Alaska Outer Continental Shelf

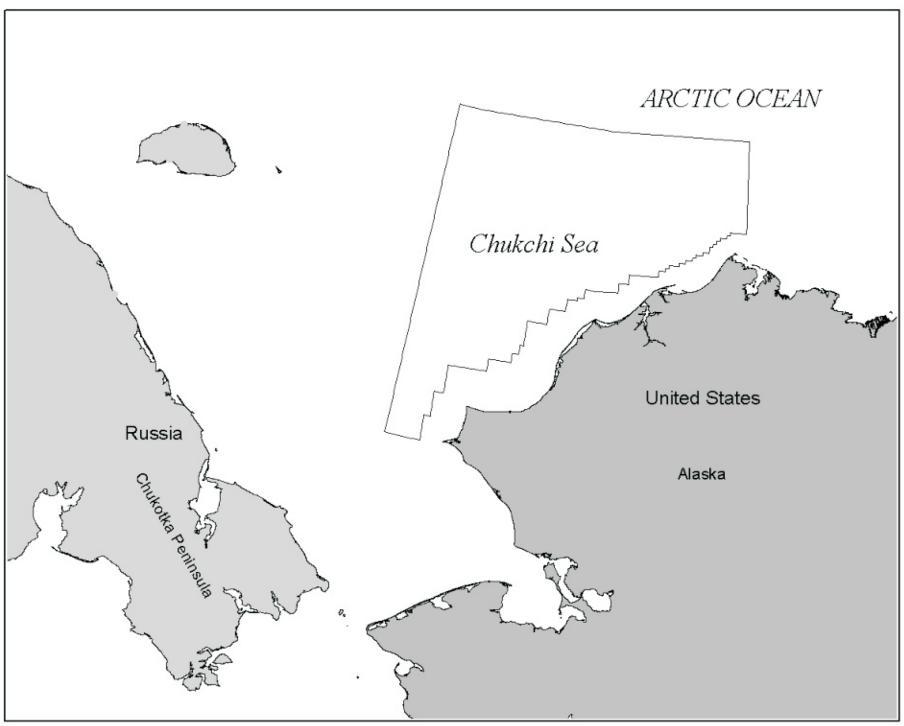
OCS EIS/EA
MMS 2007-026

Chukchi Sea Planning Area

Oil and Gas Lease Sale 193 and Seismic Surveying Activities in the Chukchi Sea

Final Environmental
Impact Statement

Volume III
Tables, Figures, Maps, Appendices, and Bibliography



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

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Table III.A-1
Community Climate Data

Community	Temperature Range	Average Precipitation	Normal Snow Cover
Point Hope	-49 to 78 ºF	10.0 inches	36 inches
Point Lay	-55 to 78 ºF	6.9 inches	21 inches
Wainwright	-56 to 80 ºF	5.0 inches	12 inches
Barrow	-56 to 78 ºF	5.0 inches	20 inches

Source:
Alaska Department of Commerce, Community Online Database

Table III.A-2
Temperature Trend for Barrow and Kotzebue (1949-2004)

Station Location	Long-term mean, °F (1949 - 2004)					Total change, °F (1949 - 2004)				
	Annual	Spring	Summer	Autumn	Winter	Annual	Spring	Summer	Autumn	Winter
Barrow	10.0	1.7	37.4	15.2	-14.2	3.4	4.3	2.6	1.2	5.5
Kotzebue	21.8	15	50.0	24.7	- 2.5	3.3	2.4	2.5	1.0	7.4

Source:
http://climate.gi.alaska.edu/ClimTrends/Change/4904Change.html.

Notes : Barrow is located at 71°17'N, 156°46' W at an elevation of 30.8 ft and Kotzebue is located at 66°53'N, 162°32' W at an elevation of 9.8 ft.

Table III.A-3
Mean Occurrence Dates (1996-2004) for Landfast Ice Conditions

	Eicken et al., 2006		Barry et al., 1979		
		Zone 1	Central Chukchi Sea	Central Beaufort Sea	
First Ice*	**Mean**	Dec 01	Early November	Mid-October	First continuous fast ice
	σ’	31.8			
Stable Ice	**Mean**	Feb 23	February	January February	Stable ice inside of 15-m isobath
	σ’	41.9			
Breakup	**Mean**	Jun 04	June 10	June 30	First openings and movement
	σ’	13.9			
Ice Free	**Mean**	Jun 18	July 05	August 01	Nearshore largely free of fast ice
	σ’	12.7			

Source:
Eicken et al. (2006); Barry et al. (1979).

Table III.A-4
Mean and Maximum Polynya Widths

Year	Mean Polynya Width		Maximum Polynya Width	
	SSMI/I, km	W/C, km	SSMI/I, km	W/C, km
1990	33	8	94	37
1991	15	13	49	61
1992	29	11	151	39
1993	20	14	81	37
1994	39	12	138	50
1995	10	11	29	47
1996	22	12	128	42
1997	15	14	38	60
1998	15	15	54	47
1999	30	—	114	—
2000	20	—	72	—
2001	27	—	75	—
9-year mean	21.9	12.2	84.6	46.7
9-year σ	±9.8	±2.1	±45.8	±9.1
12-year mean	22.9	—	85.2	—
12-year σ	±8.8	—	±40.3	—

Source:
Martin et al., (2004).

Table III.A-5
Ambient Air Quality Standards Relevant to the Chukchi Sea Planning Area

Ambient Air Quality Standards				
Pollutant	**Averaging Period[1]**	**Alaska Standards**	**National Standards[2]**	**Standard Type**
Carbon Monoxide	8-hour	10 mg/m^3	9 ppm (10 mg/m^3)	Primary
	1-hour	40 mg/m^3	35 ppm(40 mg/m^3)	Primary
Nitrogen Dioxide	Annual	100 µg/m^3	.053 ppm (100 µg/m^3)	Primary & Secondary
Ozone	1-hour	235 µg/m^3	—	—
	8-hour	—	.08 ppm (157 µg/m^3)	Primary & Secondary
Lead	Quarterly	1.5 µg/m^3	1.5 µg/m^3	Primary & Secondary
Particulate Matter (PM10)	Annual	50 µg/m^3	50 µg/m^3	Primary & Secondary
	24-hour	150 µg/m^3	150 µg/m^3	Primary & Secondary
Particulate Matter (PM2.5)	Annual	—	15 µg/m^3	Primary & Secondary
	24-hour	—	65 µg/m^3	Primary & Secondary
Sulfur Dioxide	Annual	80 µg/m^3	.03 ppm (80 µg/m^3)	Primary
	24-hour	365 µg/m^3	.014 ppm (365 µg/m^3)	Primary
	3-hour	1300 µg/m^3	.5 ppm (1300 µg/m^3)	Secondary
Reduced Sulfur Compounds	30-minute	50 µg/m^3	—	—
Ammonia	8-hour	2.1 µg/m^3	—	—

Source:
State of Alaska, Dept. of Environmental Conservation (2005), 18 AAC 50.010; U.S. Environmental Protection Agency (40 CFR Part 50)

Notes:
(a dash [—] indicates that no standards have been established)
mg/m^3 = milligrams per cubic meter
µg/m^3 = micrograms per cubic meter

Footnotes:
[1]National standards (other than ozone, particulate matter, and those based on annual averages or annual arithmetic mean) are not to be exceeded more than once a year. The ozone standard is attained when the fourth high 8-hour concentration in a year, averaged over 3 years, is equal to or less than the standard. For $PM_{10,}$ the 24-hour standard is attained when the expected number of days per calendar year with a 24-hour average concentration above 150 µg/m^3 is ≤1. For $PM_{2.5}$, the 24-hour standard is attained when 98% of the daily concentrations, averaged over 3 years, are equal to or less than the standard.
[2]Concentration expressed first in units in which it was promulgated. Equivalent units given in parentheses are based upon a reference temperature of 25 °C and a reference pressure of 760 torr. Most measurements of air quality are to be corrected to a reference temperature of 25 °C and a reference pressure of 760 torr; ppm in this table refers to ppm by volume, or micromoles of pollutant per mole of gas.

Table III.A-6
Measured Air-Pollutant Concentrations at Prudhoe Bay, Alaska 1986-1996

Pollutant[1]	Monitor Sites					
	A[2]	B[3]	C[4]	D[5]	National Standards[6]	Class II Increments[7]
Ozone						
Annual Max. 1 hr	115.8	180.3	115.6	100.0	235	—
Nitrogen Dioxide						
Annual	26.3	11.9	16.0	4.9	100	25
Inhalable Particulate Matter (PM_{10})						
Annual	—	—	10.5	—	50	17
Annual Max. 24 hr	29.3	—	25.0 [8]	—	150	30
Sulfur Dioxide						
Annual	2.6	—	5.2	2.6	80	20
Annual Max. 24 hr	10.5	—	26.2[8]	13.1	365	91
Annual Max. 3 hr	13.1	—	44.5	55.0	1,300	512
Carbon Monoxide						
Annual Max. 8 hr	—	—	1,400	—	10,000	—
Annual Max. 1 hr	—	—	2,500 [8]	—	40,000	—

Sources:
ERT Company, Inc. (1987); Environmental Science and Engineering (1987); ENSR, (1996), as cited in U.S. Army Corps of Engineers (1999)

Note:
(measured in micrograms per cubic meter; absence of data is indicated by a dash [—])

Footnotes:
[1]Lead was not monitored.
[2]Site CCP (Central Compressor Plant), Prudhoe Bay monitoring program, selected for maximum pollutant concentrations. All data are for years 1992-1996.
[3]Site Pad A (Drill Pad A), Prudhoe Bay monitoring program, site of previous monitoring, selected to be more representative of the general area or neighborhood.
All data are for years 1992-1996.
[4]Site CPF-1 (Central Processing Facility), Kuparuk monitoring program, selected for maximum pollutant concentrations. Ozone, nitrogen dioxide, and sulfur dioxide are for years 1990-1992; PM_{10} and carbon monoxide data are for 1986-1987.
[5]Site DS-1F, Kuparuk monitoring program site selected to be representative of the general area or neighborhood. All data are for years 1990-1992.
[6]Applicable National Ambient Air Quality Standards. Please refer to Table III.A-5 for more specific definitions of air quality standards.
[7]Class II PSD Standard Increments.
[8]Second highest observed value (in accordance with approved procedures for determining ambient air quality).

Table III.A-7
A Comparison of Most Common Sound Levels from Various Sources[1]

Source	Activity	dB at Source
Vessel Activity		
	Tug Pulling Barge	171
	Fishing Boats	151-158
	Zodiac (outboard)	156
	Supply Ship	181
	Tankers	169-180
	Supertankers	185-190
	Freighter	172
Ice Breaking		
	Ice-Management	171-191
	Ice-Breaking[2]	193
Dredging		
	Clamshell Dredge	150-162
	Aquarius (cutter suction dredge)	185
	Beaver Mackenzie Dredge	172
Drilling		
	Kulluk (conical drill ship) – drilling	185
	Explorer II (drill ship) - drilling	174
	Artificial Island – drilling	125
	Ice Island (in shallow water) – drilling	86
Seismic and Acoustics		
	Airgun Arrays	235-259
	Single Airguns	216-232
	Vibroseis	187-210
	Water Guns	217-245
	Sparker	221
	Boomer	212
	Depth Sounder	180
	Sub-bottom Profiler	200-230
	Side-scan Sonar	220-230
	Military	200-230
Ambient Noise		
	Ambient Noise[3]	65-133

Sources:
[1] Richardson et.al, (1995).
[2] Robert Lemeur.
[3] Burgess and Green, (1999).

Table III-B-1
Fish Resources of Arctic Alaska

Fish Species				Distribution by Large Marine Ecosystem	
Order	**Family**	**Species Name**	**Common Name**	**Beaufort Sea**	**Chukchi Sea**
Petromyzontiformes					
	Petromyzontidae (lampreys)	*Lampetra tridentata*	Pacific lamprey	—	R
		Lampetra camtschatica	Arctic lamprey	W	W
Squaliformes					
	Dalatiidae (sleeper sharks)	*Somniosus pacificus*	Pacific sleeper shark	—	W
	Squalidae (dogfish sharks)	*Squalus acanthias*	spiny dogfish	—	R
Clupeoiformes					
	Clupeidae (herrings)	*Clupea pallasii*	Pacific herring	W	W
Osmeriformes					
	Osmeridae (smelts)	*Mallotus villosus*	capelin	W	W
		Osmerus mordax	rainbow smelt	W	W
Salmoniformes					
	Salmonidae/Coregoninae (whitefishes)	*Stenodus leucichthys*	inconnu	R	—
		Coregonus sardinella	least cisco	W	W
		Coregonus autumnalis	Arctic cisco	W	—
		Coregonus laurettae	Bering cisco	W	W
		Coregonus nasus	broad whitefish	W	W
		Coregonus pidschian	humpback whitefish	W	W
	Salmonidae/Salmoninae (trouts and salmons)	*Salvelinus alpinus*	Arctic char	W	W
		Salvelinus malma	Dolly Varden	W	W
		Oncorhynchus gorbuscha	pink salmon	W	W
		Oncorhynchus kisutch	coho salmon	R	W
		Oncorhynchus tshawytscha	Chinook salmon	R	W
		Oncorhynchus keta	chum salmon	W	W
		Oncorhynchus nerka	sockeye salmon	R	W
Myctophiformes					
	Myctophidae (lanternfishes)	*Benthosema glaciale*	glacier lanternfish	R	—
Gadiformes					
	Gadidae (cods)	*Boreogadus saida*	Arctic cod	W	W
		Arctogadus glacialis	polar cod	R	—
		Arctogadus borisovi	toothed cod	R	—
		Eleginus gracilis	saffron cod	W	W
		Theragra chalcogramma	walleye pollock	—	W
		Gadus ogac	ogac	W	—

Table III.B-1
Fish Resources of Arctic Alaska (continued)

Fish Species				Distribution by Large Marine Ecosystem	
Order	**Family**	**Species Name**	**Common Name**	**Beaufort Sea**	**Chukchi Sea**
Gasterosteiformes					
	Gasterosteidae (sticklebacks)	*Gasterosteus aculeatus*	threespine stickleback	R	R
		Pungitius pungitius	ninespine stickleback	W	W
Scorpaeniformes					
	Hexagrammidae (greenlings)	*Hexagrammos stelleri*	whitespotted greenling	U-R	W
	Cottidae (sculpins)	*Triglops pingelii*	ribbed sculpin	W	W
		Hemilepidotus papilio	butterfly sculpin	—	W
		Hemilepidotus jordani	yellow Irish lord	—	R
		Icelus spatula	spatulate sculpin	W	W
		Icelus bicornis	twohorn sculpin	R	—
		Gymnocanthus tricuspis	Arctic staghorn sculpin	W	W
		Cottus aleuticus	coastrange sculpin	—	LD
		Enophrys diceraus	antlered sculpin	—	W
		Megalocottus platycephalus	belligerent sculpin	—	W
		Myoxocephalus quadricornis	fourhorn sculpin	W	W
		Myoxocephalus scorpius	shorthorn sculpin	W	W
		Myoxocephalus scorpioides	Arctic sculpin	W	W
		Myoxocephalus jaok	plain sculpin	—	W
		Micrococttus sellaris	brightbelly sculpin	—	R
		Artediellus gomojunovi	spinyhook sculpin	R	R
		Artediellus scaber	hamecon	W	W
		Artediellus pacificus	hookhorn sculpin	—	R
		Artediellus ochotensis	Okhotsk hookear sculpin	—	R
	Hemitripteridae (sailfin sculpins)	*Blepsias bilobus*	crested sculpin	—	W
		Nautichthys pribilovius	eyeshade sculpin	—	W
	Psychrolutidae (fathead sculpins)	*Eurymen gyrinus*	smoothcheek sculpin	—	R
		Cottunculus sadko	Sadko sculpin	R	—
	Agonidae (poachers)	*Hypsagonus quadricornis*	fourhorn poacher	—	R
		Pallasina barbata	tubenose poacher	—	R
		Occella dodecaedron	Bering poacher	—	R
		Leptagonus decagonus	Atlantic poacher	R	R
		Podothecus veternus	veteran poacher	U-R	R/P

Table III.B-1
Fish Resources of Arctic Alaska (continued)

Fish Species				Distribution by Large Marine Ecosystem	
Order	**Family**	**Species Name**	**Common Name**	**Beaufort Sea**	**Chukchi Sea**
Scorpaeniformes (continued)					
	Agonidae (poachers) (continued)	*Ulcina olrikii*	Arctic alligatorfish	W	W
		Aspidophoroides monopterygius	alligatorfish	—	LD
	Cyclopteridae (lumpsuckers)	*Eumicrotremus derjugini*	leatherfin lumpsucker	R/P	—
		Eumicrotremus andriashevi	pimpled lumpsucker	—	R
	Liparidae (snailfishes)	*Liparis gibbus*	variegated snailfish	W	W
		Liparis tunicatus	kelp snailfish	W	W
		Liparis bristolensis	Bristol snailfish	—	R
		Liparis fabricii	gelatinous seasnail	R/P	—
		Liparis callyodon	spotted snailfish	—	W
Perciformes					
	Zoarcidae (eelpouts)	*Gymnelus hemifasciatus*	halfbarred pout	R/P	R/P
		Gymnelus viridis	fish doctor	R/P	R/P
		Lycodes seminudus	longear eelpout	R	—
		Lycodes mucosus	saddled eelpout	R	R
		Lycodes turneri	estuarine eelpout	R	W
		Lycodes polaris	polar eelpout	W	W
		Lycodes raridens	marbled eelpout	—	W
		Lycodes rossi	threespot eelpout	R	R
		Lycodes sagittarius	archer eelpout	R	—
		Lycodes palearis	wattled eelpout	—	W
		Lycodes pallidus	pale eelpout	R	—
		Lycodes squamiventer	scalebelly eelpout	R	—
		Lycodes eudipleurostictus	doubleline eelpout	R	—
		Lycodes concolor	ebony eelpout	—	R
	Stichaeidae (pricklebacks)	*Eumesogrammus praecisus*	fourline snakeblenny	W	W
		Stichaeus punctatus	Arctic shanny	W	W
		Chirolophis snyderi	bearded warbonnet	—	R
		Leptoclinus maculatus	daubed shanny	R	R
		Anisarchus medius	stout eelblenny	W	W
		Lumpenus fabricii	slender eelblenny	W	W
	Pholidae (gunnels)	*Pholis fasciata*	banded gunnel	—	R
	Anarhichadidae (wolffishes)	*Anarhichas orientalis*	Bering wolffish	W	W
	Ammodytidae (sand lances)	*Ammodytes hexapterus*	Pacific sand lance	W	W

Table III.B-1
Fish Resources of Arctic Alaska (continued)

Fish Species				Distribution by Large Marine Ecosystem	
Order	**Family**	**Species Name**	**Common Name**	**Beaufort Sea**	**Chukchi Sea**
Pleuronectiformes					
	Pleuronectidae (righteye flounders)	*Hippoglossus stenolepis*	Pacific halibut	—	U-R
		Hippoglossoides robustus	Bering flounder	—	W
		Reinhardtius hippoglossoides	Greenland halibut	R	U-P
		Platichthys stellatus	starry flounder	W	W
		Pleuronectes quadrituberculatus	Alaska plaice	—	W
		Pleuronectes glacialis	Arctic flounder	W	W
		Limanda proboscidea	longhead dab	—	W
		Limanda aspera	yellowfin sole	—	W
		Limanda sakhalinensis	Sakhalin sole	—	U-R

Sources:
Mecklenburg, Mecklenburg, and Thorsteinson, (2002); Stevenson, et al., (2004).
.
Notes:
Distribution Keys

LD = Limited distribution relative to available biotope (e.g., continental slope)
R = Rare (<5 records) and disjunct
E = Rare and endemic species
RS = Rare species known occurring only in one LME
R/P = Rare and patchy
U-R = Unverified record-rare and disjunct
U-P = Unverified and patchy
W = Widespread
— = Undocumented, no verified records

Table III.B-2
Arctic Fish Occurrence in Coastal and Marine Waters of the Alaskan Chukchi and Beaufort Seas

