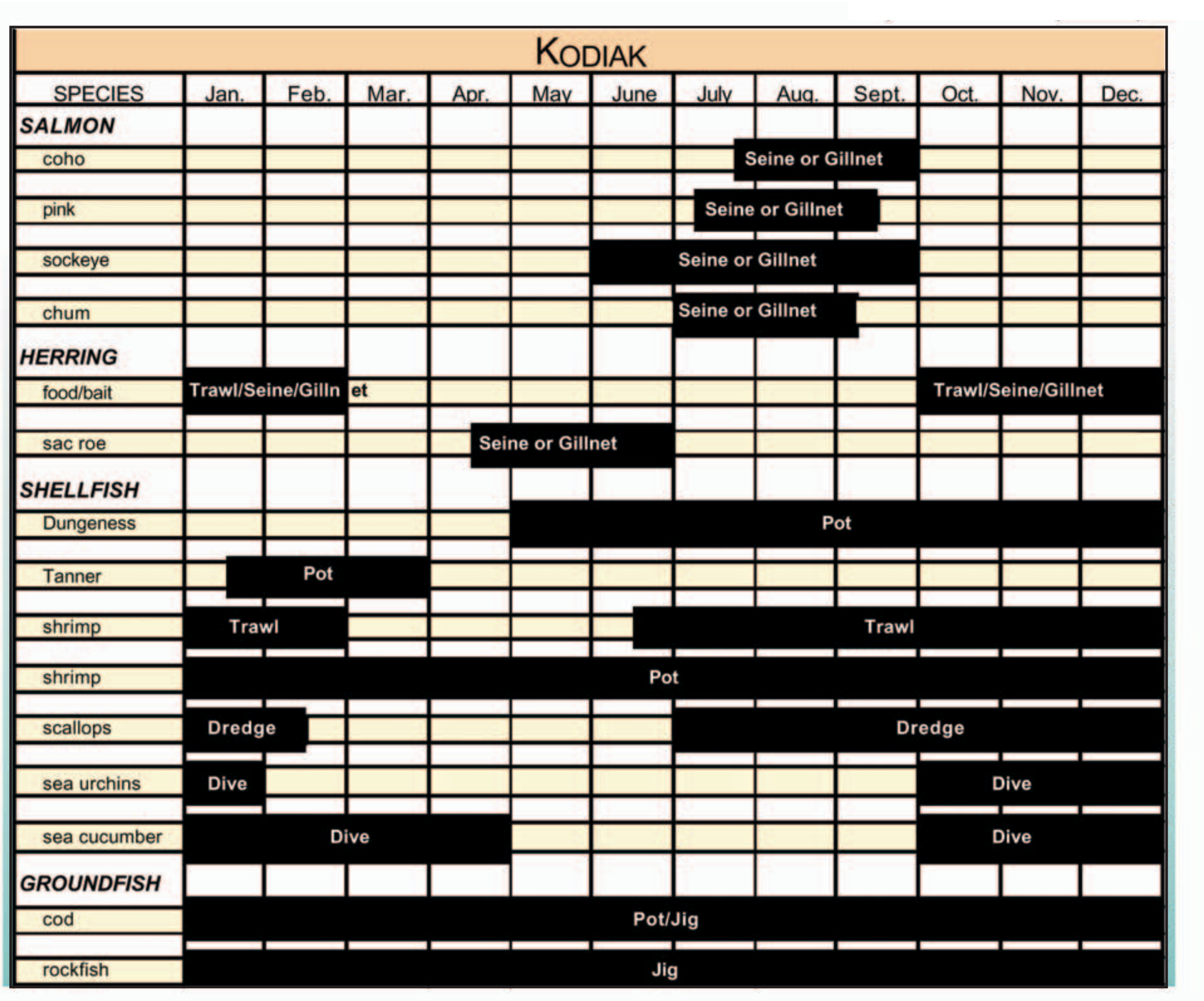
Figure III.C-3 Commercial Fishing Seasons in Alaska in Prince William Sound, Copper River, and Cook Inlet





Source: State of Alaska, Dept. of Fish and Game Internet Web Page (2000).

Figure III.C-4 Commercial Fishing Seasons in Alaska for Chignik and the Alaska Peninsula



Source: State of Alaska, Dept. of Fish and Game Internet Web Page (2000).

Figure III.C-5 Commercial Fishing Seasons in Kodiak Alaska

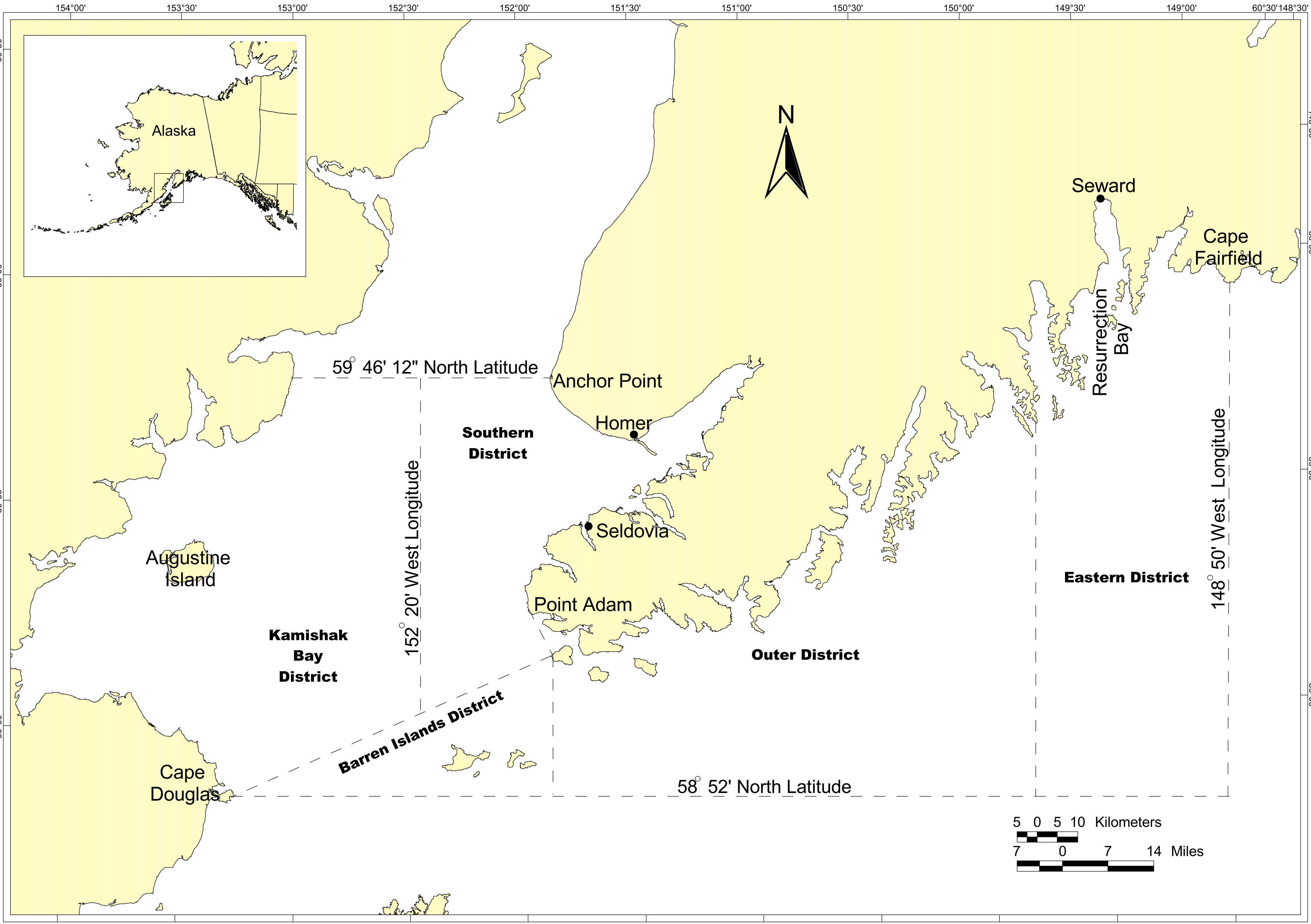


Figure III.C-6 Lower Cook Inlet Salmon and Herring Management Area

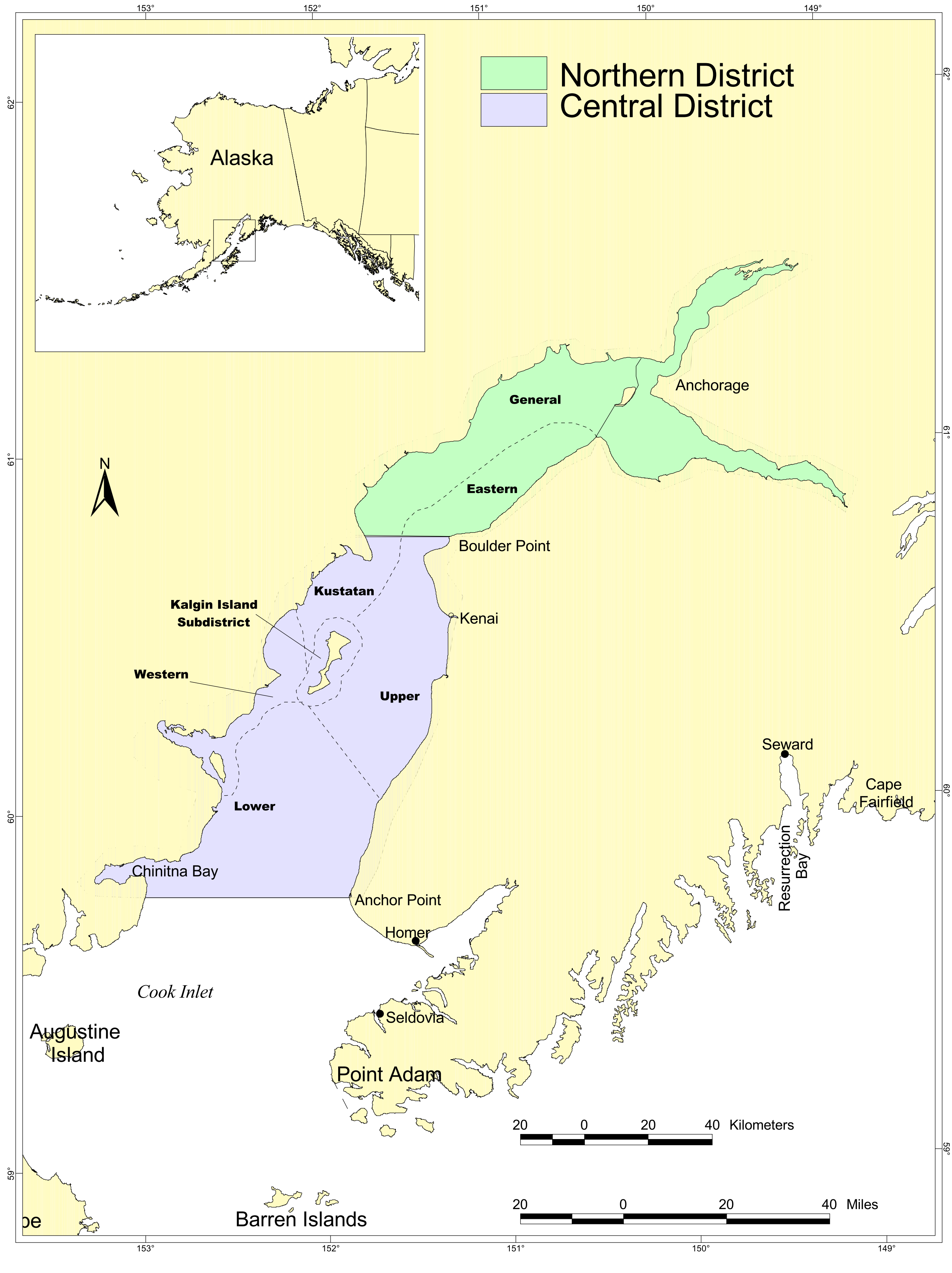


Figure III.C-7 Upper Cook Inlet Commercial Fisheries Subdistrict Fishing Boundaries

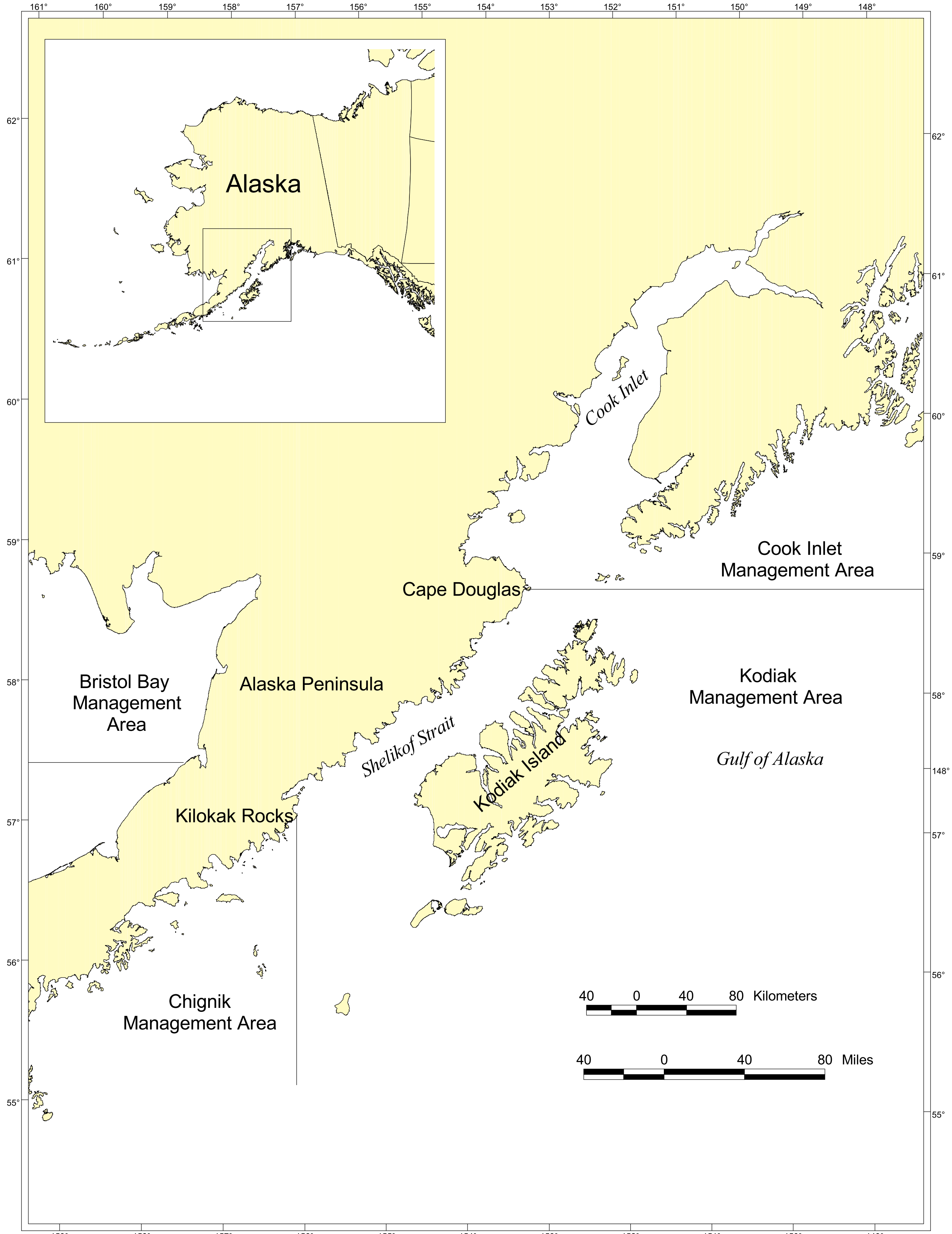
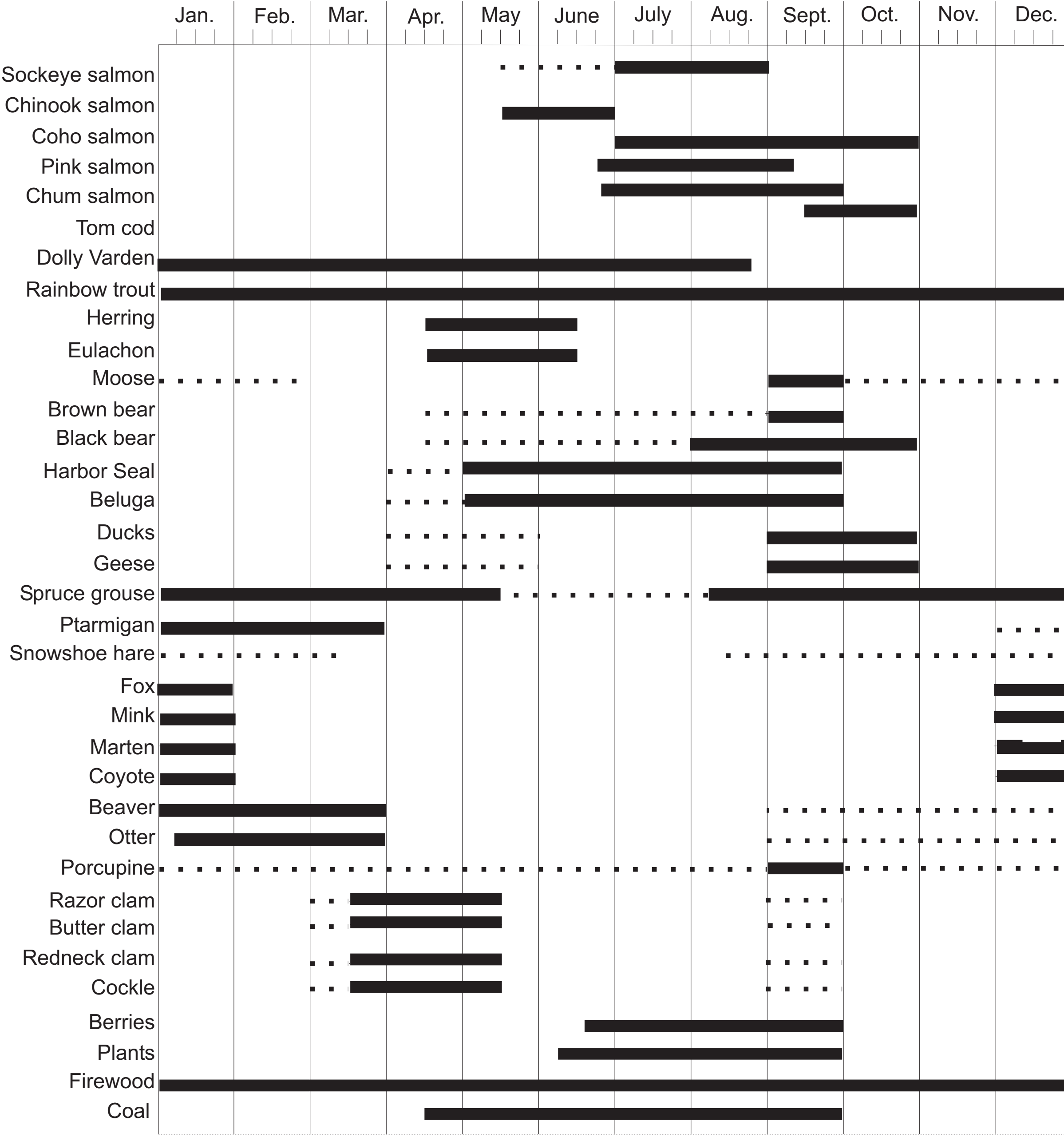
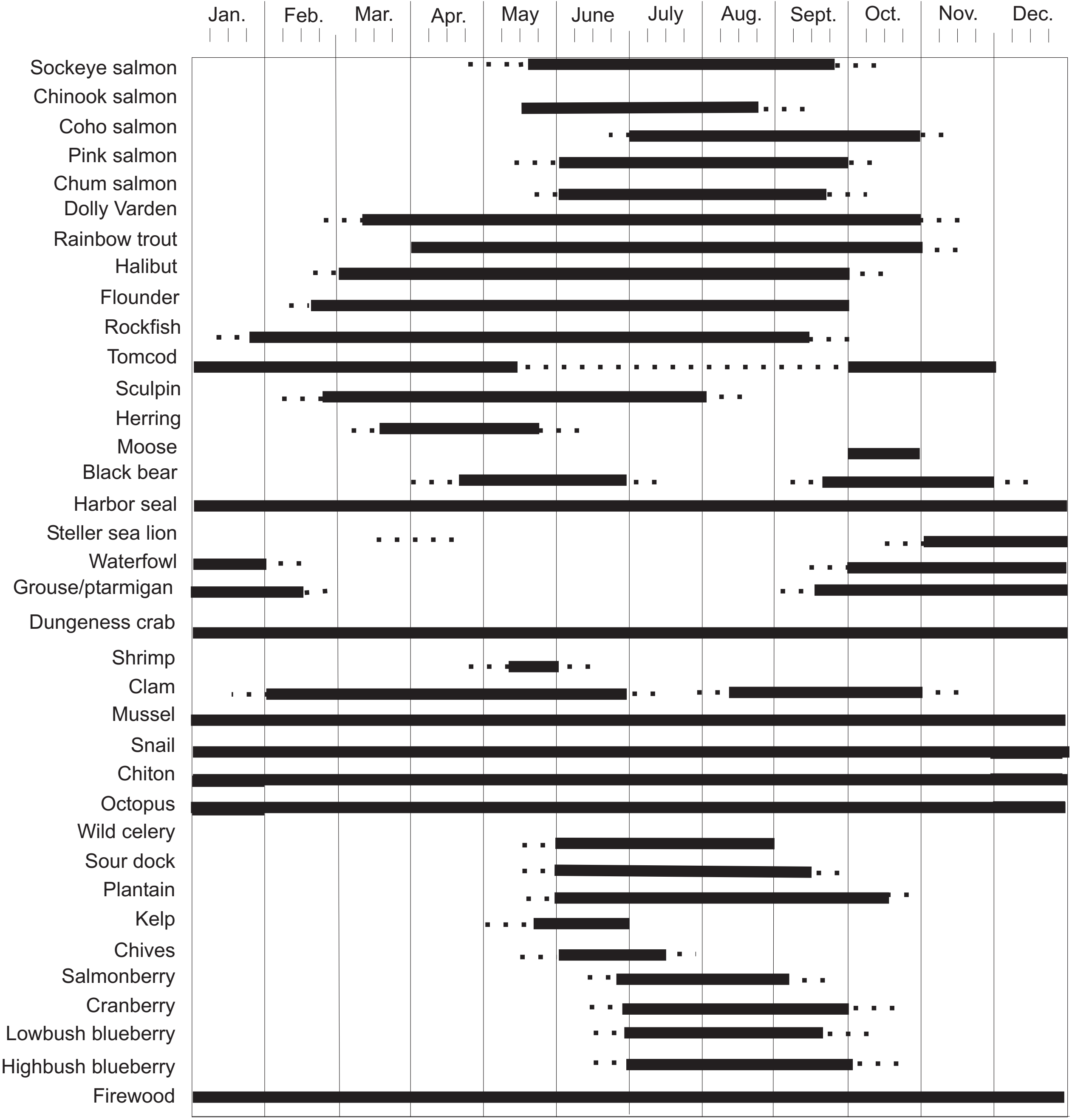


Figure III.C-8 Southwestern Alaska Showing the Kodiak Management Area and Its Relationship to Surrounding Management Areas



Source: Foster as cited in Schroeder et al. (1987).

Figure III.C-9 Tyonek Annual Round of Harvest Activities
Solid line indicates when harvest takes place. Broken line indicates occasional harvest activity.

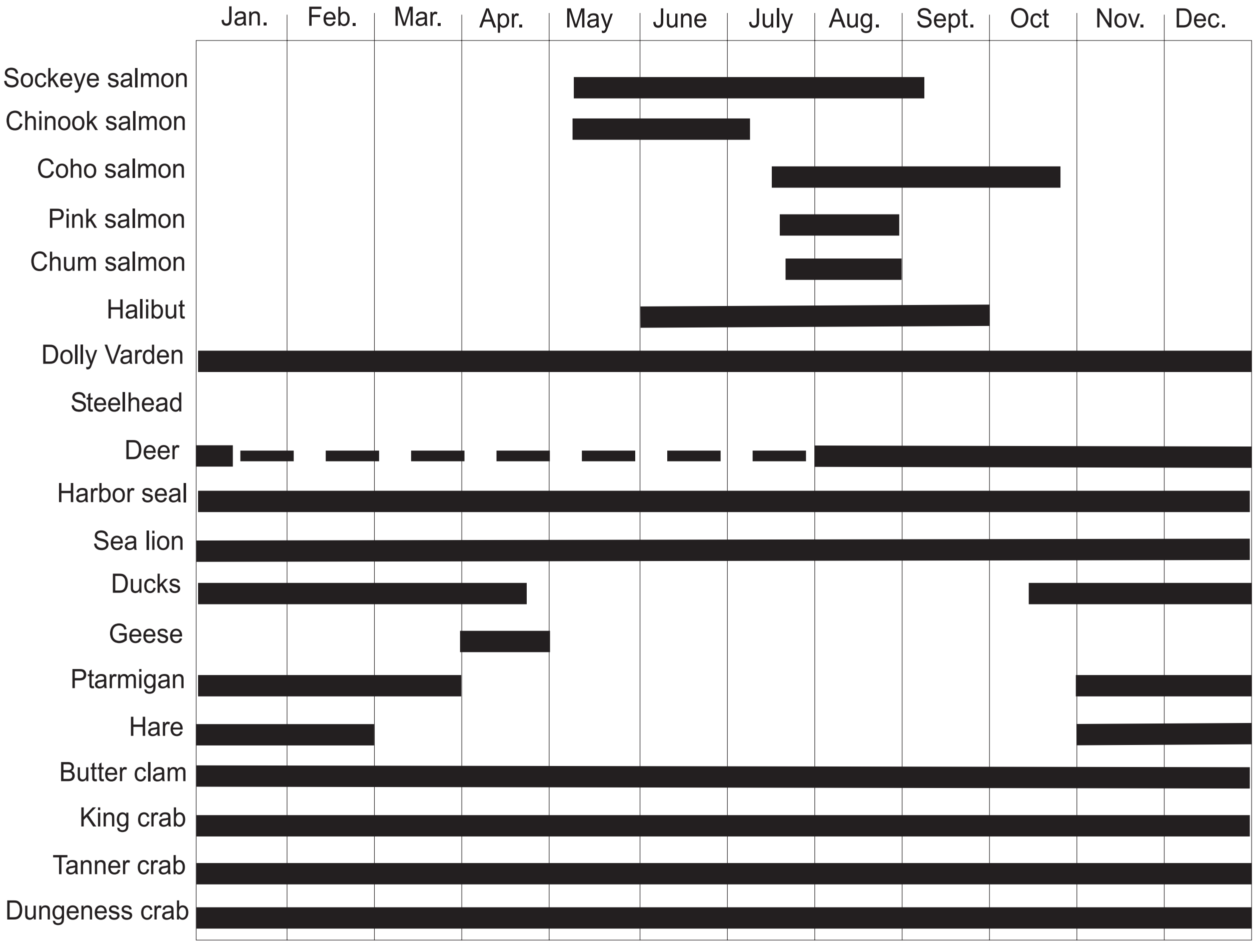


Source: Stanek et al. as cited in Schroeder et al. (1987).

Figure III.C-10 Nanwalek and Port Graham Annual Round of Harvest Activities
Solid line indicates when harvest takes place. Broken line indicates occasional harvest activity.