			Freshwater		Brackish Nearshore			Marine Neritic						Marine Oceanic			Behavioral Stratification						
Species	Common Name	Principle Environment	Fluvial	Lacustrine	Estuarine	Intertidal	0-2m (Infralittoral Fringe)	1-50m	51-100m	101-200m	201-300m	301-500m	501-700m	701-1000m	1001-3000m	>3000m	Demersal	Bathydemersal	Bentho-Pelagic	1-200m (epipelagic)	(mesopelagic)	>1000m (bathypelagic)	cryopelagic
Lampetra tridentata	Pacific lamprey	A	X	X	X	X	X	X	X	X	X	—	—	—	—	—	X	—	—	—	—	—	—
Lampetra camtschatica	Arctic lamprey	A	X	X	X	X	X	X	X	—	—	—	—	—	—	—	X	—	—	—	—	—	—
Somniosus pacificus	Pacific sleeper shark	M	—	—	—	—	X	X	X	X	X	X	X	X	X	X	—	X	—	—	—	—	—
Squalus acanthias	spiny dogfish	M	—	—	—	—	X	X	X	X	X	X	X	X	X	X	—	X	—	—	—	—	—
Clupea pallasii	Pacific herring	M	—	—	—	X	X	X	X	X	X	—	—	—	—	—	—	—	—	—	—	—	—
Mallotus villosus	capelin	M	—	—	—	X	X	X	X	X	X	—	—	—	—	—	—	—	—	—	—	—	—
Osmerus mordax	rainbow smelt	A	X	—	—	X	X	X	X	X	X	—	—	—	—	—	—	—	—	—	—	—	—
Stenodus leucichthys	inconnu	FW/A	X	X	X	X	X	X	X	—	—	—	—	—	—	—	X	—	—	—	—	—	—
Coregonus sardinella	least cisco	A	X	X	X	X	X	X	X	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Coregonus autumnalis	Arctic cisco	A	X	X	X	X	X	X	X	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Coregonus laurettae	Bering cisco	A	X	—	—	X	X	X	X	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Coregonus nasus	broad whitefish	FW/A	X	X	X	X	X	X	—	—	—	—	—	—	—	—	X	—	—	—	—	—	—
Coregonus pidschian	humpback whitefish	A	X	—	—	X	X	X	—	—	—	—	—	—	—	—	X	—	—	—	—	—	—
Salvelinus alpinus	Arctic char	A/FW	X	X	X	X	X	X	X	—	—	—	—	—	—	—	—	X	—	—	—	—	—
Salvelinus malma	Dolly Varden	A	X	X	X	X	X	X	X	X	X	—	—	—	—	—	—	X	—	—	—	—	—
Oncorhynchus gorbuscha	pink salmon	A	X	—	—	X	X	X	X	X	X	X	—	—	—	—	—	X	—	—	—	—	—
Oncorhynchus kisutch	coho salmon	A	X	—	—	X	X	X	X	X	X	X	—	—	—	—	—	X	—	—	—	—	—
Oncorhynchus tshawytscha	Chinook salmon	A	X	—	—	X	X	X	X	X	X	X	—	—	—	—	—	X	—	—	—	—	—
Oncorhynchus keta	chum salmon	A	X	—	—	X	X	X	X	X	—	—	—	—	—	—	—	X	—	—	—	—	—
Oncorhynchus nerka	sockeye salmon	A	X	X	X	X	X	X	X	X	X	X	—	—	—	—	—	X	—	—	—	—	—
Benthosema glaciale	glacier lanternfish	M	—	—	—	—	—	—	—	—	—	X	X	X	X	X	—	—	—	—	—	—	—
Boreogadus saida	Arctic cod	M	—	—	—	X	—	—	X	X	X	X	X	X	X	—	—	X	—	—	—	—	—
Arctogadus glacialis	polar cod	M	—	—	—	—	—	—	X	X	X	X	X	X	X	—	—	X	—	—	—	—	—
Arctogadus borisovi	toothed cod	B/M	—	—	—	—	—	—	X	X	X	—	—	—	—	—	—	X	—	—	—	—	—
Eleginus gracilis	saffron cod	M	X	—	—	X	X	X	X	X	—	—	—	—	—	—	X	—	—	—	—	—	—
Theragra chalcogramma	walleye pollock	M	—	—	—	—	—	—	—	X	X	X	X	X	X	X	X	X	—	—	—	—	—
Gadus ogac	ogac	M	—	—	—	—	—	X	X	X	X	—	—	—	—	—	X	X	—	—	—	—	—
Gasterosteus aculeatus	threespine stickleback	A/FW	X	X	X	X	X	X	X	X	X	X	X	X	X	—	X	X	—	—	—	—	—
Pungitius pungitius	ninespine stickleback	A/FW	X	X	X	X	X	X	X	X	—	—	—	—	—	—	X	—	X	—	—	—	—
Hexagrammos stelleri	whitespotted greenling	M	—	—	—	X	X	X	X	X	X	—	—	—	—	—	X	—	—	—	—	—	—
Triglops pingelii	ribbed sculpin	M	—	—	—	—	—	X	X	X	X	X	—	—	—	—	X	—	—	—	—	—	—
Hemilepidotus papilio	butterfly sculpin	M	—	—	—	X	X	X	X	X	X	X	—	—	—	—	X	—	—	—	—	—	—
Hemilepidotus jordani	yellow Irish lord	M	—	—	—	—	—	X	X	X	X	X	—	—	—	—	X	—	—	—	—	—	—
Icelus spatula	spatulate sculpin	M	—	—	—	—	—	X	X	X	X	X	—	—	—	—	X	—	—	—	—	—	—
Icelus bicornis	twohorn sculpin	M	—	—	—	—	—	X	X	X	—	—	—	—	—	—	X	—	—	—	—	—	—

Table III.B-2
Arctic Fish Occurrence in Coastal and Marine Waters of the Alaskan Chukchi and Beaufort Seas. (continued)

			Freshwater		Brackish			Marine									Behavioral Stratification						
					Nearshore			Neritic						Oceanic									
Species	Common Name	Principle Environment	Fluvial	Lacustrine	Estuarine	Intertidal	0-2m (Infralittoral Fringe)	1-50m	51-100m	101-200m	201-300m	301-500m	501-700m	701-1000m	1001-3000m	>3000m	Demersal	Bathydemersal	Bentho-Pelagic	1-200m (epipelagic)	201-1000m (mesopelagic)	>1000m (bathypelagic)	cryopelagic
Gymnocanthus tricuspis	Arctic staghorn sculpin	M	—	—	—	—	—	X	X	X	X	—	—	—	—	—	X	—	—	—	—	—	—
Cottus aleuticus	coastrange sculpin	B/FW	X	X	X	X	X	—	—	—	—	—	—	—	—	—	X	—	—	—	—	—	—
Enophrys diceraus	antlered sculpin	M	—	—	—	—	—	X	X	—	—	—	—	—	—	—	X	—	—	—	—	—	—
Megalocottus platycephalus	belligerent sculpin	B	X	—	X	X	X	X	—	—	—	—	—	—	—	—	X	—	—	—	—	—	—
Myoxocephalus quadricornis	fourhorn sculpin	B/M/FW	X	—	X	X	X	X	—	—	—	—	—	—	—	—	X	—	—	—	—	—	—
Myoxocephalus scorpius	shorthorn sculpin	B/M	—	—	X	X	X	X	X	X	—	—	—	—	—	—	X	—	—	—	—	—	—
Myoxocephalus scorpioides	Arctic sculpin	B/M	—	—	X	X	X	X	—	—	—	—	—	—	—	—	X	—	—	—	—	—	—
Myoxocephalus jaok	plain sculpin	M	—	—	—	X	X	X	X	—	—	—	—	—	—	—	X	—	—	—	—	—	—
Microcottus sellaris	brightbelly sculpin	B/M	—	—	—	—	—	X	X	—	—	—	—	—	—	—	X	—	—	—	—	—	—
Artediellus gomojunovi	spinyhook sculpin	M	—	—	—	—	—	X	X	X	X	X	—	—	—	—	X	—	—	—	—	—	—
Artediellus scaber	hamecon	B/M	—	—	—	—	—	X	X	—	—	—	—	—	—	—	X	—	—	—	—	—	—
Artediellus pacificus	hookhorn sculpin	M	—	—	—	—	—	X	X	X	X	—	—	—	—	—	X	—	—	—	—	—	—
Artediellus ochotensis	Okhotsk hookear sculpin	M	—	—	—	—	—	X	X	—	—	—	—	—	—	—	X	—	—	—	—	—	—
Blepsias bilobus	crested sculpin	M	—	—	—	—	—	X	X	X	—	—	—	—	—	—	X	—	—	—	—	—	—
Nautichthys pribilovius	eyeshade sculpin	M	—	—	—	—	—	X	X	X	X	X	—	—	—	—	X	—	—	—	—	—	—
Eurymen gyrinus	smoothcheek sculpin	M	—	—	—	—	—	X	X	X	X	X	—	—	—	—	X	—	—	—	—	—	—
Cottunculus sadko	Sadko sculpin	M	—	—	—	—	—	—	—	—	X	X	X	X	—	—	X	—	—	—	—	—	—
Hypsagonus quadricornis	fourhorn poacher	M	—	—	—	—	—	X	X	X	X	X	—	—	—	—	X	—	—	—	—	—	—
Pallasina barbata	tubenose poacher	M	—	—	—	X	X	X	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Occella dodecaedron	Bering poacher	M	—	—	—	—	—	X	—	—	—	—	—	—	—	—	X	—	—	—	—	—	—
Leptagonus decagonus	Atlantic poacher	M	—	—	—	—	—	X	X	X	—	—	—	—	—	—	X	—	—	—	—	—	—
Podothecus veternus	veteran poacher	M	—	—	—	—	—	X	X	X	X	—	—	—	—	—	X	—	—	—	—	—	—
Ulcina olrikii	Arctic alligatorfish	B/M	—	—	—	—	—	X	X	—	—	—	—	—	—	—	X	—	—	—	—	—	—
Aspidophoroides monopterygius	alligatorfish	M	—	—	—	—	—	X	X	X	—	—	—	—	—	—	X	—	—	—	—	—	—
Eumicrotremus derjugini	leatherfin lumpsucker	M	—	—	—	—	—	—	X	X	X	—	—	—	—	—	X	—	—	—	—	—	—
Eumicrotremus andriashevi	pimpled lumpsucker	M	—	—	—	—	—	X	X	—	—	—	—	—	—	—	X	—	—	—	—	—	—
Liparis gibbus	variegated snailfish	M	—	—	—	—	—	X	X	X	X	—	—	—	—	—	X	—	—	—	—	—	—
Liparis tunicatus	kelp snailfish	M	—	—	—	—	—	X	X	X	—	—	—	—	—	—	X	—	—	—	—	—	—
Liparis bristolensis	Bristol snailfish	M	—	—	—	—	—	X	X	—	—	—	—	—	—	—	X	—	—	—	—	—	—
Gymnelus viridis	fish doctor	M	—	—	—	X	X	X	X	X	X	—	—	—	—	—	X	—	—	—	—	—	—
Lycodes seminudus	longear eelpout	M	—	—	—	—	—	—	—	X	X	X	X	—	—	—	X	—	—	—	—	—	—
Lycodes mucosus	saddled eelpout	M	—	—	—	—	—	X	X	—	—	—	—	—		—	X	—	—	—	—	—	—
Lycodes turneri	estuarine eelpout	M	—	—	—	—	—	X	X	X	—	—	—	—	—	—	X	—	—	—	—	—	—
Lycodes polaris	polar eelpout	M	—	—	—	—	—	X	X	X	—	—	—	—	—	—	X	—	—	—	—	—	—

Table III.B-2

Arctic Fish Occurrence in Coastal and Marine Waters of the Alaskan Chukchi and Beaufort Seas. (continued)

			Freshwater		Brackish			Marine									Behavioral Stratification						
					Nearshore			Neritic						Oceanic									
Species	Common Name	.Principle Environment	Fluvial	Lacustrine	Estuarine	Intertidal	0-2m (Infralittoral Fringe)	1-50m	51-100m	101-200m	201-300m	301-500m	501-700m	701-1000m	1001-3000m	>3000m	Demersal	Bathydemersal	Bentho-Pelagic	1-200m (epipelagic)	201-1000m (mesopelagic)	>1000m (bathypelagic)	cryopelagic
Lycodes raridens	marbled eelpout	M	–	–	–	–	–	X	X	X	–	–	–	–	–	–	X	–	–	–	–	–	–
Lycodes rossi	threespot eelpout	M	–	–	–	–	–	X	X	X	X	X	–	–	–	–	X	–	–	–	–	–	–
Lycodes sagittarius	archer eelpout	M	–	–	–	–	–	–	–	–	–	X	X	–	–	–	X	–	–	–	–	–	–
Lycodes palearis	wattled eelpout	M	–	–	–	–	–	X	X	X	–	–		–	–	–	X	–	–	–	–	–	–
Lycodes pallidus	pale eelpout	M	–	–	–	–	–	X	X	X	X	X	X	X	X	–	X	X	–	–	–	–	–
Lycodes squamiventer	scalebelly eelpout	M	–	–	–	–	–	–	–	–	–	X	X	X	X	–	X	X	–	–	–	–	–
Lycodes eudipleurostictus	doubleline eelpout	M	–	–	–	–	–	X	X	X	X	–	–	–	–	–	X	–	–	–	–	–	–
Lycodes concolor	ebony eelpout	M	–	–	–	–	–	X	X	X	X	X	X	X	X	–	X	X	–	–	–	–	–
Eumesogrammus praecisus	fourline snakeblenny	M	–	–	–	–	–	X	X	X	X	X		–	–	–	X	–	–	–	–	–	–
Stichaeus punctatus	Arctic shanny	M	–	–	–	–	–	X	X	–	–	–	–	–	–	–	X	–	–	–	–	–	–
Chirolophis snyderi	bearded warbonnet	M	–	–	–	–	–	X	X	–	–	–	–	–	–	–	X	–	–	–	–	–	–
Leptoclinus maculatus	daubed shanny	M	–	–	–	–	–	X	X	X	X	X	–	–	–	–	X	–	–	–	–	–	–
Anisarchus medius	stout eelblenny	M	–	–	–	–	–	X	X	X	–	–	–	–	–	–	X	–	–	–	–	–	–
Lumpenus fabricii	slender eelblenny	M	–	–	–	X	X	X	X	–	–	–		–	–	–	–	–	X	–	–	–	–
Pholis fasciata	banded gunnel	M	–	–	–	–	–	X	–	–	–	–	–	–		–	X	–	–	–	–	–	–
Anarhichas orientalis	Bering wolffish	M	–	–	–	–	–	X	–	–	–	–	–	–	–	–	X	–	–	–	–	–	–
Ammodytes hexapterus	Pacific sand lance	M	–	–	–	X	X	X	X	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Hippoglossus stenolepis	Pacific halibut	M	–	–	–	–	–	X	X	X	X	X	X	X	X	–	X	–	–	–	–	–	–
Hippoglossoides robustus	Bering flounder	M	–	–	–	–	–	X	X	X	X	X	–	–	–	–	X	–	–	–	–	–	–
Reinhardtius hippoglossoides	Greenland halibut	M	–	–	–		–	X	X	X	X	X	X	X	X	–	X	–	–	–	–	–	–
Platichthys stellatus	starry flounder	M/B	X	–	X	X	X	X	X	X	X	X	–	–	–	–	X	–	–	–	–	–	–
Pleuronectes quadrituberculatus	Alaska plaice	M	–	–	–	–	–	X	X	X	X	X	–	–	–	–	X	–	–	–	–	–	–
Pleuronectes glacialis	Arctic flounder	B/M	X	–	X	–	X	X	–	–	–	–	–	–	–	–	X	–	–	–	–	–	–
Limanda proboscidea	longhead dab	M	X	–	X	–	X	X	–	–	–	–	–	–	–	–	X	–	–	–	–	–	–
Limanda aspera	yellowfin sole	M	X	–	X	–	X	X	X	X	X	X	X	–	–	–	X	–	–	–	–	–	–
Limanda sakhalinensis	Sakhalin sole	M	X	–	X	–	X	X	X	X	–	X	–	X	–	–	X	–	–	–	–	–	–

Sources:

Moulton and George,(2000); Mecklenburg, Mecklenburg, and Thorsteinson, et al., (2002); Froese and Pauly, (2003).

Notes:

– = Absent	**B** = Brackish	**M** = Marine
A = Anadromous	**FW** = Freshwater	**X** = Present

Table III.C-1
Estimated Number of Jobs by Sector, North Slope Borough Residents Only

	1980	1988	1993	1998	2003
Federal Government	100	83	37	39	61
State Government	12	20	25	35	26
City Government	—	71	61	57	66
NSB Government	642	1,087	893	989	777
NSB School District	—	419	345	289	409
Private Construction	201	95	21	66	43
Regional/Village Corporation		311	304	407	383
Transportation	107	122	45	43	53
Oil Industry	30	46	21	16	23
Service	71	84	53	83	108
Other	176	168	138	368	242
Total	**1,689**	**2,506**	**1,943**	**2,392**	**2,191**

Sources:

1980 data from Alaska Consultants, Inc., (1981); 1988, 1993, 1998, and 2003 data are from North Slope Borough Economic Profile and Census Reports.

Note:

NSB = North Slope Borough

Table III.C-2
Employment of Residents by Sector, North Slope Communities, 2003

Sector	Anaktuvuk Pass	Atqasuk	Barrow	Kaktovik	Nuiqsut	Point Hope	Point Lay	Wainwright
Federal Government	1	0	45	1	0	10	2	2
State Government	2	0	22	0	1	0	1	0
City Government	12	1	21	3	5	14	2	8
NSB Government	51	20	464	27	29	44	24	48
NSB School District	30	20	194	21	27	62	29	44
NSB CIP	0	0	4	0	2	0	1	3
Oil Industry	3	0	14	1	3	2	0	0
Private Construction	4	0	23	5	3	1	4	4
ASRC	3	0	69	5	3	1	4	3
Village Corporation	19	27	87	18	37	60	9	38
Finance	0	0	5	0	0	0	1	0
Transportation	0	0	48	0	1	3	1	1
Communication	0	0	8	0	0	0	0	0
Trade	0	1	27	0	0	2	0	1
Service	4	0	103	0	0	0	1	0
Ilkisagvik College	0	0	58	0	0	2	1	1
Other	2	3	132	3	10	25	5	18
Total	**131**	**72**	**1,324**	**84**	**121**	**226**	**85**	**171**

Source:

2003 Economic Profile and Census Report, Volume IX, Department of Planning and Community Service North Slope Borough.

Table III.C-3
Employment Estimates (In thousands) (nonagricultural wage and salary employment)

	1995	1996	1997	1998	1999	2000	2005
Anchorage-Mat Su Region	131	132	135	141	144	148	157
Kenai Peninsula Borough	16	16	16	17	17	17	16
Fairbanks North Star Borough	31	31	32	33	33	34	36
Total for 3 Areas	178	178	183	191	194	199	209
Alaska Total	**261**	**261**	**269**	**275**	**278**	**284**	**292**

Source:
Alaska Department of Labor and Workforce Development, Research and Analysis Section.

Table III.C-4
Annual Bowhead Whale Subsistence Harvest for Chukchi Sea Villages, 1982-2005

Year	Barrow	Wainwright	Point Hope	Kivalina
1982	0	2	1	0
1983	2	2	1	0
1984	4	2	2	1
1985	5	2	1	0
1986	8	3	2	0
1987	7	4	5	1
1988	11	4	5	0
1989	10	2	0	0
1990	11	5	3	0
1991	12	4	6	1
1992	22	0	2	1
1993	23	5	2	0
1994	16	4	5	2
1995	19	5	1	1
1996	24	3	3	0
1997	30	3	4	0
1998	25	3	3	0
1999	24	5	2	0
2000	18	5	3	0
2001	27	6	4	0
2002	22	1	0	0
2003	16	5	4	0
2004	21	4	3	0
2005	29	3	7	0

Sources:
S.R. Braund and Assocs. (1984); Stoker and Krupnik, (1993); AEWC, (1993), (1994), (1995); Philo et al., (1994); Suydam et al., (1995); S.R. Braund and Assocs. (2002); S.R. Braund and Assocs. and North Slope Borough Department of Wildlife Management, (2006).

Table III.C-5
Annual Beluga Whale Harvest for Barrow, Wainwright, Point Lay, Point Hope, and Kivalina, 1980-2005

Year	Number of Whales				
	Barrow	Wainwright	Point Lay	Point Hope	Kivalina
1980	0	0	15-18	23-35	3-5
1981	5	0	29-38	4-7	10-15
1982	3-5	0	28-33	17	4-5
1983	3	0	18	20-31	24
1984	0	0	0	30	27
1985	0	0	18	30	120-200
1986	0	5	33	30	7
1987	0	47	22-35	40	4
1988	0	3	40	59	6
1989	1	0	16	17	0
1990	0	0	62	16	1
1991	1	5	35	39	1
1992	0	20	24	15	10
1993	2	0	77	79	3
1994	5	0	56	53	3
1995	0	0	31	40	3
1996	2	0	41	15	7
1997	8	4	3	32	1
1998	1	38	48	52	0
1999	1	3	47	33	1
2000	1	0	0	16	44
2001	1	23	34	24	0
2002	1	37	47	23	3
2003	2	38	36	34	0
2004	1	0	53	29	1
2005	7	1	41	?	2

Sources:
Alaska Beluga Whale Committee [ABWC], (2002), (2006); Fuller and George, (1997); Lowry et al., (1989); Burns and Frost, (1989); Impact Assessment, (1989); Burns and Seaman, (1986); Braund and Burnham, (1984).

Table III.C-6
Annual Walrus Harvest for Barrow, Wainwright, Point Lay, Point Hope, and Kivalina, 1985-2005

Harvest Season	Number of Walrus				
	Barrow	Wainwright	Point Lay	Point Hope	Kivalina
1985	--	--	--	--	--
1986	--	--	--	--	--
1987	54	--	6	--	--
1988	1-62	0-59	0	--	--
1989	14	43	0	2	46
1990	7	0	0	5	0
1991	23	32	0	0	0
1992	26	48	0	5	1
1993	27	44	1	5	12
1994	16	68	1	6	16
1995	12	83	4	0	38
1996	13	24	4	0	13
1997	48	50	7	3	2
1998	24	69	8	5	0
1999	17	48	6	5	0
2000	19	36	6	6	0
2001	37	94	3	2	0
2002	39	119	11	16	0
2003	51	29	9	12	0
2004	52	47	5	20	0
2005	5	21	5	0	4

Sources:
USDOI, FWS, (1997), (2002); FWS, MTRP Tagging Database, 1989-2005; Braund, (1993); Braund and Burnham, (1984); CPDB, (1996); Fuller and George, (1997).

Table III.C-7
Annual Polar Bear Harvest for Barrow, Wainwright, Point Lay, Point Hope, and Kivalina, 1983-2005

Harvest Season*	Number of Bears				
	Barrow	Wainwright	Point Lay	Point Hope	Kivalina
1983/84	27	34	8	30	3
1984/85	33	18	0	18	3
1985/86	14	8	6	17	2
1986/87	18	13	4	13	1
1987/88	15	9	2	9	5
1988/89**	29	14	2	9	1
1989/90	14	9	1	23	5
1990/91	14	6	3	18	3
1991/92	22	3	0	9	2
1992/93	26	8	3	17	1
1993/94	30	10	1	8	1
1994/95	11	7	1	20	2
1995/96	18	14	1	7	0
1996/97	40	9	6	14	0
1997/98	18	6	3	12	0
1998/99	16	2	0	18	3
1999/00	17	5	4	10	0
2000/01	28	10	1	15	1
2001/02	25	2	1	9	0
2002/03	20	5	1	12	1
2003/04	10	13	3	10	0
2004/05	2	5	4	9	2
2005/06***	?	?	?	?	?

Source:
Schliebe, Amstrup, and Garner, (1995); Schliebe, (2006).

Notes:
* Harvest runs from 1 July to 30 June.
** Atqasuk harvested 2 bears during the 1988/89 season.
*** Harvest season incomplete.

Table III.C-8
Breakdown of Total Harvest by Subsistence-Harvest Category for Point Hope, Alaska, 1992. The 1993 Population of Point Hope was 699; The Total Number of Households was 156

Subsistence Harvest Category	Total Weight	Pounds Per Household	Pounds Per Capita
Birds	9,429	60	13
Fish	30,589	196	44
Invertebrates	88	1	0
Marine Mammals	262,009	1,680	375
Plants	2,720	17	4
Terrestrial Mammals	35,548	228	51
Total	340,383	2,182	487

Source:
Fuller and George, (1997).

Table III.C-9
Top Five Species Harvested at Point Hope, Alaska during Calendar Year, 1992

Top Five Species Harvested	Edible Pounds Harvested	Number Harvested	Pounds Per Household	Pounds Per Capita	Percent of Total Harvest
Beluga	137,172	98	879	196	40.3%
Walrus	55,797	72	358	80	16.4%
Bearded Seal	28,242	160	181	40	8.3%
Caribou	26,303	225	169	38	7.7%
Bowhead	23,365	3	150	33	6.9%

Source:
Fuller and George, (1997).

Table III.C-10
Participation in Subsistence Harvest Activities, Point Hope Alaska, 1992, of 156 Households, 142 Households Participated in This Survey

	Number of Households				Percent of Households			
Activity	Often	Sometimes	Vacation	Not at All	Often	Sometimes	Vacation	Not at All
Fall Whaling	4	5	0	133	3%	4%	0%	94%
Fish	86	29	1	26	61%	20%	1%	18%
Helped Whaling Crew	92	27	2	21	55%	19%	1%	15%
Hunt Caribou	71	27	1	43	50%	19%	1%	30%
Hunt Moose, Bear, or Sheep	35	27	2	78	25%	19%	1%	55%
Hunt Seal	78	29	0	35	55%	20%	0%	25%
Hunt Walrus	70	33	0	39	49%	23%	0%	27%
Hunt Waterfowl and Eggs	81	27	1	33	57%	19%	1%	23%
Make Sleds or Boats	53	26	0	63	37%	18%	0%	44%
Pick Berries	81	39	1	21	57%	27%	1%	15%
Sew Skins, Make Parkas	49	35	0	58	35%	25%	0%	41%
Spring Whaling	98	16	4	24	69%	11%	3%	17%
Trap	14	22	0	106	10%	15%	0%	75%

Source:
Fuller and George, (1997).

Table III.C-11
Point Hope, Amount of Food Consumed Harvested from Local Sources[1]

Amount	1998		2003	
	Number	Percent	Number	Percent
None	4	2.9%	10	7.0%
Very Little	11	8.2%	16	11.3%
Less Than Half	23	17.2%	23	16.2%
Half	34	25.4%	28	19.7%
More Than Half	34	25.4%	30	21.1%
Nearly All	19	14.2%	15	10.6%
All	9	6.7%	20	14.1%
Total	134	100%	142	100%

Source:

Fuller and George, (1997).

Note:

[1] Results include only those households responding to the census survey and the query about the amount of subsistence harvested by the household.

Table III.C-12
Point Hope Money Spent on Subsistence Activities, 2003[1]

Amount	Number	Percent
$0 to $100	27	22.5%
$200 to $400	9	7.5%
$500 to $700	10	8.3%
$800 to $1,200	11	9.2%
$1,200 to $3,000	22	18.3%
$3,100 to $9,500	22	18.3%
$9,600 to $20,000	18	15.1%
$21,000+	1	0.8%
Total	**120**	100%

Source:

Fuller and George, (1997).

Note:

[1] Results include only those households responding to the census and the questions about money spent on subsistence activities.

Table III.C-13a
Kivalina Marine Mammal Subsistence Harvests for 1964-1965, 1965-1966, 1982-1983, 1983-1984, and 1991-1992

Resource	Number Taken				
	1964-1965	1965-1966	1982-1983	1983-1984	1991-1992
Bearded seal	153	119	134	60	139
Spotted seal	4	1	1	1	30
Ringed seal	908	467	172	109	110
Ribbon seal	NR	NR	1	NR	8
Walrus	0	3	51	4	28
Beluga	6	12	27	28	10
Bowhead whale [a]	0	0	0	1	1
Gray whale	0	0	0	part of carcass	0
Polar bear	NR	1	NR	2	8

Notes:
[a] Two additional bowhead whales were taken in 1994.
NR None reported

Table III.C-13b
Kivalina Land Mammal Subsistence Harvests for 1964-1965, 1965-1966, 1982-1983, 1983-1984, and 1991-1992

Resource	Number Taken				
	1964-1965	1965-1966	1982-1983	1983-1984	1991-1992
Caribou	256	1,010	346	564	351
Moose	NR	4	6	6	17
Grizzly	1	2	NR	2	3
Fox	6	19	47	58	21
Sheep	NR	NR	2	NR	U
Wolf	1	1	NR	1	9
Wolverine	17	21	12	10	23
Lynx	NR	6	1	NR	0
Porcupine	1	1	1	NR	0
Mink	NR	1	NR	NR	2
Otter	NR	NR	1	NR	2
Hare	NR	NR	NR	NR	0
Squirrel	NR	NR	3	53	10

Notes:
NR None reported

Table III.C-13c
Kivalina Fish Subsistence Harvests for 1964-1965, 1965-1966, 1982-1983, 1983-1984, and 1991-1992

Resource	Pounds Taken				
	1964-1965	1965-1966	1982-1983	1983-1984	1991-1992
Char	93,995	28,140	69,059	68,467	69,792
Cod	NR	6,955	9	4,299	6,095
Burbot	NR	2	2	2	516
Grayling	NR	40	290	968	644
Salmon	1,425	116	464	2,107	5,081
Whitefish	2,500	13	100	1,608	4,662
Sculpin	ND	ND	9	9	ND
Smelt	ND	ND	ND	20	22

Notes:
NR None reported
ND No data collected

Table III.C-13d
Kivalina Bird Subsistence Harvests for 1964-1965, 1965-1966, 1982-1983, 1983-1984, and 1991-1992

Resource	1964-1965 Number Taken	1965-1966 Number Taken	1982-1983 Number Taken	1983-1984 Number Taken	1991-1992 Number Taken
Geese	ND	ND	215	387	944
Ducks	ND	ND	134	210	609
Ptarmigan	ND	16	46	242	637
Cranes	ND	ND	4	4	12
Snowy Owls	ND	ND	15	26	29
Swans	ND	ND	1	NR	0
Murres	ND	10	ND	18	ND

Notes:
ND No data collected.
NR None reported.

Table III.C-13e
Kivalina Plant Subsistence Harvests for 1964-1965, 1984, 1965-1966. 1982-1983, 1983-1984, and 1991-1992

Resource	1964-1965 lbs taken	1965-1966 lbs taken	1982-1983 lbs taken	1983-1984 lbs taken	1991-1992 lbs taken
Blackberries	550	181	457	591	See mixed
Sourdock	260	213	85	NR	See mixed
Eskimo Potato	ND	ND	40	NR	See mixed
Salmonberries	ND	ND	1,721	14	See mixed
Blueberries	ND	ND	461	488	See mixed
Mixed	370 (salmonberries, blackberries, sourdock)	283 (berries)	ND	ND	4,615 (recorded as berries, not as type)

Notes:
ND No data collected.
NR None reported.

Sources of data for Tables III.C-13a-13e:
Burch, (1985); Alaska Department of Fish and Game Community Profile Database.

Table III.C-14
Importance of Subsistence Foods to Households in NANA Region (Indicated by:
"How Much of Your Own Food Did Your Family Catch, Hunt. Or Fish for This Year?"

Response	Kivalina	Noatak	Kotzebue
"All of our food"	5.6%	—	5.6%
"Most of our food"	L6.7%	57.1%	14.9%
Half of our food"	38.9%	28.6%	16.1%
"Some of our food"	38.9%	14.3%	49.1%
"None of our food"	—	—	14.3%
Total	100.0%	100.0%	100.0%

Sources:
NANA Regional Strategy, Community Survey, 1978, as reported in Red Dog Mine Project EIS, February, 1984; Draft EIS Navigation Improvements Delong Mountain Terminal, Alaska.

Table III.C-15
Ethnic Composition of Barrow, Atqasuk, Wainwright, Point Lay, and Point Hope—Percent by Race

	State of Alaska		Barrow		Atqasuk		Wainwright		Point Lay		Point Hope	
	Population	Percent	Population	Percent	Population	Percent	Population	Percent	Population	Percent	Population	Percent
Total	626,932		4,581		228		546		247		757	
Hispanic or Latino	25,852	4.1	153	3.3	0	0.0	0	0.0	6	2.4	13	1.7
Not Hispanic or Latino	601,080	95.9	4,428	96.7	228	100	546	100	241	97.5	744	98.2
Population of one race	570,626	91.0	4,063	88.7	227	99.6	531	97.2	233	94.3	728	96.1
White	423,788	67.6	972	21.2	11	4.8	37	6.7	28	11.3	66	8.7
Black or African-American	21,073	3.4	44	1.0	0	0.0	1	0.2	0	0.0	1	0.1
American Indian or Alaska Native	96,505	15.4	2,558	55.8	215	94.3	493	90.2	204	82.5	659	87.0
Asian	24,741	3.9	429	9.4	1	0.4	0	0.0	1	0.4	1	0.1
Native Hawaiian and Pacific Islander	3,181	0.5	59	1.3	0	0.0	0	0.0	0	0.0	0	0.0
Some other race	1,388	0.2	1	0.0	0	0.0	0	0.0	0	0.0	1	0.1
Two or more races	30,454	4.9	365	8.0	1	0.4	15	2.7	14	5.6	29	3.8

Source:
Census Table SF-1, http://146.63.75.45/census2000/Census_lv2.asp.

Table III.C-16
Population Counts for Native Subsistence-Based Communities in the Arctic Ecoregion; Total American Indian and Alaskan Native Population Percentages

Community`	Total Residents	Percent American Indian/Alaska Native
North Slope Borough	7,385	68.4%
Kaktovik	293	74.4
Nuiqsut	433	88.2
Barrow	4,581	57.2
Wainwright	546	90.3
Point Lay	247	82.6
Point Hope	757	87.1
Northwest Arctic Borough	7,208	82.5
Kivalina	377	96.6
Kotzebue	3,082	71.2
Noorvik	634	90.1
Buckland	406	95.8
Deering	136	93.4
Nome Census Area	9,196	75.2
Diomede	146	92.5
Shismaref	562	93.2
Wales	152	83.6

Source:
USDOC, Bureau of the Census, (2000).

Table III.C-17
Median Household, Median Family, Per-Capita Incomes; Number of People in Poverty; Percent of the Total Borough or Native Subsistence-based Community Population

Community	Median Household Income	Median Family Income	Per-Capita Income	Number of People in Poverty (Percent of Community Population)
North Slope Borough	$63,173	$63,810	$20,540	663 (9.1%)
Kaktovik	55,625	60,417	22,031	18 (6.6)
Nuiqsut	48,036	46,875	14,876	10 (2.4)
Barrow	67,097	68,203	22,902	390 (8.6)
Wainwright	54,722	58,125	16,710	70 (12.5)
Point Lay	68,750	75,833	18,003	18 (7.4)
Point Hope	63,125	66,250	16,641	112 (14.8)
Northwest Arctic Borough	45,796	45,230	15,286	1,243 (17.4)
Kivalina	30,833	30,179	8,360	99 (26.4)
Kotzebue	57,163	58,068	18,289	401 (13.1)
Noorvik	51,964	52,708	12,020	51 (7.6)
Buckland	38,333	40,000	9,624	49 (11.9)
Deering	33,333	43,438	11,000	8 (5.8)
Nome Census Area	41,250	44,189	15,476	1,569 (17.4)
Diomede	23,750	24,583	9,944	56 (35.4)
Shishmaref	30,714	29,306	10,487	89 (16.3)
Wales	33,333	39,583	14,877	28 (18.3)

Source:
USDOC, Bureau of the Census, (2000).

Table III.C.18
Shipwrecks in the Chukchi Sea Planning Area

Vessel Name	Type	Tons	Date Wrecked	Location	Cause of Wreck
Caulaincourt	French whaling ship	657	9/5/1861	At Point Belcher	Stove by ice; was quickly full of water and lost.
Henry Kneeland	Whaling ship	304	6/22/1864	In the Chukchi Sea	Struck an ice cake, filled instantly, and lost.
Gratitude	Whaling bark	337	7/2/1865	40 mi from Cape Lisburne	Stove by ice and sank while trying to escape the *C.S.S. Shenandoah* and get into the protection of grounded ice.
Ontario	Whaling bark	489	9/27/1866	In the Chukchi Sea	Abandoned after colliding with the *Helen Mar* in a gale on September 27, 1866. With the vessel in this damaged condition, the crew refused duty, and she was abandoned with 1,050 barrels of whale oil aboard.
Hae Hawaii	Whaling bark	368	9/22/1868	In the Seahorse Islands, off Point Franklin	Anchors dragged in a gale and the vessel went ashore and was lost.
Eagle	Whaling bark	336	9/30/1869	On Seahorse Shoal, off Point Franklin	Grounded and lost; crew rescued by the vessel *John Carver*.
Almira	Whaling ship	310	8/26/1870	Near Point Barrow	Stove by ice and lost.
Hibernia	Whaling ship	256	8/28/1870	About 2 mi SW of Point Barrow	Ice stove hole in bow and vessel ran aground. Sold at auction for $150.
Comet	Whaling brig	255	9/2/1871	Between Point Franklin and Seahorse Islands	Crushed between grounded floe and moving pack ice and lost.
Roman	Whaling bark	358	9/7/1871	In the Seahorse Islands, off Point Franklin	Crushed between grounded floe and moving pack ice. Vessel sank less than an hour after being carried off by the ice. Crew escaped over the ice.
Awashonks	Whaling bark	380	9/8/1871	S of Wainwright Inlet	Crushed and lost after being pushed partly onto ice. Wreck was still visible in 1872.
Julian	Whaling ship	356	9/8/1871	S of Wainwright Inlet	Crushed in ice and abandoned.
Kohola	Whaling brig	270	9/9/1871	2 mi NE of Wainwright Inlet	Abandoned after trapped in ice. In 1872, found high and dry S of Point Belcher.
Carlotta	Whaling bark	480	9/12/1871	Point Belcher, near Wainwright Inlet	Abandoned after trapped in ice.
Fanny	Whaling bark	391	9/13/1871	6 mi S of Point Belcher, ¼ mi from shore	Abandoned after trapped in ice and crushed.
Monticello	Whaling bark	356	9/13/1871	4 mi S of Point Belcher	Trapped in ice and abandoned. In 1872, hull of vessel was identified; bow and stern were ½ mi apart.
Champion	Whaling ship	367	9/14/1871	Point Belcher, near Wainwright Inlet	Abandoned after trapped in ice.
Concordia	Whaling bark	368	9/14/1871	Point Belcher, near Wainwright Inlet	Abandoned after trapped in ice; burned by Inupiaq Eskimos.

Table III.C.18
Shipwrecks in the Chukchi Sea Planning Area (continued)

Vessel Name	Type	Tons	Date Wrecked	Location	Cause of Wreck
Contest	Whaling bark	341	9/14/1871	Point Belcher, near Wainwright Inlet	Abandoned after trapped in ice.
Elizabeth Swift	Whaling bark	327	9/14/1871	Point Belcher, near Wainwright Inlet	Abandoned after trapped in ice.
Emily Morgan	Whaling bark	365	9/14/1871	1 mi N of Point Belcher	Abandoned after trapped in ice and crushed. By 1872, wreck had drifted 1 mi N of Point Belcher, and in 1873 the wreck was still visible.
Eugenia	Whaling bark	315	9/14/1871	Point Belcher, near Wainwright Inlet	Ice snapped rudder and vessel was abandoned after it became trapped in ice; it was later crushed.
Florida	Whaling ship	470	9/14/1871	In the Seahorse Islands, off Point Franklin	Abandoned after trapped in ice and forced ashore by ice. In 1872, the vessel was found ashore at Seahorse Islands and was burned to water's edge by Inupiaq Eskimos. Somme accounts have the vessel drifting N to Barrow.
Gay Head	Whaling ship	300	9/14/1871	Point Belcher, near Wainwright Inlet	Abandoned after trapped in ice; in 1872, found burned by Inupiaq Eskimos.
George	Whaling bark	259	9/14/1871	Point Belcher, near Wainwright Inlet	Abandoned after trapped in ice and crushed.
George Howland	Whaling bark	361	9/14/1871	Point Belcher, near Wainwright Inlet	Abandoned after trapped in ice.
Henry Taber	Whaling bark	296	9/14/1871	Point Belcher, near Wainwright Inlet	Abandoned after trapped in ice.
James D. Thompson	Whaling bark	432	9/14/1871	Point Belcher, near Wainwright Inlet	Abandoned after trapped in ice.
John Wells	Whaling bark	357	9/14/1871	Point Belcher, near Wainwright Inlet	Abandoned after trapped in ice.
Mary	Whaling ship	373	9/14/1871	S of Wainwright Inlet	Abandoned after trapped in ice and crushed.
Massachusetts	Whaling bark	356	9/14/1871	Point Belcher, near Wainwright Inlet	Abandoned after trapped in ice. In 1872, hull had been carried around Point Barrow by ice.
Navy	Whaling bark	385	9/14/1871	Point Belcher, near Wainwright Inlet	Abandoned after trapped in ice.
Oliver Crocker	Whaling bark	305	9/14/1871	Point Belcher, near Wainwright Inlet	Abandoned after trapped in ice.
Paiea	Whaling bark	386	9/14/1871	Point Belcher, near Wainwright Inlet	Abandoned after trapped in ice.
Reindeer	Whaling ship	332	9/14/1871	Point Belcher, near Wainwright Inlet	Abandoned after trapped in ice. In 1872, found 5 mi S of Point Belcher.
Seneca	Whaling bark	328	9/14/1871	Point Belcher, near Wainwright Inlet	Abandoned and lost after trapped in ice. Vessel survived the crush of 1871 and was taken in tow by the bark Florence in July 1872. Later, it was cut adrift in bad weather, ran aground, and was lost.

Table III.C.18
Shipwrecks in the Chukchi Sea Planning Area (continued)

Vessel Name	Type	Tons	Date Wrecked	Location	Cause of Wreck
Thomas Dickason	Whaling bark	461	9/14/1871	N of Wainwright Inlet	Abandoned and lost after trapped in ice. In 1872, vessel was found 2 mi N of Wainwright Inlet with water flowing in and out of her.
Victoria	Trading brig	149	9/14/1871	S of Wainwright Inlet	Abandoned and lost after trapped in ice.
William Rotch	Whaling ship	290	9/14/1871	S of Wainwright Inlet	Forced ashore by ice and abandoned.
Roscoe	Whaling bark	313	8/19/1872	Off Point Barrow	Stove while at anchor and abandoned.
Arctic	Whaling bark	431	7/7/1876	18 mi from the "Bend" (Point Belcher)	Crushed in ice and abandoned. Crew reached shore and was rescued by the vessel *Onward*.
Three Brothers	Whaling bark	357	9/11/1877	Off Point Barrow	Abandoned in ice and lost; whale catch saved.
W.A. Farnsworth	Whaling bark	432	9/15/1877	Near Point Barrow	Stove by ice, filled with water, capsized, and sank.
William H. Allen	Trading brig	157	8/2/1878	Off Cape Smyth	Stove by ice and sank.
Florence	Whaling bark	245	8/8/1878	4 mi S of Point Barrow	Stove by ice and sank.
Daniel Webster	Whaling bark	327	7/12/1881	5 mi S of Point Barrow	Crushed by ice and sank rapidly. Crew escaped to Point Barrow and some walked to Icy Cape and sailed in the bark *Coral*.
North Star	Steam whaling bark	489	7/8/1882	Off Point Barrow, 2 ½ mi from shore	Crushed in ice on her maiden voyage under command of L.C. Owen and the "force of ice was so great that the cracking of her timbers could be heard on shore." Crew made way over ice to U.S. Army Signal Service Station.
John Howland	Whaling bark	384	7/17/1883	S of Point Hope	Stove by ice and condemned. Boat burned on July 20 and sank on July 21.
Cyane	Whaling bark	295	8/23/1883	5 mi NE of Point Belcher	Vessel stranded in fog and heavy SW gale and went to pieces.
Louisa	Whaling bark	304	9/24/1883	Off Point Hope	Struck ice in a gale and sank.
Bowhead	Steam whaling bark	533	8/11/1884	Blossom Shoals, near Icy Cape	Made fast to grounded ice to clean boilers. She was truck and holed by a piece of drifting ice and sank quickly. Crew was rescued by the nearby steam whalers *Narwhal* and *Balaena*.
George and Susan	Whaling bark	343	8/10/1885	9 mi N of Wainwright Inlet	Driven ashore and wrecked in SW gale after parting anchor chain and colliding with the bark *Mabel*. All crew but 3 rescued by the revenue cutter *Corwin*.
Mabel	Whaling bark	188	8/10/1885	At Wainwright Inlet	After being fouled by the whaler *George and Susan* in a gale, the vessel went ashore and stranded. It became a total wreck. The revenue cutter *Corwin* tried to get a hawser on board but failed. The *Corwin* was able to rescue the crew. Hulk still on beach in 1886.

Table III.C.18
Shipwrecks in the Chukchi Sea Planning Area (continued)

Vessel Name	Type	Tons	Date Wrecked	Location	Cause of Wreck
Clara Light	Whaling schooner/tender	179	8/31/1886	15 mi N of Point Franklin	Abandoned in ice and lost.
Fleetwing	Whaling bark	328	8/3/1888	1 mi NE of Point Barrow	Chain cable parted in heavy SW gale and vessel went ashore on shoal. Ship was abandoned by crew, sold at auction, and gear salvaged. Remains were burned by Inupiaq Eskimos on August 15.
Mary and Susan	Whaling bark	327	8/3/1888	4 mi S of Point Barrow	Lost on outlying reef in a gale. Crew rescued by the cutter *Bear* the same day. Vessel burned on August 4.
Ino	Schooner	98	8/8/1888	At Cape Smyth	Driven ashore in sudden SW gale and stranded when anchors dragged.
Ohio	Whaling bark	206	10/3/1888	At Point Hope	The *Ohio* was driven onto the beach in a heavy gale and snowstorm and grounded. The vessel broke up and was a total loss. After 8 months, some of the crew were rescued; 25 were lost.
Thomas Pope	Whaling bark/tender	226	7/28/1890	Off Point Hope	Masts were cut away in a gale. Vessel was stove by ice and stranded. Crew and cargo were taken off by steamer *William Lewis* and brig *F.A. Barstow*.
Spy	Sloop	17	11/25/1890	At Point Barrow	Caught in ice and crushed while heading for winter quarters.
William Lewis	Steam bark	463	10/3/1891	At Point Barrow	Ran ashore in gale and snowstorm and piled up on a snow covered sand spit at Point Barrow when captain mistook it for slush ice. Crew and cargo rescued by steamer *Navarch.* On March 20, 1892, the wreck was accidentally burned by salvers.
Emily Schroeder	Schooner	?	10/13/1893	Marryatt Inlet, Point Hope Lagoon	Dragged anchor and driven ashore in storm. Seen hard aground as late as 1896.
Hidalgo	Brig	174	7/24/1896	8 mi W of Cape Thompson, within 1 mi of Jabbertown	Forced ashore by ice and broken up by sea and ice. Cutter *Bear* took crew to Unalaska.
Navarch	Steam whaling bark	494	8/12/1897	Off Blossom Shoals, near Icy Cape	Lost off Blossom Shoals but later drifted in ice to Point Barrow.
Orca	Steam whaling bark	628	9/21/1897	N of Seahorse Islands, off Point Franklin	Ice tore away propeller and rudder and part of the stern was crushed between two immense ice floes. At the time, the Orca was the world's largest steam whaler. The steam whaler *Belvedere* rescued all hands and the crew later walked 100 mi to Barrow to overwinter.
Jessie H. Freeman	Steam whaling bark	516	9/22/1897	N of Seahorse Islands, off Point Franklin	Crushed in ice and abandoned on September 24. Vessel was later burned accidentally by Inupiaq Eskimos and sank. The crew escaped to the steam whaler *Belvedere* and later walked to Point Barrow to overwinter.
Rosario	Schooner	141	7/2/1898	¾ mi SW of Point Barrow	Crushed in pack ice near Point Barrow. Crew rescued by the revenue cutter *Bear.*
Grampus	Steam whaling bark	326	7/18/1901	Near Point Barrow	Nipped in ice. Vessel was beached and condemned; all hands were saved.
Laura Madsen	Whaling schooner	345	10/14/1905	At anchorage off Point Barrow	Caught in ice and crushed.