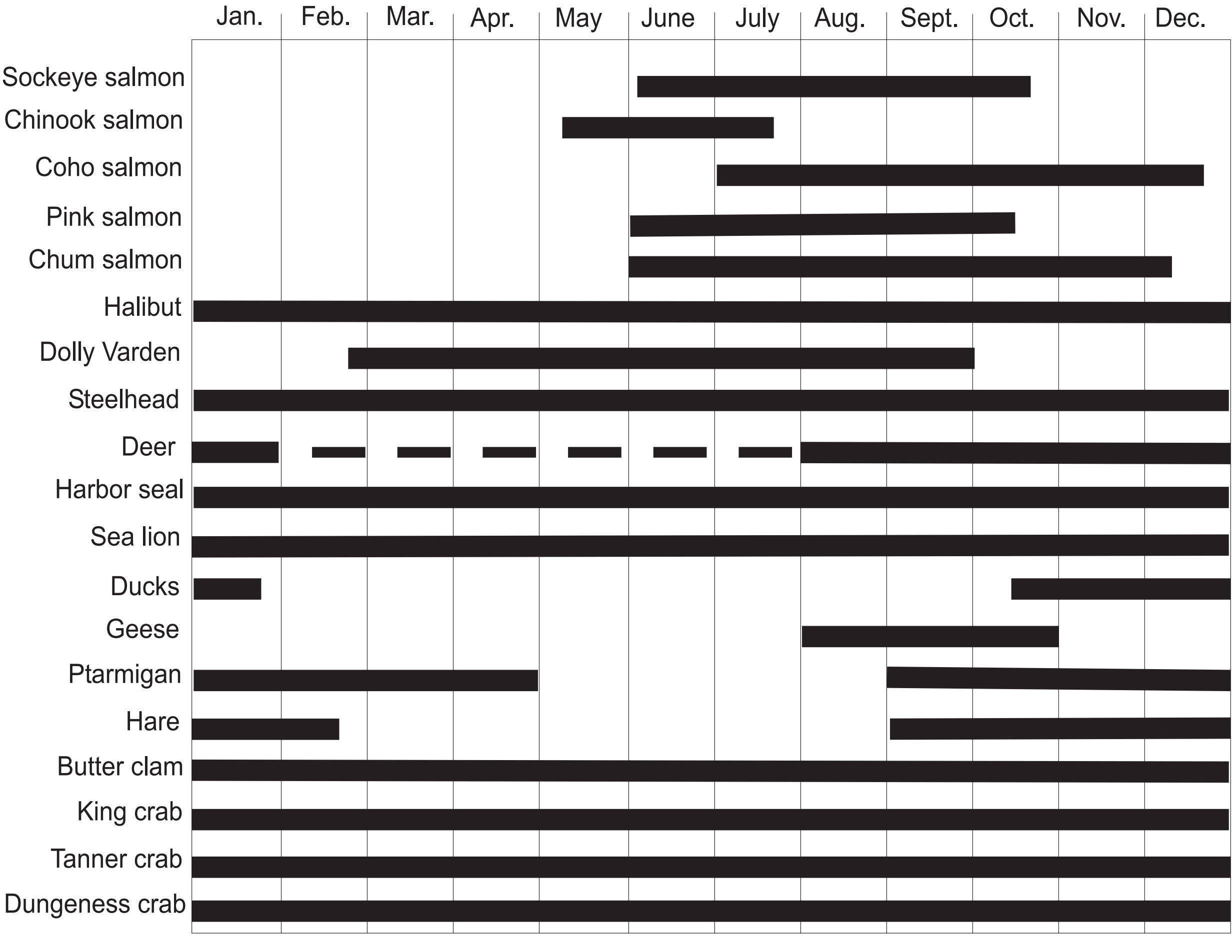
Source: Schroeder et al. (1987).

Figure III.C-11 Akhiok Annual round of Harvest Activities, 1982-1983
Solid line indicates when harvest usually takes place.



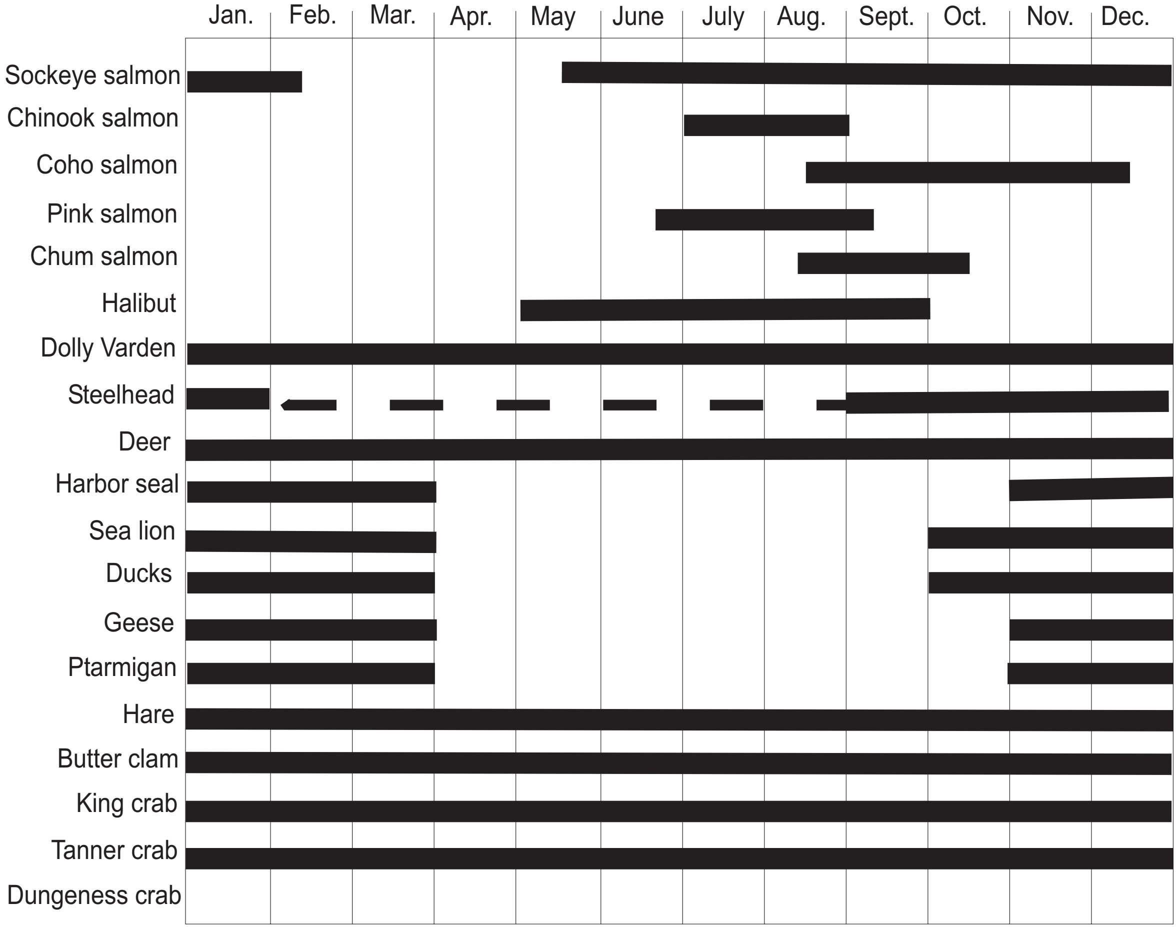
Source: Schroeder et al. (1987).

Figure III.C-12 Karluk Annual Round of Harvest Activities 1982-1983
Solid line indicates when harvest usually takes place. Broken line indicates occasional harvest activity.



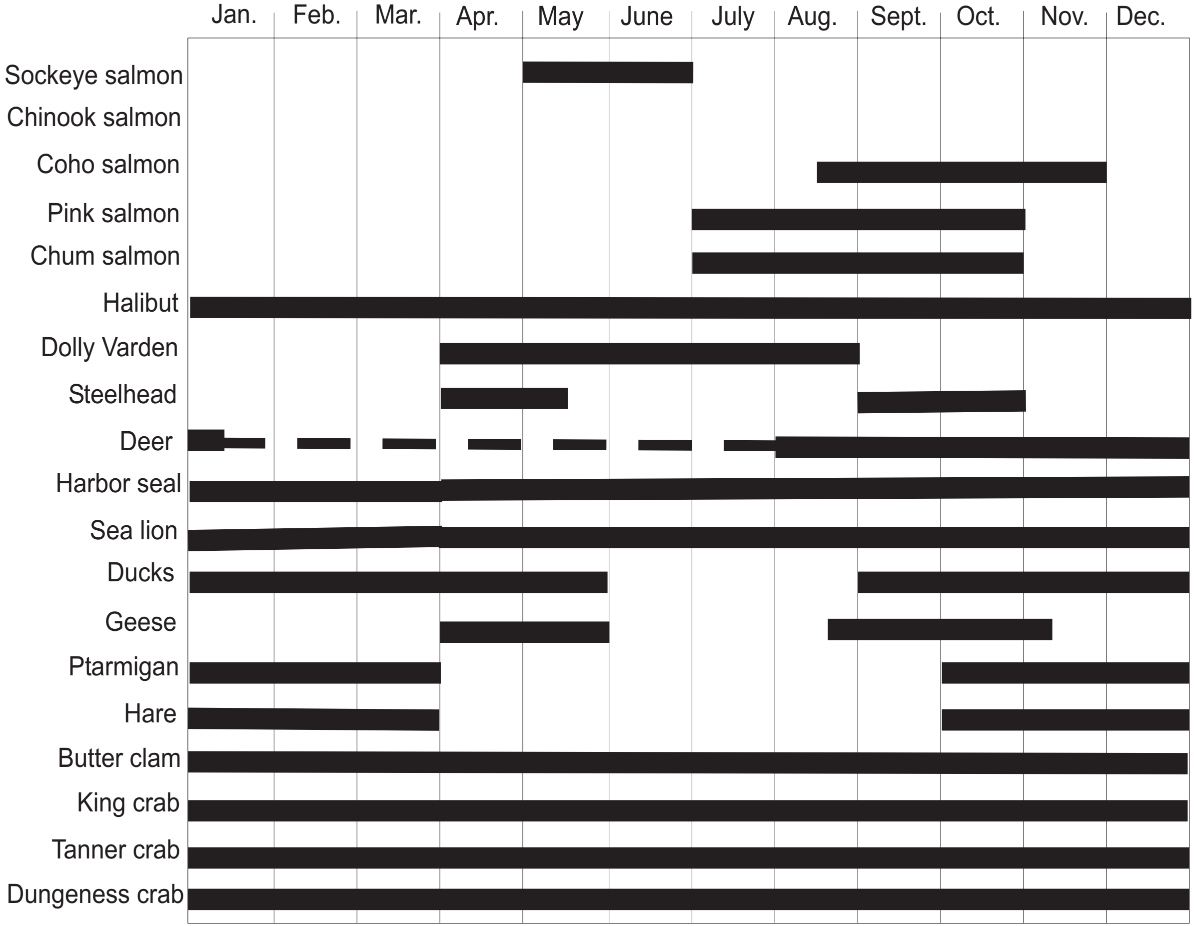
Source: Schroeder et al. (1987).

Figure III.C-13 Larsen Bay Annual Round of Harvest Activities, 1982-1983
Solid line indicates when harvest usually takes place. Broken line indicates occasional harvest activity.



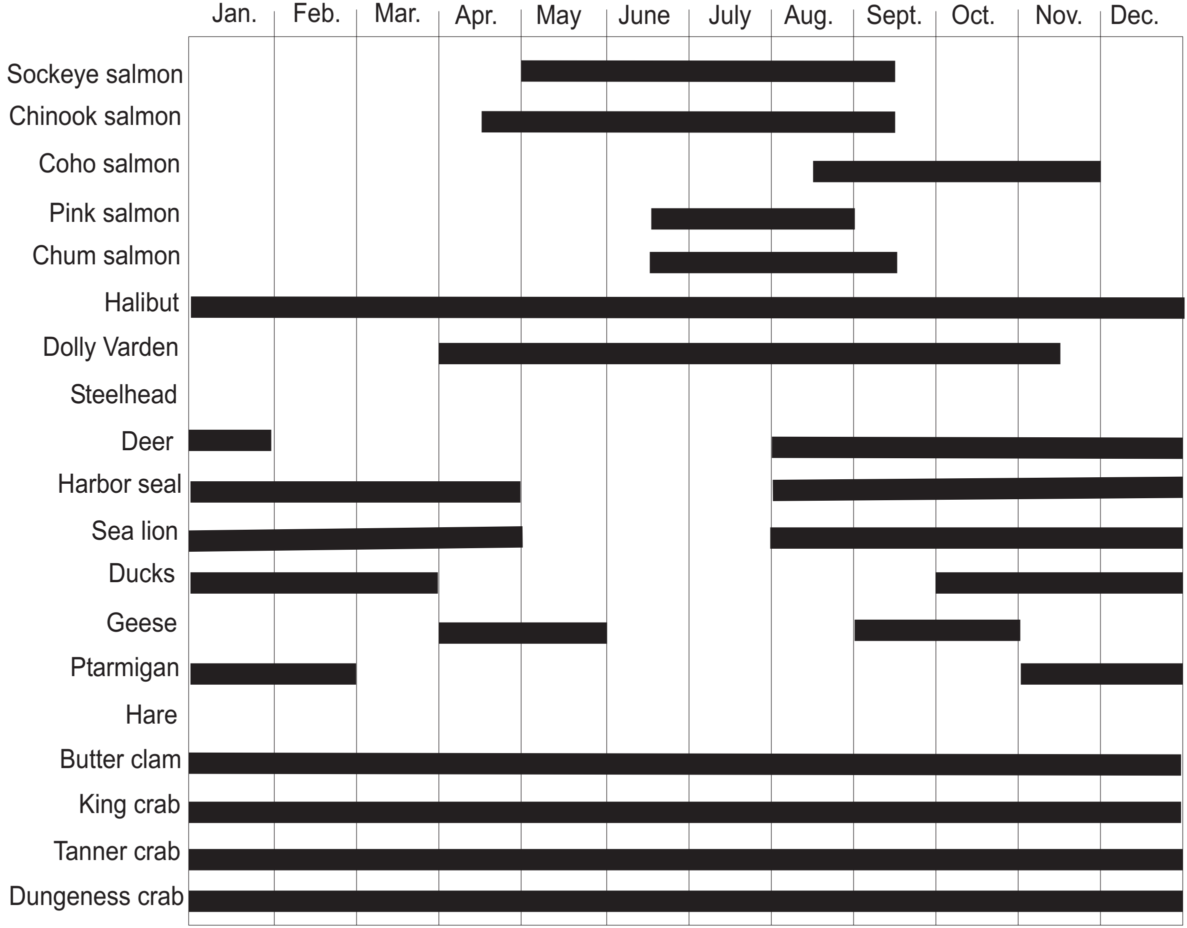
Source: Schroeder et al. (1987).

Figure III.C-14 Old Harbor Annual Round of Harvest Activities, 1982-1983
Solid line indicates when harvest usually takes place. Broken line indicates occasional harvest activity.



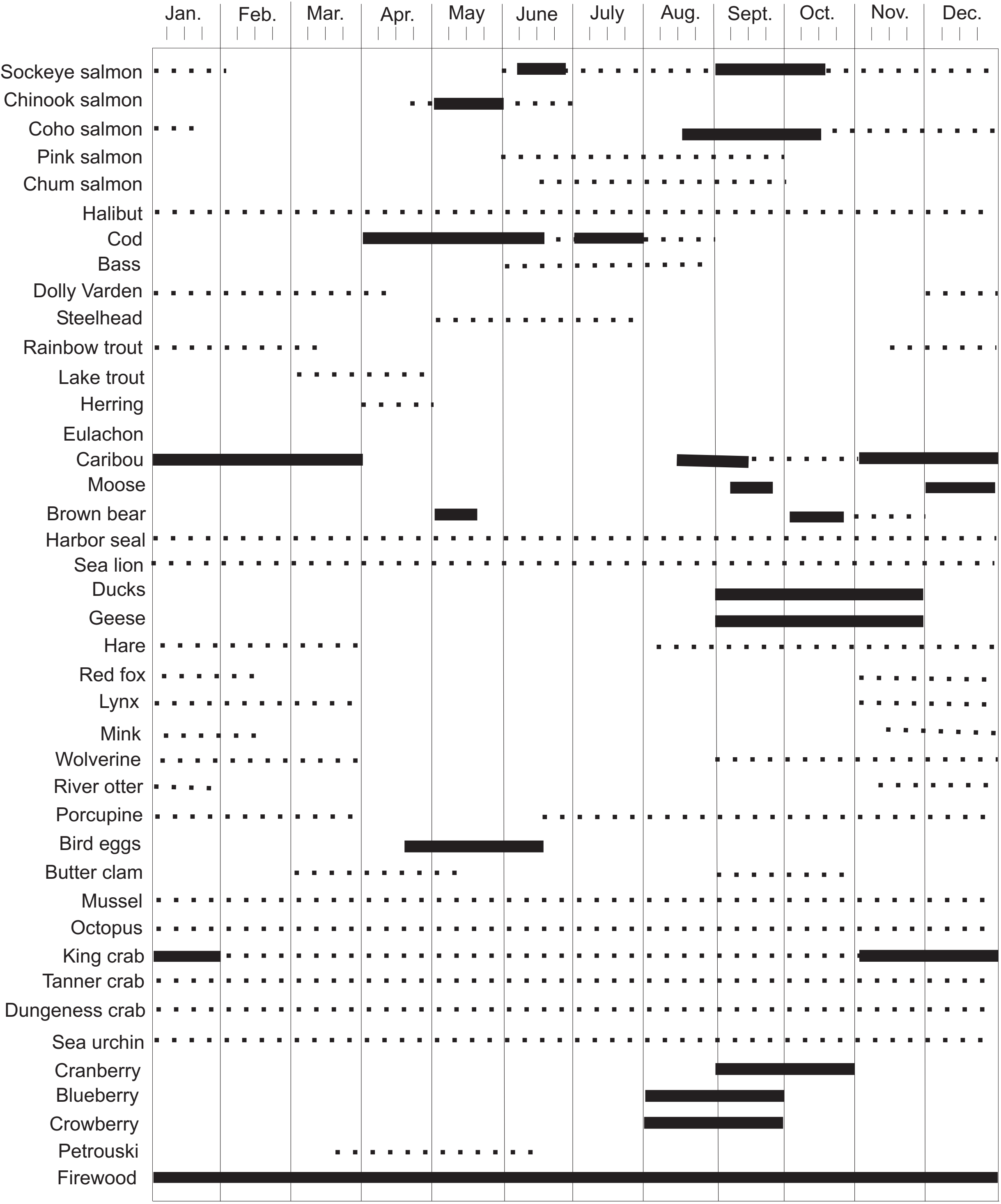
Source: Schroeder et al. (1987).

Figure III.C-15 Ouzinkie Annual Round of Harvest Activities, 1982-1983
Solid line indicates when harvest usually takes place. Broken line indicates occasional harvest activity.



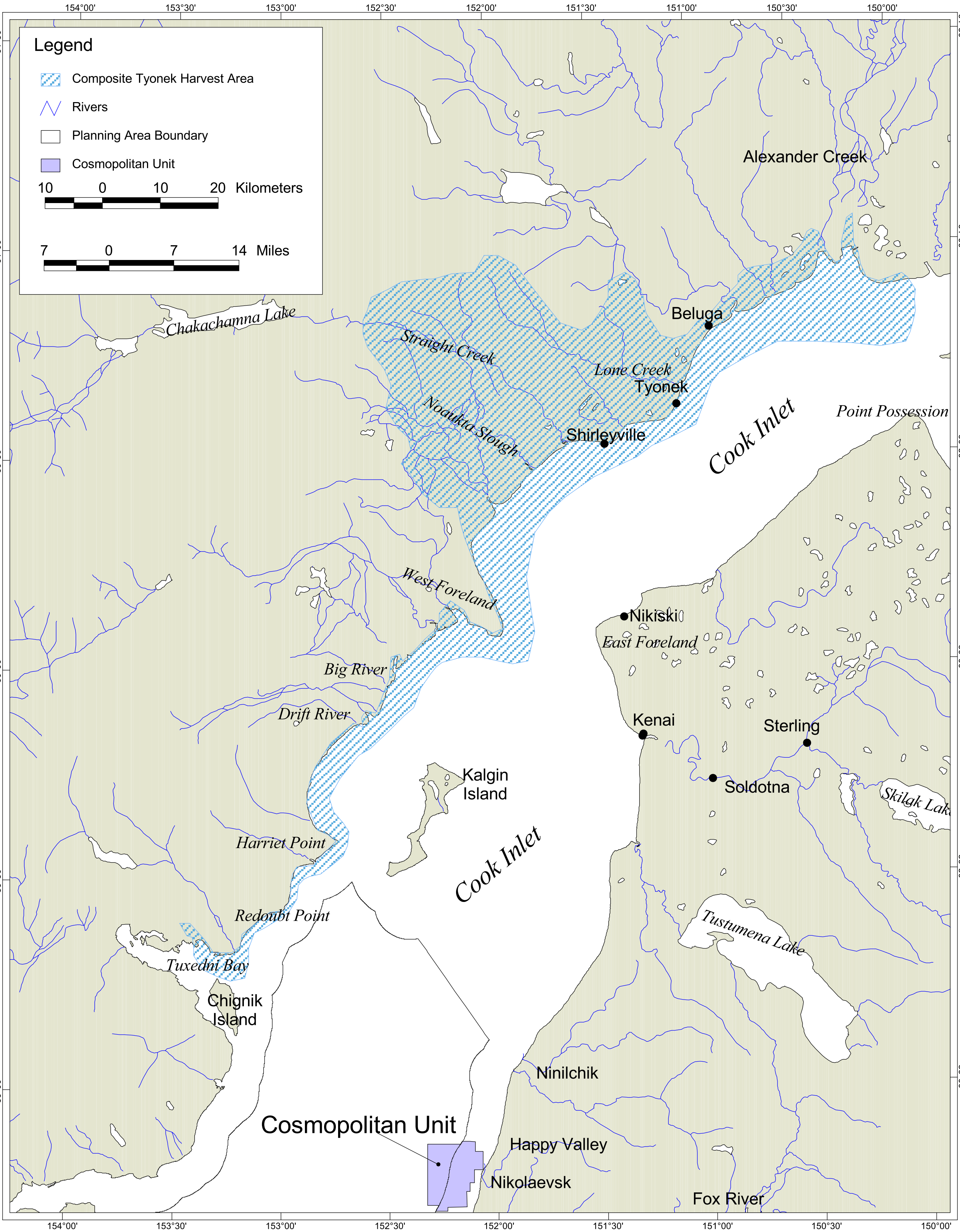
Source: Schroeder et al. (1987).

Figure III.C-16 Port Lions Annual Round of Harvest Activities, 1982-1983
Solid line indicates when harvest usually takes place.



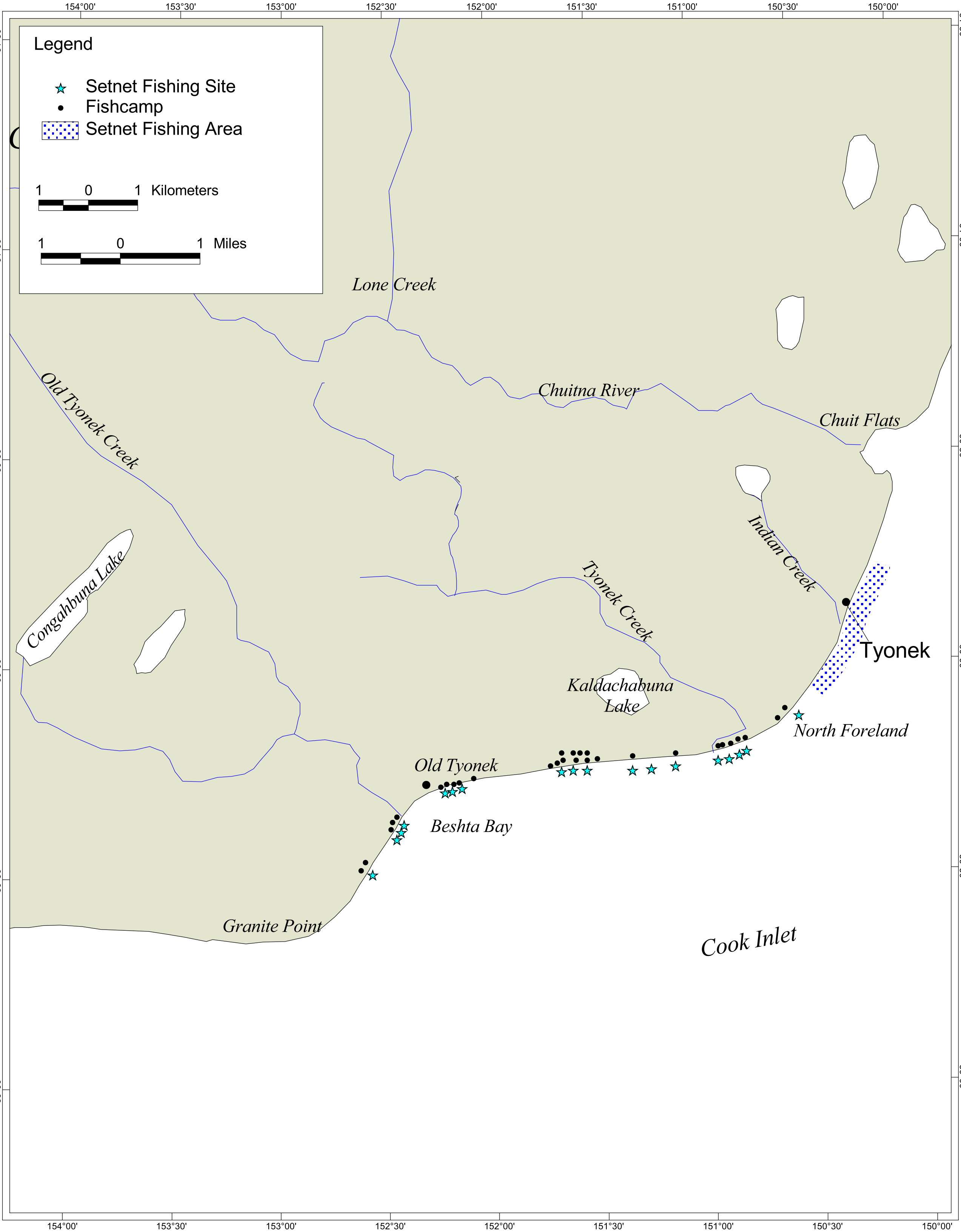
Source: Schroeder et al. (1987).

Figure III.C-17 Chignik Annual Round of Harvest Activities
Solid line indicates when harvest takes place. Broken line indicates occasional harvest activity.



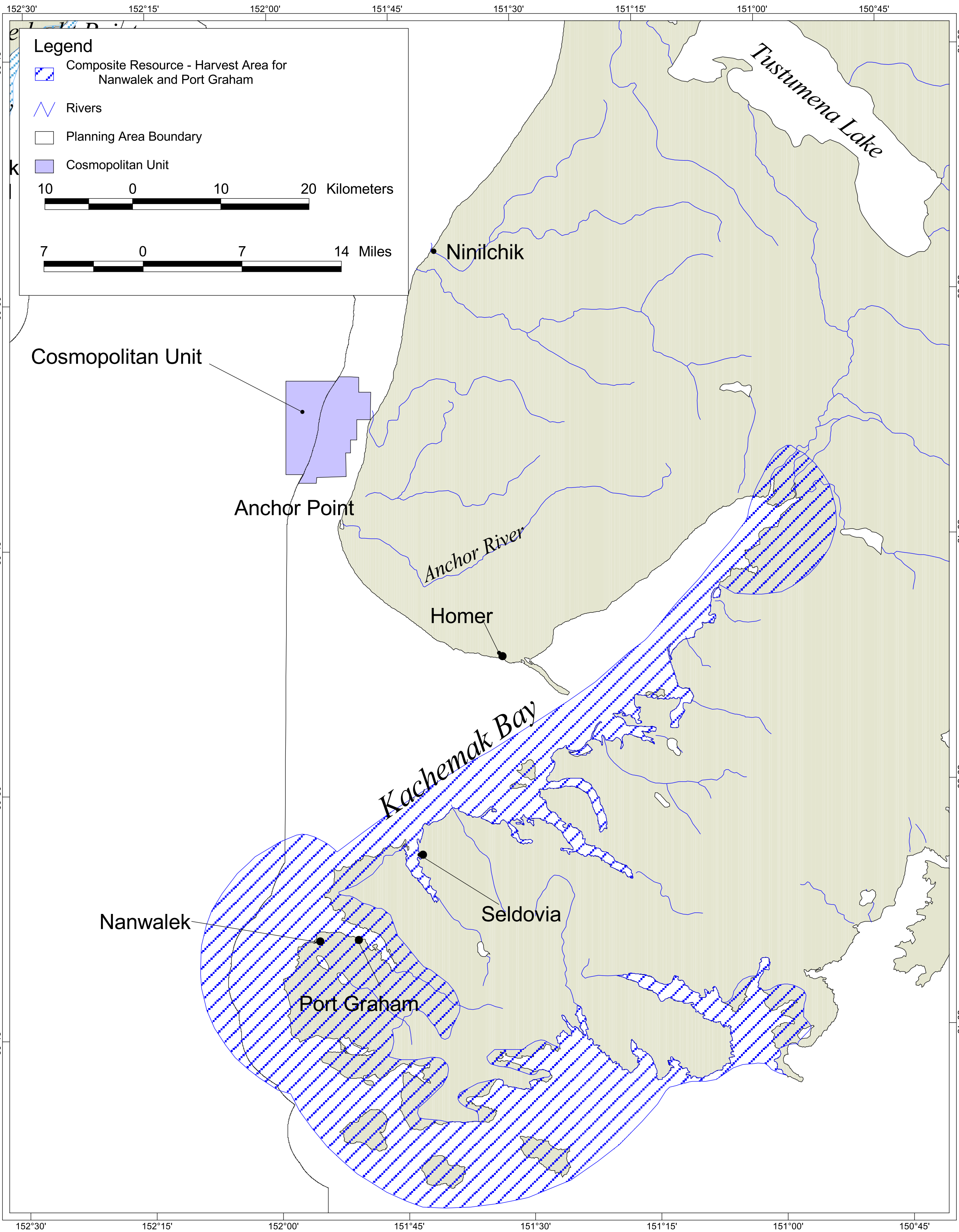
Source: Fall, Foster, and Stanek (1984).

Figure III.C-18 Composite Resource Harvest Area for Tyonek



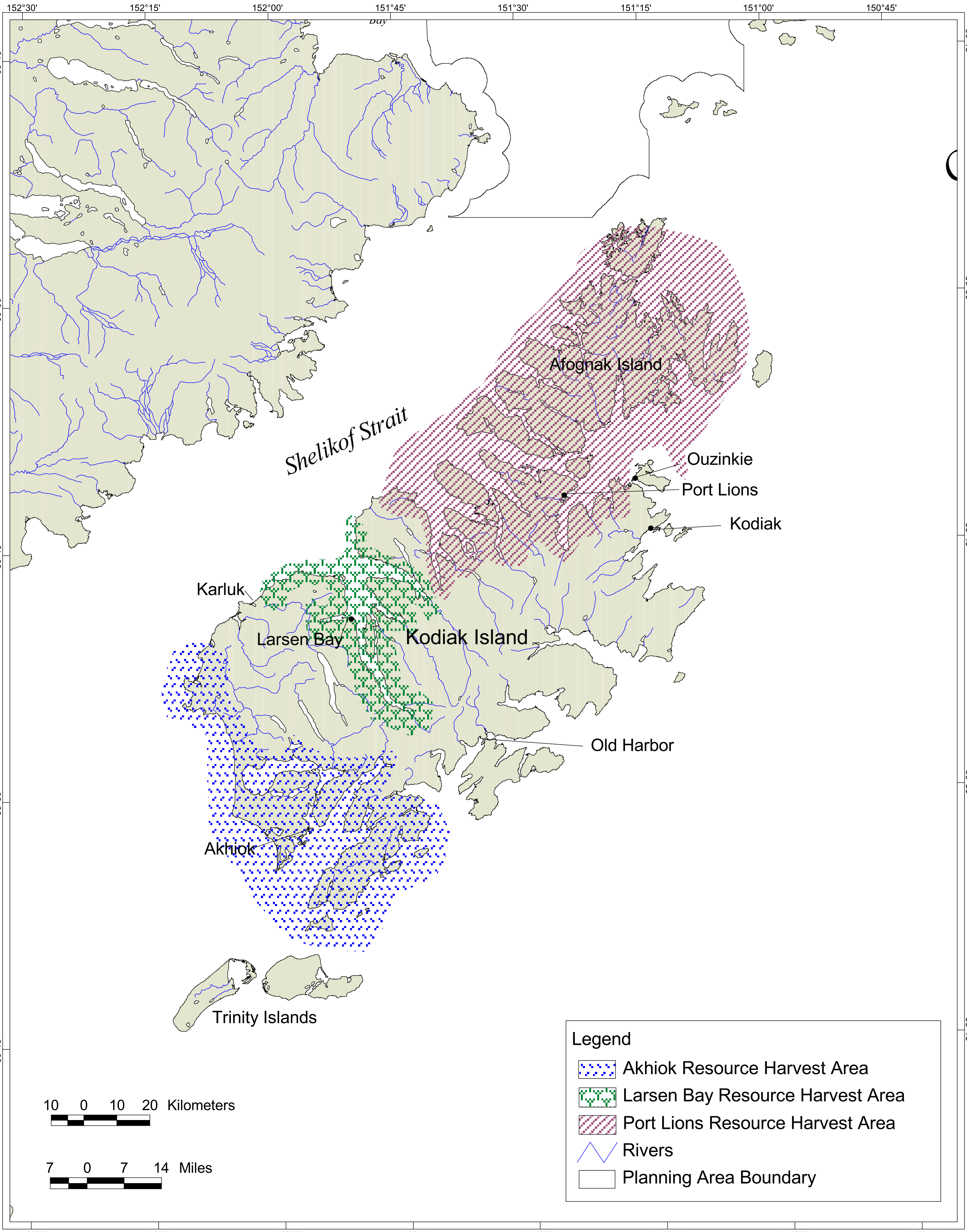
Source: Fall, Foster, and Stanek (1984).

Figure III.C-19 Tyonek Fishing Sites



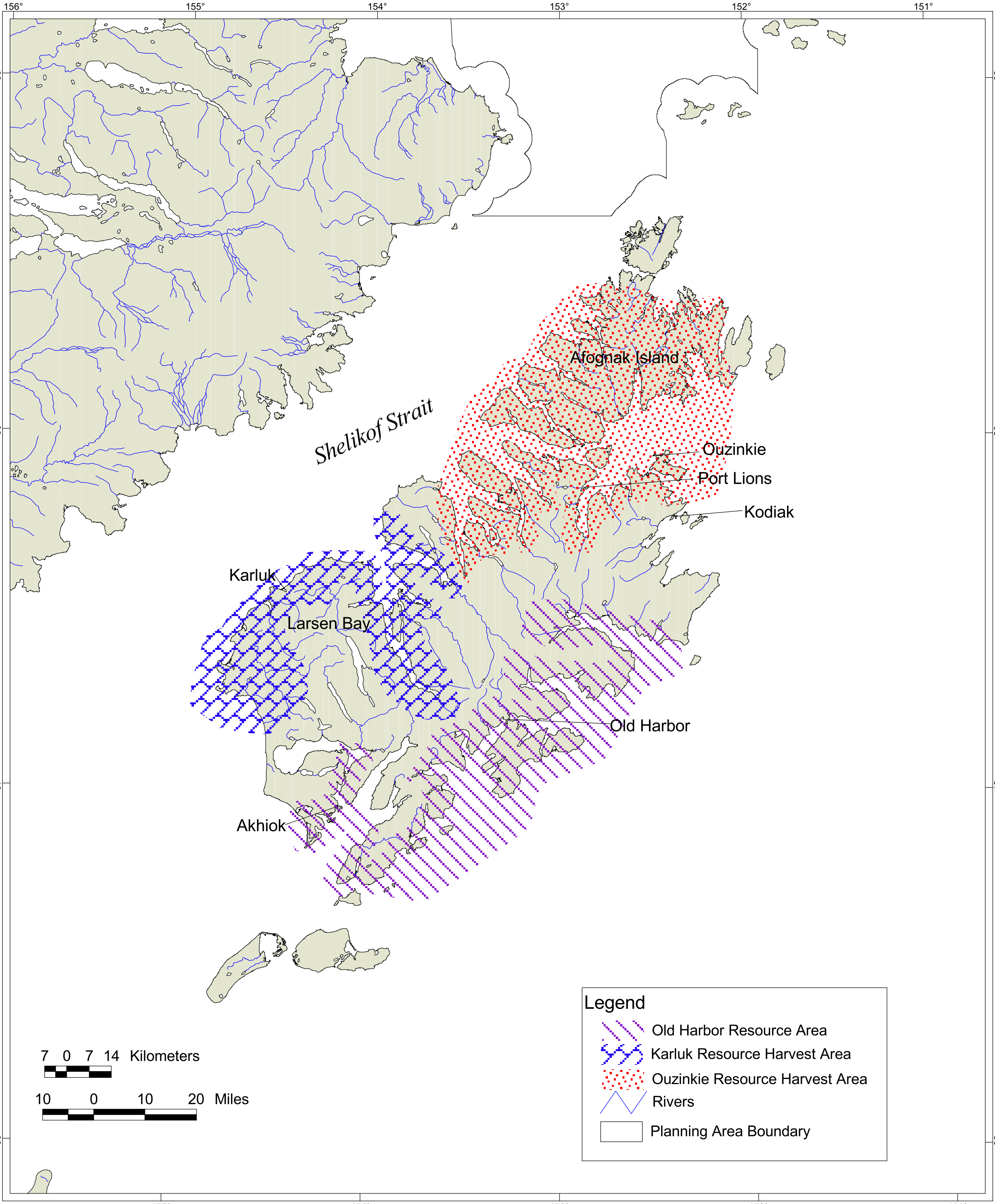
Source: Stanek (1984).

Figure III.C-20 Resource Harvest Areas for Nanwalek and Port Graham



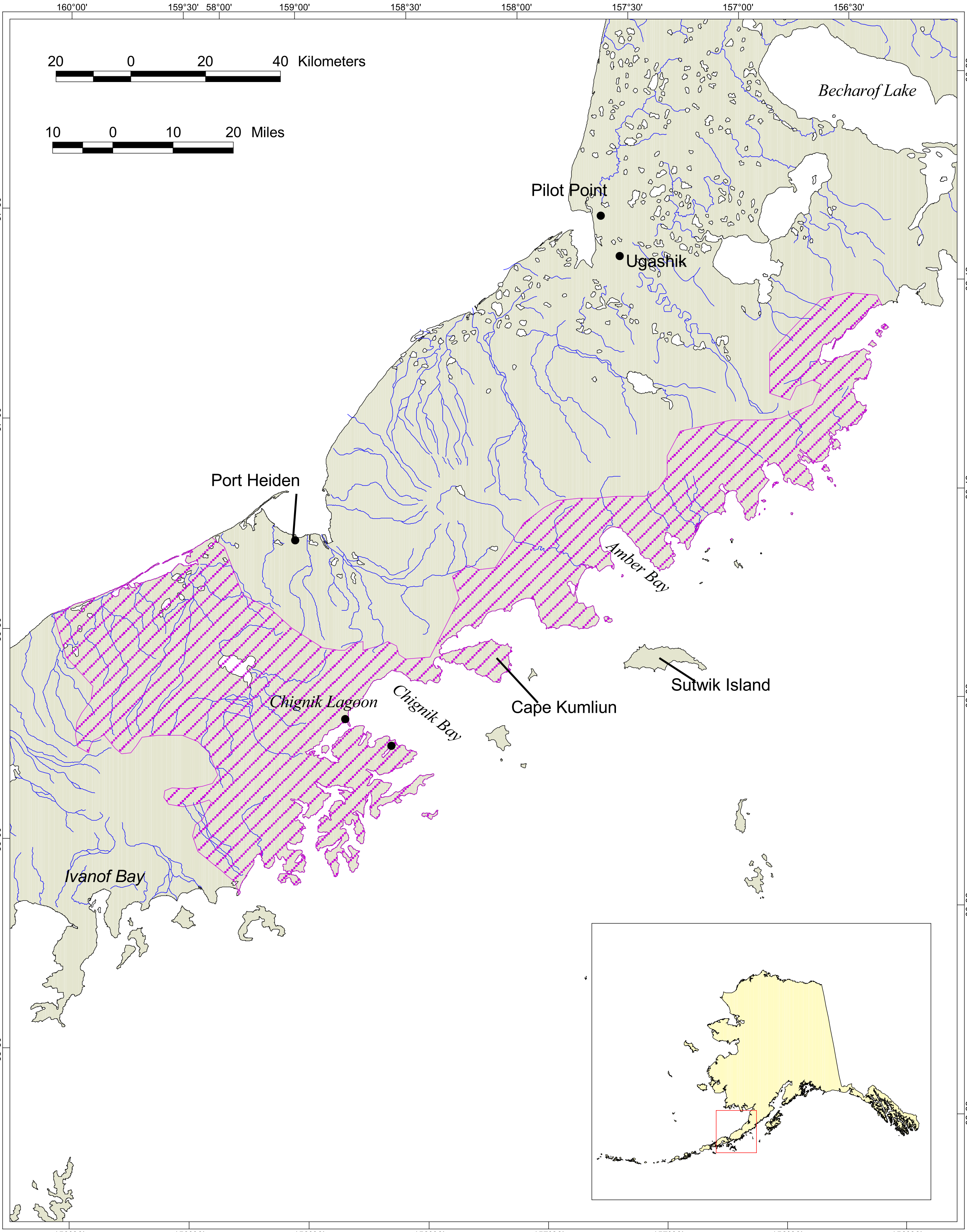
Source: Schroeder et al. (1987).

Figure III.C-21 Akhiok, Larsen Bay, and Port Lions Resource Harvest Areas, 1983



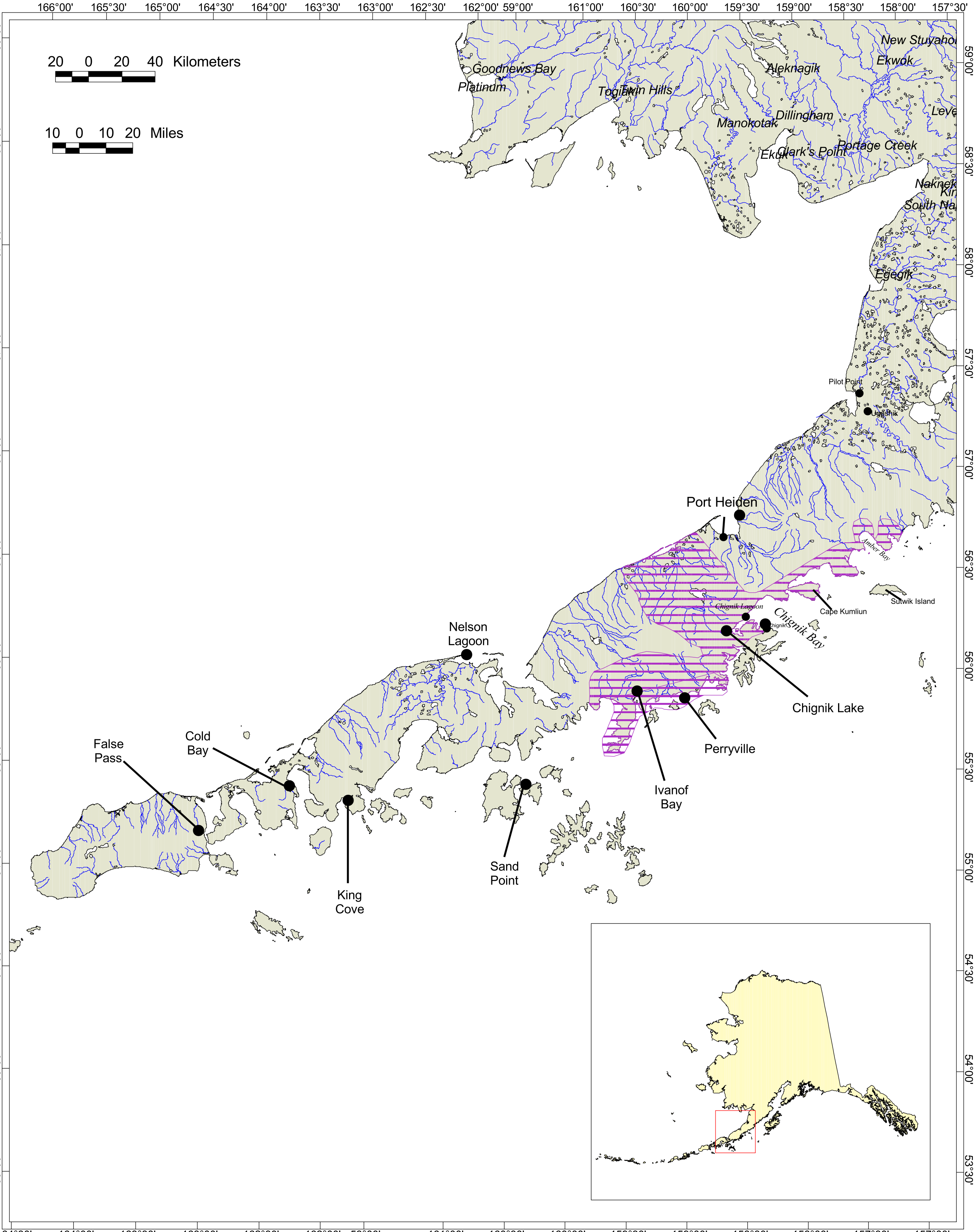
Source: Schroeder et al. (1987).

Figure III.C-22 Karluk, Old Harbor, and Ouzinkie Resource Harvest Areas, 1983



Source: Morris (1987).

Figure III.C-23 Chignik and Chignik Lagoon Resource Harvest Areas, 1962-1983.



Source: Morris (1987).

Figure III.C-24 Chignik Lake, Ivanof Bay, and Perryville Resource Harvest Areas, 1962-1984

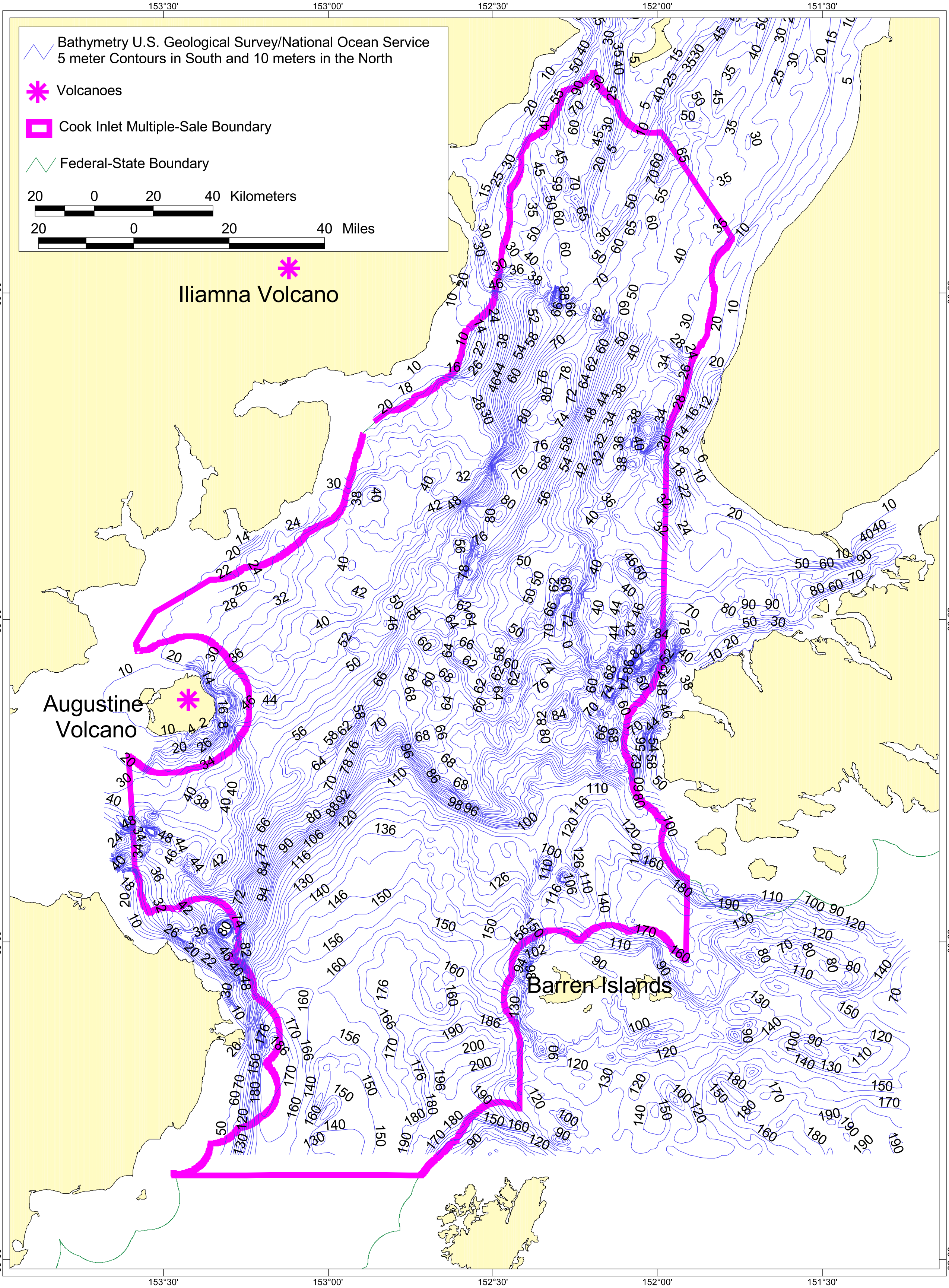
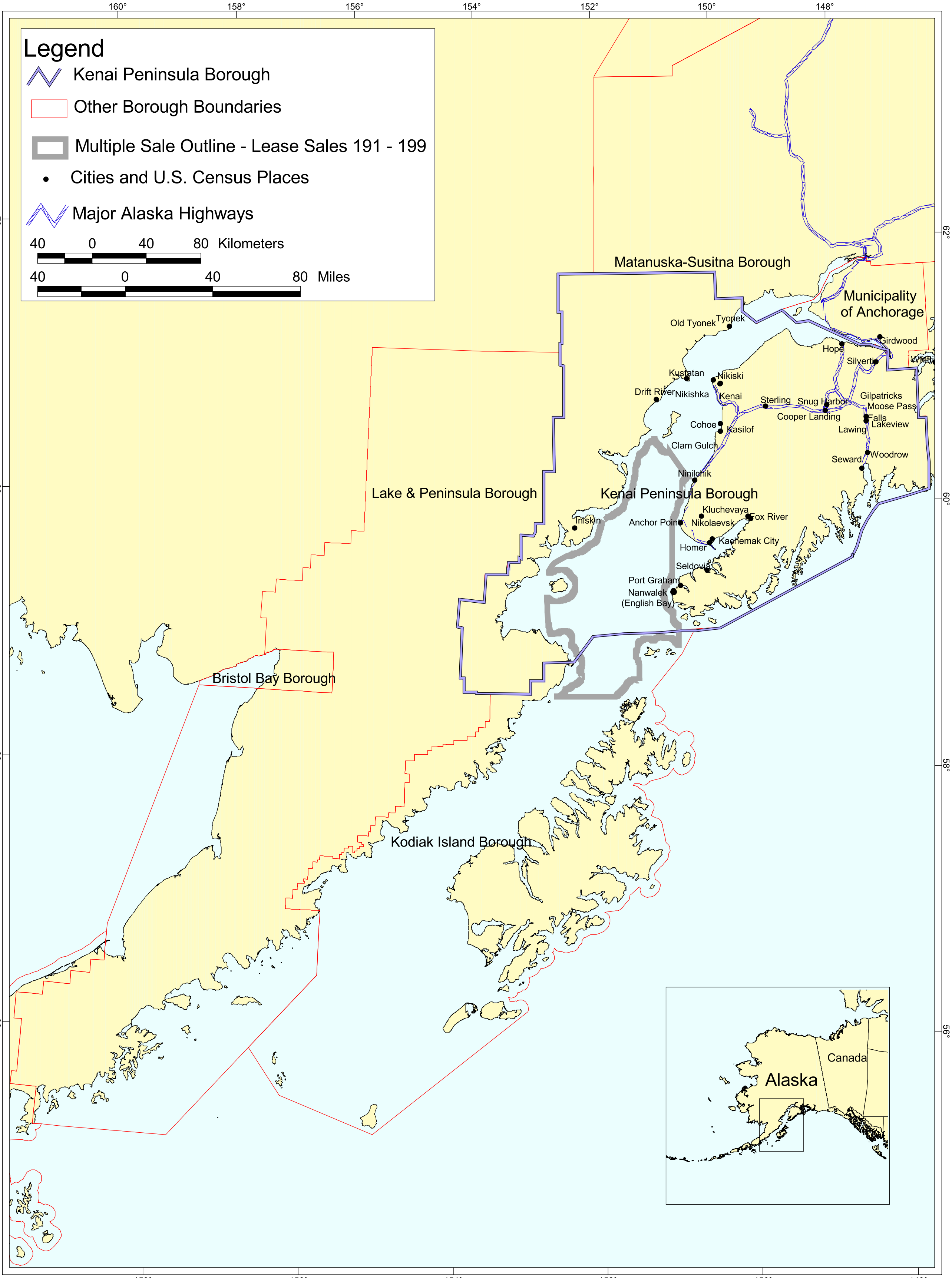
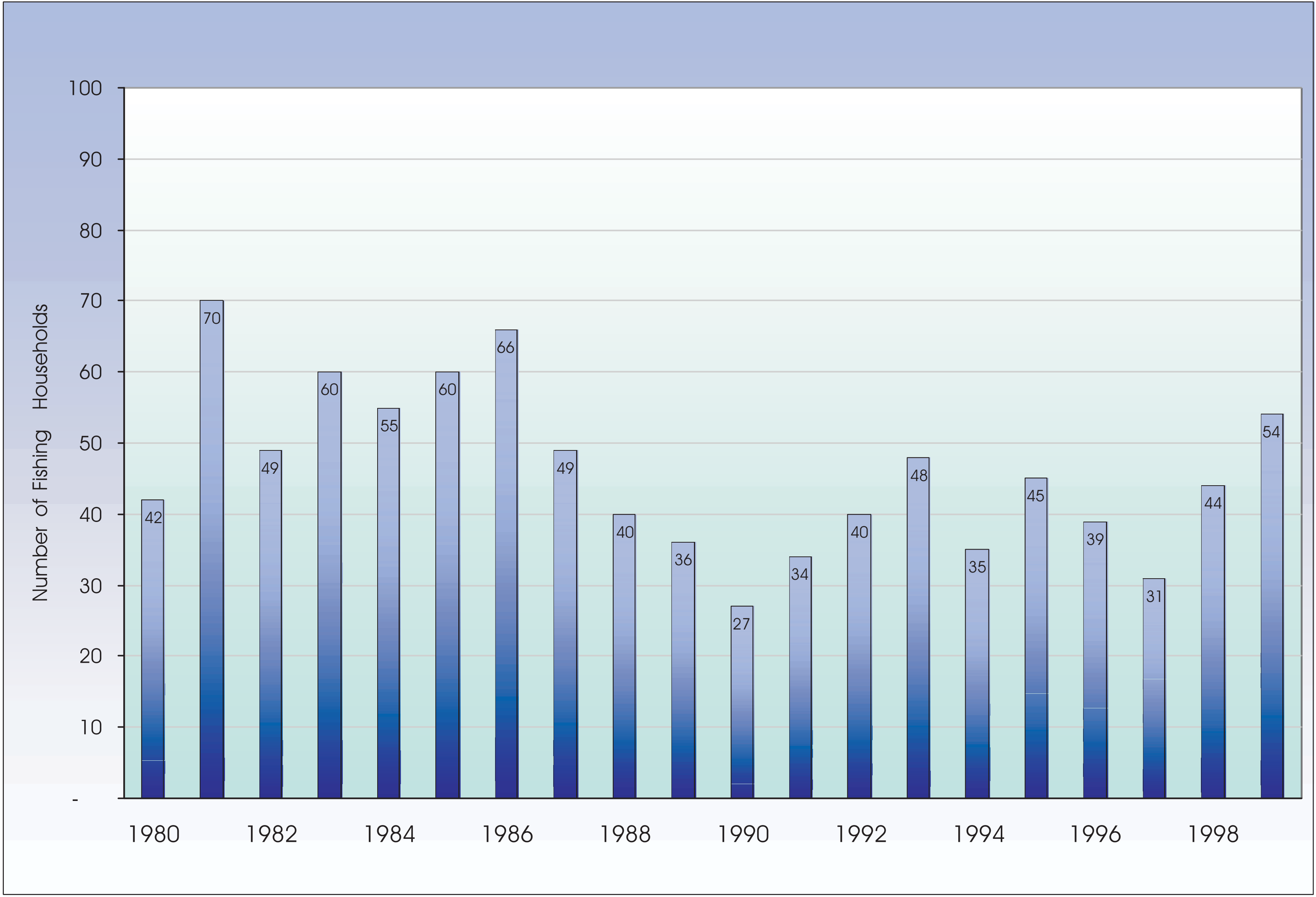