Table III.C.18
Shipwrecks in the Chukchi Sea Planning Area (continued)

Vessel Name	Type	Tons	Date Wrecked	Location	Cause of Wreck
Ivy	Schooner	142	9/1/1908	At Point Barrow	Driven ashore by ice pack. Crew took passage to Seattle on schooner *Volante*. Vessel was salvaged but it sank the next year near Barrow.
Helen Johnston	Gas schooner	39	7/29/1910	7 mi E of Point Hope	Pounded to pieces by ice in a strong SE gale. The crew was rescued by the cutter *Bear*.
Transit	Schooner	547	8/25/1913	5 mi SW of Cape Smyth	Wrecked when ice pushed it ashore. On July 30, 1914, vessel was located on the beach 10 mi S of Cape Smyth. Captain and crew escaped over the ice to Barrow and returned S on the schooner *Hetty B*.
Arctic	Auxiliary gas schooner	669	8/10/1924	16 mi S of Point Barrow	Crushed in ice while on a trading and whaling voyage. The crew was rescued by the vessel *Boxer*. The *Arctic* was the former *H.D. Bendixsen*.
Lady Kindersly	Canadian power schooner	?	8/31/1924	Off Point Barrow	Caught in ice and crushed. Crew rescued by vessel *Boxer*. The ship carried cargo of machinery and stores for northern outposts.
Lettie	Gas screw	33	9/9/1924	½ mi NE of Wainwright Inlet and ½ mi from shore	Vessel got out of channel, stranded and was lost.
Baychimo	Canadian trading/supply steamer	1,322	11/24/1931	Just S of Point Barrow	Caught in ice and abandoned. Vessel drifted for years in Arctic ice, was sighted and even boarded a number of times, but finally disappeared and considered a ghost ship. It was officially listed as lost in 1934.
Arnold Liebes	Gas boat	?	1/1/1934	Off Point Barrow	Wrecked.
C.B. Brower	Gas boat	?	1/1/1934	Off Point Barrow	Wrecked.
Eli-Yuk	Oil screw	35	9/2/1963	Off Wainwright	Foundered.
Basil	Diesel boat	28	9/7/1950	At Cape Lisburne	Stranded on the beach and lost.

Source:
USDOI, MMS, Alaska OCS Region, Alaska Shipwreck Database (2007).

Table IV.A-1
Exploration and Development Scenario, Chukchi Sea OCS

Scenario Element	Range	Comments
Oil production (billion barrels)	1	First development project only
Natural gas production	0	Delayed for North Slope gas line; reinjected
Exploration wells	3-6	2-5 wells are dry holes or subcommercial shows
Delineation wells	4-8	Confirm and define the commercial discovery
Production platforms	1	Central platform with processing facility; supports 4-20 subsea satellite templates
Production wells	80-120	Total includes 20-80 subsea production wells
Service wells	20-40	All service wells are on platform
In-field flowlines (miles)	10-50	Gathering system from subsea wells
Offshore sales pipeline (miles)	30-150	Possible distance to landfall
Onshore sales pipeline (miles)	Up to 300	Connecting to existing/future North Slope pipelines
Peak production (thousand barrels per day)	200-250	Oil production only; associated gas is reinjected
New landfall	1	Point Belcher near Wainwright
New support shore base	1	Point Belcher near Wainwright
New processing facility	1	Collocated with shore base
New waste facility	1	Collocated with shore base
Drilling-fluid discharge by exploration wells (tons)	665-1330	475 tons/well with 80% recycled for all exploration and delineation wells (95 tons discharged for 7-14 wells)
Rock-cutting discharge by exploration wells (tons)	4200-8400	600 tons/well (7-14 wells total)
Discharges during development drilling	0	80% of drilling fluids are recycled; remaining waste fluids and rock cuttings for on-platform wells will be disposed of in service wells. Drilling wastes from subsea wells will be barged to an onshore disposal facility.
Years of activity	30-40	Period from lease sale to end of oil production

Source:
USDOI, MMS, Alaska OCS Region (2006).

Table IV.A-2a
Possible Timetable for Development

Year	Seismic Surveys	Exploration Wells	Delineation Wells	Exploration Drilling Rigs	Production Platforms	Production Wells	Subsea Wells	Service Wells	Production Drilling Rigs	In-Field Flowlines	Offshore Pipelines (miles)	New Shorebases	Annual Oil Production (MMbbl)	Daily Oil Production (Bopd)
2005														
2006	4													
2007	4													
2008	4													
2009	3	1		1										
2010	3	1		1										
2011	2		2	1										
2012	1		2	1										
2013	1		2	1										
2014	1	1		1								1		
2015	1	1		1										
2016	1													
2017											30			
2018											30			
2019							8		2	5	30			
2020					1	6	8	3	3	5			54.0	147,945
2021						18	8	5	4	5			70.0	191,781
2022						18	8	5	4	5			82.0	224,658
2023						18	8	5	3	5			82.0	224,658
2024						10	8	6					82.0	224,658
2025						10		4					82.0	224,658
2026													72.2	197,808
2027													63.5	173,973
2028													55.9	153,151
2029													49.2	134,795
2030													43.3	118,630
2031													38.1	104,384
2032													33.5	91,781
2033													29.5	80,822
2034													26.0	71,233
2035													22.8	62,466
2036													20.1	55,068
2037													17.7	48,493
2038													15.6	42,740
2039													13.7	37,534
2040													12.1	33,151
2041													10.6	29,041
2042													9.8	26,849
2043													8.2	22,466
2044													6.2	16,986
2045														
2046														
2047														
	25	**4**	**6**	**7**	**1**	**80**	**48**	**28**	**20**	**30**	**60**		**1000**	
Notes:	(1 mo/yr)		(4 mo/yr)		(30 inj wells)			(rig/years)						

Table IV.A-2b. Possible Timetable for Production

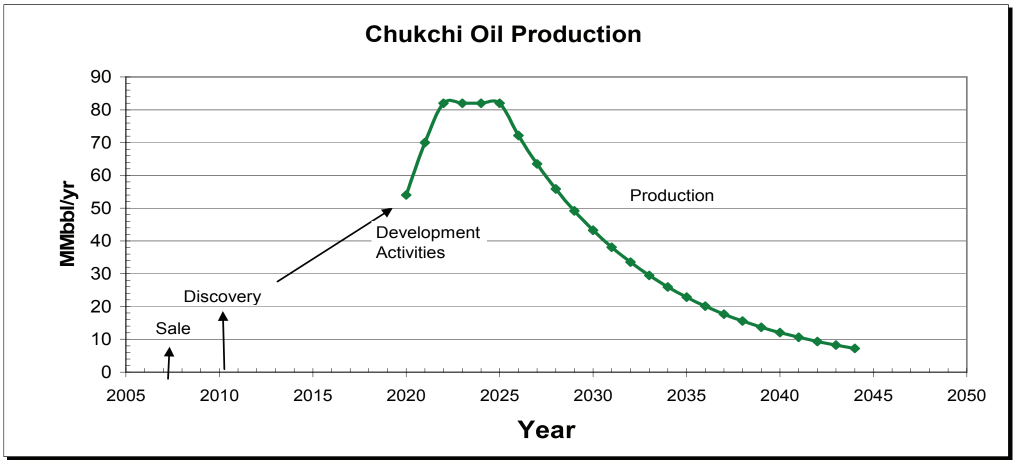


Table IV.A-3
Commercial Development Potential for Sale 193 Alternatives

Chukchi Sea, Sale 193 Alternatives	Opportunity Index (Commercial Chance)
Alternative 1 (Full Program Area Proposal)	1.0
Alternative 2 (No Lease Sale)	0.0
Alternative 3 (Corridor I Deferral)	0.64
Alternative 4 (Corridor II Deferral)	0.85

Source:
USDOI, MMS, Alaska OCS Region (2006).

Table IV.A-4
Large and Small Spill Sizes, Source of Spill, Type of Oil, Number and Size of Spill and Receiving Environment We Assume for Analysis in this EIS by Section

EIS Section	Source of Spill	Type of Oil	Number and Size of Spill(s)	Receiving Environment
Large Spills (≥1,000 barrels)				
IV.C	**Offshore** Pipeline Platform/Storage Tank	Crude Or Diesel	1 spill 4,600 Or 1,500 barrels	Open Water Under Ice On Top of Sea Ice Broken Ice Coastal Shoreline
Small Spills[1] (< 1,000 barrels)				
IV.C	**Offshore and/or Onshore** Operational Spills from All Sources	Diesel or Crude	133 spills <1 barrel 43 spills ≥1 barrel but <25 barrels 2 spills ≥25 and <500 barrels 1 spill ≥500 and <1,000 barrels	Open Water On Top of Sea Ice Broken Sea Ice Snow/Ice Tundra Coastal Shoreline
	Onshore and/or Offshore Operational Spills from All Sources	Refined	440 spills of 0.7 barrels each	

Source:
USDOI, MMS, Alaska OCS Region (2006).

Table IV.A-5
Small Crude Oil Spills: Assumed Spills over the Production Life of Chukchi Sea Sale 193

Sale 193 Alternative	Assumed Small Crude-Oil Spills <500 barrels				
	Resources (Bbbl)[1]	Spill Rate (Spills/Bbbl)	Assumed Spill Size (bbl)	Estimated Number of Spills	Estimated Total Spill Volume (bbl)
I Proposed Action	1	178	3	178	534
II No Lease Sale	0	178	3	0	0
III Corridor I	0.64	178	3	114	342
IV Corridor II	0.85	178	3	152	453
Alternative	**Assumed Small Crude-Oil Spills ≥ 500 and ≤1,000 barrels**				
I Proposed Action	1	0.64	680	0.64	680
II No Sale	0	0.64	680	0	0
III Corridor I	0.64	0.64	680	0.41	680
IV Corridor II	0.85	0.64	680	0.54	680

Source:
USDOI, MMS, Alaska OCS Region (2006).

Note:
[1]The estimation of oil spills is based on the estimated resources. If these resources are not produced then no oil spills occur.

Table IV.A-6
Small Refined Oil Spills: Assumed Spills over the Production Life of Chukchi Sea Sale 193

Sale193 and its Alternatives	Resource Range (Bbbl)	Spill Rate (Spills/Bbbl)	Average Spill Size (bbl)	Estimated Number of Spills[1]	Estimated Total Spill Volume (bbl)[1]
I Proposed Action	1	440	0.7 (29 gal)	440	308
II No Sale	0	440	0.7 (29 gal)	0	0
III Corridor I	0.6402	440	0.7 (29 gal)	282	197
IV Corridor II	0.8457	440	0.7 (29 gal)	373	250

Source:
USDOI, MMS, Alaska OCS Region (2006).

Note:
[1] The fractional estimated mean spill number and volume is rounded to the nearest whole number.

Table IV.C-1
Sale 193 Employment and Personal Income Effects

Area of Residence// Phase of OCS Activity	Employment Annual Average Jobs			Total Personal Income Annual Average in 100,000's of Constant 2006 $		
	Direct	Indirect and Induced	Total	For Direct Workers	For Indirect and Induced Workers	Total
North Slope Borough (a)						
Exploration	2	1	3	2	1	3
Development	22	8	30	14	5	19
Production	8	3	11	6	2	8
South Central Alaska and Fairbanks (b)						
Exploration	215	108	323	94	19	113
Development	1,054	527	1,581	108	22	130
Production	502	251	753	43	9	52

Sources:
Jack Faucett Associates, Inc. (2000); USDOI, MMS (2006).

Table IV.C-2
Sociocultural Effects from Routine Activities

<table>
<tr><th rowspan="2">Characteristic</th><th colspan="4">Phase of Project</th></tr>
<tr><th>Seismic Survey</th><th>Exploration</th><th>Development and Production</th><th>Decommissioning</th></tr>
<tr><td colspan="5">Social Organization
Households, families, and also wider networks of kinship and friends, which in turn are embedded in groups that are responsible for acquiring, distributing, and consuming subsistence resources.</td></tr>
<tr><td>Employment/Income Characteristics</td><td colspan="4">Measurable but little effect. See Section IV.C.1.k, Economy. Indirect and negligible effect to extent that project revenues accrue to Alaska Permanent Fund (APF) which is an important source of income to households in North Slope Borough (NSB) communities or are allocated to the Capital Improvement Program (CIP), which has been an important source of employment in NSB communities. See Section V.C-13, Cumulative Effects for further discussion.</td></tr>
<tr><td>Demographics
Change in population size, density, and rate of change
Ethnic and racial composition
Residential Stability</td><td colspan="4">Negligible effect in Point Lay and Point Hope, as no project-related activity is anticipated for these locations. Negligible effect in Barrow, as it has a large population and few newcomers are expected from project-related employment. Could be measurable in Wainwright because of proximity to supply base, with an increase in residential stability if employment reverses recent trend of outmigration of residents looking for work.</td></tr>
<tr><td>Workforce Changes

Influx and outflow of temporary workers

Changes to age structure of community due to outmigration of adults to project-related employment

Outmigration of higher trained or skilled labor force

Removal of adults and especially harvesters from community for employment in remote project areas

Removal of trained individuals from community to work in project-related employment</td><td colspan="4">Some employment opportunities for Alaskan Native as observers on seismic-survey vessels and during other activities.

Temporary workers should see a negligible effect in Point Lay and Point Hope , as no project-related activity is anticipated for these locations. Negligible effect in Barrow, as it has a large population and few newcomers are expected from project-related employment. Could be measurable in Wainwright because of proximity to supply base and use of airport as transfer point.

Use of construction enclaves should minimize the movement of temporary workers through the communities. Communities have experienced influx of and outmigration of temporary and resident workers as a result construction.

Workforce changes could be measurable in Wainwright because of proximity to supply base to the extent that residents seek and secure employment. Petroleum employment generally has not translated to employment for Native residents. Programs and policies are in place to provide the opportunities.</td></tr>
<tr><td>Employment/Income Characteristics</td><td colspan="4">Measurable but little effect. See Section IV.C.1.k, Economy. Indirect and negligible effect to extent that project revenues accrue to APF, which is an important source of income to households in NSB communities or are allocated to NSB CIP, which has been an important source of employment in NSB communities.</td></tr>
<tr><td>Social Well Being

Risk, safety and health

Displacement/relocation concerns

The ability of future Alaskan Native to care for themselves in either traditional way or cash economy

Community leadership, family, and/or kinship networks destabilized</td><td colspan="4">Perception about potential deflection of subsistence resources which cause harvest to occur farther offshore, leading to greater risk for hunters; change pattern of onshore distribution, leading to displacement from traditional subsistence areas and decline in the availability of wild foods; and induce health concerns from ingesting food contaminated from oil spill and discharges. Effects would be most pronounced in the Wainwright area because of the presence of onshore infrastructure.

Indirect effects proportional to effects of project-related activities on subsistence harvest, with effects realized beyond the immediately affected area. For example, disruption of sharing networks and task groups could occur if a community was not successful in the bowhead whale harvest or food was perceived to be contaminated.</td></tr>
</table>

Table IV.C-2
Sociocultural Effects from Routine Activities (continued)

<table>
<tr><td colspan="3">Cultural Values
Close relationship with natural resources, emphasis on kinship, maintenance of the community, cooperation, and sharing. Subsistence is a central activity that embodies these values, with bowhead whale hunting the paramount subsistence activity.</td></tr>
<tr><td>Subsistence Values

Loss or damage to property or equipment used in wildlife harvesting

Present or future loss of income and/or income-in-kind from wildlife harvesting</td><td colspan="2">Potential effects directly related to effects on subsistence harvest. See Section IV.C.1.l. Highest potential for change is in Wainwright area.

Conflict avoidance agreement should eliminate the potential loss or damage to property. Indirect effects could be realized, if disturbance or displacement of subsistence resources requires traveling farther distances or greater times.

Indirect effects proportional to effects of project-related activities on subsistence-distribution network. For example, disruption of sharing networks from disturbance would reflect a loss of income-in-kind from wildlife harvesting.</td></tr>
<tr><td>Known Cultural, Historical, and Archaeological Resources</td><td>None. Operations do not disturb sites.</td><td>Potential effects to sites from disturbance are mitigated.</td></tr>
<tr><td>Cultural Continuity

Language, spiritual teachings, knowledge transfer

Conflicts with newcomers with different values</td><td colspan="2">No adverse impacts to language, spiritual teachings, or knowledge transfer are anticipated.

Conflicts with values of newcomers should negligible at Point Lay and Point Hope, as no project-related activity is anticipated for these locations and in Barrow as it has a diverse population and few newcomers are expected from project-related employment. Could be measurable in Wainwright because of proximity to supply base. Wainwright’s previous experience with newcomers as part of the CIP and Industry Orientation Program should moderate the effects.</td></tr>
<tr><td colspan="3">Institutional Organization
Structure of Borough, City, and Tribal government, and the Native Alaskan Regional and various village for-profit and not-for-profit corporations, and nongovernmental organizations.</td></tr>
<tr><td>Governmental Functions

Size, structure, and functions of local government

Land use, planning, zoning and permitting

Community infrastructure and services</td><td>None. Short-term activity with no onshore industrial activity or service demands.</td><td>Negligible at the NSB level as this is a continuation of primary industrial activity.

Significant change near Wainwright from presence of nearby supply base—new industrial infrastructure for the area.

Considerable planning and zoning actions for Wainwright/Peard Bay area from placement onshore of industrial facilities such as the new supply base and onshore pipeline, similar to other projects that are routinely considered by NSB departments.

For other services, effect is negligible as the onshore industrial activity is not expected to generate service demands. Stress caused by project could marginally increase demand for public mental health services.</td></tr>
</table>

Table IV.C-2
Sociocultural Effects from Routine Activities (continued)

Non-Governmental Organizations Organizational capability and characteristics Distribution of power and authority Interorganizational cooperation	Considerable effort expended by existing organizations, such as Alaska Eskimo Whaling Commission effort in conflict avoidance negotiations. Once project construction completed, the agreement and monitoring will become routine as in the Northstar annual-open-water meeting. Opportunities for participation structured under NEPA and other statutes should not change. Capacity and characteristics of other organizations could be affected to the extent that the activity represents a new activity for them to consider and they must develop the expertise and financial resources to participate which could cause organizational stress. High level of interorganizational cooperation and integration currently exists at the regional level, although this may need to accommodate organizations for which the activity represents a new activity. Cooperative management policies implemented by the Department of the Interior should moderate these effects.

Source:
Characteristics derived from "Principles and guidelines for social impact assessment in the USA" in Impact Assessment and Project Appraisal, v. 21, no. 3, pp 231-250, (September 2003); Determining Significance of Environmental Effects: An Aboriginal Perspective. Canadian Environmental Assessment Agency's Research and Development Program, Research and Development Monograph Series, 2000 (http://www.ceaa-acee.gc.ca) and Socioeconomic and Resource Use Considerations in The Norton Basin Environment and Possible Consequences of Planned Offshore Oil Development. 1984. Outer Continental Shelf Environmental Assessment Program.