Figure III.C-25 Bathymetry and Physiographic Zones



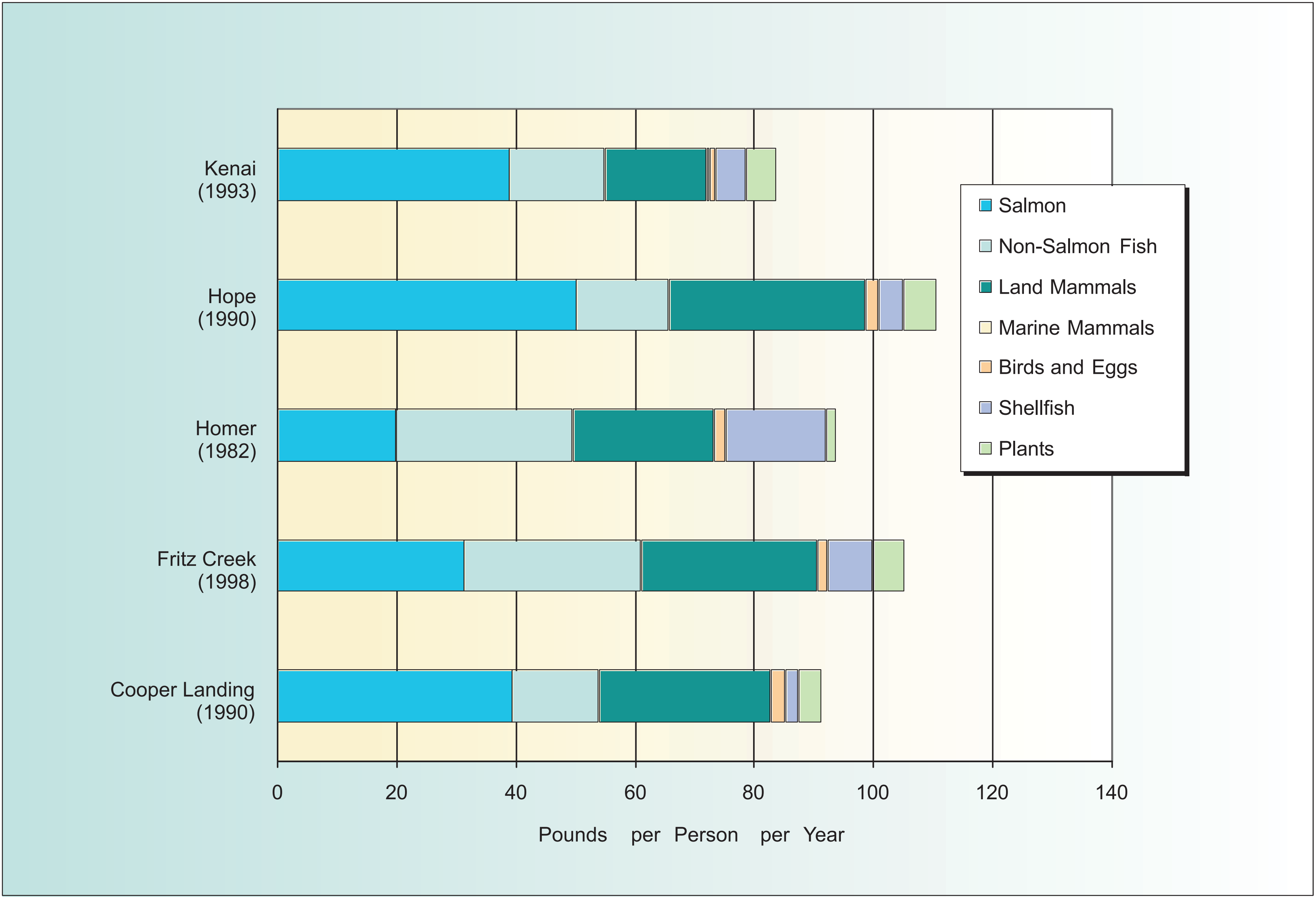
Source: U.S. Census Bureau (2000).

Figure III.C-26   Area Boroughs, Cities, and U.S. Census Places



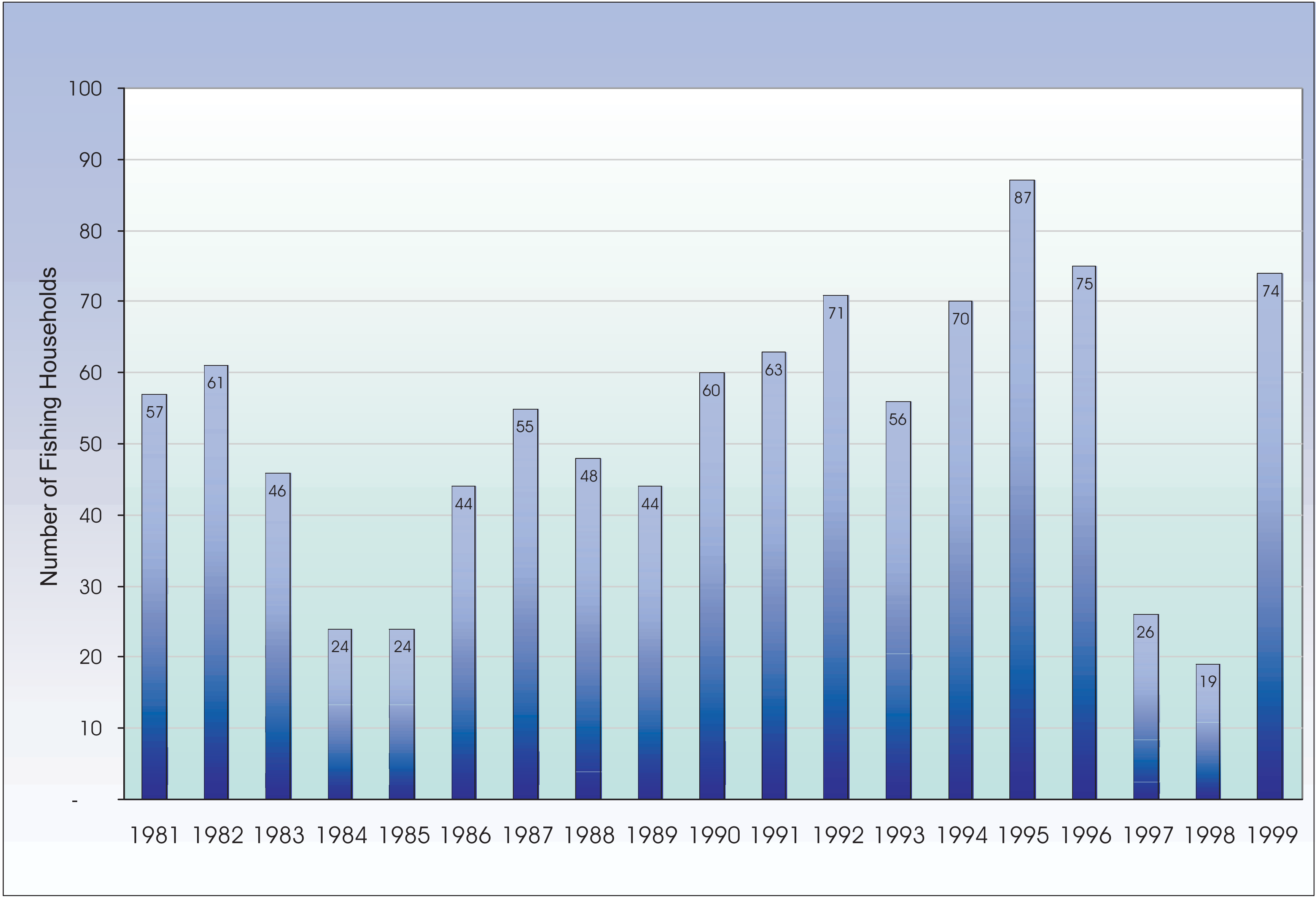
Source: ADFG, Division of Subsistence, 2002 http://www.dced.state.ak.us/AEIS/Kenai/Subsistence/Kenai_Subsistence_Narrative.htm

Figure III.C-27 Number of Fishing Households for Subsistence Salmon, Tyonek Fishery, 1980-1999.



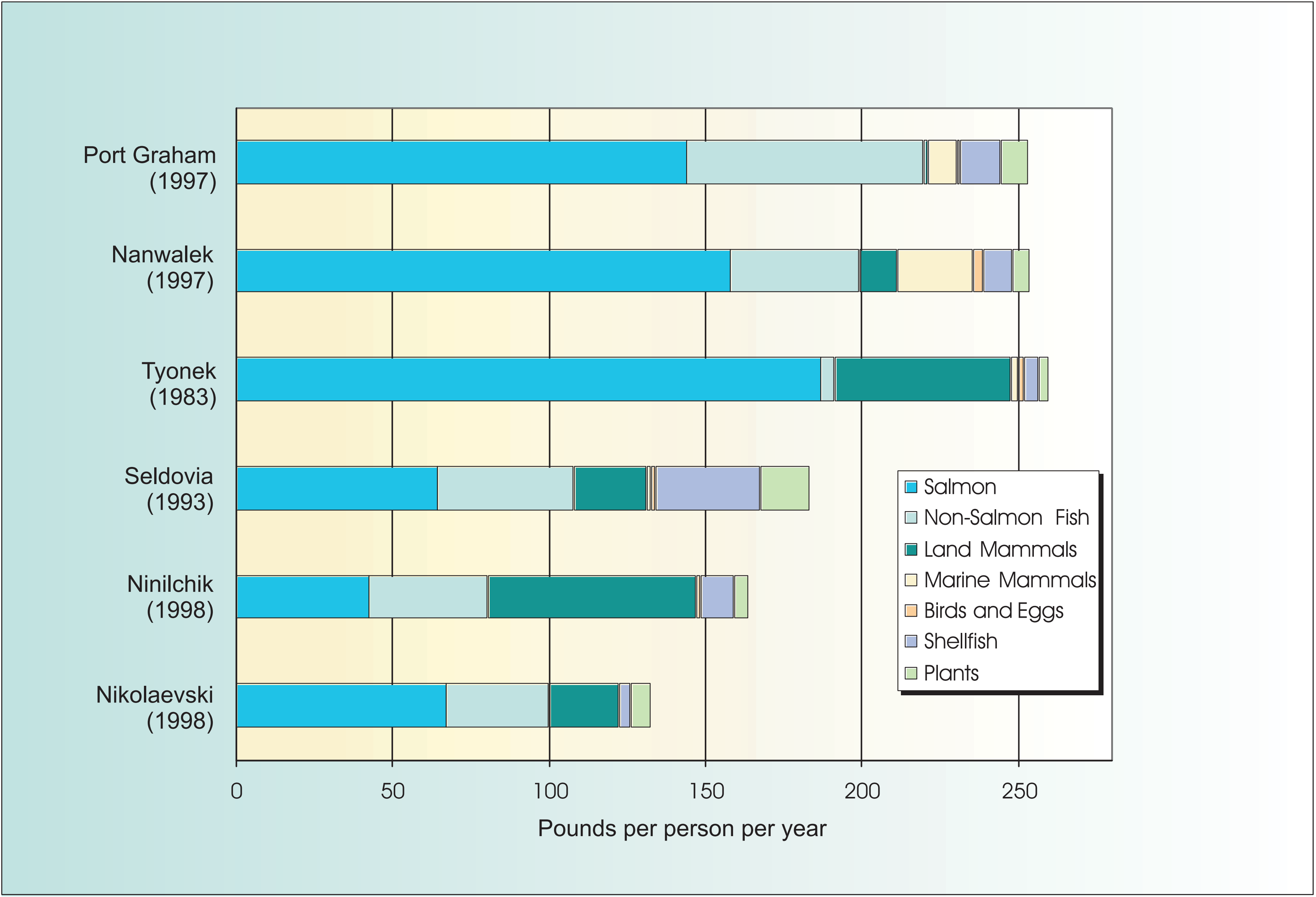
Source: ADFG, Division of Subsistence, 2002

Figure III.C-28 Wild Food Harvest in Five Kenai Peninsula Borough Communities



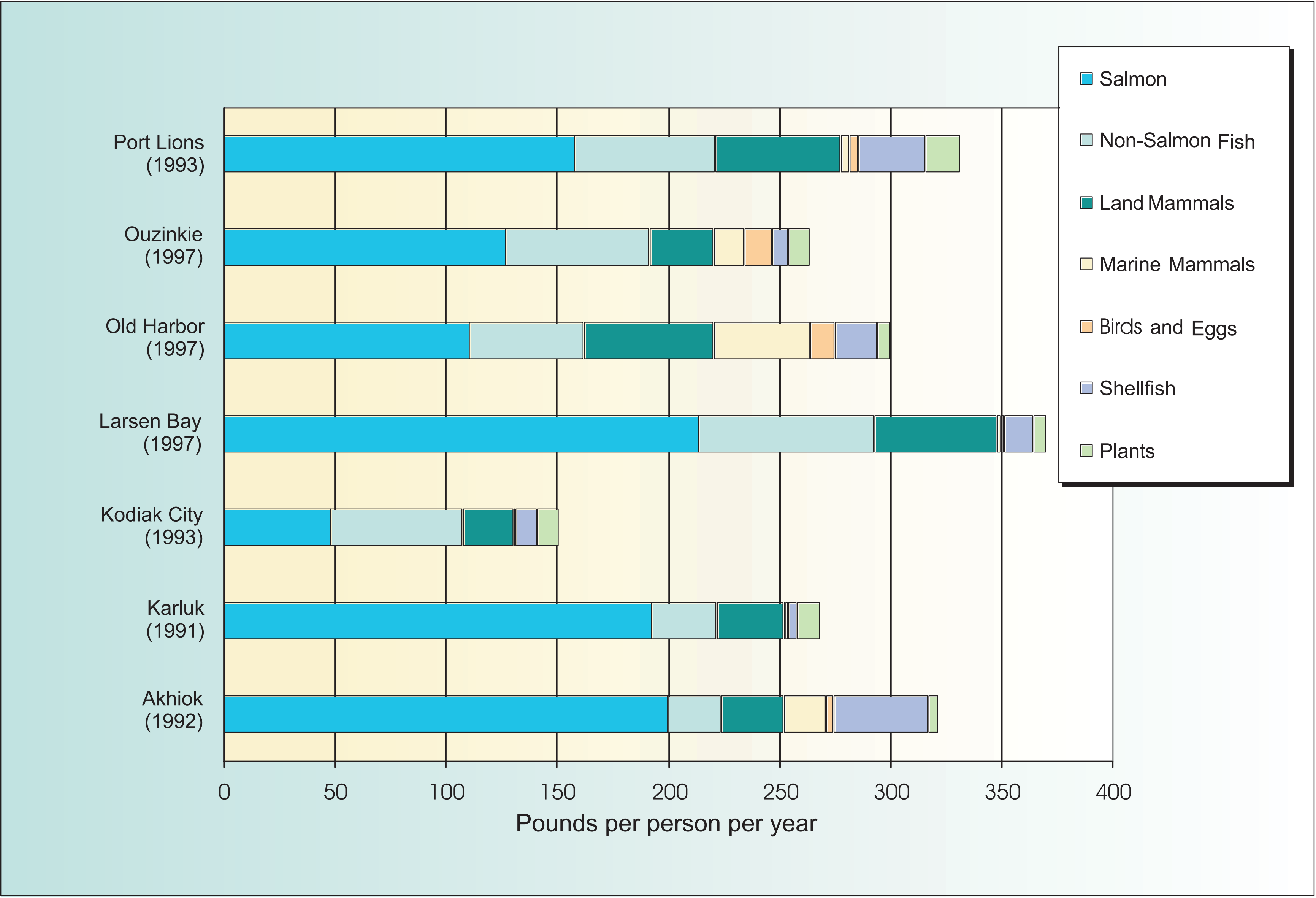
Source: ADFG, Division o of Subsistence, 2002

Figure III.C-29 Number of Fishing Households for Subsistence Salmon - Port Graham Fishery, 1981-1999.



Source: ADFG, Division of Subsistence, 2002

Figure III.C-30 Wild Food Harvest in Six Kenai Peninsula Borough Communities



Source: ADFG, Division of Subsistence, 2002

Figure III.C-31 Wild Food Harvest in Seven Kodiak Island Borough Communities

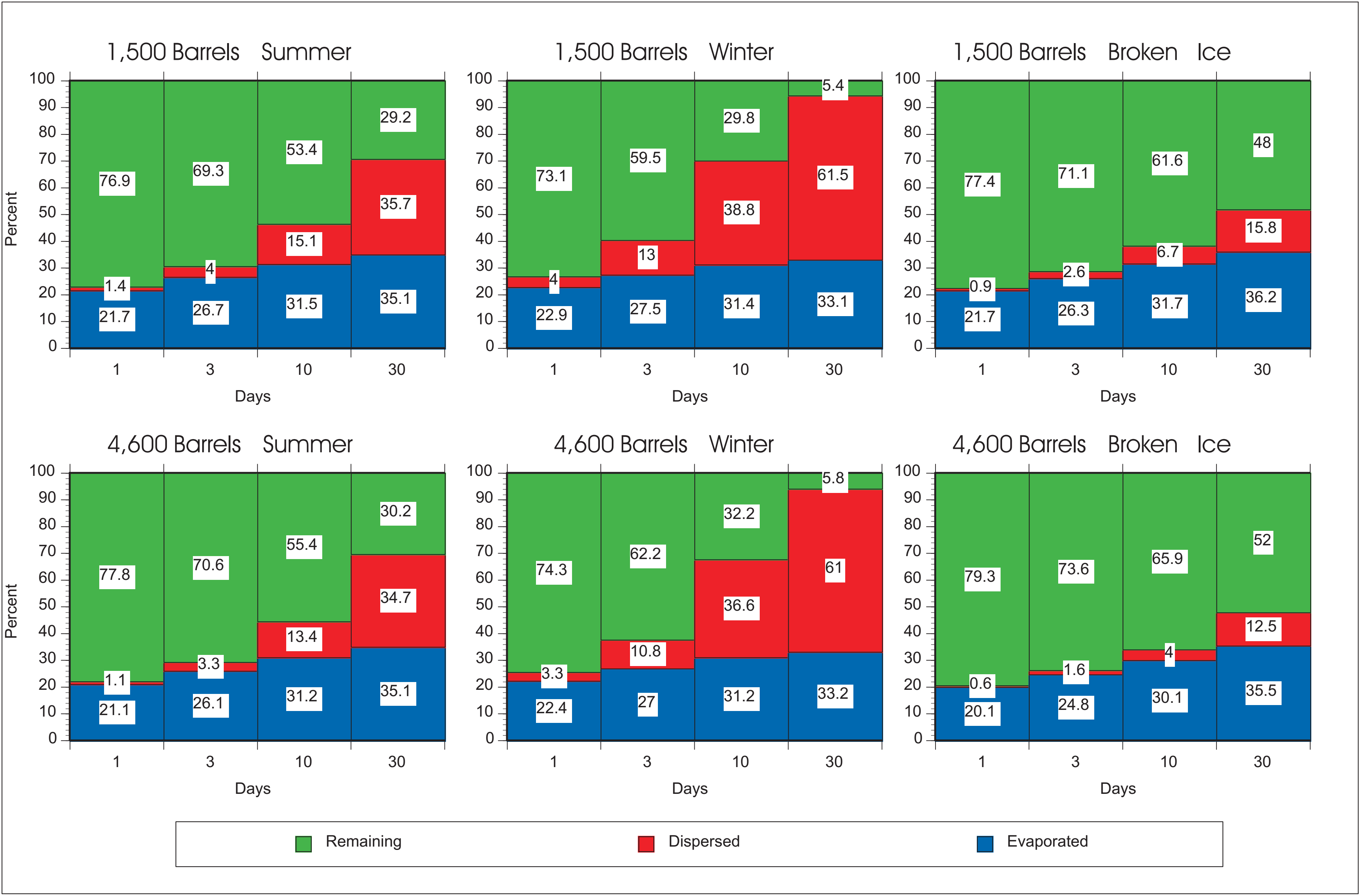


Figure IV.A.-1. Weathering Calculations for a 1,500-Barrel Platform and a 4,600-Barrel Pipeline Spill for Summer and Winter Open Water and Winter Broken Ice