Table V-1
Alaska North Slope Oil and Gas Discoveries as of March 2006

	Name	Location of Field or Pool	Production Oil, Gas	Location of Production Facility	Discovery	Production Began	Category	Ranking Criteria
Past Development And Production								
1	South Barrow	Onshore	Gas	Onshore	1949	1950	Field	—
2	Prudhoe Bay	Onshore	Oil	Onshore	1967	1977	Field	—
3	Lisburne	Onshore	Oil	Onshore	1967	1981	Field	—
4	Kuparuk	Onshore	Oil	Onshore	1969	1981	Field	—
5	East Barrow	Onshore	Gas	Onshore	1974	1981	Field	—
6	Milne Point	Onshore	Oil	Onshore	1969	1985	Field	—
7	Endicott	Offshore	Oil	Offshore	1978	1986	Field	—
8	Sag Delta	Offshore	Oil	Onshore	1976	1989	Field	—
9	Sag Delta North	Offshore	Oil	Offshore	1982	1989	Satellite[1]	—
10	Schrader Bluff	Onshore	Oil	Onshore	1969	1991	Satellite[2]	**When**
11	Walakpa	Onshore	Gas	Onshore	1980	1992	Field	**Production**
12	Point McIntyre	Offshore	Oil	Onshore	1988	1993	Field	**Began**
13	North Prudhoe Bay	Onshore	Oil	Onshore	1970	1993	Field	—
14	Niakuk	Offshore	Oil	Onshore	1985	1994	Field	—
15	Sag River	Onshore	Oil	Onshore	1969	1994	Satellite[3]	—
16	West Beach	Onshore	Oil	Onshore	1976	1994	Field	—
17	Cascade	Onshore	Oil	Onshore	1993	1996	Field	—
18	West Sak	Onshore	Oil	Onshore	1969	1997	Satellite[2]	—
19	Badami	Offshore	Oil	Onshore	1990	1998	Field	—
20	Eider	Offshore	Oil	Offshore	1998	1998	Satellite[1]	—
21	Tarn	Onshore	Oil	Onshore	1991	1998	Field	—
22	Tabasco	Onshore	Oil	Onshore	1992	1998	Satellite[2]	—
23	Midnight Sun	Onshore	Oil	Onshore	1998	1999	Satellite[4]	—
24	Alpine	Onshore	Oil	Onshore	1994	2000	Field	—
25	Northstar	Offshore	Oil	Offshore	1984	2001	Field	—
26	Aurora	Onshore	Oil	Onshore	1999	2001	Satellite[4]	—
27	NW Eileen/Borealis	Onshore	Oil	Onshore	1999	2001	Field	—
28	Polaris	Onshore	Oil	Onshore	1999	2001	Satellite	—
29	Meltwater	Onshore	Oil	Onshore	2000	2001	Pool	—
30	Palm	Onshore	Oil	Onshore	2001	2002	Pool	—
31	Orion	Onshore	Oil	Onshore	2000	2003	Satellite	
32	Raven	Onshore	Oil	Onshore	?	2006	Pool	
Present Development								
33	Fiord (CD 3)	Onshore	Oil	Onshore	1992	(2006)	Pool	**When**
34	Nanuq (CD 4)	Onshore	Oil	Onshore	1996	(2006)	Pool	**Production**
35	Oooguruk	Offshore	Oil	Offshore	2003	**(2008)**	Pool	**Is Expected**
Reasonably Foreseeable Future Development								
36	Nikaitchuq	Offshore	Oil	Offshore	2004	—	Pool	
37	Alpine West (CD 5)	Onshore	Oil	Onshore	1998	—	Pool	
38	Lookout (CD 6)	Onshore	Oil	Onshore	2001	—	Pool	**Ranked in order of**
39	Tuvaaq	Offshore	Oil	Offshore	2005	—	Prospect	**the chance and**
40	Liberty	Offshore	Oil	Offshore	1983	—	Pool	**timing of**
41	Spark (CD 7)	Onshore	Gas & Oil	Onshore	2000	—	Pool	**future development**
42	Carbon	Onshore	Oil & Gas	Onshore	2004	—	Prospect	
43	Moose's Tooth	Onshore	Gas & Oil	Onshore	2001	—	Prospect	**(highest = first)**
44	Rendezvous	Onshore	Gas & Oil	Onshore	2000	—	Pool	
45	Kalubik	Offshore	Oil	Onshore	1992	—	Prospect	
46	Thetis Island	Offshore	Oil	Offshore	1993	—	Prospect	
47	Sikulik	Onshore	Gas	Onshore	1988	—	Pool	
48	Gwydyr Bay	Offshore	Oil	Onshore	1969	—	Pool	
49	Pete's Wicked	Onshore	Oil	Onshore	1997	—	Prospect	
50	Point Thomson	Onshore	Gas & Oil	Onshore	1977	—	Pool	
51	Sandpiper	Offshore	Gas & Oil	Offshore	1986	—	Pool	
52	Mikkelson	Onshore	Oil	Onshore	1978	—	Prospect	
53	Sivuliiq (Hammerhead)	Offshore	Oil	Offshore	1985	—	Pool	
54	Sourdough	Onshore	Oil	Onshore	1994	—	Show	
55	Yukon Gold	Onshore	Oil	Onshore	1994	—	Show	
56	Flaxman Island	Offshore	Oil	Offshore	1975	—	Prospect	
57	Stinson	Offshore	Oil	Offshore	1990	—	Prospect	
58	Kuvlum	Offshore	Oil	Offshore	1987	—	Prospect	

Table V-1
Alaska North Slope Oil and Gas Discoveries as of March 2006 (continued)

	Name	Location of Field or Pool	Production Oil, Gas	Location of Production Facility	Discovery	Production Began	Category	Ranking Criteria
Speculative Future Development								
59	Hemi Springs	Onshore	Oil	Onshore	1984	—	Pool	—
60	Ugnu	Onshore	Oil	Onshore	1984	—	Pool	—
61	Umiat	Onshore	Oil	Onshore	1946	—	Pool	—
62	Fish Creek	Onshore	Oil	Onshore	1949	—	Show	—
63	Simpson	Onshore	Oil	Onshore	1950	—	Prospect	—
64	East Kurupa	Onshore	Gas	Onshore	1976	—	Show	**Insufficient**
65	Meade	Onshore	Gas	Onshore	1950	—	Prospect	**Information to**
66	Wolf Creek	Onshore	Gas	Onshore	1951	—	Show	**Estimate Chance**
67	Gubik	Onshore	Gas	Onshore	1951	—	Pool	**of Development**
68	Square Lake	Onshore	Gas	Onshore	1952	—	Show	—
69	East Umiat	Onshore	Gas	Onshore	1964	—	Prospect	—
70	Kavik	Onshore	Gas	Onshore	1969	—	Show	—
71	Kemik	Onshore	Gas	Onshore	1972	—	Show	—

Notes:
Field information is taken from State of Alaska, Dept. of Natural Resources Annual Report December, 2004 and Petroleum News
Footnotes for Satellites identify the associated production unit:
[1]Duck Island Unit;
[2]Kuparuk River Unit;
[3]Milne Point Unit;
[4]Prudhoe Bay Unit.
Parentheses indicate when production startup is expected.
Definitions: Field—infrastructure (pads/wells/facilities) installed to produce one or more pools.
Satellite—a pool developed from an existing pad.
Pool—petroleum accumulation with defined limits.
Prospect—a discovery tested by several wells.
Show—a one-well discovery with poorly defined limits and production capacity.

Table V-2
Past Development: 2005 Production and Reserve Data

				Produced				**Reserves[2]**	
Unit or *Area*	**Field**	**Type (Oil or Gas)**	**Discovery**	**Began**	**Gas (Bcf)**	**2005 Oil (MMbbl)[1]**	**Production to**	**Oil (MMbbl)[1]**	**Gas (Bcf)**
Duck Island									
—	Endicott	O	1973	1987	–	454.988710	Endicott	–	–
—	Sag Delta North[2]	O	1989	1989	–	"	Endicott	–	–
—	Sag Delta[2]	O	1976	1989	–	"	Endicott	–	–
—	Eider	O	1998	1998	–	2.718,616	Endicott	–	–
—	Ivishak	O	–	–	–	8.102,357	Endicott	"l	"l
Duck Island Unit	–	–	–	–	–	–	–	131	843
Prudhoe Bay									
—	Prudhoe Bay	O	1967	1977	–	283.684.252	Prudhoe	"	"
—	Lisburne	O	1968	1981	–	156.991045	Lisburne	41	"
—	Niakuk	O	1985	1994	–	83.893006	Lisburne	41	–
—	West Beach	O	1976	1994	–	3.581710	Lisburne	–	–
—	N. Prudhoe Bay	O	1970	1993	–	2.070780	Lisburne	–	–
—	Point McIntyre	O	1988	1993	–	396.736189	Lisburne	211	–
—	Prudhoe Bay IPA's	O	–	–	–	–	–	2,839	23,000
—	Midnight Sun	O	1998	1999	–	13.474471	Prudhoe	–	–
—	Aurora	O	1999	2001	–	14.849654	Prudhoe	–	–
—	NW Eileen/Borealis	O	1999	2001	–	37.925608	Prudhoe	–	–
—	Polaris	O	1999	2001	–	4.786145	Prudhoe	–	–
—	Orion	O	1968	2003	–	5.206855	Prudhoe	–	–
—	P. Bay Satellites	O	–	–	–	– "	Prudhoe	473	–
Kuparuk River									
—	Kuparuk River	O	1969	1981	–	2,024.989583	Kuparuk	956	1,000
—	Tabasco	O	1992	1998	–	11.264871	Kuparuk	15	–
—	Tarn	O	1992	1998	–	72.680379	Kuparuk	71	50
—	West Sak	O	1969	1998	–	–	Kuparuk	528	100
—	Meltwater	O	—	2001	–	9.757986	Kuparuk	–	–
—	Palm	O	—	2002		–	Kuparuk	–	–
Milne Point									
—	Milne Point	O	1969	1985	–	18.9794041	Milne Point	–	–
—	Cascade[4]	O	1993	1996	–	–	Milne Point	–	–
—	Schrader Bluff	O	1969	1991	–	44.534458	Milne Point	–	–
—	Sag River	O	1968	1994	–	1.677089	Milne Point	–	–
Milne Point Unit	–	–	–	–	–	–	–	479	14
Badami	Badami	O&G	1990	1998	–	4.498862	TAPS	2	–
Colville River	Alpine	O	1994	2000	–	184.716137	Kuparuk	450	400
Northstar	Northstar	O	1984	2001	–	89.636187	TAPS	152	450
NPR-A[1]	East Barrow	G	1974	1981	0.081	–	Barrow	–	5
—	South Barrow	G	1949	1950	0.2.25	–	Barrow	–	4
—	Walakpa	G	1980	1993	1.5167	–	Barrow	–	25
All Units or Areas Total		–	–	–	–	–	–	**6.4**	**33**

Notes:

[1] Production information is from State of Alaska, Oil and Gas Conservation Commission (2005)
[2] Reserves were estimated by subtracting 2005 production from State of Alaska, Oil and Gas Conservation Commission (2005) from the Reserve Data in ADNR (2006a).
[3] Endicott includes Endicott, Sag Delta and Sag Delta North. Prudhoe Bay satellites include Midnight Sun, Aurora, Borealis, Polaris and Orion
[4] Cascade is included in Milne Point.

Table V-3
Present Development: Estimated Reserve Data

Unit or Area	Field	Type (Oil, Gas)	Discovery	Status	Oil Reserves (MMbbl)
Colville River	CD 3 Fiord	Oil	1992	Present Development	50
Colville River	CD 4 Nanuq	Oil	1996	Present Development	38
Oooguruk	Oooguruk	Oil	–	Present Development	50-90
Total for All Units or Areas		–	–	–	158

Table V-4
Future Lease Sales

Sale	Proposed Sale Date(s)	Area/Description	Resources or *Hydrocarbon Potential*
Federal			
2002-2007 Beaufort Sea OCS Sale 202	April 2007	As much as 8.7 million acres from the Canadian border on the east to Barrow on the west in the Beaufort Sea (*Federal Register,* 2007).	340-557 mmbbl Oil (Estimated)
2007-2012 Beaufort Sea OCS Sales 209 and 217	2009 and 2011, respectively	As much as 33.29 million acres from the Canadian border on the east to Barrow on the west	0.5-1.0 BBO
2007-2012 Chukchi Sea OCS Sales 193, 212, and 221	November 2007, 2010, and 2012, respectively	As much as 46.75 million acres from Barrow on the east to Point Hope on the south	1.0 BBO
Northeast NPR-A	September 2006	As much as 3 million acres of the Northeast NPR-A Planning Area (USDOI, BLM, 2005).	0.50-2.2 Bbbl Oil (Estimated)
Northwest NPR-A	September 2006	As much as 9.98 million acres of the Northwest NPR-A Planning Area (*USDOI, BLM and MMS 2003)*.	0.00-0.735 Bbbl Oil Estimated
South NPRA	To Be Determined		
State Of Alaska			
North Slope Areawide	March 2006[1] October 2006-2010	As much as 5,100,000 acres of State-owned lands between the Canning and Colville rivers and north of the Umiat Baseline (about 69° 20' N.).	*Moderate to High*
Beaufort Sea Areawide	March 2006[1] October 2006-2010	Unleased State-owned tide- and submerged lands between the Canadian border and Point Barrow and some coastal uplands acreage located along the Beaufort Sea between the Staines and Colville rivers. The gross proposed sale area is in excess of 2,000,000 acres and is divided into 576 tracts..	*Moderate to High*
North Slope Foothills Areawide	May 2006 February 2007-2010[1]	State-owned lands lying between the National Petroleum Reserve-Alaska and the Arctic National Wildlife Refuge south of the Umiat Baseline and north of the Gates of the Arctic National Park and Preserve. The gross proposed sale area is in excess of 7,000,000 acres.	*Moderate*
Canada			
Beaufort Sea	May 2006	Petroleum exploration rights on a total of two (2) parcels of land in the Beaufort Sea/Mackenzie Delta region of the Northwest Territories covering 156,348 hectares, more or less.	*?*

Source:
ADNR (2006b) Five Year Oil and Gas Leasing Program; USDOI, MMS (2006).

Note:
1 Other than the April 2007 202 Sale, no decision has been made on whether these OCS sales will be held
Bbbl = billion barrels.

Table V-5
Detailed Reserve and Resource Estimates for the Cumulative Analysis

Activity	Oil (billions of barrels)	Gas (trillions of cubic feet)
Production of remaining reserves (Past and Present)	**6.6**	—
Onshore–past (Prudhoe Bay and surrounding fields on State lands)	6.15	—
Offshore–past (Duck Island Unit and Northstar)	0.28	—
Onshore Present (CD3, CD4,)	0.08	—
Offshore Present (Oooguruk)	0.07	—
Reasonably Foreseeable Future Production (resources total)	**3.5**	**32.0**
Onshore discovered gas	—	32.0
Onshore discovered, satellites, heavy oil, and reserve growth	2.0	—
Offshore discovered (Beaufort)	0.5	—
Undiscovered Offshore (Chukchi Sale 193)	1.0	
Speculative Production (resources total)	**7.7**	**13.3**
Onshore	5.7	9.0
Offshore	2.0	4.3

Notes:

1. Reserves are proven and economically recoverable oil or gas produced through existing infrastructure.
2. Resources are unproven (undiscovered) oil and gas that could be produced with new infrastructure.
3. Reasonably foreseeable gas production includes gas from stranded reserves in Prudhoe Bay area fields. We subtract the gas consumed for field use (300 Bcf per year) from reserves (35 Tcf) until the expected startup of a North Slope gas pipeline in 2015.
4. Speculative production is entirely from undiscovered oil and gas resources with development delayed several decades in the future. Onshore gas resources are from NPRA as associated and non-associated pools. Offshore gas resources are from associated gas reinjected during oil production. Offshore gas would then be recovered through existing oil field infrastructure. Associated gas estimates assume a GOR of 1000 cf/bbl.

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

Name	Estimated Pipeline Length (miles)	Project Description and Route
		Active Project
Trans-Alaska Pipeline (TAPS)	800	The 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 15 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. The TAPS 2005 year to date average barrels of oil pumped through pump station 1 was just under 900,000 barrels. The lower operational limit generally is 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 will become non-operational, and all oil production is likely to be shut in. Alyeska Pipeline Service Company is planning pipeline reconfiguration efforts between 2005 and 2011 to extend the economic life of the TAPS and North Slope oil fields.
		Future Natural Gas Projects
All-Alaska Gas Pipeline	800	The "All Alaska Gas Pipeline" is similar to the old "Trans-Alaska Gas System" project. The route would originate in the Prudhoe Bay Unit and run parallel to the Trans-Alaska oil pipeline to Valdez, then jog to the east to Anderson Bay to an LNG plant. There are "variations" on this project depending on whether it is standalone or is connected, at Delta Junction, to a transportation pipeline coming from Prudhoe Bay that goes into Canada.
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. The new pipeline would run parallel to the 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 consumers 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 recent increase in gas prices into the $3-$4-million/cubic-foot range make this project more appealing today. Currently, several variations to routes are being considered for the overland gas-pipeline system.
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. BP began production at the GTL pilot project on the Kenai Peninsula in Alaska in July 2003. This plant is expected to operate at least through 2006[3.] All of the major North Slope gas owners (BP-Amoco, Exxon-Mobil, and Connoco-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.
Mackenzie Gas Pipeline	1,300	The Mackenzie Gas Project is a proposed 1220-kilometre natural gas pipeline system along the Mackenzie Valley of Canada's Northwest Territories to connect northern onshore gas fields with North American markets.. The industries goal is to have natural gas moving through the pipeline by 2010.

Notes:
[1] Thomas et al. (1996).
[2] Alaska Report (1997).
3 Hult, J. (2006)

Table V-7a
Oil and Gas Production 1969 to December 2005 on the North Slope of Alaska

Production To Date	Oil (billions of barrels)	Gas (trillions of cubic feet)	Reference
Onshore	14.5	—	State of Alaska,Alaska Oil and Gas Conservation Commission (2005) State of Alaska, DNR (2005)
Offshore	0.5	—	
Total	**15.0**	**51.6**	

Notes:

1. Oil production includes both crude oil and natural gas liquids that are blended into the stream carried by TAPS.
2. Large volumes of associated natural gas has been recovered with oil production, however 90% of it has been reinjected to increase oil recovery. In 2003, North Slope gas production was 3.3 Tcf (average 9.1 Bcf per day) and a total of 297 Bcf was consumed as fuel for facilities. Small amounts of natural gas have been produced fields in the Barrow area since the mid-1940's largely to supply energy for the village of Barrow.

Table V-7b
Summary of Reserve and Resource Estimates for the Cumulative Analysis

Production Activity	Oil (billions of barrels)	Contribution of by Volume of OCS Oil (%)	Gas (trillions of cubic feet)	Contribution of by Volume of OCS Gas (%)
Low End of the Range (Past and Present)	6.6	15%	0	0
Middle Portion (Past, Present, and Reasonably Foreseeable)	10.1	10%	32.0	0
High End (Past, Present, Reasonably Foreseeable, and Speculative)	17.8	5.6%	45.3	9.5

Source:
USDOI, MMS, Alaska OCS Region (2006).

Table V-7c
Detailed Reserve and Resource Estimates for the Cumulative Analysis

Activity	Oil (billions of barrels)	Gas (trillions of cubic feet)
Production of remaining reserves (Past and Present)	**6.6**	—
Onshore–past (Prudhoe Bay and surrounding fields on State lands)	6.15	—
Offshore–past (Duck Island Unit and Northstar)	0.28	—
Onshore Present (CD3, CD4,)	0.08	—
Offshore Present (Oooguruk)	0.07	—
Reasonably Foreseeable Future Production (resources total)	**3.5**	**32.0**
Onshore discovered gas	—	32.0
Onshore discovered, satellites, heavy oil, and reserve growth	2.0	—
Offshore discovered (Beaufort)	0.5	—
Undiscovered Offshore (Chukchi Sale 193)	1.0	—
Speculative Production (resources total)	**7.7**	**13.3**
Onshore	5.7	9.0
Offshore	2.0	4.3

Notes:

5. Reserves are proven and economically recoverable oil or gas produced through existing infrastructure.
6. Resources are unproven (undiscovered) oil and gas that could be produced with new infrastructure.
7. Reasonably foreseeable gas production includes gas from stranded reserves in Prudhoe Bay area fields. We subtract the gas consumed for field use (300 Bcf per year) from reserves (35 Tcf) until the expected startup of a North Slope gas pipeline in 2015. Speculative production is entirely from undiscovered oil and gas resources with development delayed several decades in the future. Onshore gas resources are from NPRA as associated and non-associated pools. Offshore gas resources are from associated gas reinjected during oil production. Offshore gas would then be recovered through existing oil field infrastructure. Associated gas estimates assume a GOR of 1000 cf/bbl.

Table V-8
Cumulative Oil-Spill-Occurrence Estimates ≥500 Barrels or ≥1,000 Barrels Resulting from Oil Development over the Assumed 15-- to-20 Year Production Life of Sale 193

Category	Crude-Oil Spills					
	Reserves and Resources (Bbbl)	Spill Rate (Spills/Bbbl)	Size Category (bbl)	Assumed Size (Barrels)	Mean Number of Spills	Assumed Number of Spills for Analysis
Offshore						
Past, Present, and Reasonably Foreseeable	0.85	0.53	≥1000		0.45	0
Alternative I for Sale 193	1.0	0.51	≥1000		0.51	0
Total	**1.85**	**0.51**	**≥1000**		**0.96**	**0**
Onshore						
Past, Present, and Reasonably Foreseeable	8.24	0.64	≥500	500–925	5.3	5
Alternative I for Sale 193	1.0	0.11	≥500	0	0.11	0
Total	**9.24**	**0.11**	**≥500**	**500-925**	**5.4**	**5**
TAPS Pipeline						
Past, Present, and Reasonably Foreseeable	10.1	0.21	≥500		1.91	2
Alternative I for Sale 193	1.0	0.21	≥500	0	0.21	0
Total	**11.1**	**0.21**	**≥500**		**2.12**	**2**

Source:
USDOI, MMS, Alaska OCS Region (2006).

Notes:
The Alaska Dept. of Environmental Conservation database has no significant crude oil spills on the North Slope resulting from well blowouts and no facility or onshore pipeline spills greater than 1,000 barrels for the years 1985-2000. This has recently changed and spill rates for the North Slope may be updated when spill size is validated for the GC-2 transit pipeline spill and validated spill data is collected.

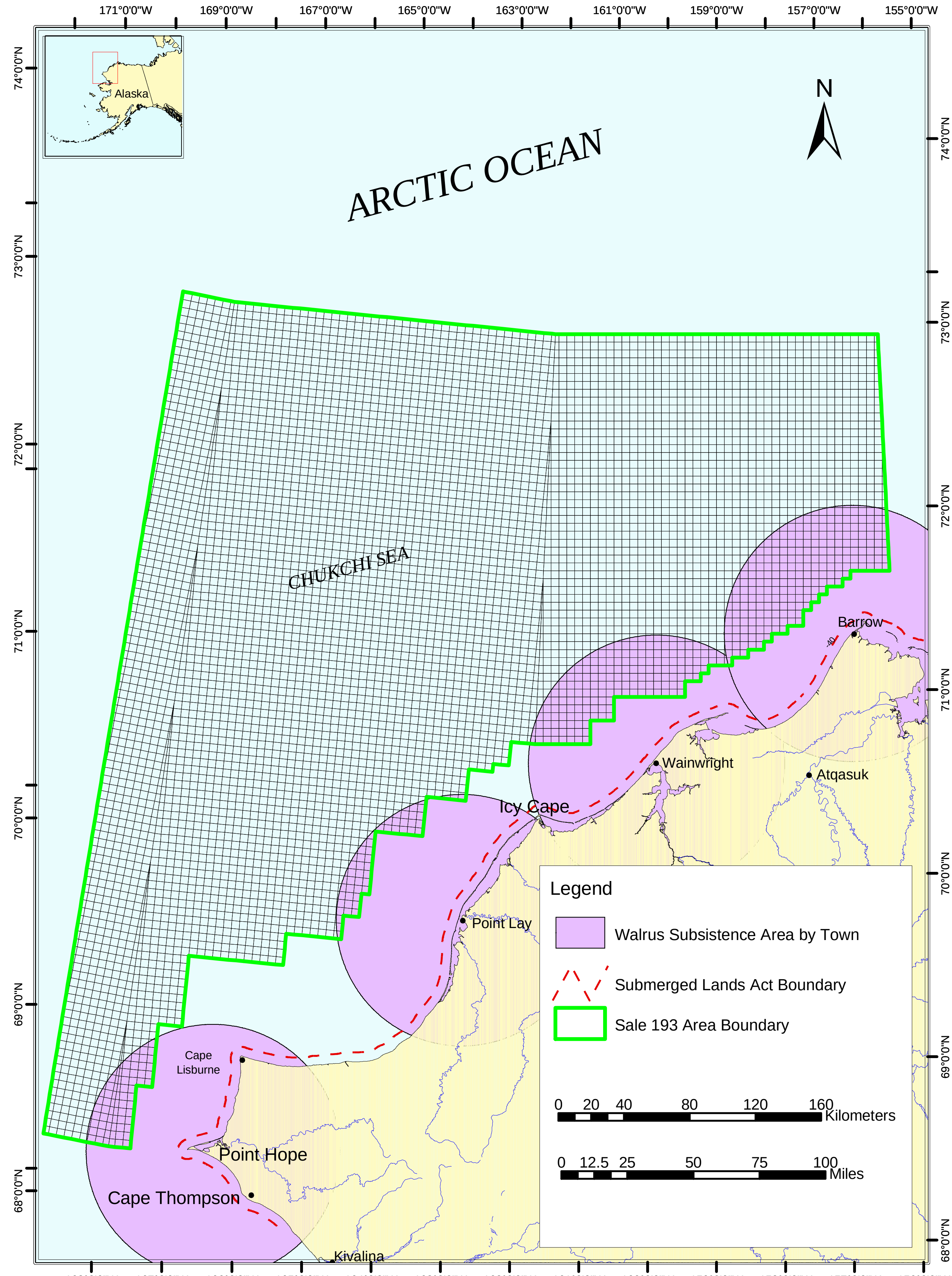


Figure II.B-1 Walrus Subsistence Areas

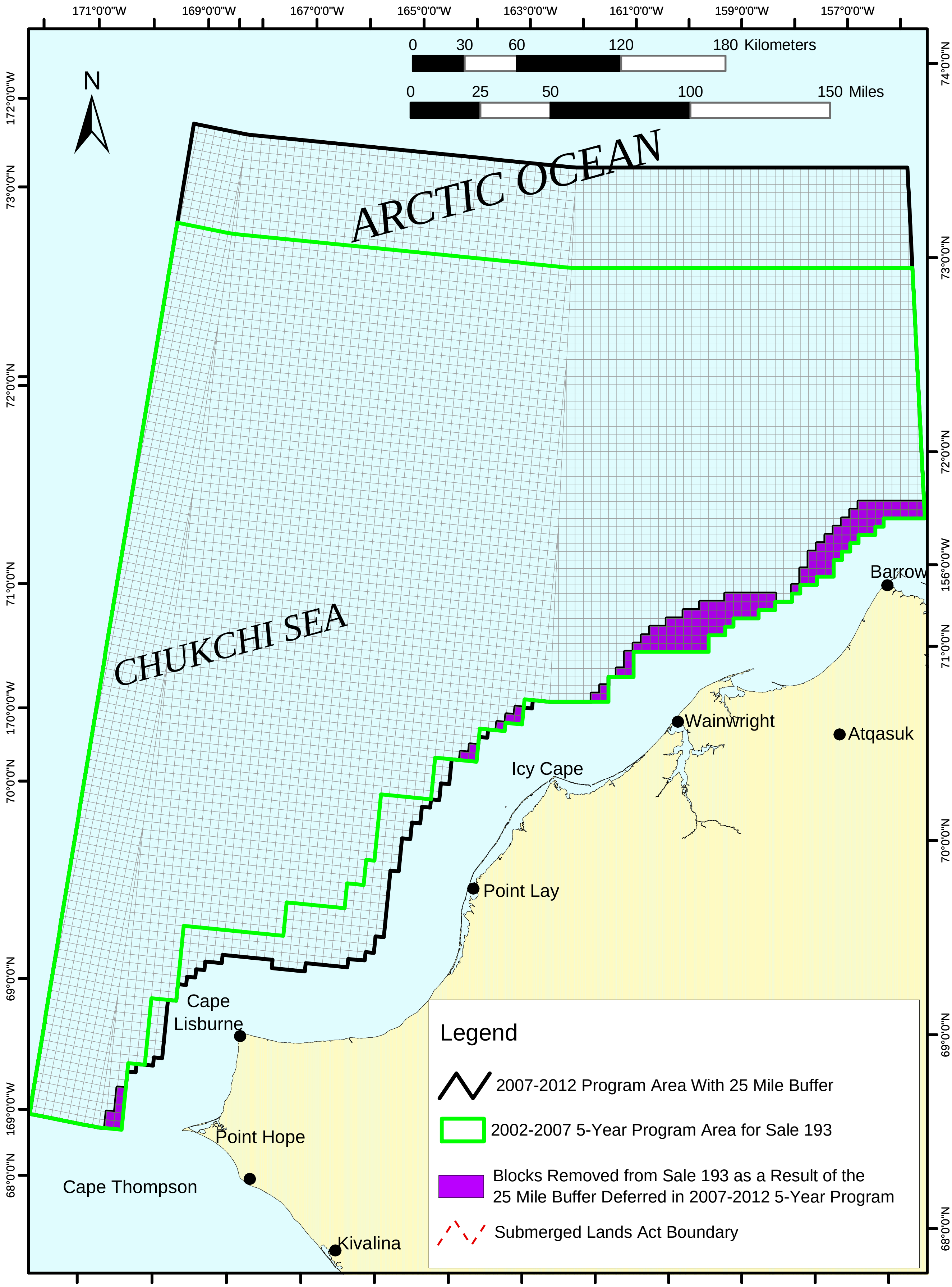


Figure II.B-2 2002-2007 5-Year Program Area for Sale 193 and 2007-2012 5-Year Program.

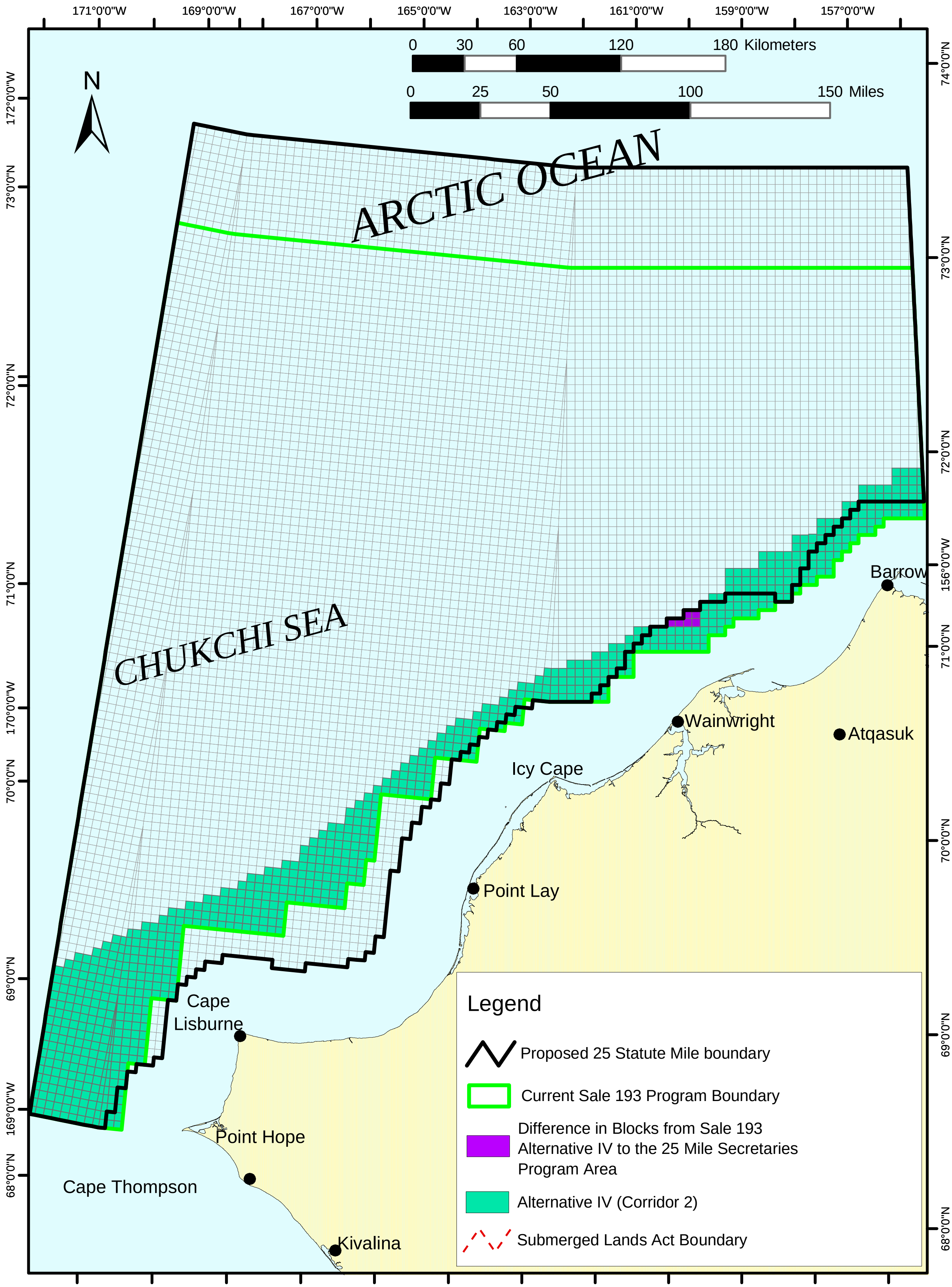
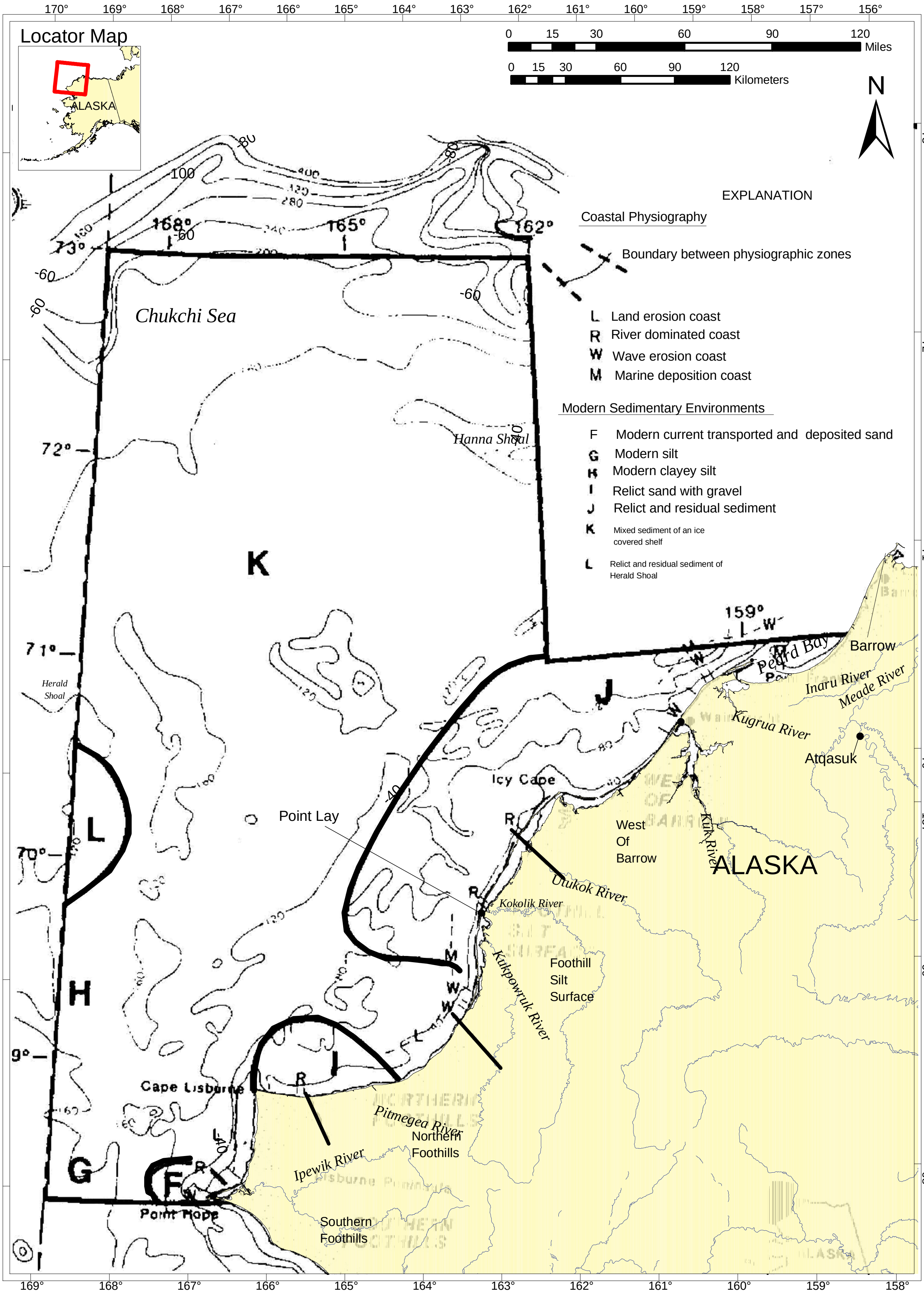
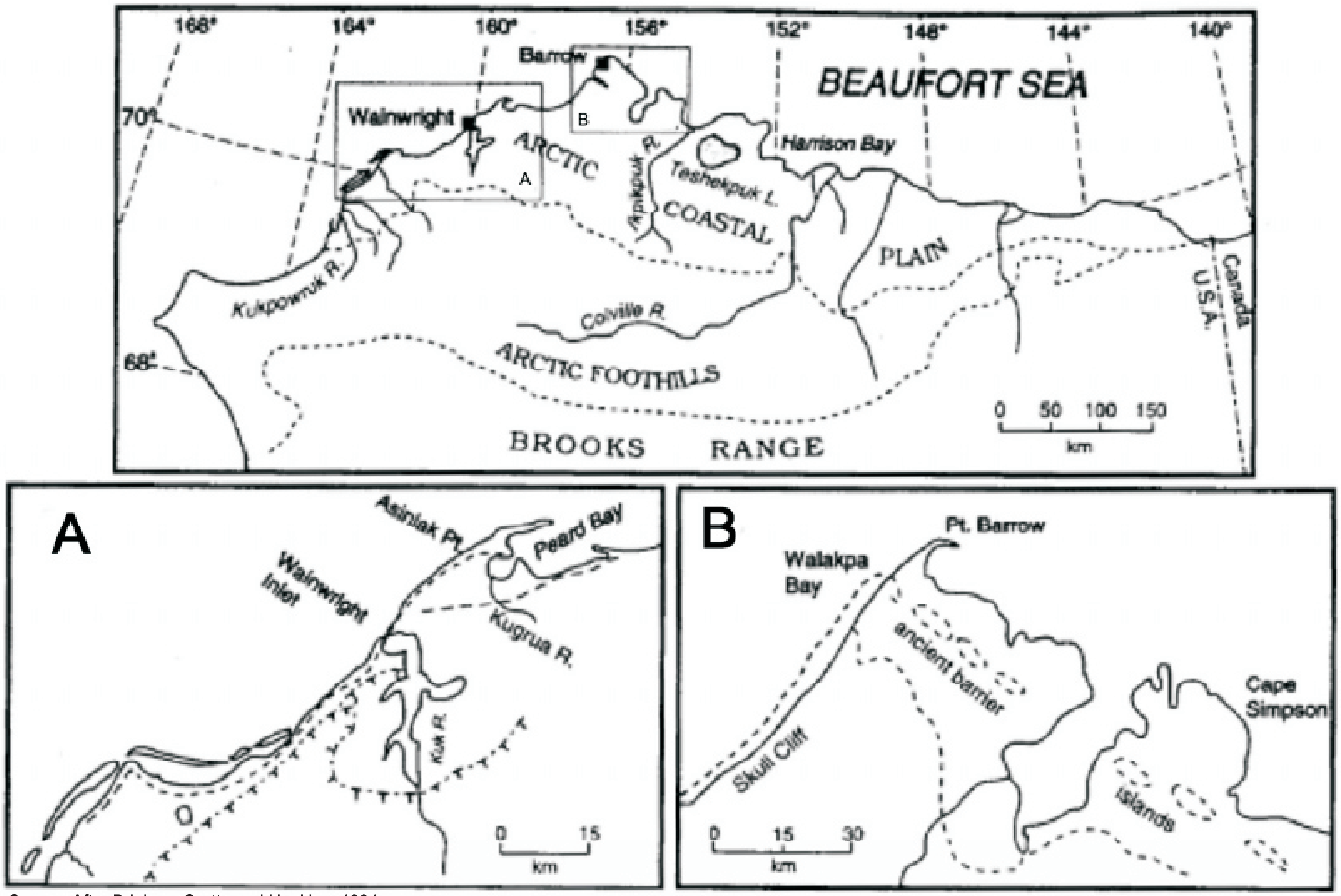


Figure II.B-3 Secretaries proposed program area 2007-2012 and the current Sale 193 Alternative IV (Corridor 2).



Source: McManus, Kelly, and Creager, 1969; Hartwell, 1973; Thurston and Theiss, 1987.

Figure III.A-1 Coastal Physiography.



Source: After Brigham-Grette and Hopkins, 1994.

Figure III.A-2 Last Interglacial Shoreline and Barrier Beaches along the Chukchi and Beaufort Sea Coasts. A. Paleoshorelines, bay mouth bar, and spit complex constructed during the last interglaciation in the Wainwright area; B. Paleogeography of ancient spit, lagoon,and barrier islands near Barrow, Alaska.

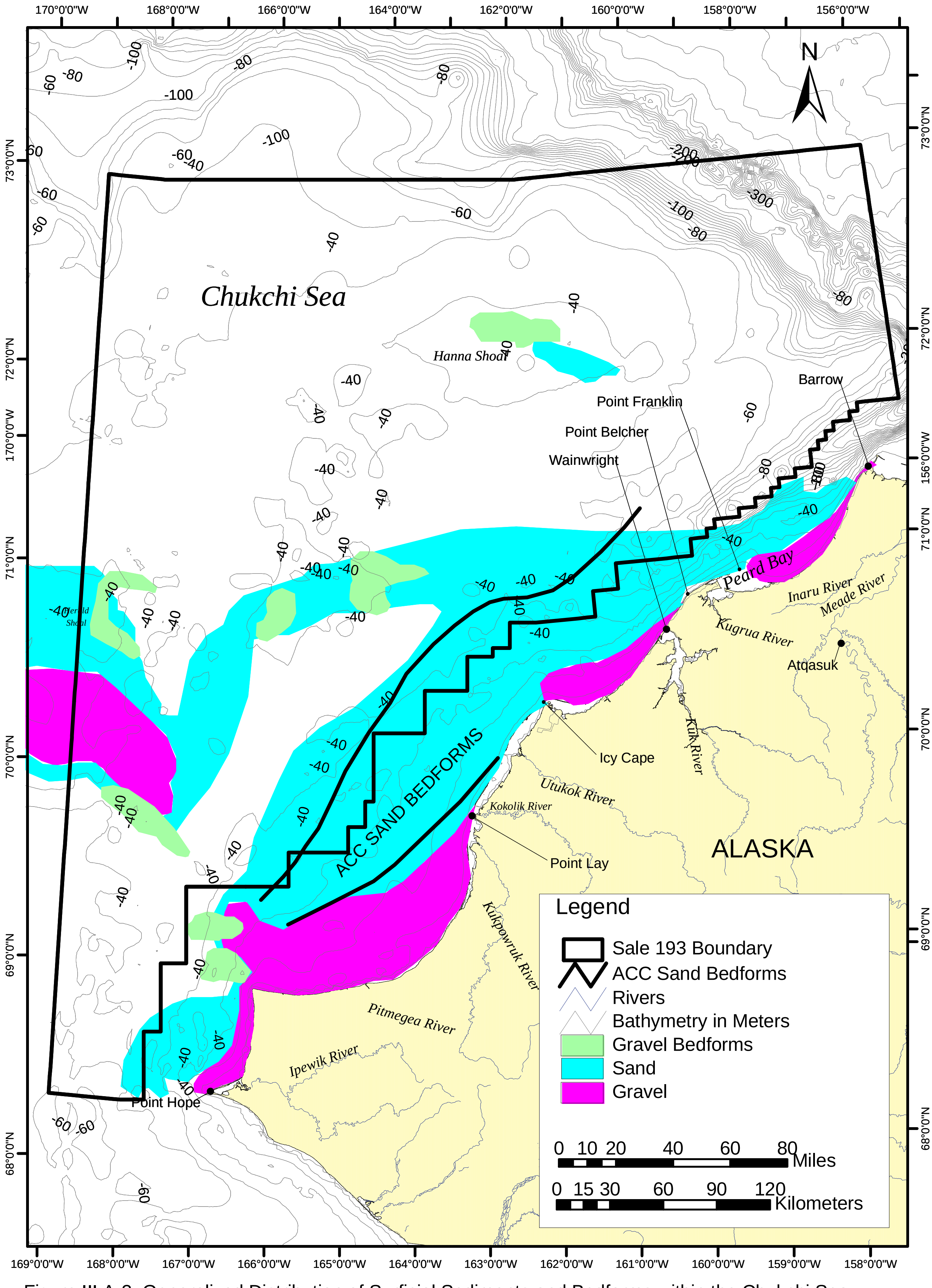
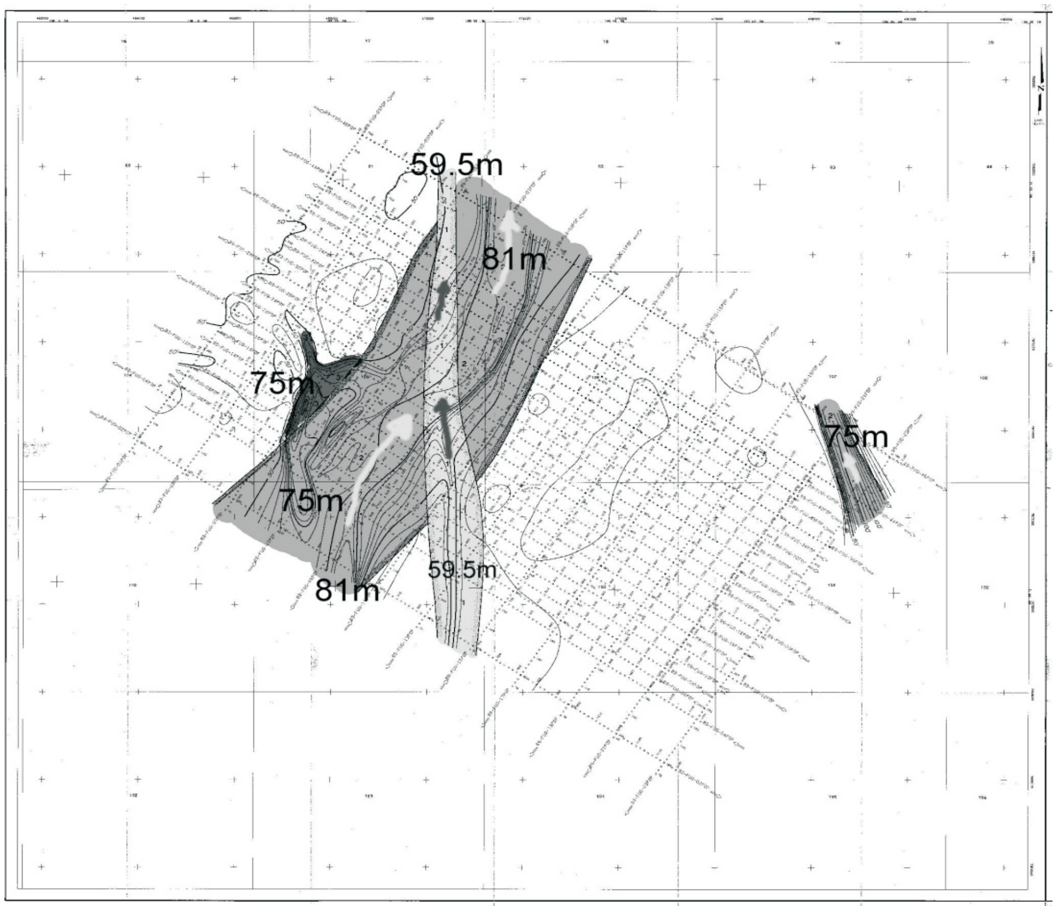
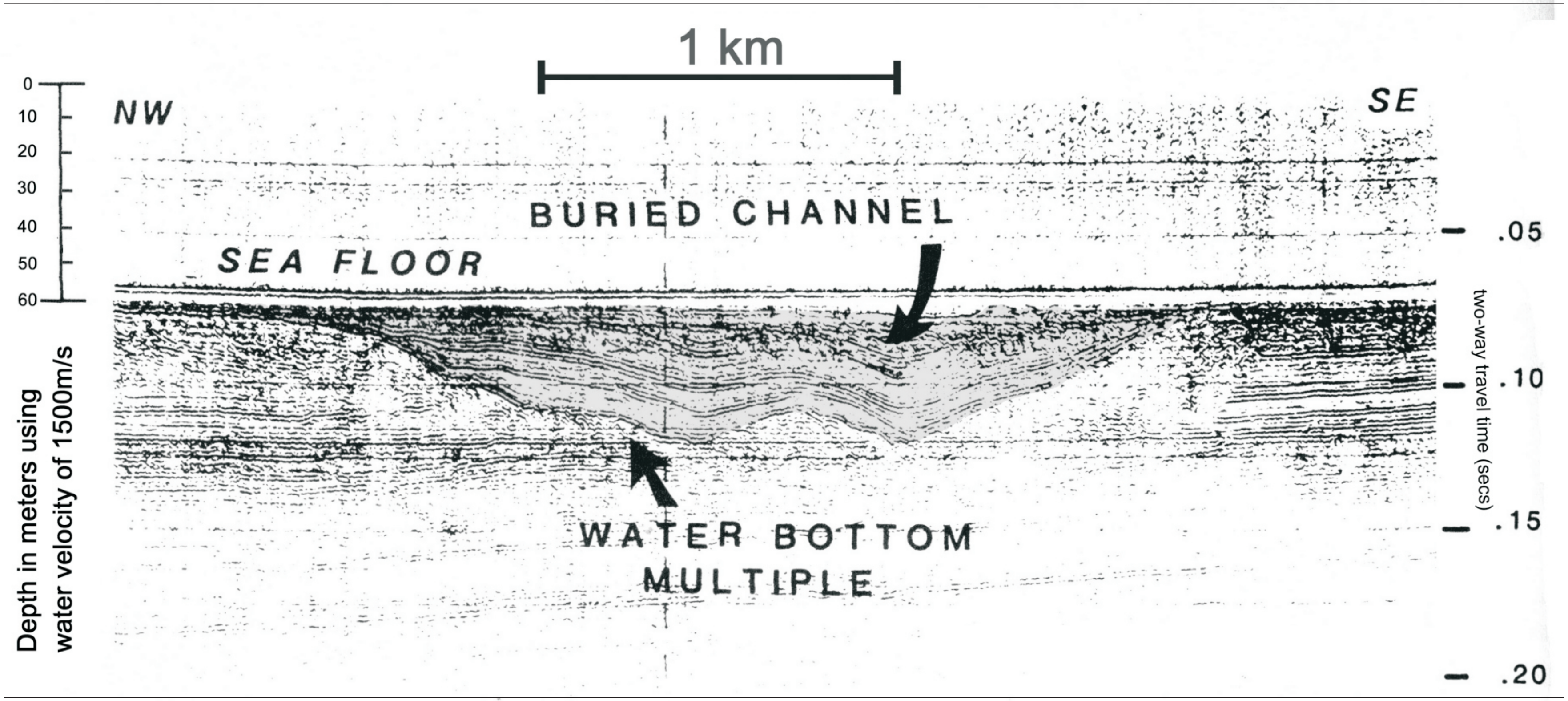