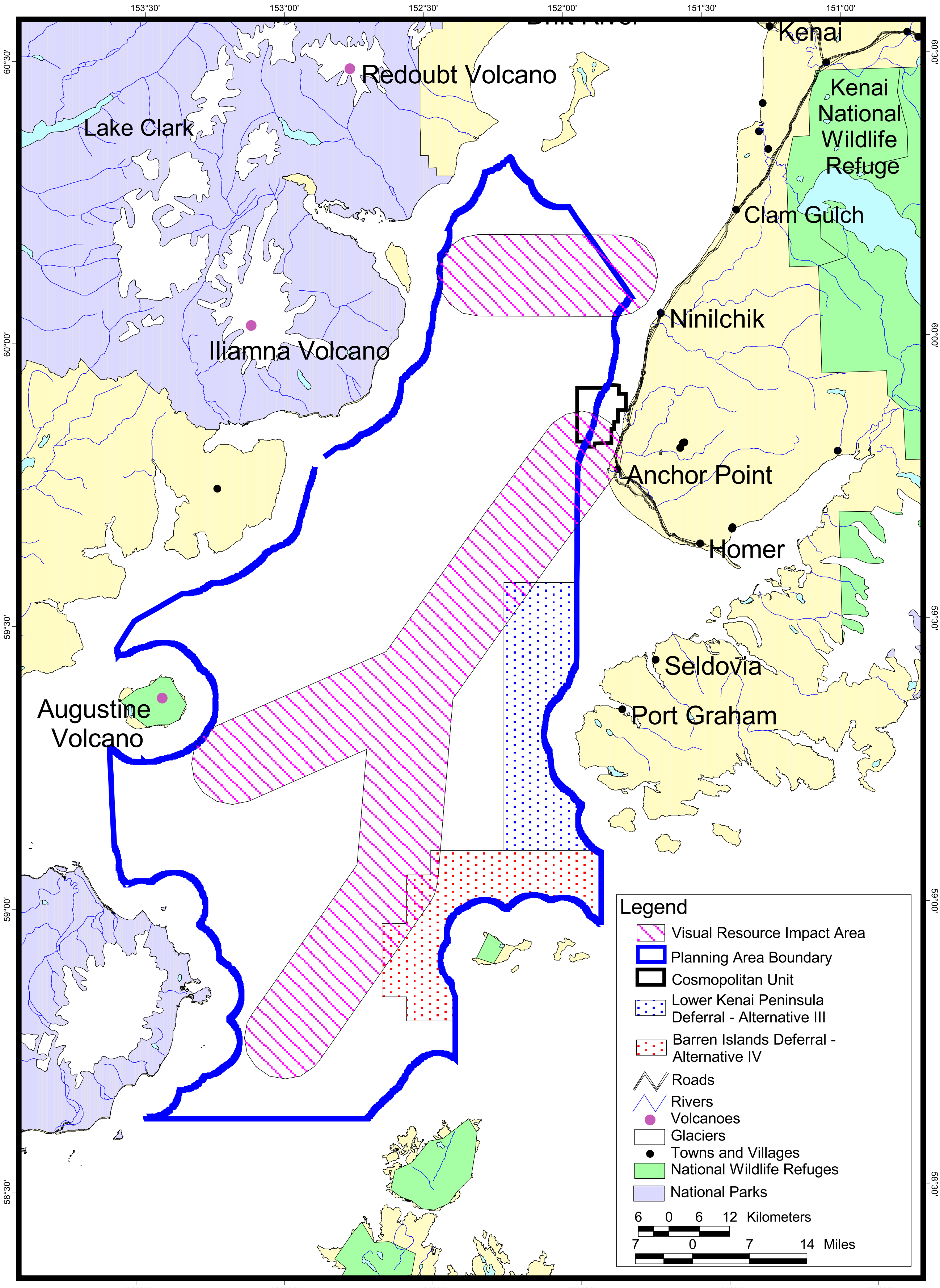


Figure IV.A-2 Visual Resource Impact Area

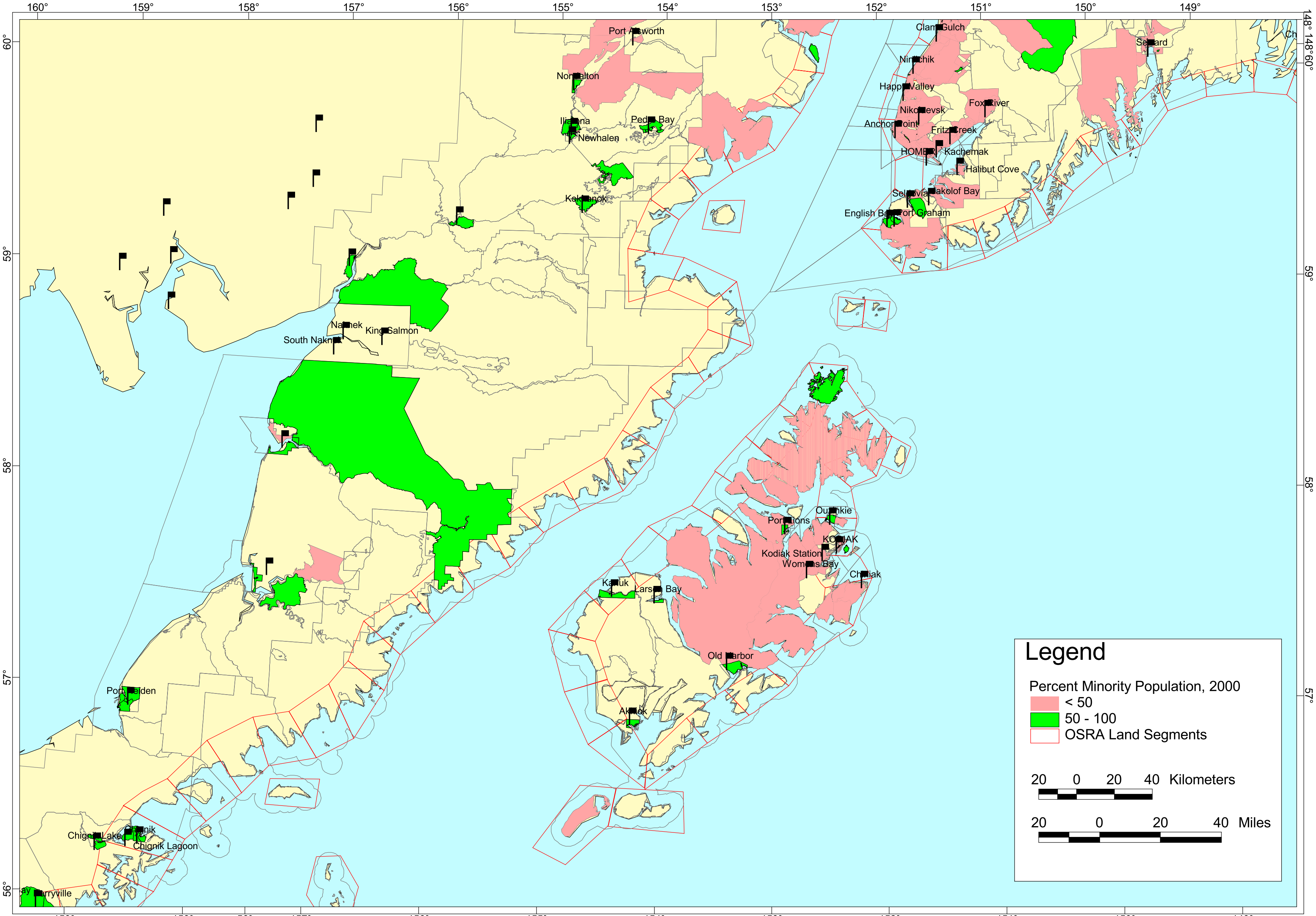


Figure IV.B-1 Percent Minority Population, 2000

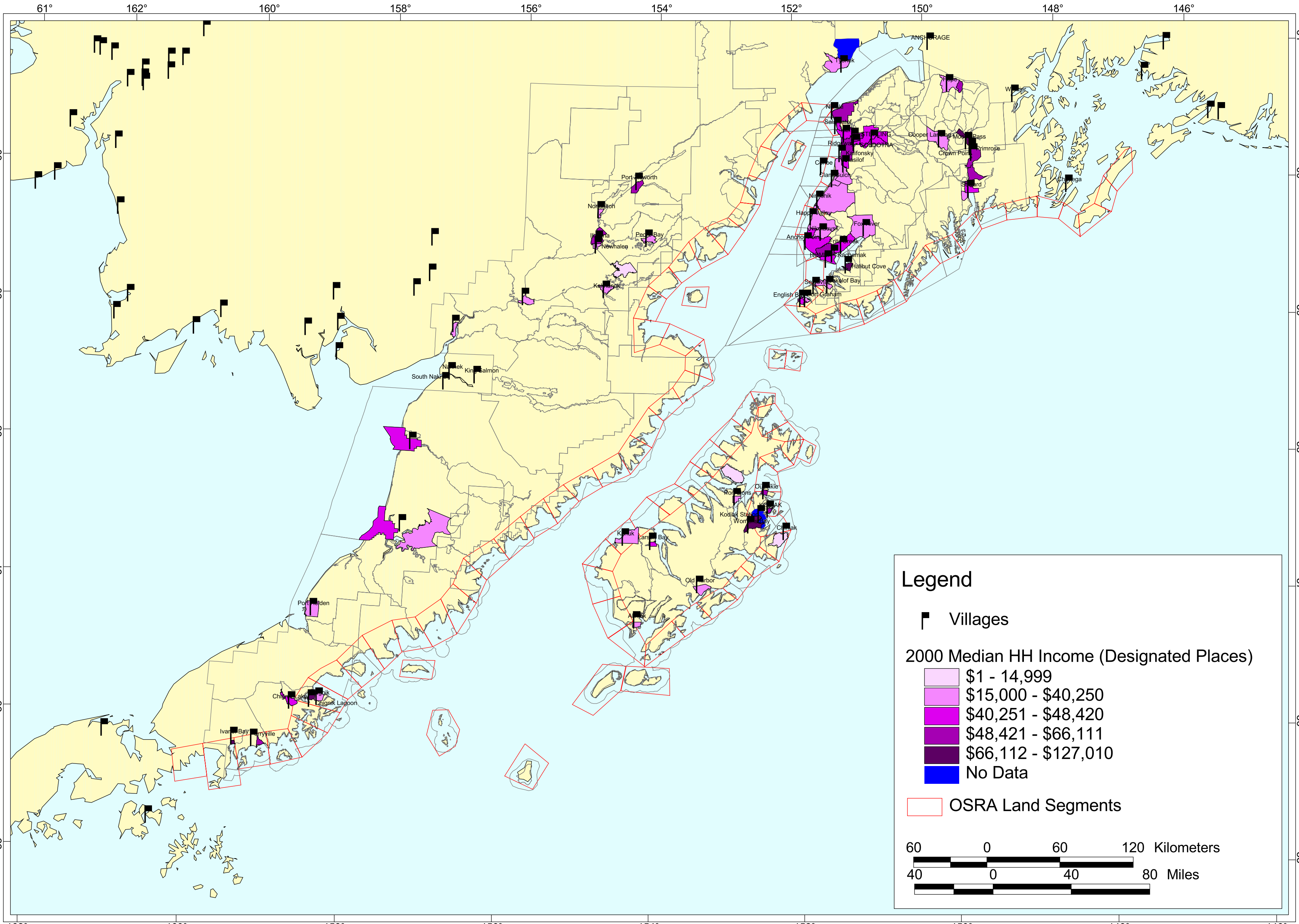
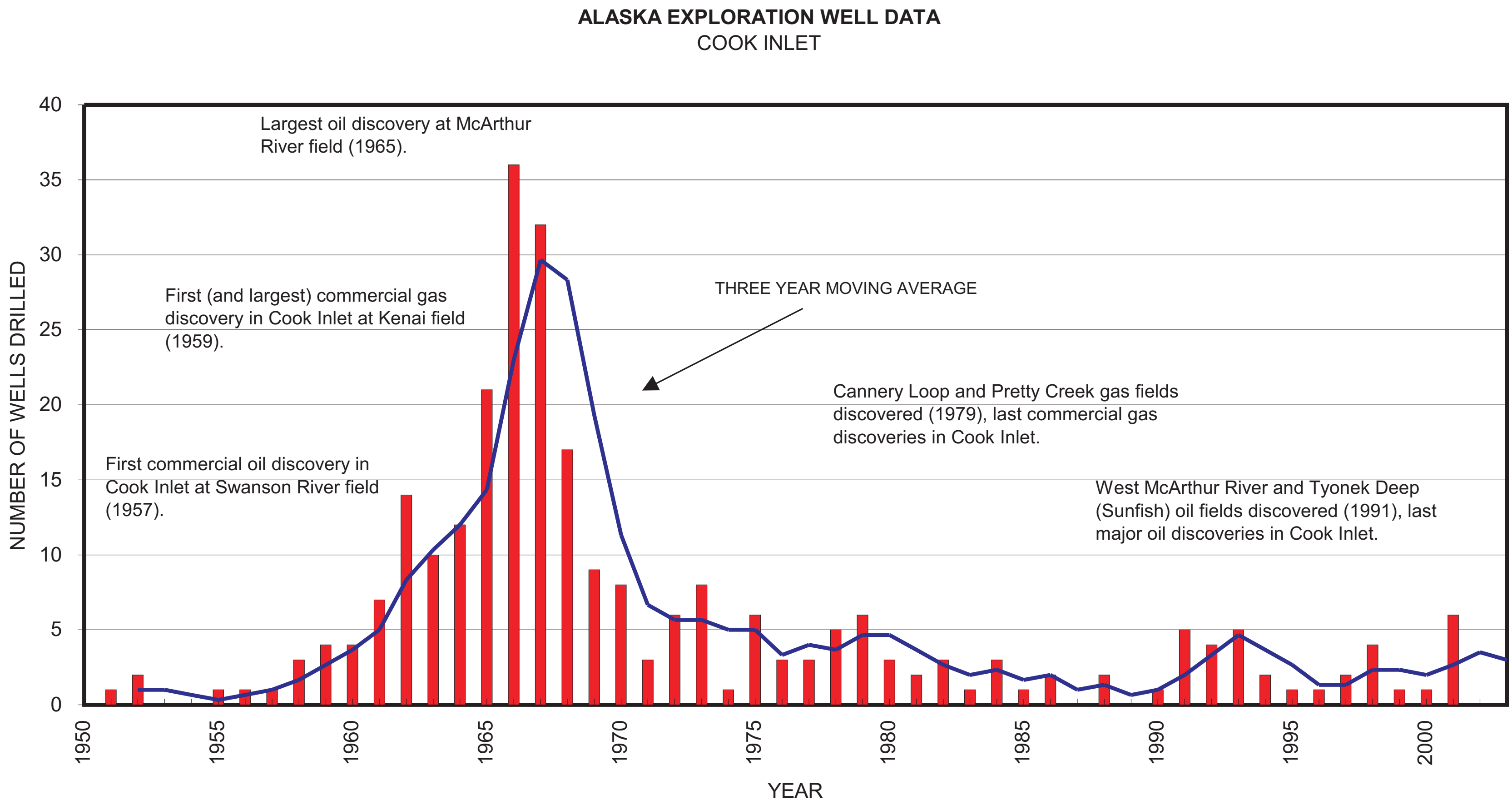


Figure IV.B-2 Median Household Income, Kenai Peninsula, 2000



Source: State of Alaska Department of Natural Resources, Division of Oil and Gas (2002).

Figure V.B-1 Declining Trend of Large Discoveries in the Cook Inlet Basin

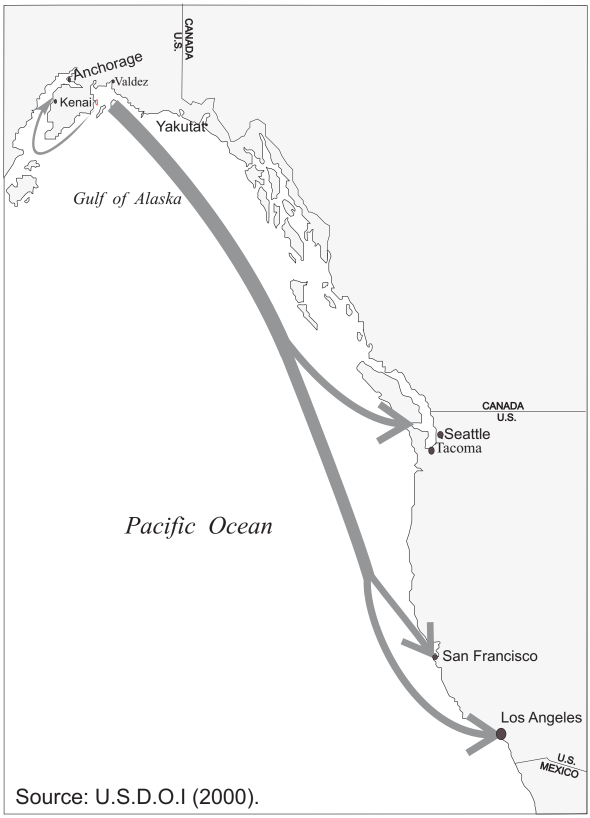


Figure V.B-2 General Tanker Routes and Ports of Entry

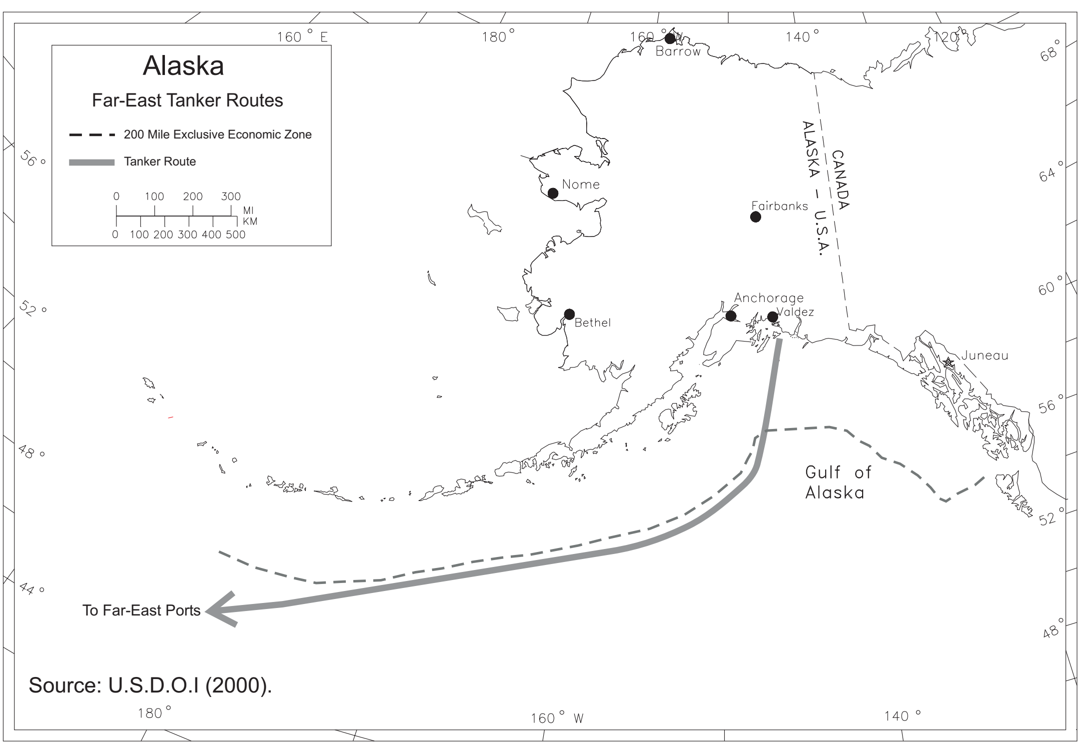
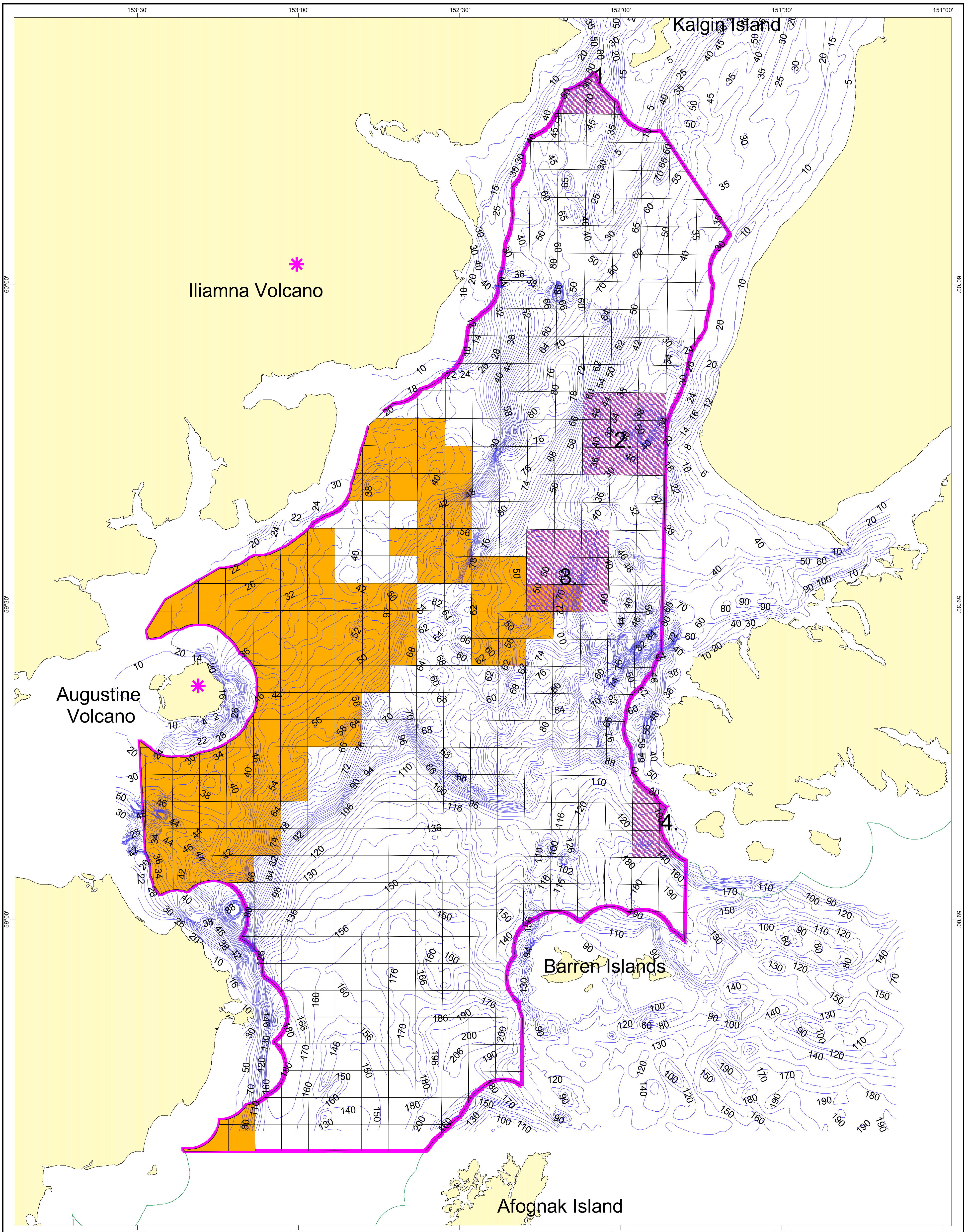


Figure V.B-3 Potential Valdez to Far East Tanker Route

MAPS



Map 1
Archaeology Blocks and Bathymetry of Lower Cook Inlet

Legend

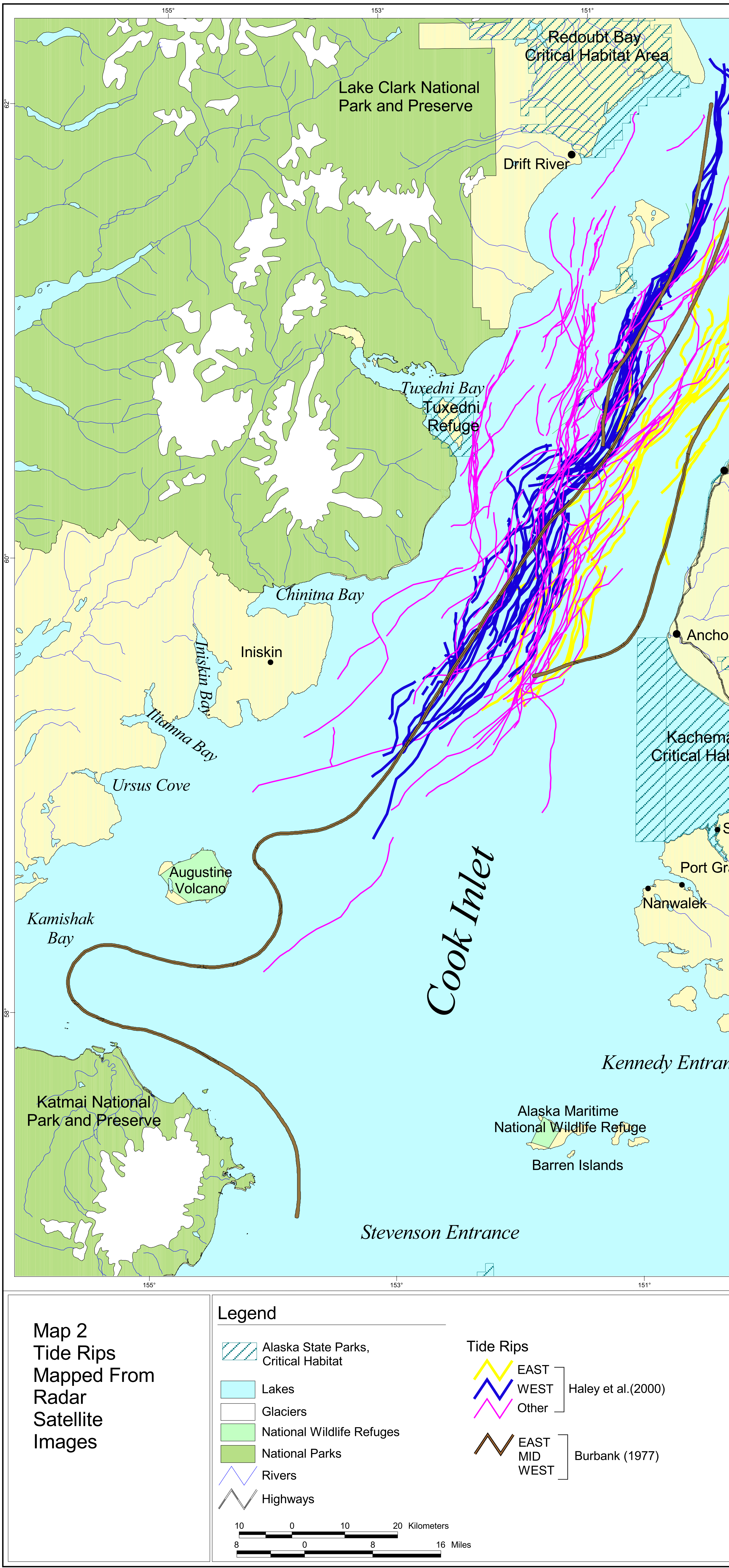
- Bathymetry U.S. Geological Survey/National Oceanic Service 2-meter Contours in the South and 5 meters in the North
- Volcanoes
- Archaeology Blocks (Prehistoric)
- Cook Inlet Multiple Sale Boundary
- Submerged Lands Act Boundary
- Lease Blocks
- Archaeology Blocks (Historic) Based on Reported Vessel Loss Locations of:
  1. Winabob
  2. Kandu
  3. Dynamite Kid
  4. Seldovia

  (See Table III.C-16)

30 0 30 60 Kilometers

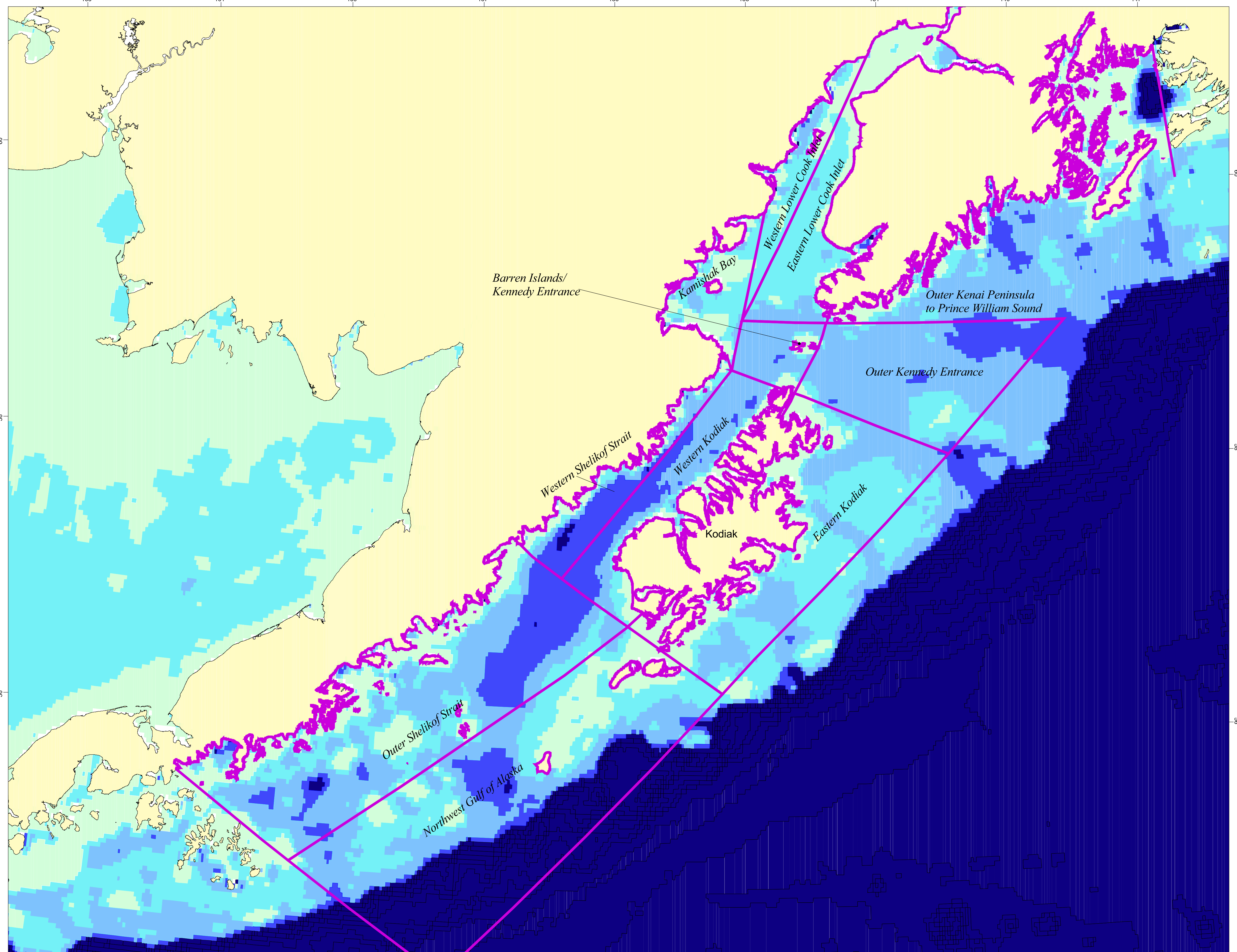
20 0 20 40 Miles

Locator Map



Map 2
Tide Rips
Mapped From
Radar
Satellite
Images

Map 3
Cook Inlet Fish Habitat Areas for Analysis of Essential Fish Habitat in Cook Inlet



Legend

Fish Habitat Analysis Areas

Bathymetry in Meters

- -50 to 0
- -100 to -51
- -200 to -101
- -300 to -201
- < -300

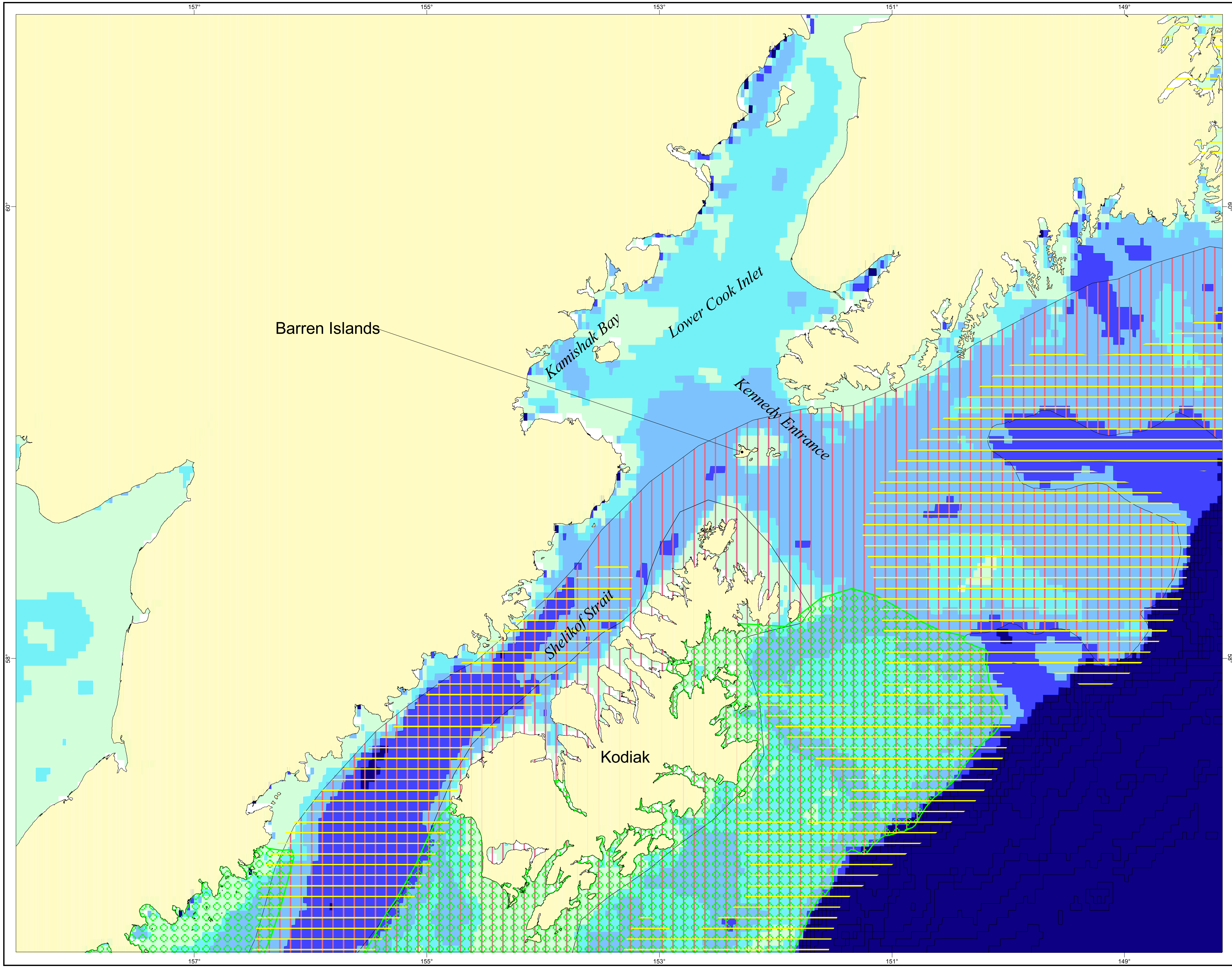
Bathymetry is a National Marine Fisheries Service conversion of ETOP02 bathymetry. ETOP02 is available at http://www.ngdc.noaa.gov/mgg/image/2min relief.html

30 0 30 60 Kilometers

20 0 20 40 Miles

Locator Map

Map 4 Groundfish Essential Fish Habitat in Cook Inlet

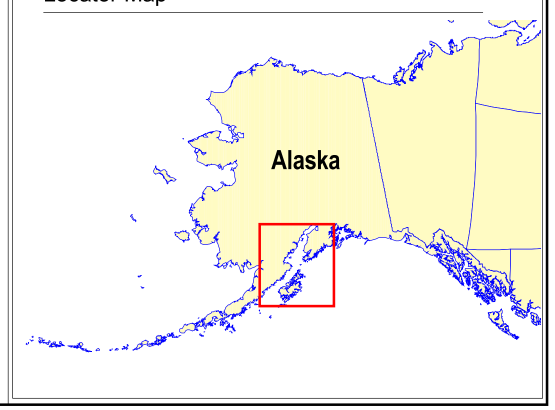


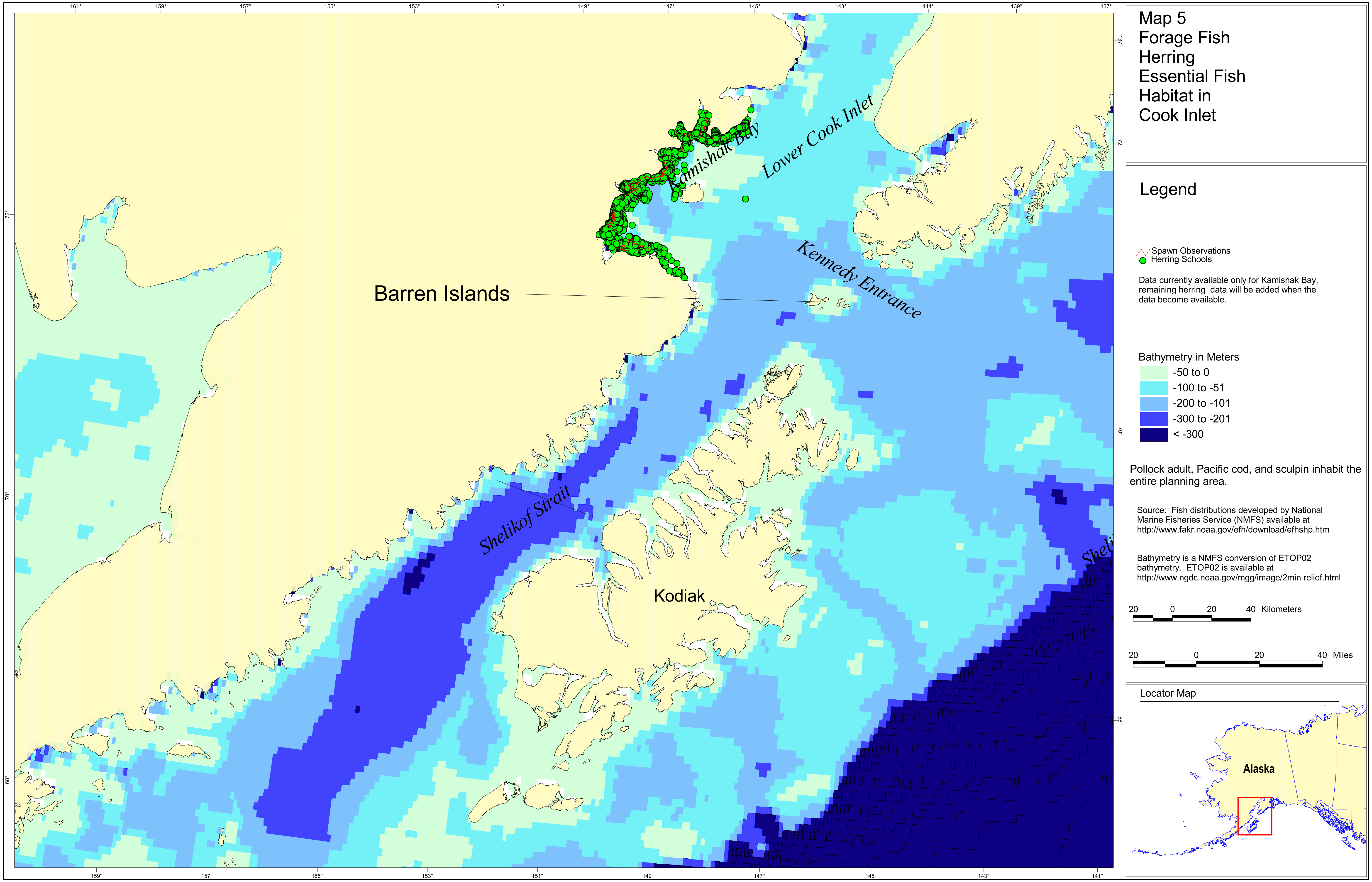
Legend

Source: Fish distributions developed by National Marine Fisheries Service (NMFS) available at http://www.fakr.noaa.gov/efh/download/efhshp.htm

Bathymetry is a NMFS conversion of ETOP02 bathymetry. ETOP02 is available at http://www.ngdc.noaa.gov/mgg/image/2min relief.html

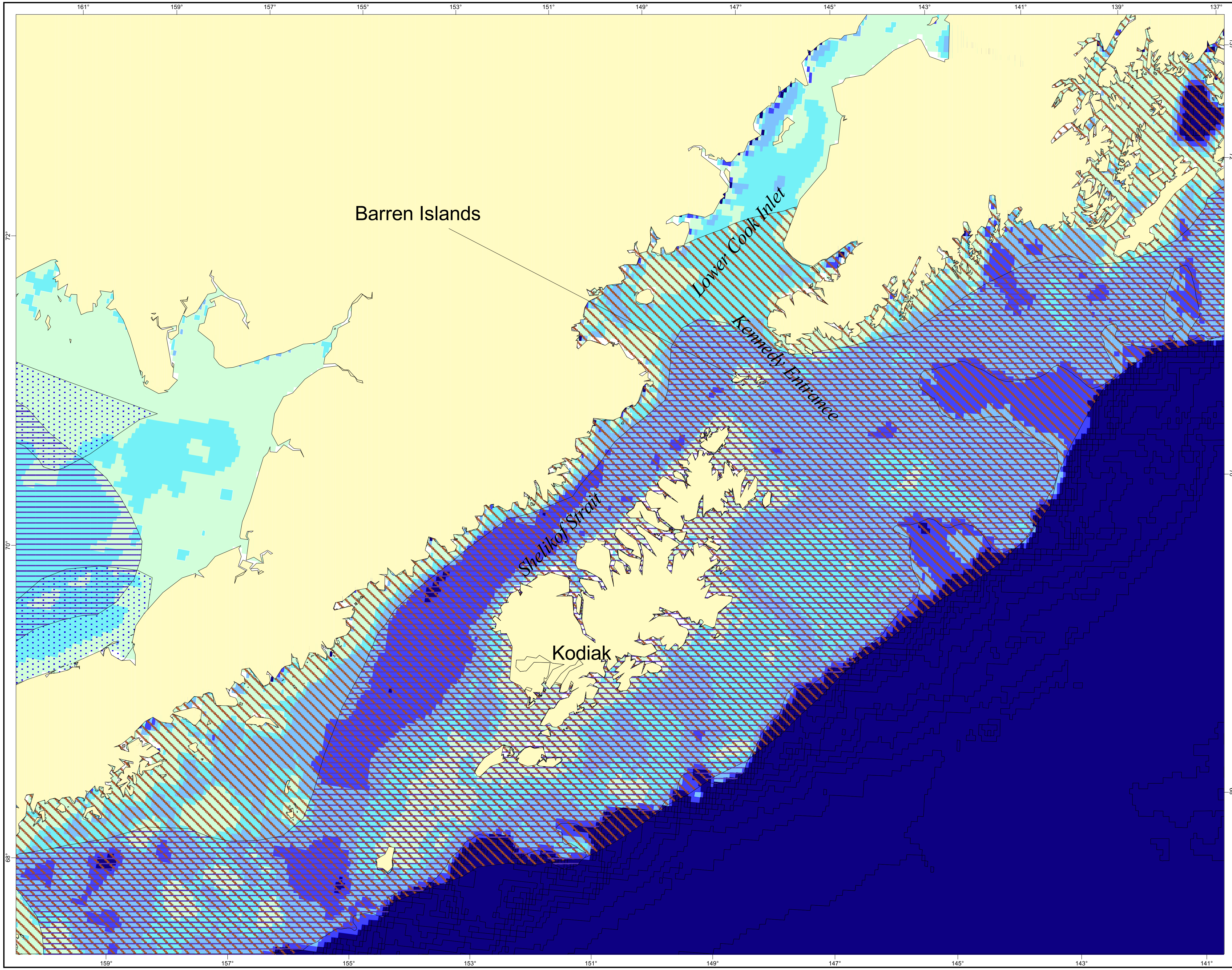
Locator Map





Map 5
Forage Fish
Herring
Essential Fish
Habitat in
Cook Inlet
Legend
Spawn Observations
Herring Schools
Data currently available only for Kamishak Bay, remaining herring data will be added when the data become available.
Bathymetry in Meters
-50 to 0
-100 to -51
-200 to -101
-300 to -201
< -300
Pollock adult, Pacific cod, and sculpin inhabit the entire planning area.
Source: Fish distributions developed by National Marine Fisheries Service (NMFS) available at http://www.fakr.noaa.gov/efh/download/efhshp.htm
Bathymetry is a NMFS conversion of ETOP02 bathymetry. ETOP02 is available at http://www.ngdc.noaa.gov/mgg/image/2min relief.html
20 0 20 40 Kilometers
20 0 20 40 Miles
Locator Map
Alaska
Kamishak Bay
Lower Cook Inlet
Kennedy Entrance
Barren Islands
Shelikof Strait
Kodiak

Map 6
Forage Fish Essential Fish Habitat in Cook Inlet



Legend

- Rainbow Smelt
- Pollock Larvae
- Pollock Eggs

Bathymetry in Meters
- -50 to 0
- -100 to -51
- -200 to -101
- -300 to -201
- < -300

Pollock adult, Pacific cod, and sculpin inhabit the entire planning area.

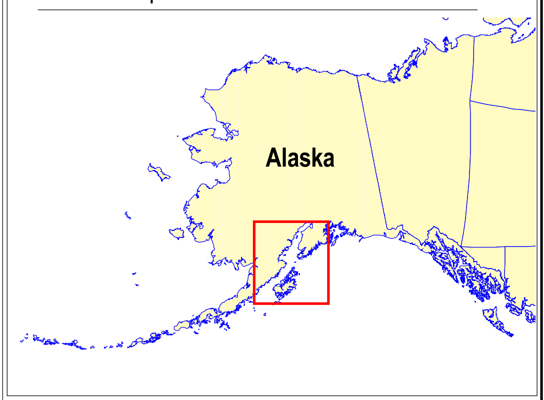
Source: Fish distributions developed by National Marine Fisheries Service (NMFS) available at http://www.fakr.noaa.gov/efh/download/efhshp.htm

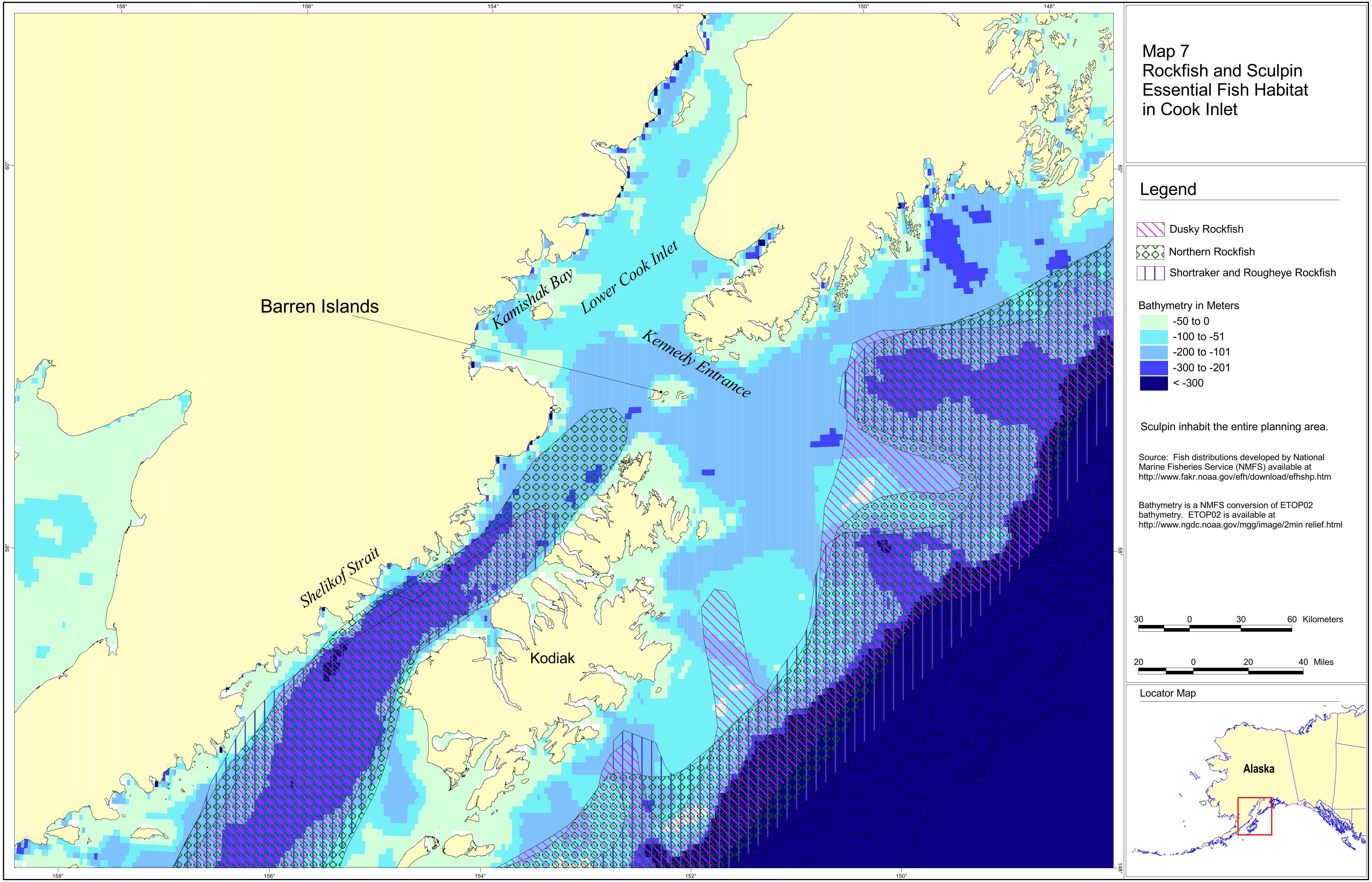
Bathymetry is a NMFS conversion of ETOP02 bathymetry. ETOP02 is available at http://www.ngdc.noaa.gov/mgg/image/2min relief.html

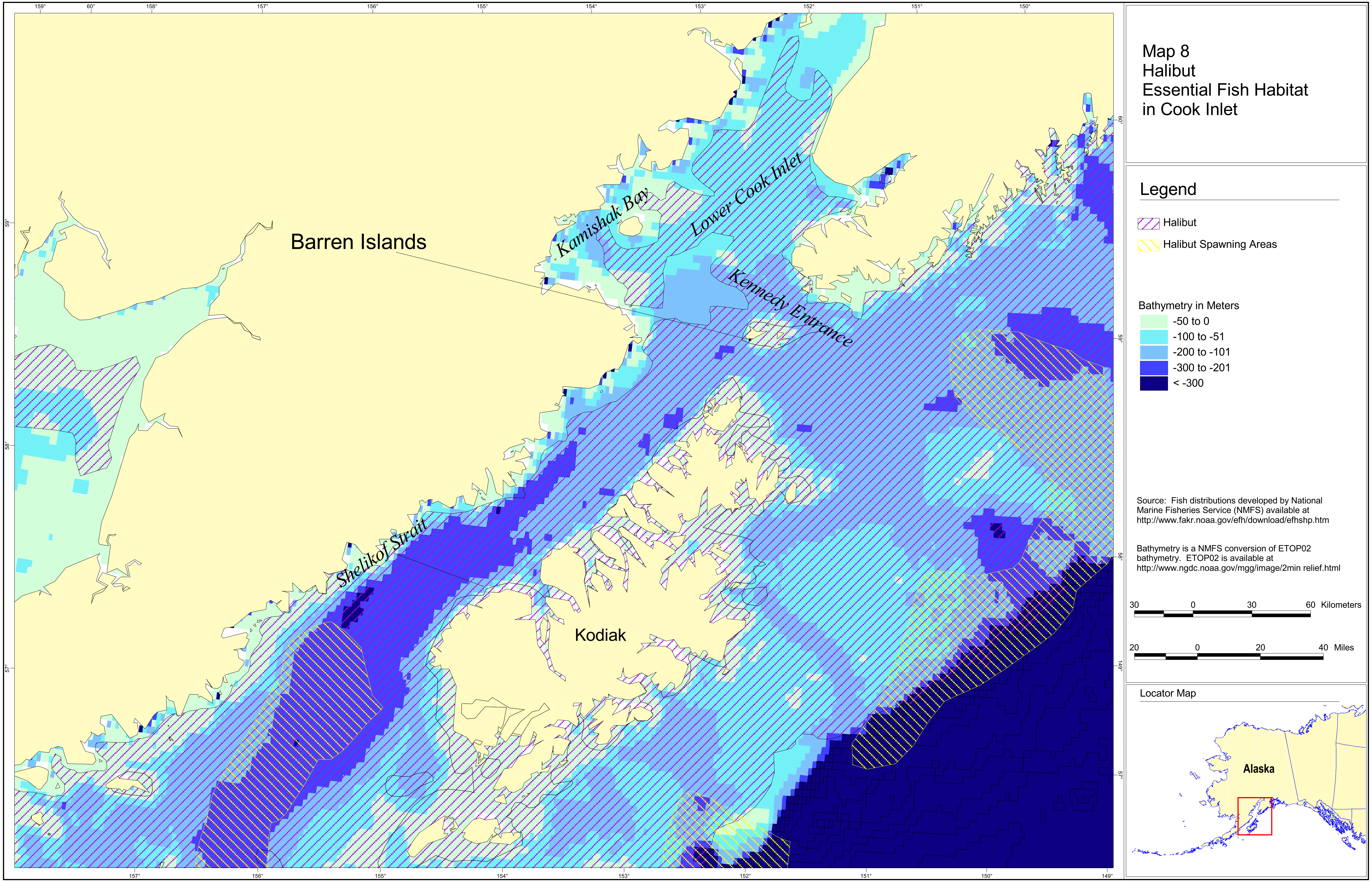
40 0 40 80 Kilometers

30 0 30 60 Miles

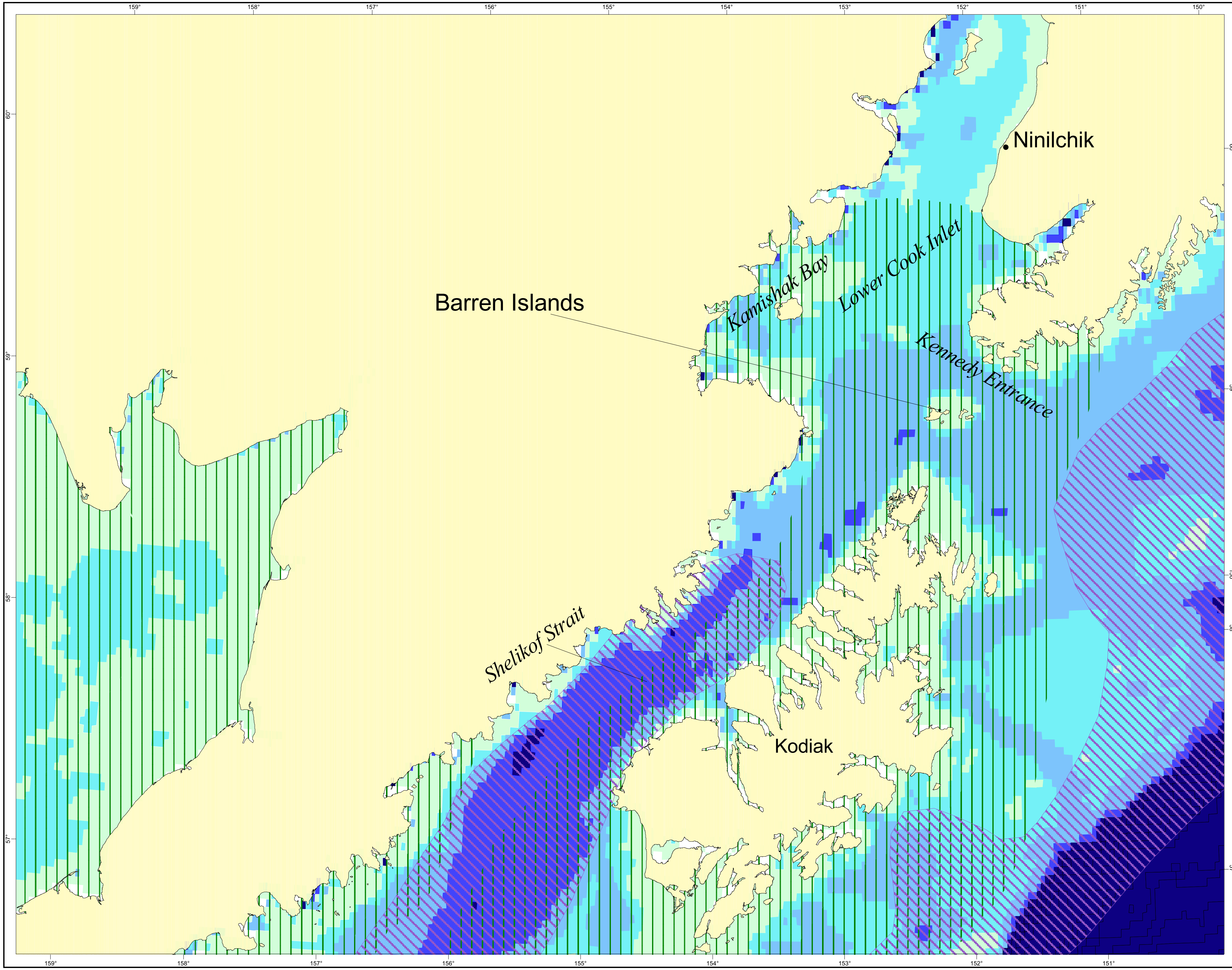
Locator Map




Map 7
Rockfish and Sculpin
Essential Fish Habitat
in Cook Inlet
Legend
Dusky Rockfish
Northern Rockfish
Shortraker and Rougheye Rockfish
Bathymetry in Meters
-50 to 0
-100 to -51
-200 to -101
-300 to -201
< -300
Sculpin inhabit the entire planning area.
Source: Fish distributions developed by National Marine Fisheries Service (NMFS) available at http://www.fakr.noaa.gov/efh/download/efhshp.htm
Bathymetry is a NMFS conversion of ETOP02 bathymetry. ETOP02 is available at http://www.ngdc.noaa.gov/mgg/image/2min relief.html
30 0 30 60 Kilometers
20 0 20 40 Miles
Locator Map
Alaska
Barren Islands
Kamishak Bay
Lower Cook Inlet
Kennedy Entrance
Shelikof Strait
Kodiak
158°
156°
154°
152°
150°
148°
60°
58°



Map 8
Halibut
Essential Fish Habitat
in Cook Inlet
Legend
Halibut
Halibut Spawning Areas
Bathymetry in Meters
-50 to 0
-100 to -51
-200 to -101
-300 to -201
< -300
Source: Fish distributions developed by National Marine Fisheries Service (NMFS) available at http://www.fakr.noaa.gov/efh/download/efhshp.htm
Bathymetry is a NMFS conversion of ETOP02 bathymetry. ETOP02 is available at http://www.ngdc.noaa.gov/mgg/image/2min relief.html
30 0 30 60 Kilometers
20 0 20 40 Miles
Locator Map
Alaska
Barren Islands
Kamishak Bay
Lower Cook Inlet
Kennedy Entrance
Shelikof Strait
Kodiak



Map 9
Flounders
Essential Fish Habitat
in Cook Inlet

Legend

Dover Sole

Yellowfin Sole

Bathymetry in Meters

-50 to 0

-100 to -51

-200 to -101

-300 to -201

< -300

Arrowtooth flounder inhabit entire planning area.
Flathead sole and rock sole inhabit entire planning area from Ninilchik south.