Figure III.A-3 Generalized Distribution of Surficial Sediments and Bedforms within the Chukchi Sea.



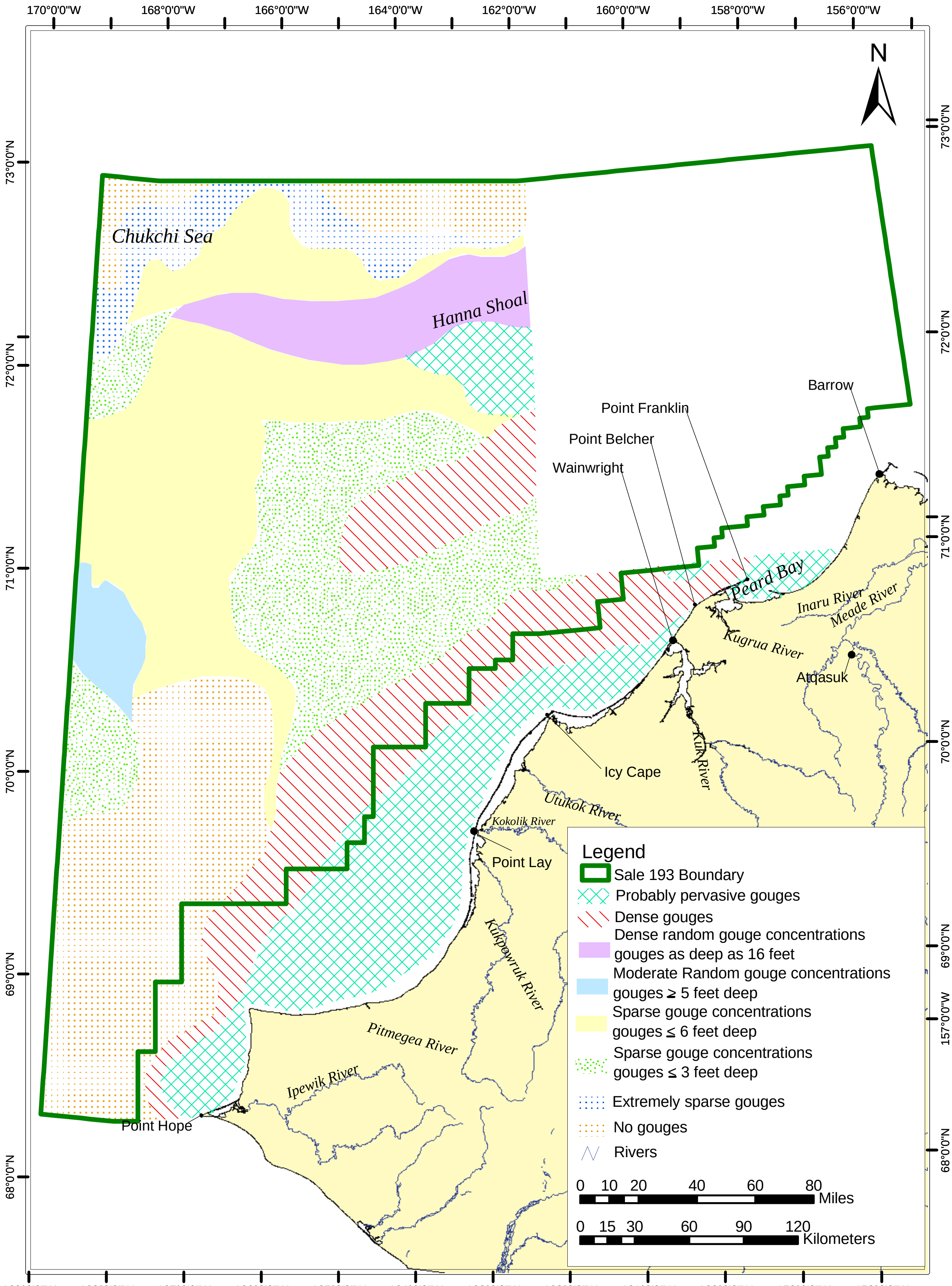
Source: After Fugro-McClelland, 1989.

Figure III.A-4 Site Survey for the Popcorn Well Showing Three Successive Channel Events. The Depths to the Deepest Portions of the Channels (thalwag) are Shown in Meters.



Source: After Grantz et al., 1982.

Figure III.A-5 Segment of USGS Uniboom Line 012, Showing a Filled Paleochannel West of the Barrow Sea Valley.



Source: Grantz et al., 1982; Thurston and Theiss, 1987.

Figure III.A-6 Ice Gouge Density.

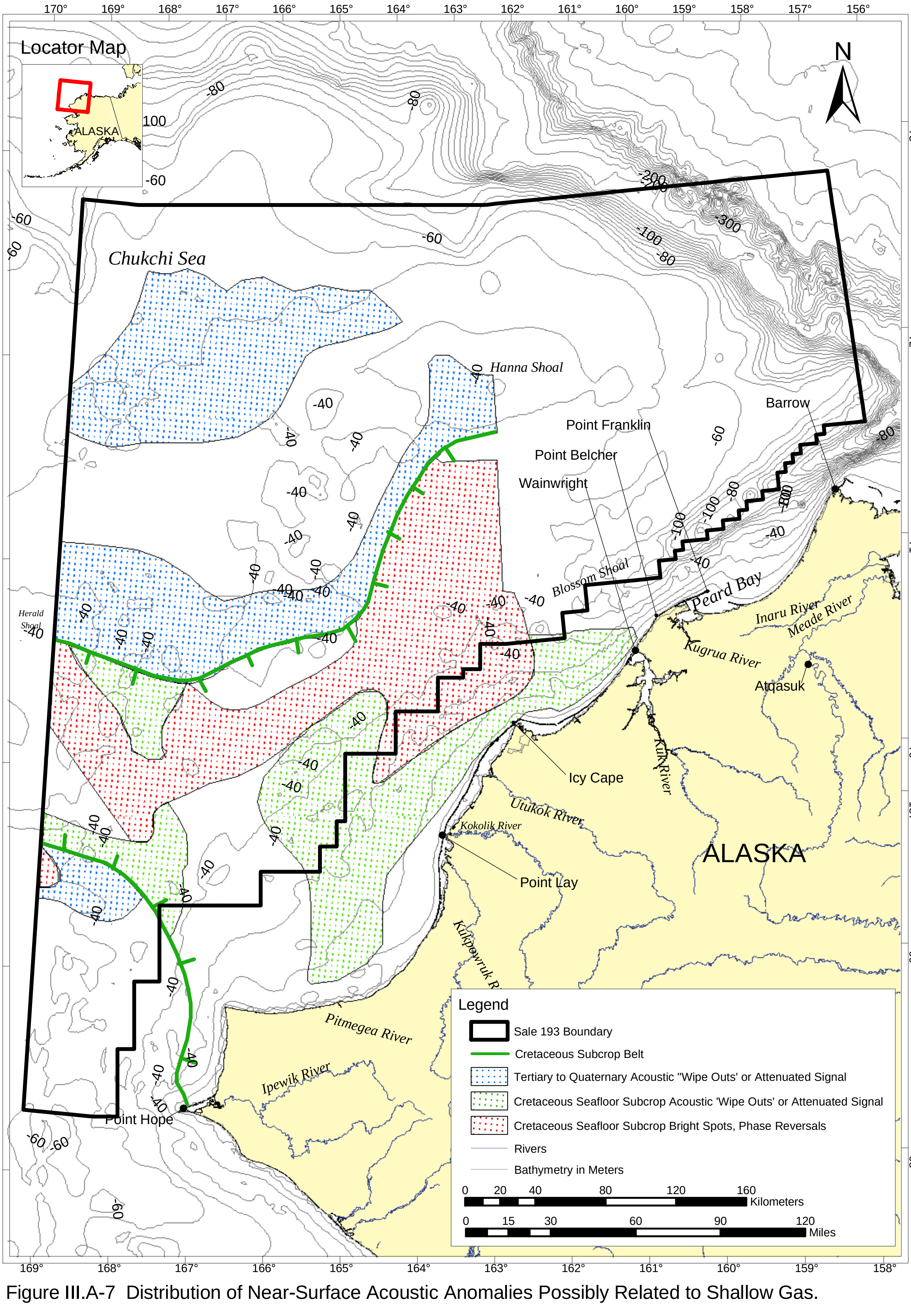
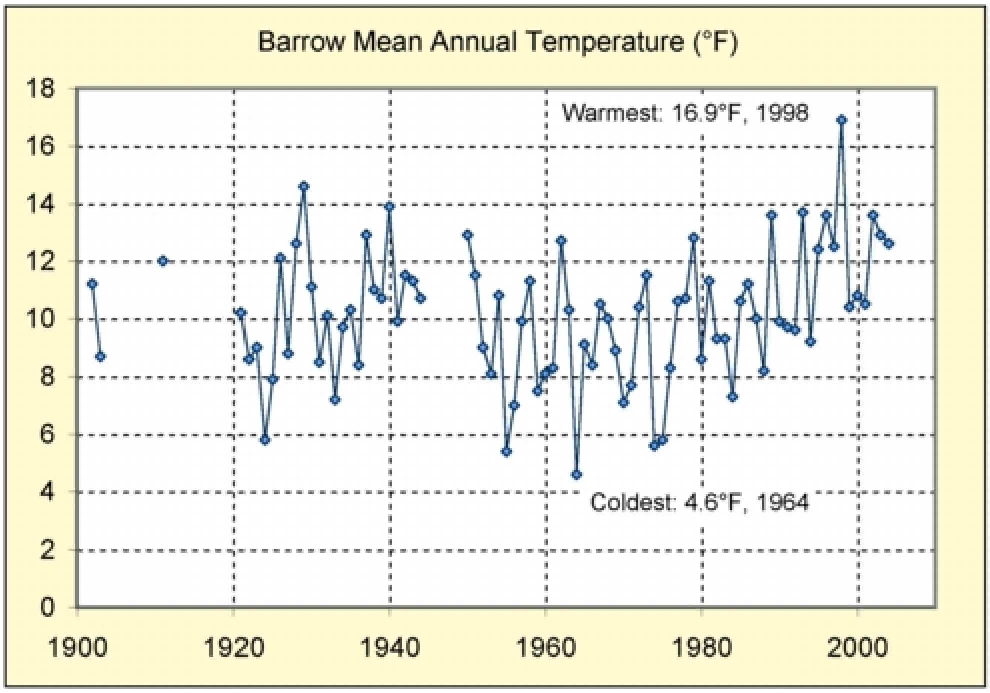
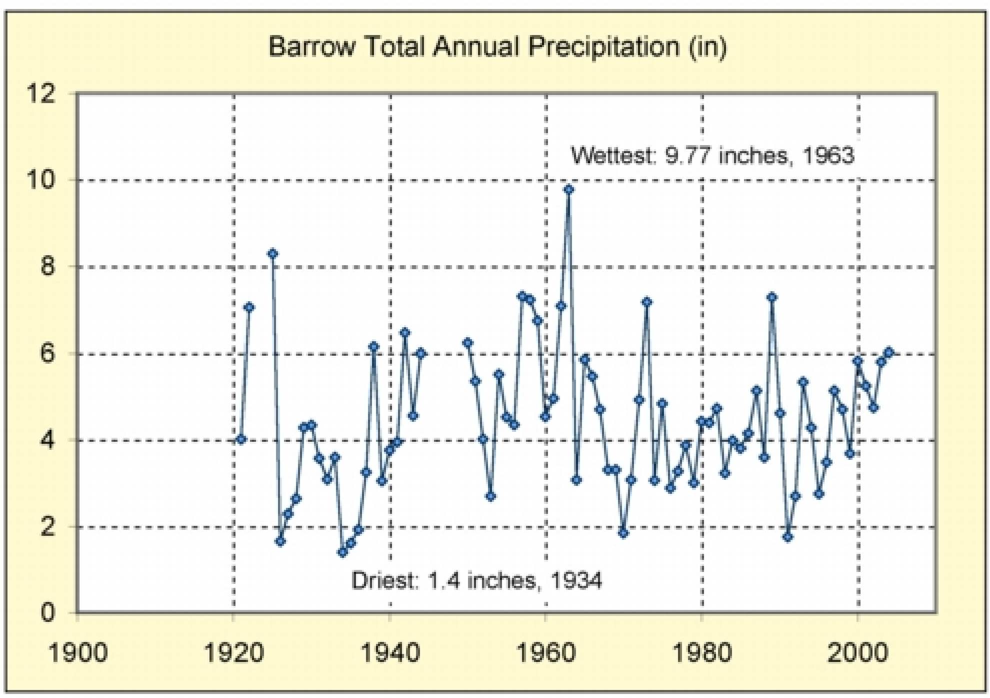


Figure III.A-7 Distribution of Near-Surface Acoustic Anomalies Possibly Related to Shallow Gas.



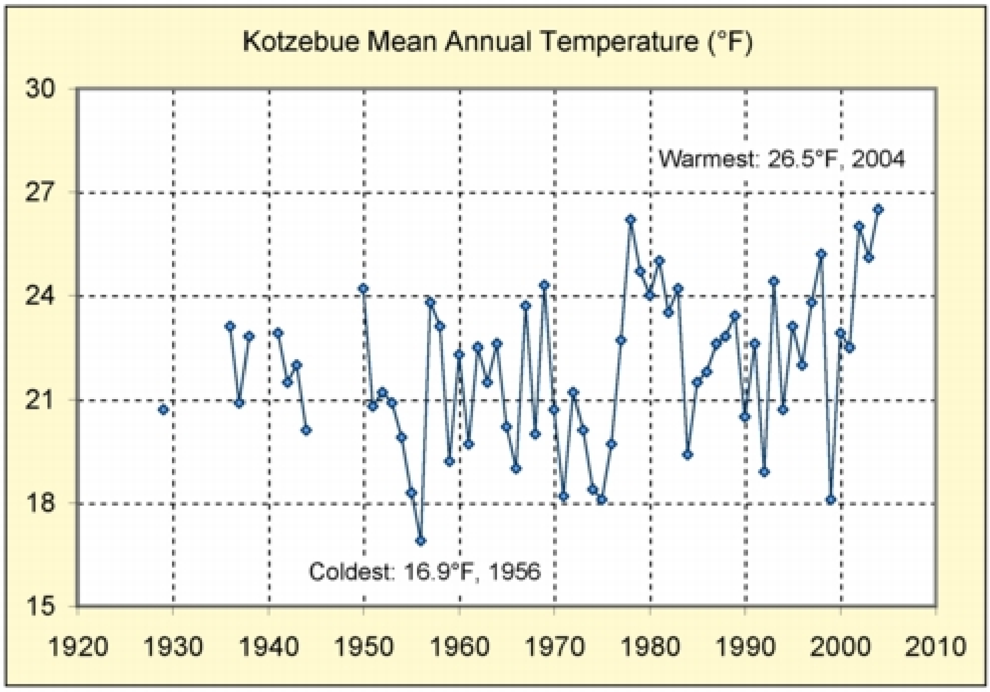
Source: Alaska Climate Research Center

Figure III.A-8 Barrow Mean Annual Temperature.



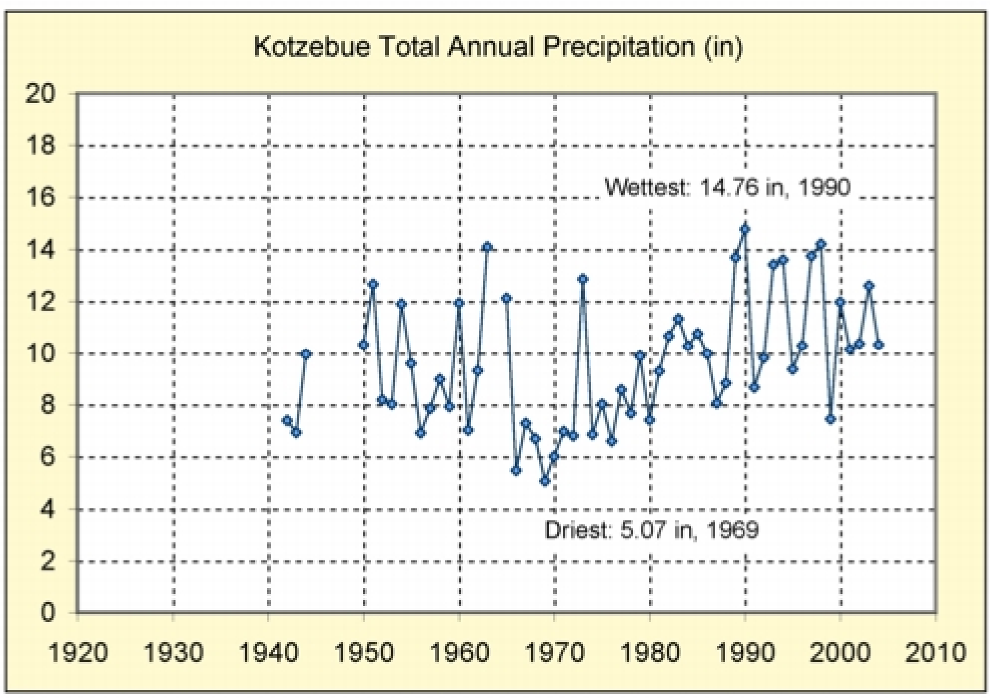
Source: Alaska Climate Research Center

Figure III.A-9 Barrow Total Annual Precipitation.



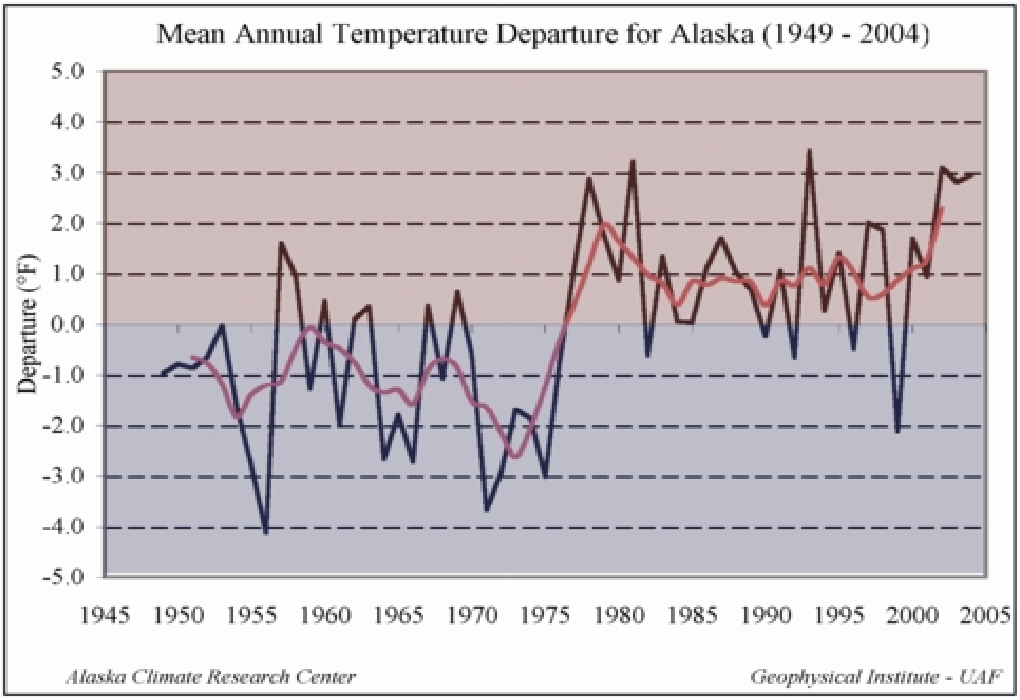
Source: Alaska Climate Research Center

Figure III.A-10 Kotzebue Mean Annual Temperature.