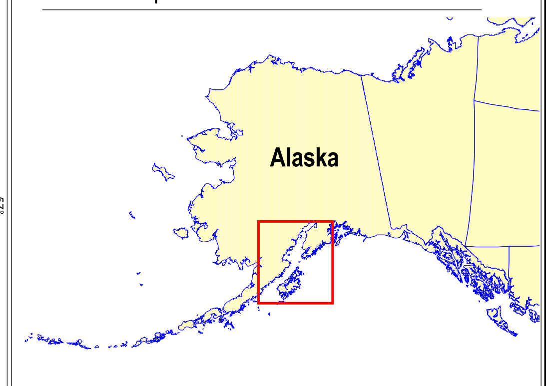
Source: Fish distributions developed by National Marine Fisheries Service (NMFS) available at http://www.fakr.noaa.gov/efh/download/efhshp.htm

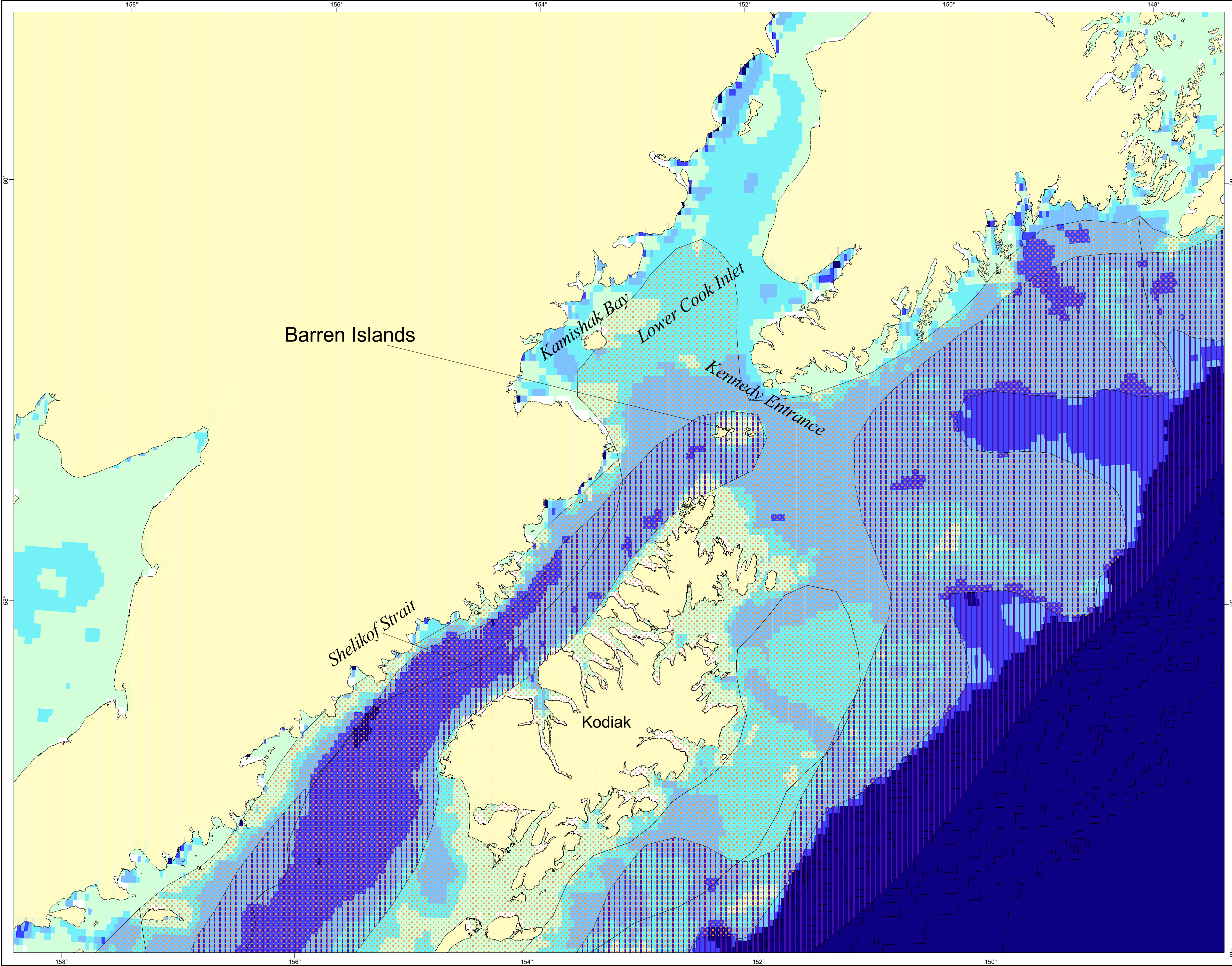
Bathymetry is a NMFS conversion of ETOP02 bathymetry. ETOP02 is available at http://www.ngdc.noaa.gov/mgg/image/2min relief.html

30 0 30 60 Kilometers

20 0 20 40 Miles

Locator Map





Map 10
Scallops and Perch Essential Fish Habitat in Cook Inlet

Legend

- Weathervane Scallops
- Pacific Ocean Perch

Bathymetry in Meters

- -50 to 0
- -100 to -51
- -200 to -101
- -300 to -201
- < -300

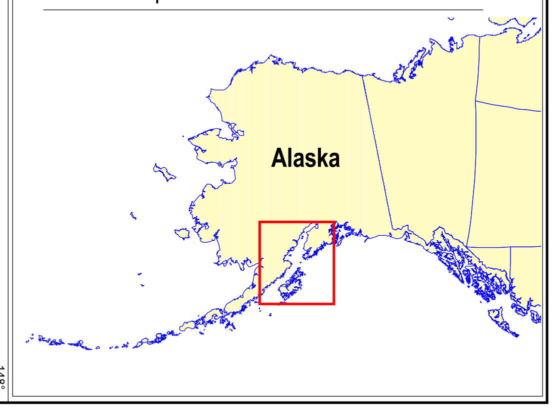
Source: Fish distributions developed by National Marine Fisheries Service (NMFS) available at http://www.fakr.noaa.gov/efh/download/efhshp.htm

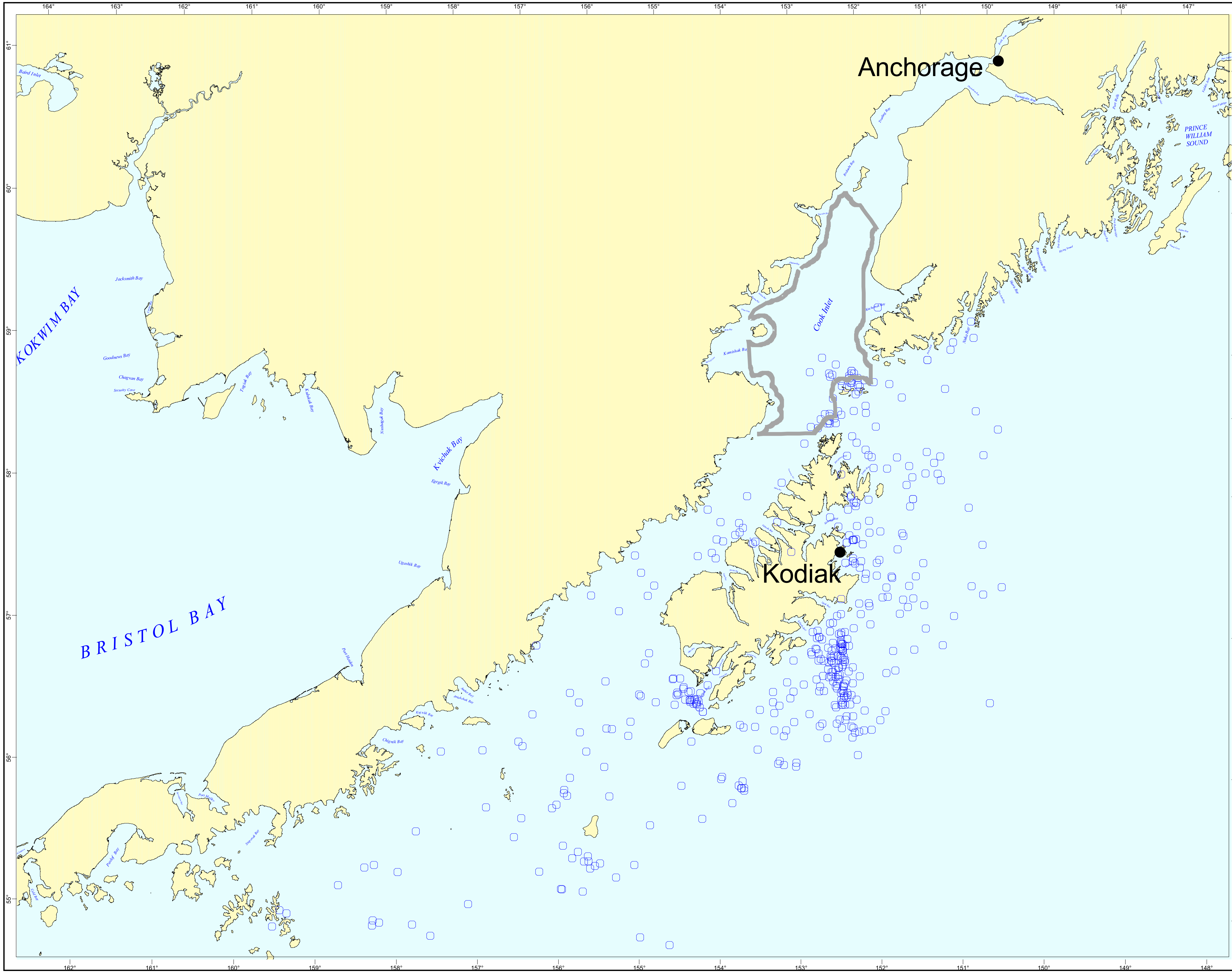
Bathymetry is a NMFS conversion of ETOP02 bathymetry. ETOP02 is available at http://www.ngdc.noaa.gov/mgg/image/2min relief.html

30 0 30 60 Kilometers

20 0 20 40 Miles

Locator Map





Map 11
Sightings of Endangered Humpback Whales Between 1980 and 1997 in Areas Near the Proposed OCS Cook Inlet Program Area

Legend

Humpback whale

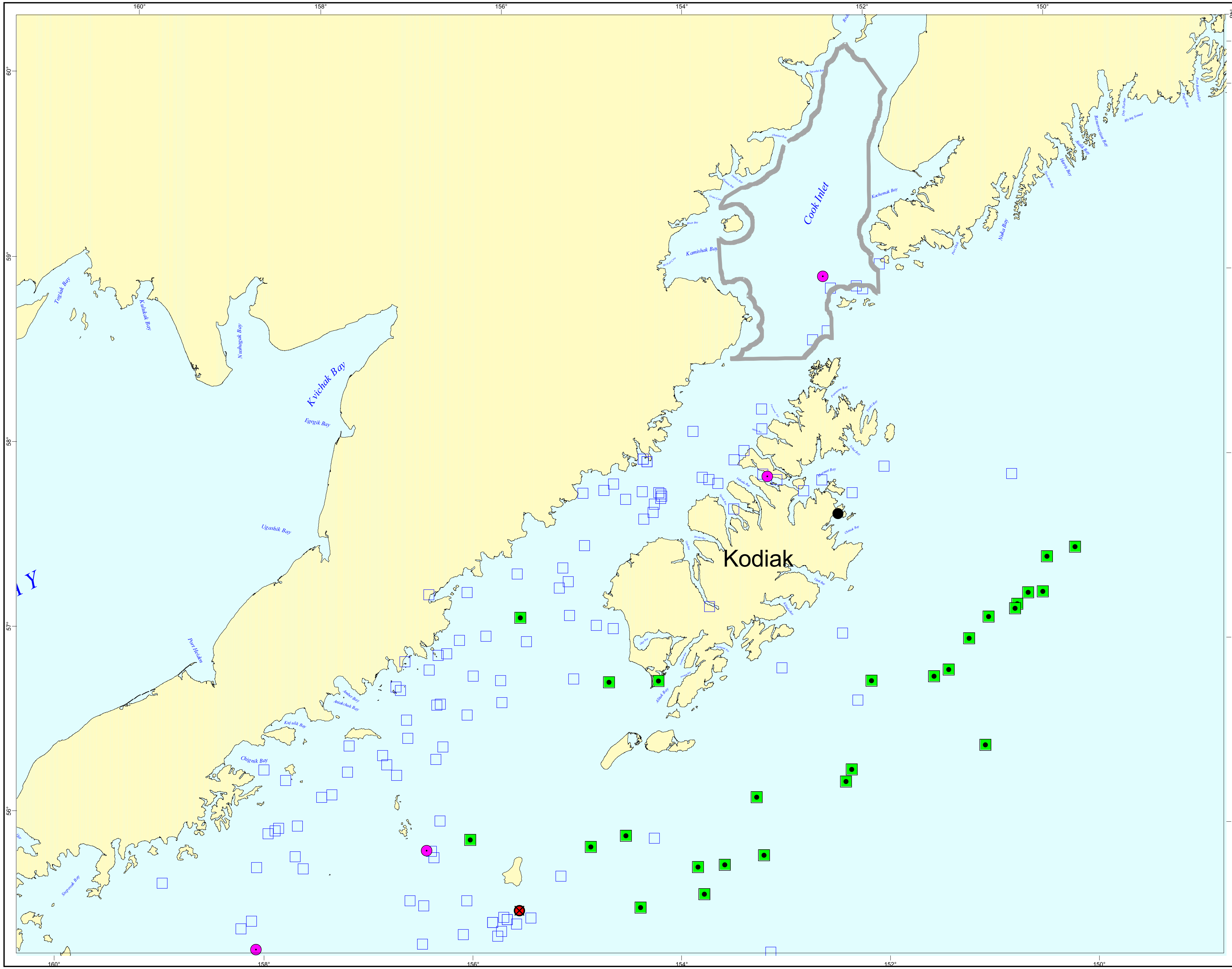
Source: National Marine Fisheries Service Platforms of Opportunity Database, 1958-1997, provided by S. Mizroch, National Marine Mammal Laboratory.

40 0 40 80 Kilometers

30 0 30 60 Miles

Locator Map

Map 12
Sightings of Blue, Fin, Sei, and Sperm Whales Between 1980 and 1997 in Areas Near the Proposed Cook Inlet Lease Sales 191 and 199 Area



Legend

Blue whale

Fin whale

Sei whale

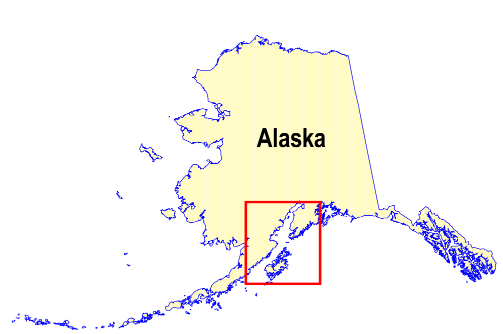
Sperm whale

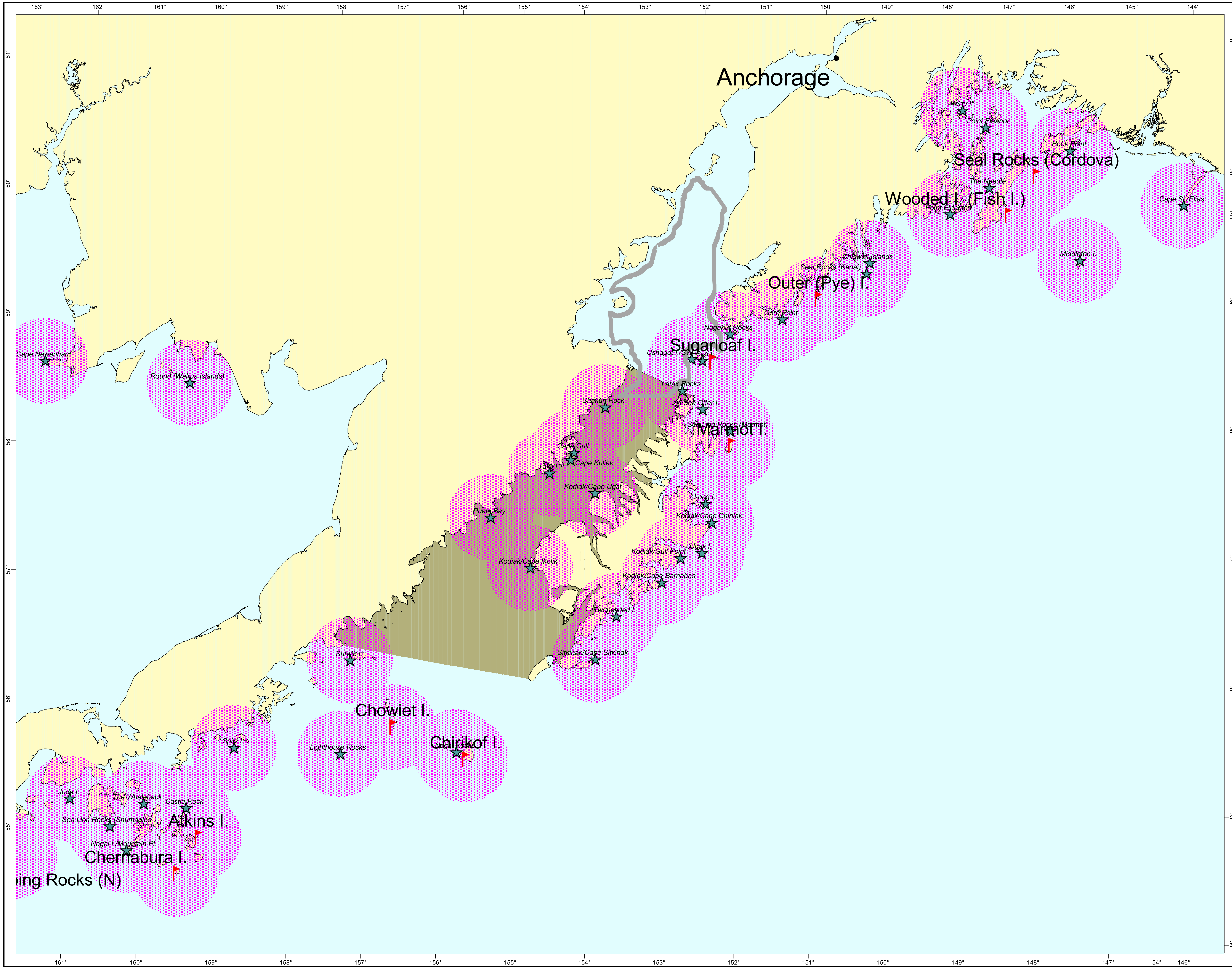
Source: National Marine Fisheries Service Platforms of Opportunity Database, 1958-1997, provided by S. Mizroch, National Marine Mammal Laboratory.

30 0 30 60 Kilometers

20 0 20 40 Miles

Locator Map





Map 13
Critical Habitat Area for the Western Population of Steller Sea Lions in the Eastern Bering Sea and Gulf of Alaska

Legend

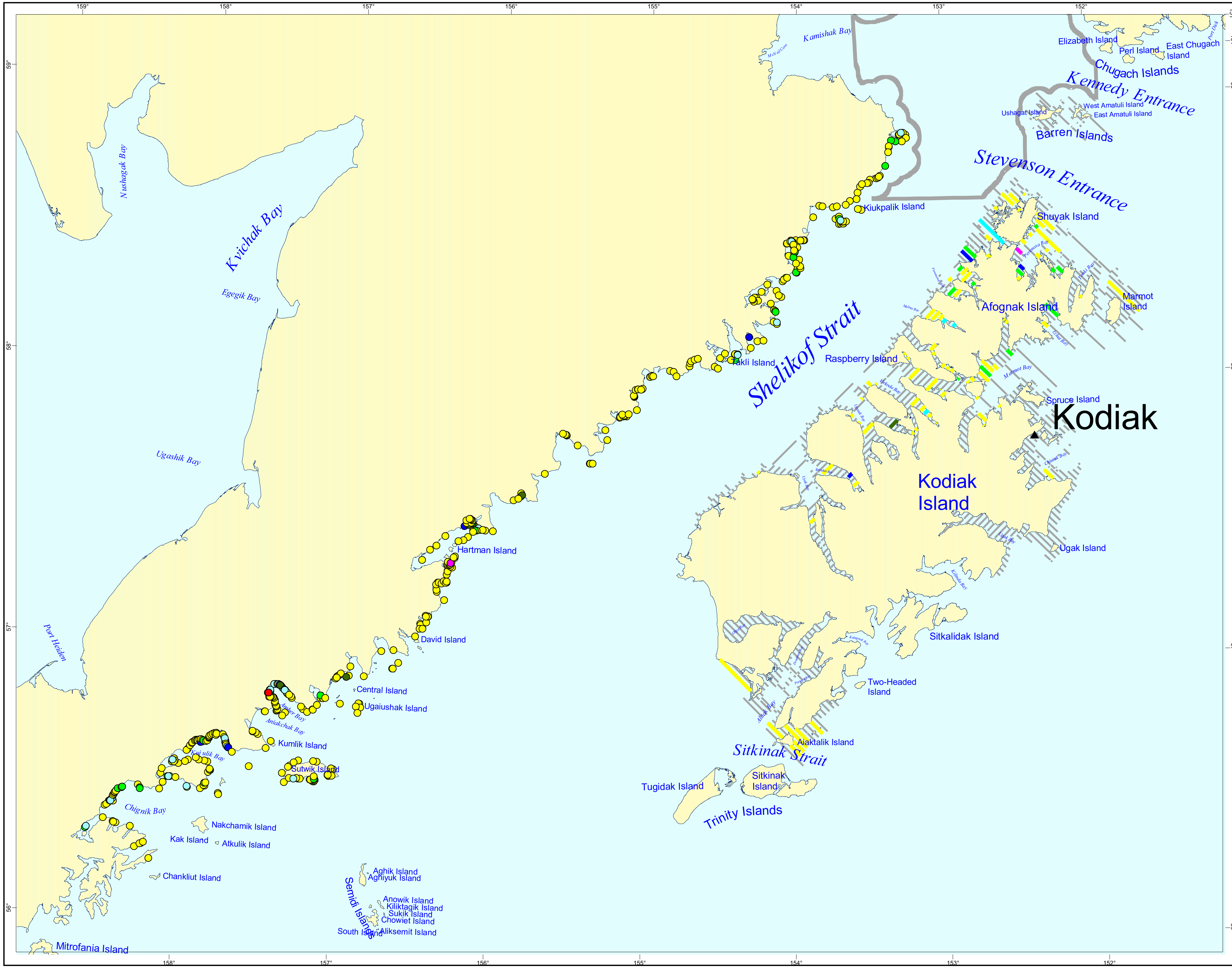
- Towns
- Multiple Sale Area
- Rookery
- Haulout
- 20 Nautical-Mile Aquatic Zone
- Shelikof Foraging Area

Source: 50 CFR 226.202; File provided by B. Gerkes, Office of Protected Resources, National Marine Fisheries Service

30 0 30 60 Kilometers

30 0 30 60 Miles

Locator Map



Map 14
Distribution and Abundance of Sea Otters in the Kodiak Archipelago and Coastal Regions of the South Side of the Alaska Peninsula in the Summer of 2001

Legend

Kodiak Survey Transects
- 1 - 5
- 5 - 10
- 10 - 20
- 20 - 30
- 30 - 40
- 40 - 50
- 50 - 60
- 0

Alaska Peninsula Sea Otter Sightings
- 1 - 5
- 5 - 10
- 10 - 20
- 20 - 30
- 30 - 40
- 40 - 50
- 50 - 60
- 0

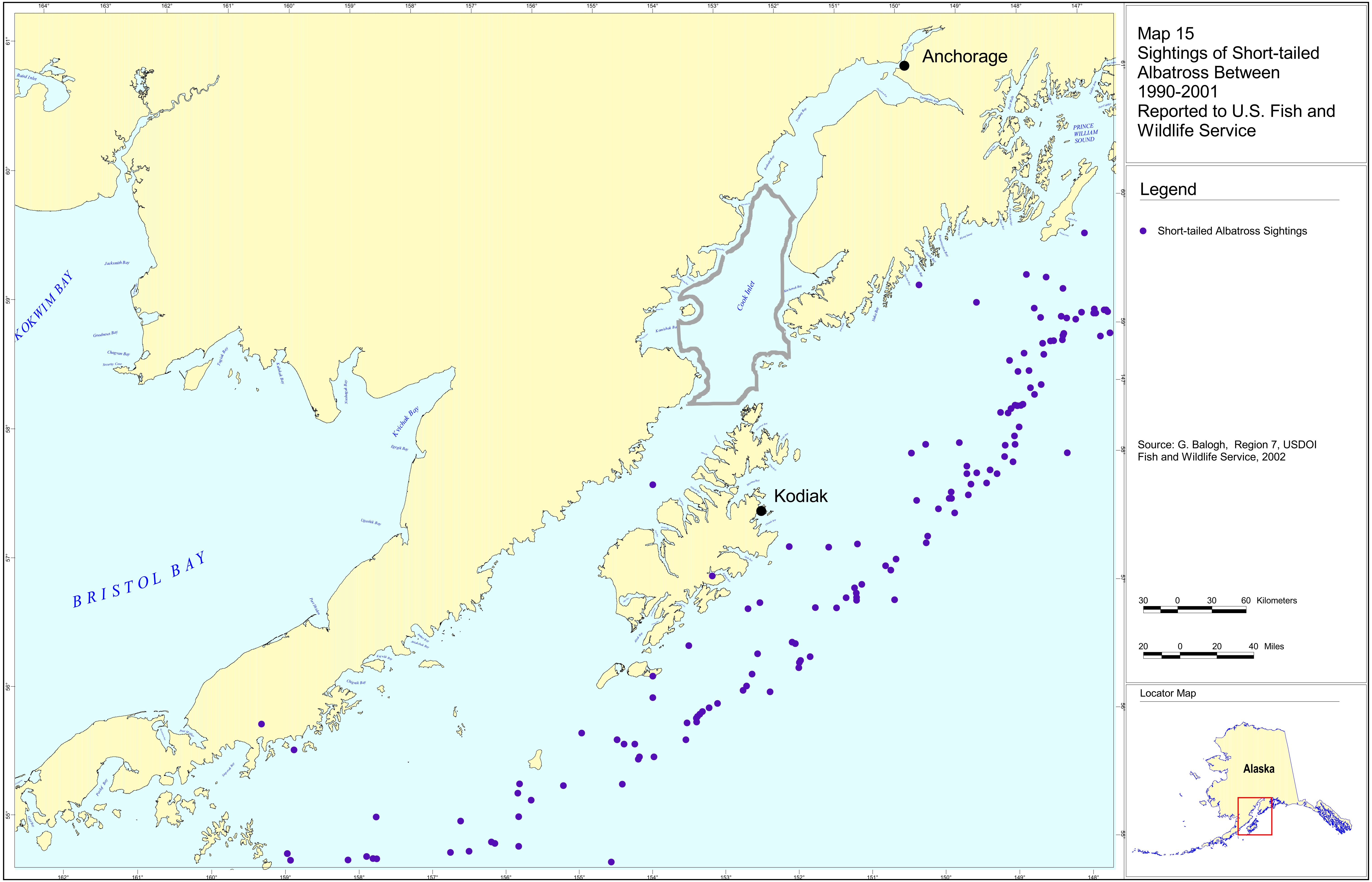
Source: Based on data collected by the Fish and Wildlife Service. Data provided by D. Burn, Region 7, Fish and Wildlife Service, 2002.

20 0 20 40 Kilometers

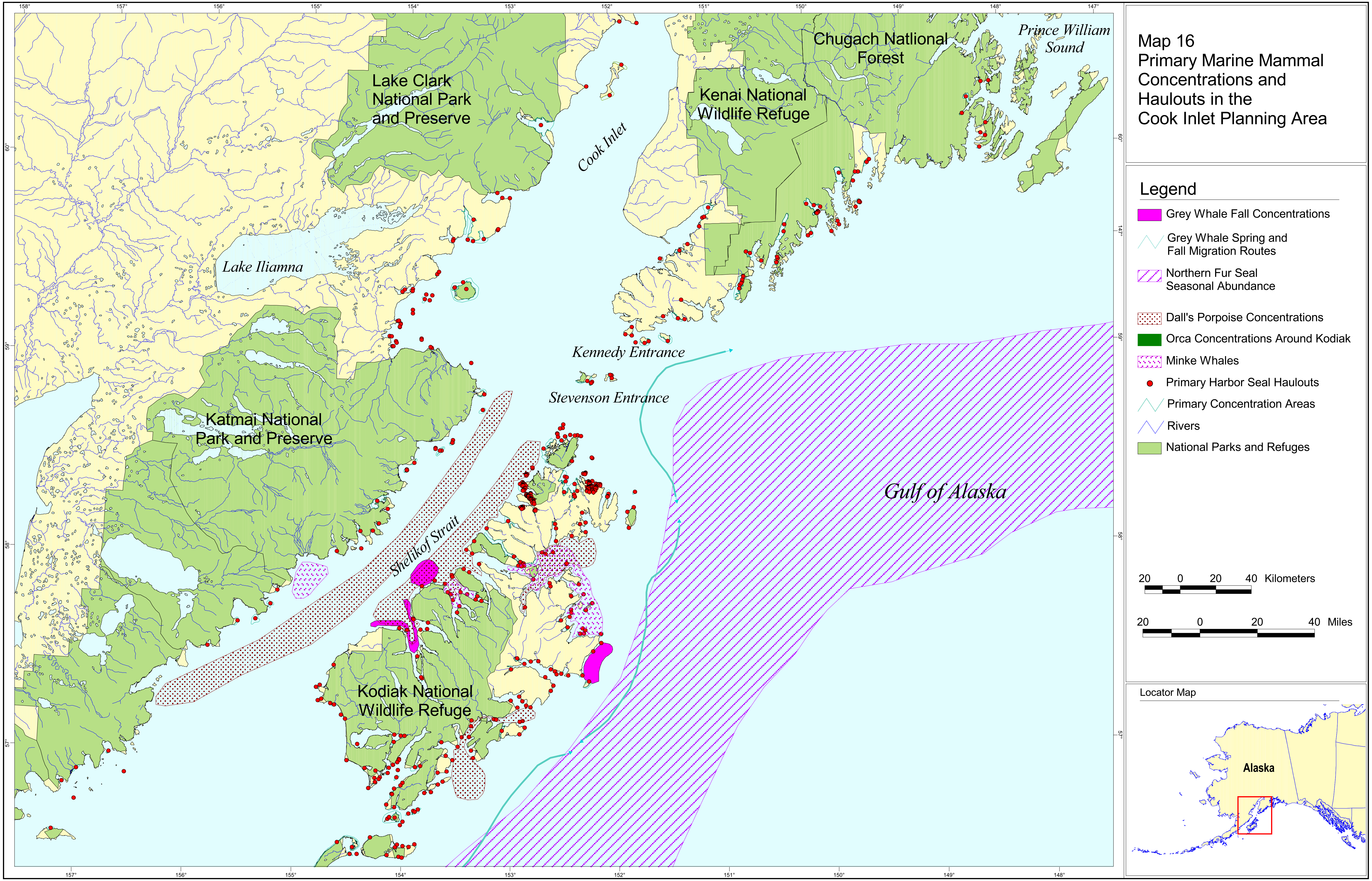
10 0 10 20 Miles

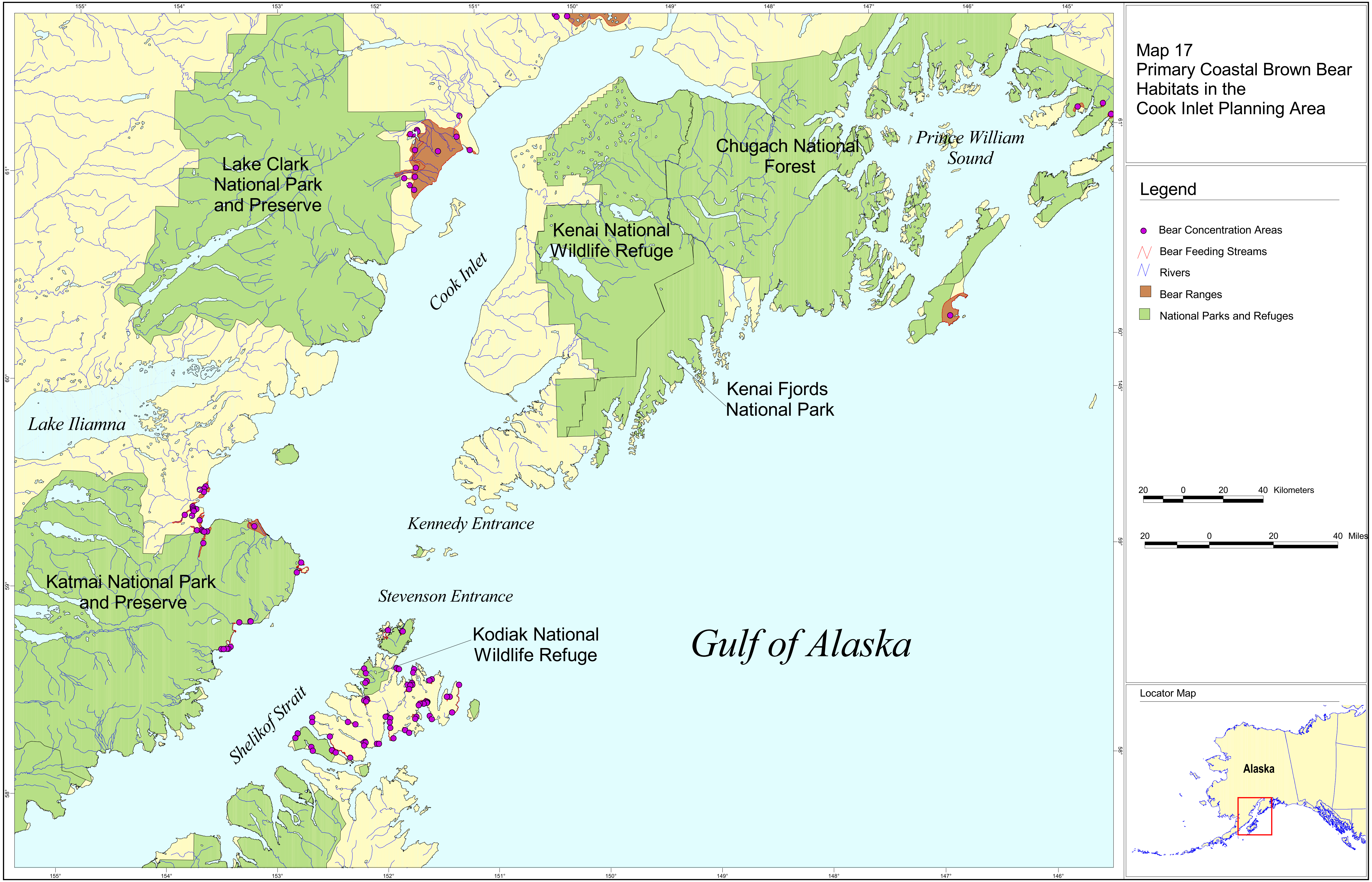
Locator Map

Alaska

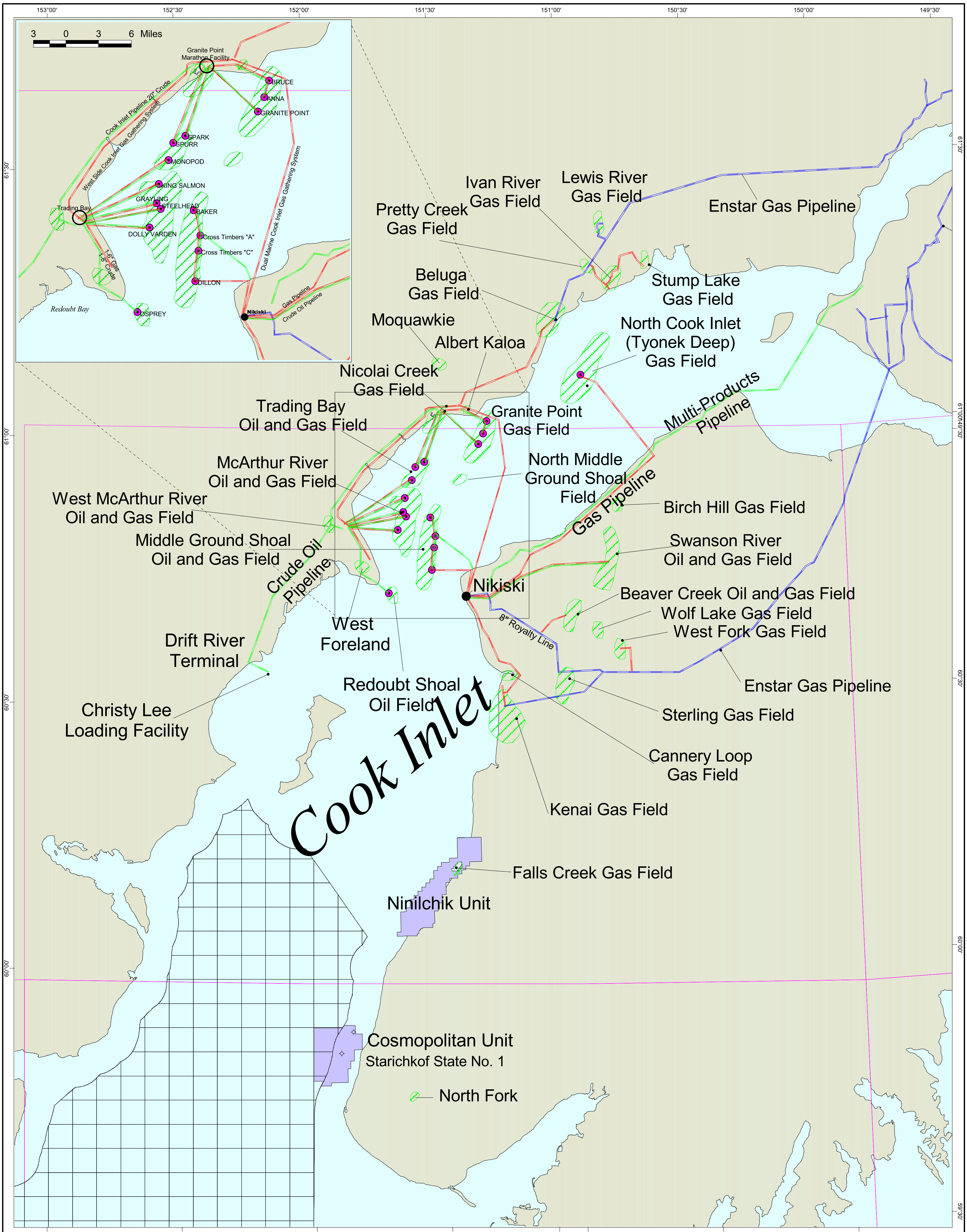

Anchorage
Kodiak
BRISTOL BAY
KOKWIM BAY
Cook Inlet
Kvichak Bay
PRINCE WILLIAM SOUND
Map 15
Sightings of Short-tailed Albatross Between 1990-2001
Reported to U.S. Fish and Wildlife Service
Legend
Short-tailed Albatross Sightings
Source: G. Balogh, Region 7, USDOI Fish and Wildlife Service, 2002
30 0 30 60 Kilometers
20 0 20 40 Miles
Locator Map
Alaska

Map 16
Primary Marine Mammal Concentrations and Haulouts in the Cook Inlet Planning Area





Map 17
Primary Coastal Brown Bear Habitats in the Cook Inlet Planning Area
Legend
Bear Concentration Areas
Bear Feeding Streams
Rivers
Bear Ranges
National Parks and Refuges
20 0 20 40 Kilometers
20 0 20 40 Miles
Locator Map
Alaska
Lake Clark National Park and Preserve
Kenai National Wildlife Refuge
Chugach National Forest
Prince William Sound
Cook Inlet
Lake Iliamna
Kenai Fjords National Park
Kennedy Entrance
Katmai National Park and Preserve
Stevenson Entrance
Kodiak National Wildlife Refuge
Gulf of Alaska
Shelikof Strait



Map 18
Cook Inlet
Oil and Gas
Pipelines

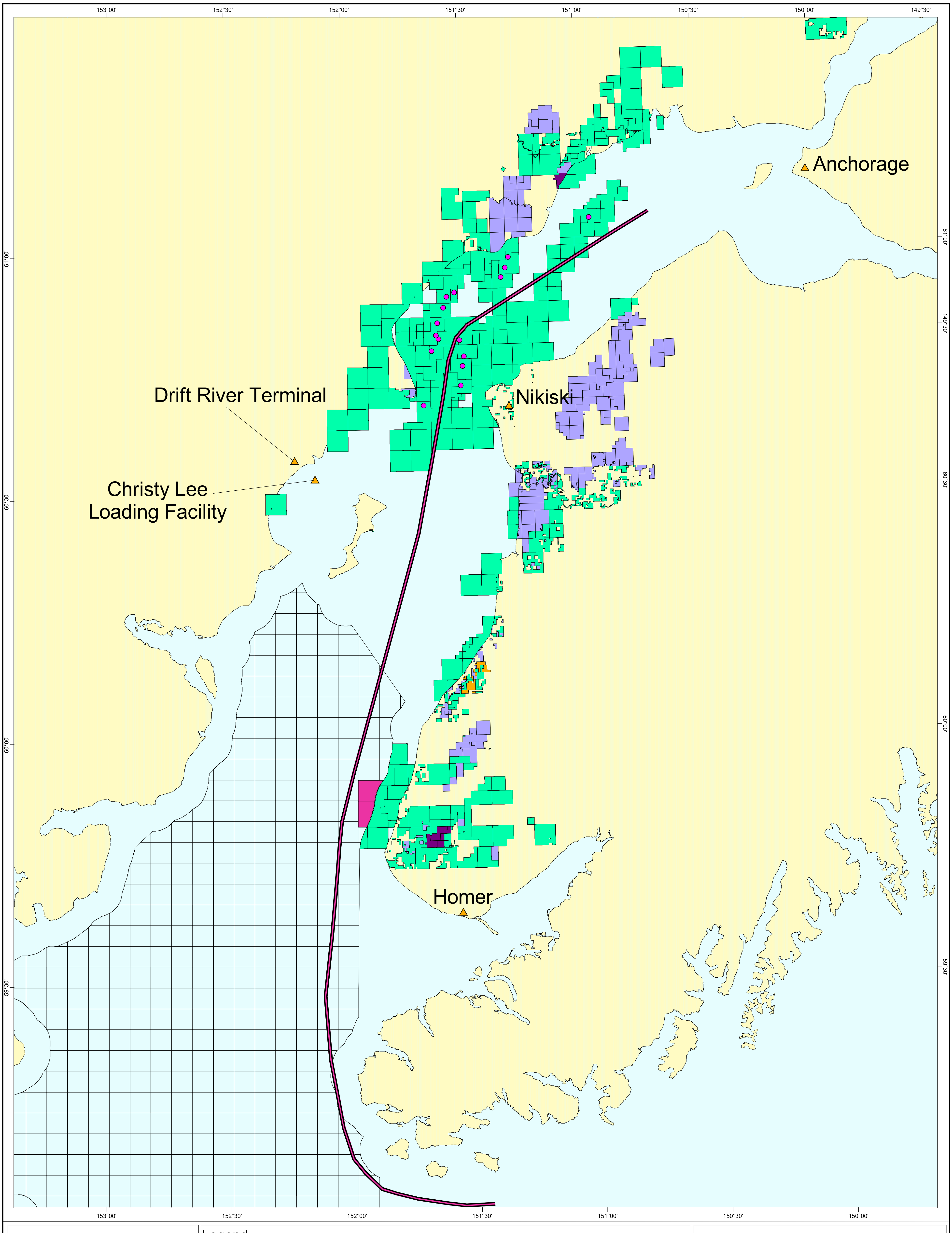
Legend

- Liquid Petroleum Pipelines
- Gas Lines Not Owned by Enstar
- Well Locations
- Enstar - Owned Gas Pipelines
- Platforms
- Oil/Gas Fields
- Planning Area Boundary
- Unit Boundaries

10 0 10 20 Kilometers

7 0 7 14 Miles

Locator Map



Map 19
Cook Inlet
Leasing Activity,
Platforms, and
Marine
Transportation

Legend

- Major Ports/Terminals
- Platform Locations in State Waters
- Approximate Cook Inlet Vessel Route (Source: Coast Pilot)
- Federal Lease Blocks in Multiple Sale Area

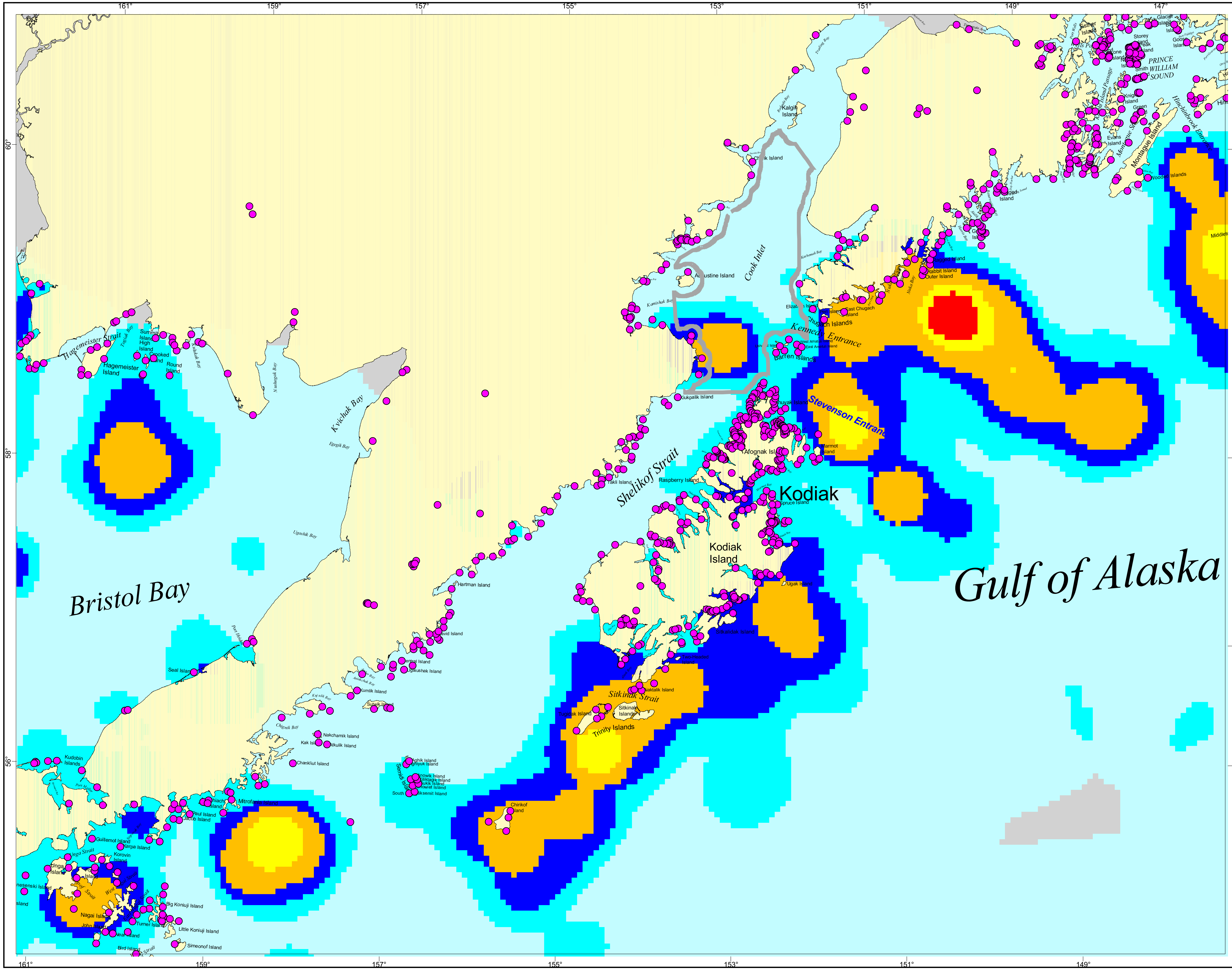
Leases Shown by Subsurface Ownership of Minerals

- University of Alaska
- Federal Leased Blocks Sale 149
- Federal Land
- CIRI
- State of Alaska

20 0 20 40 Kilometers

10 0 10 20 Miles

Locator Map



Map 20
Pelagic Seabird Densities and Distribution of Seabird Colonies

Legend

Seabird Colonies

Seabird Densities
(number of individuals per square kilometer)

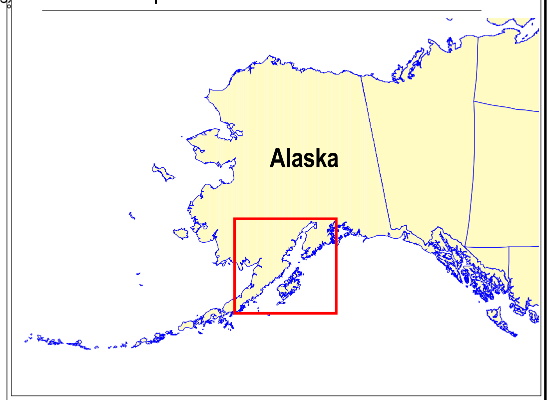
- 0-100
- 100-250
- 250-500
- 500-1500
- 1500-3000
- 3000-6000
- No Data

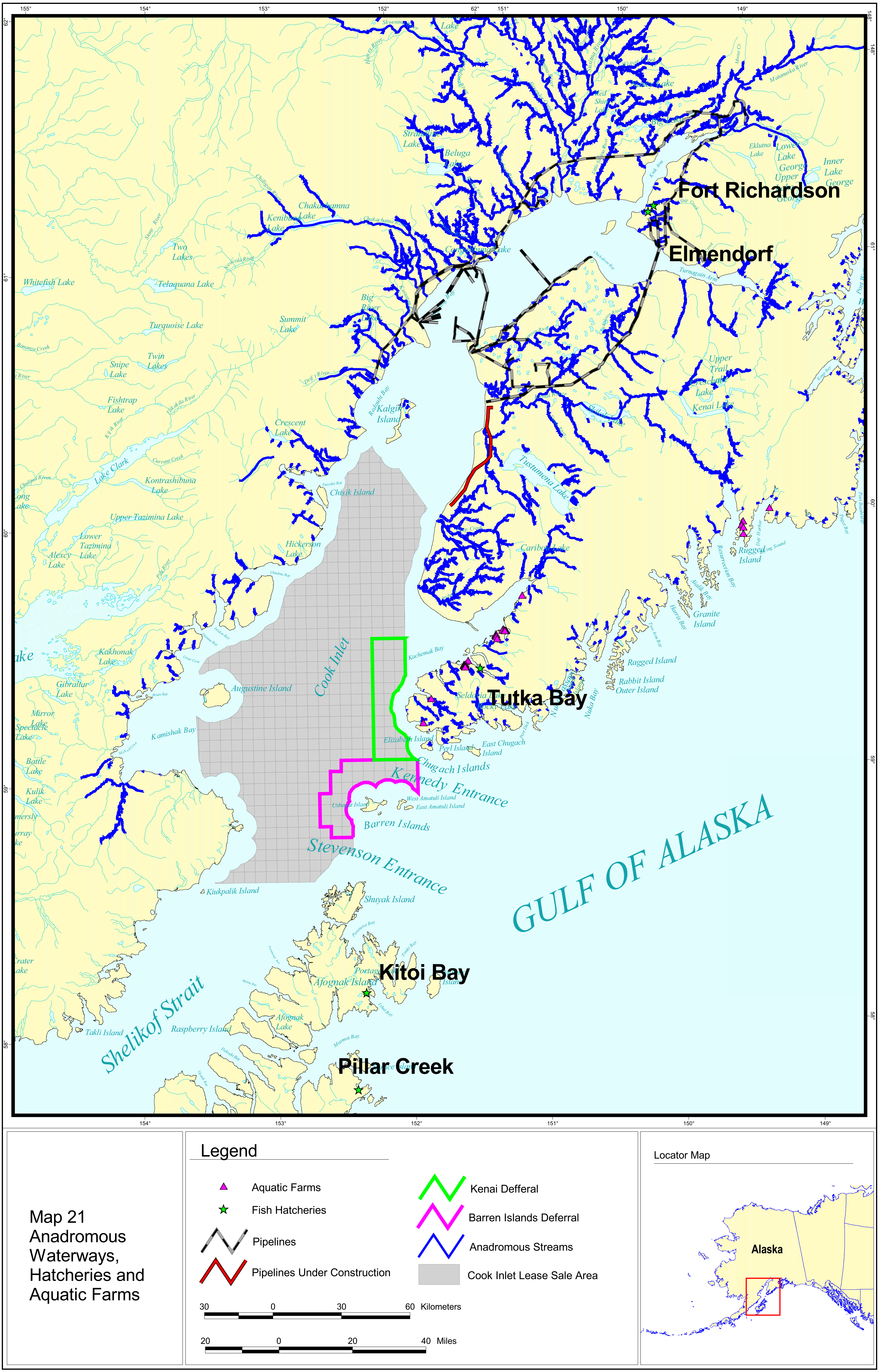
Source: Beringian Seabird Colony Catalog, USDOIFWS and North Pacific Pelagic Seabird Database, USGS Alaska Science Center

30 0 30 60 Kilometers

20 0 20 40 Miles

Locator Map





Map 21
Anadromous Waterways, Hatcheries and Aquatic Farms

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Index of selected headings and keywords in headings. The EIS analyzes the following alternatives and resources. *Alternatives:* Proposal for Sales 191 and 199 (Alternative I); No action (Alternative II); Lower Kenai Peninsula Deferral (Alternative III); Barren Island Deferral (Alternative IV) and the Agency-Preferred Alternative. *Resources:* Water Quality; Air Quality; Lower Trophic Level Organisms; Fisheries Resources; Essential Fish Habitat; Endangered and Threatened Species; Marine and Coastal Birds; Non-endangered Marine Mammals; Terrestrial Mammals; Economy; Commercial Fishing; Subsistence Harvest Patterns; Sociocultural Systems; Recreation; Tourism; Visual Resources; Sports Fishing; Environmental Justice; Archaeological Resources; and Coastal Zone Management.

The Department of the Interior Mission
As the Nation's principal conservation agency, the Department of the Interior has responsibility for most of our nationally owned public lands and natural resources. This includes fostering sound use of our land and water resources; protecting our fish, wildlife, and biological diversity; preserving the environmental and cultural values of our national parks and historical places; and providing for the enjoyment of life through outdoor recreation. The Department assesses our energy and mineral resources and works to ensure that their development is in the best interests of all our people by encouraging stewardship and citizen participation in their care. The Department also has a major responsibility for American Indian reservation communities and for people who live in island territories under U.S. administration.

The Minerals Management Service Mission
As a bureau of the Department of the Interior, the Minerals Management Service's (MMS) primary responsibilities are to manage the mineral resources located on the Nation's Outer Continental Shelf (OCS), collect revenue from the Federal OCS and onshore Federal and Indian lands, and distribute those revenues.

Moreover, in working to meet its responsibilities, the **Offshore Minerals Management Program** administers the OCS competitive leasing program and oversees the safe and environmentally sound exploration and production of our Nation's offshore natural gas, oil and other mineral resources. The MMS **Royalty Management Program** meets its responsibilities by ensuring the efficient, timely and accurate collection and disbursement of revenue from mineral leasing and production due to Indian tribes and allottees, States and the U.S. Treasury.

The MMS strives to fulfill its responsibilities through the general guiding principles of: (1) being responsive to the public's concerns and interests by maintaining a dialogue with all potentially affected parties and (2) carrying out its programs with an emphasis on working to enhance the quality of life for all Americans by lending MMS assistance and expertise to economic development and environmental protection.