Source: Alaska Climate Research Center

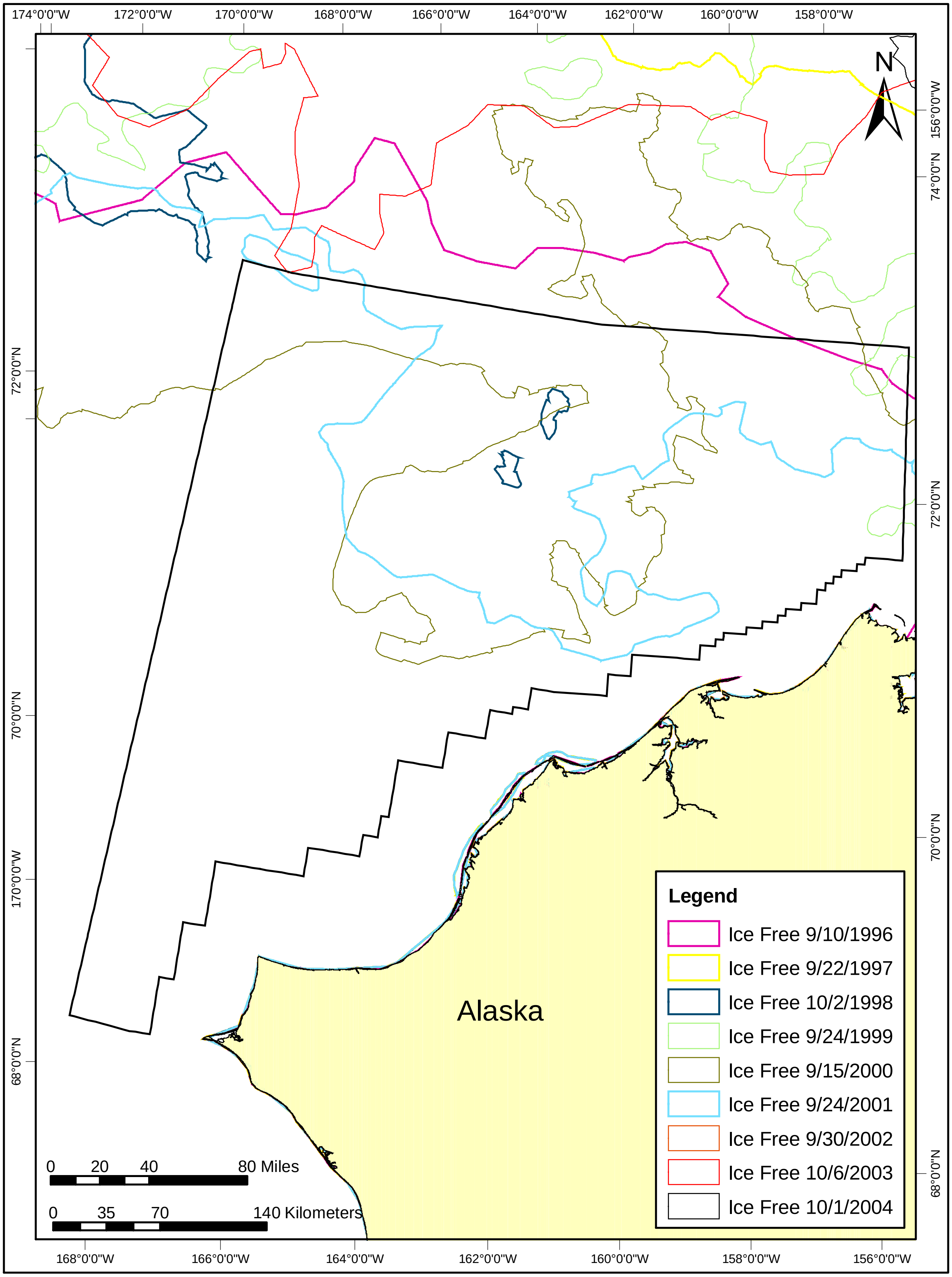
Figure III.A-11 Kotzebue Total Annual Precipitation.



Source: Alaska Climate Research Center

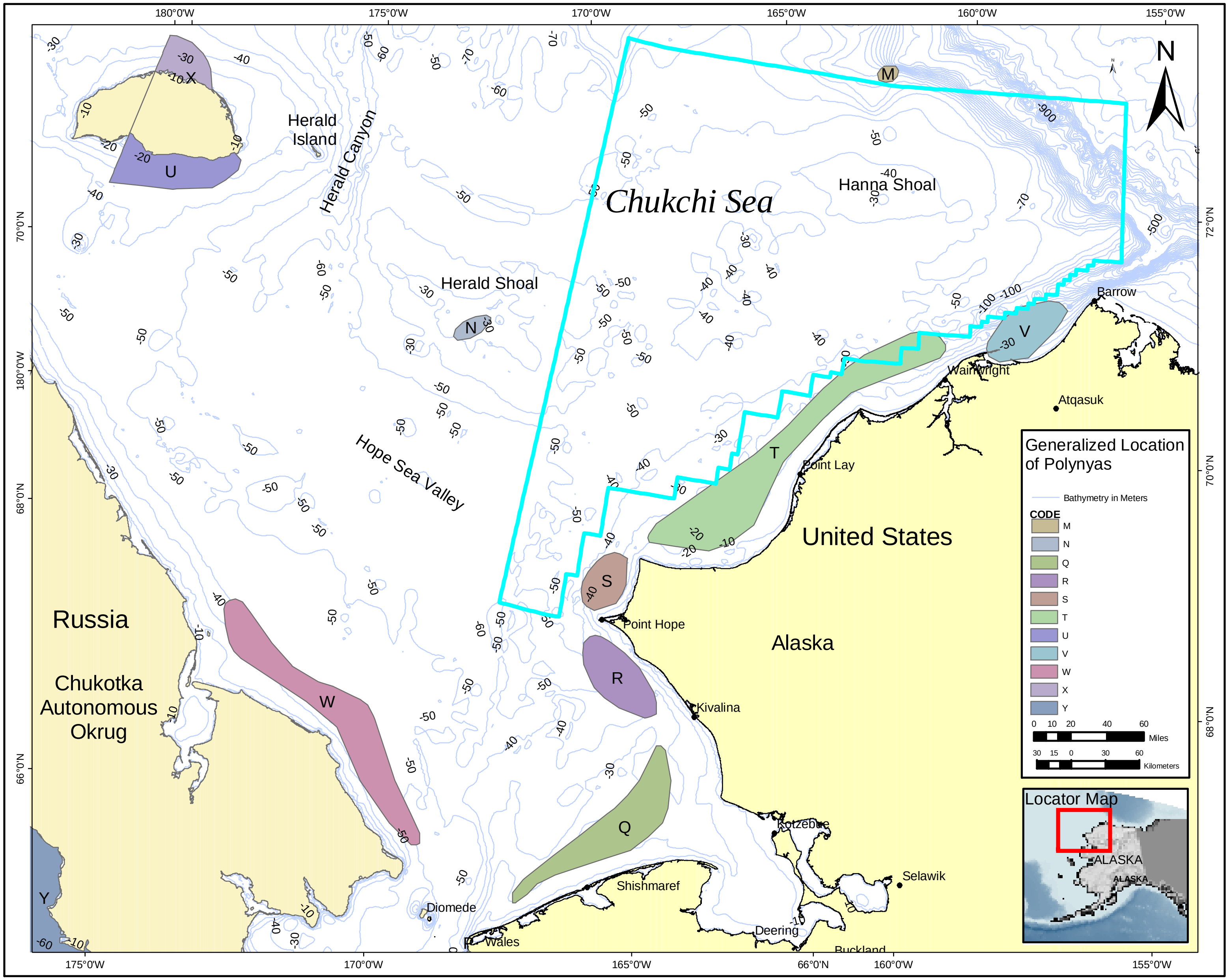
Figure III.A-12 Mean Annual Temperature Departure for Alaska (1949-2004).

The heavy black line on the graph represents the aggregate mean annual temperature departure.
The heavy red line on the graph represents the 5-year moving average temperature.



Source: USDOC, NOAA, National Ice Center 1996-2004.

Figure III.A-13 Generalized Maximum Retreat of Sea Ice 1996-2004.



Source: Stringer and Groves, 1991.

Figure III.A-14 Generalized Location of Chukchi Polynyas.

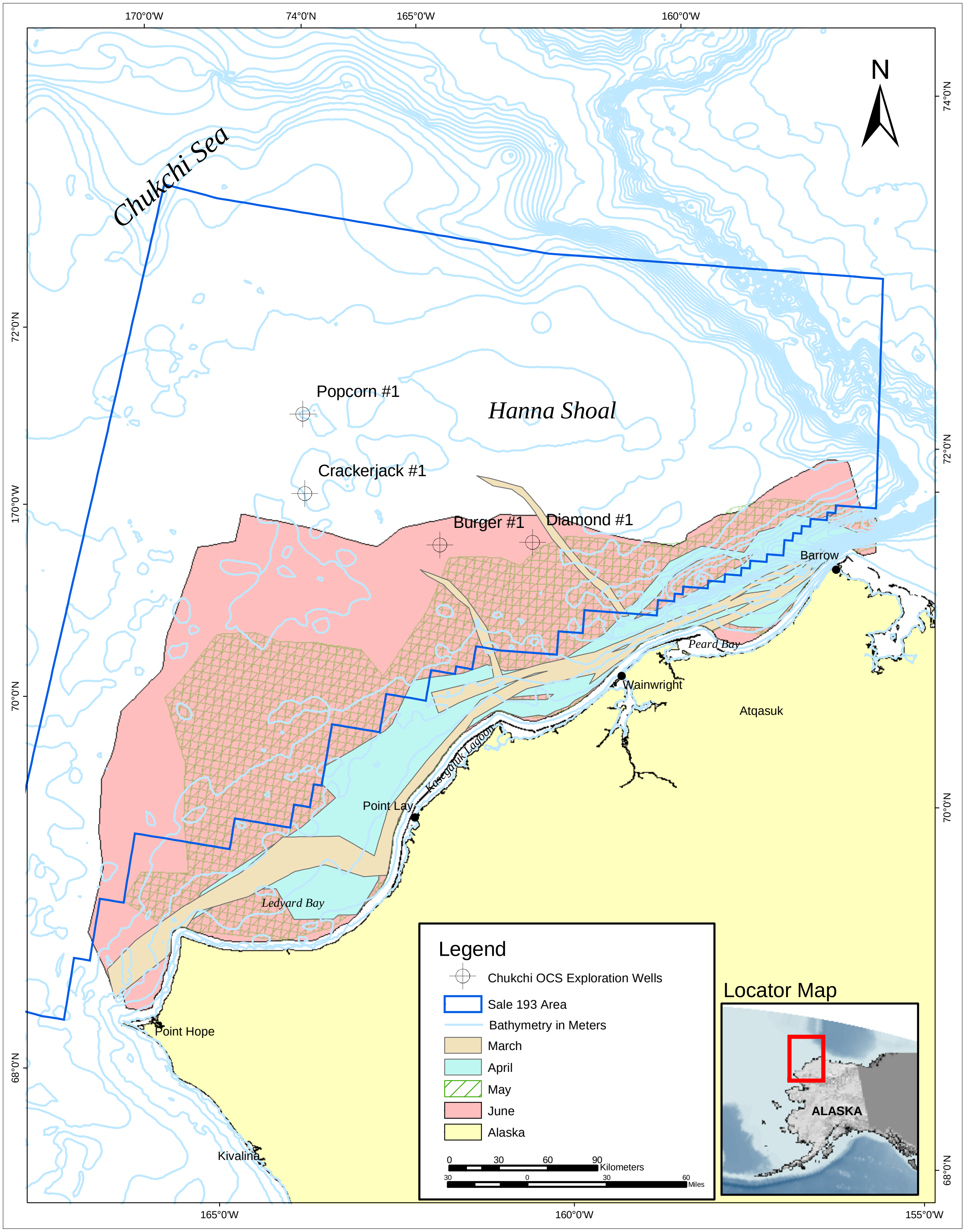
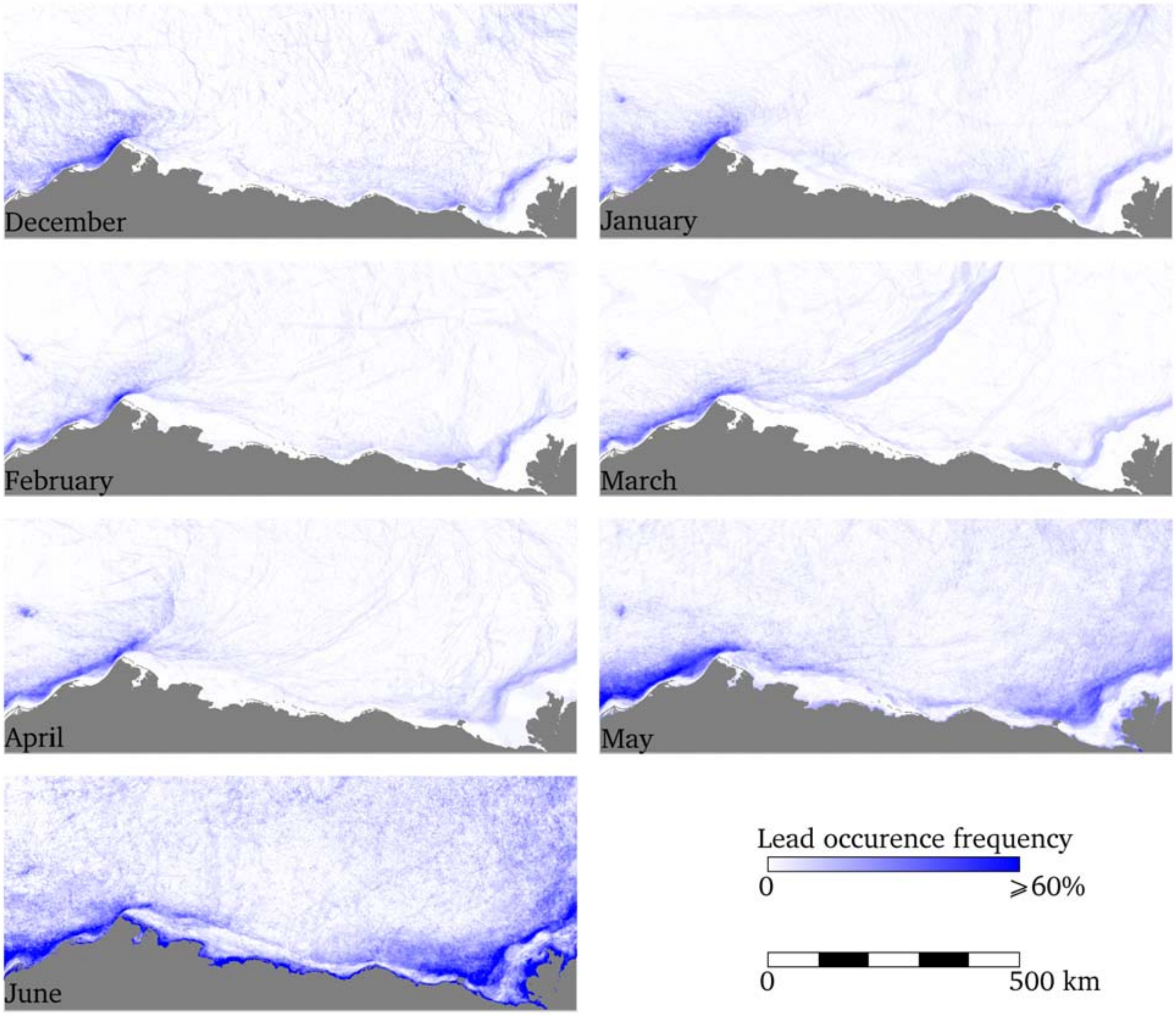
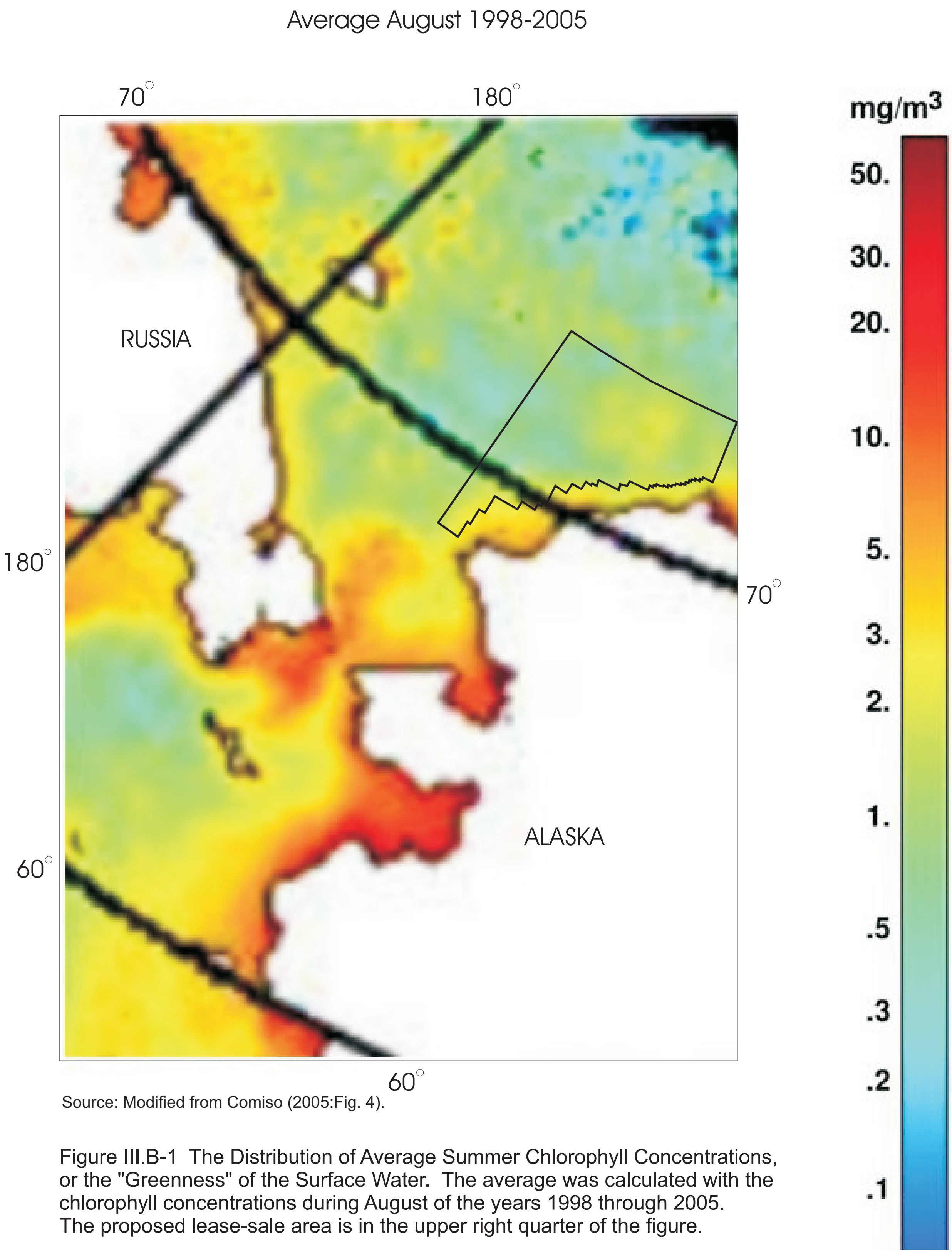


Figure III.A-15 Maximum Polynya and Flaw Lead for 1995, 1997, 2003, and 2004.



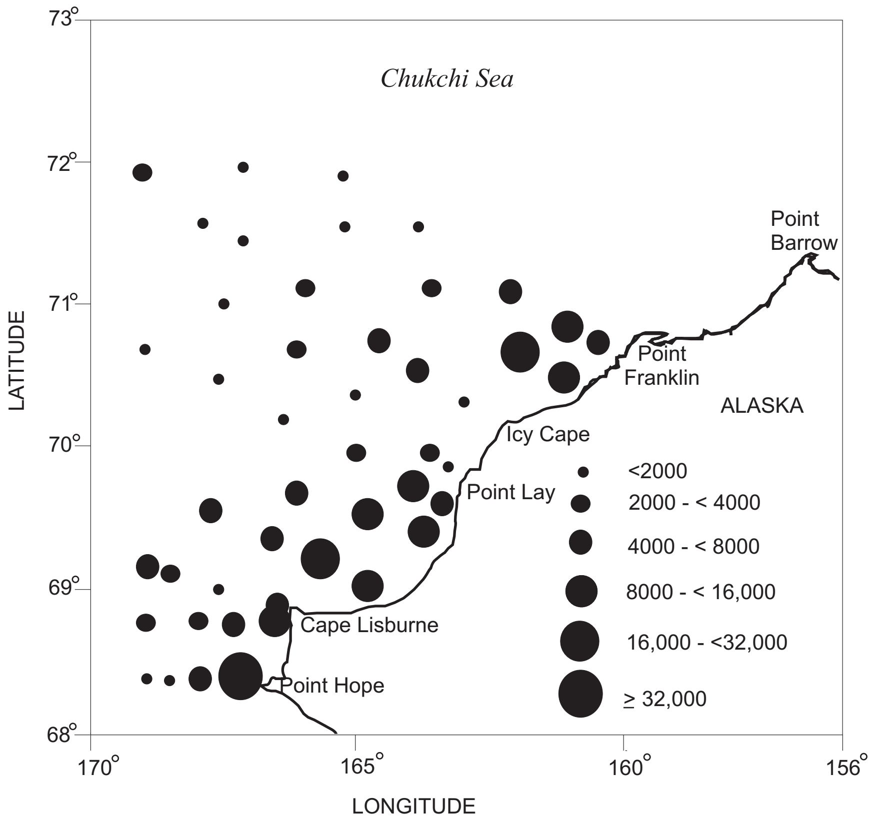
Source: Eiken et al., 2006.

Figure III.A-16 Monthly Recurrence Probability of Leads Derived from All Images for the Time Period 1993-2004.



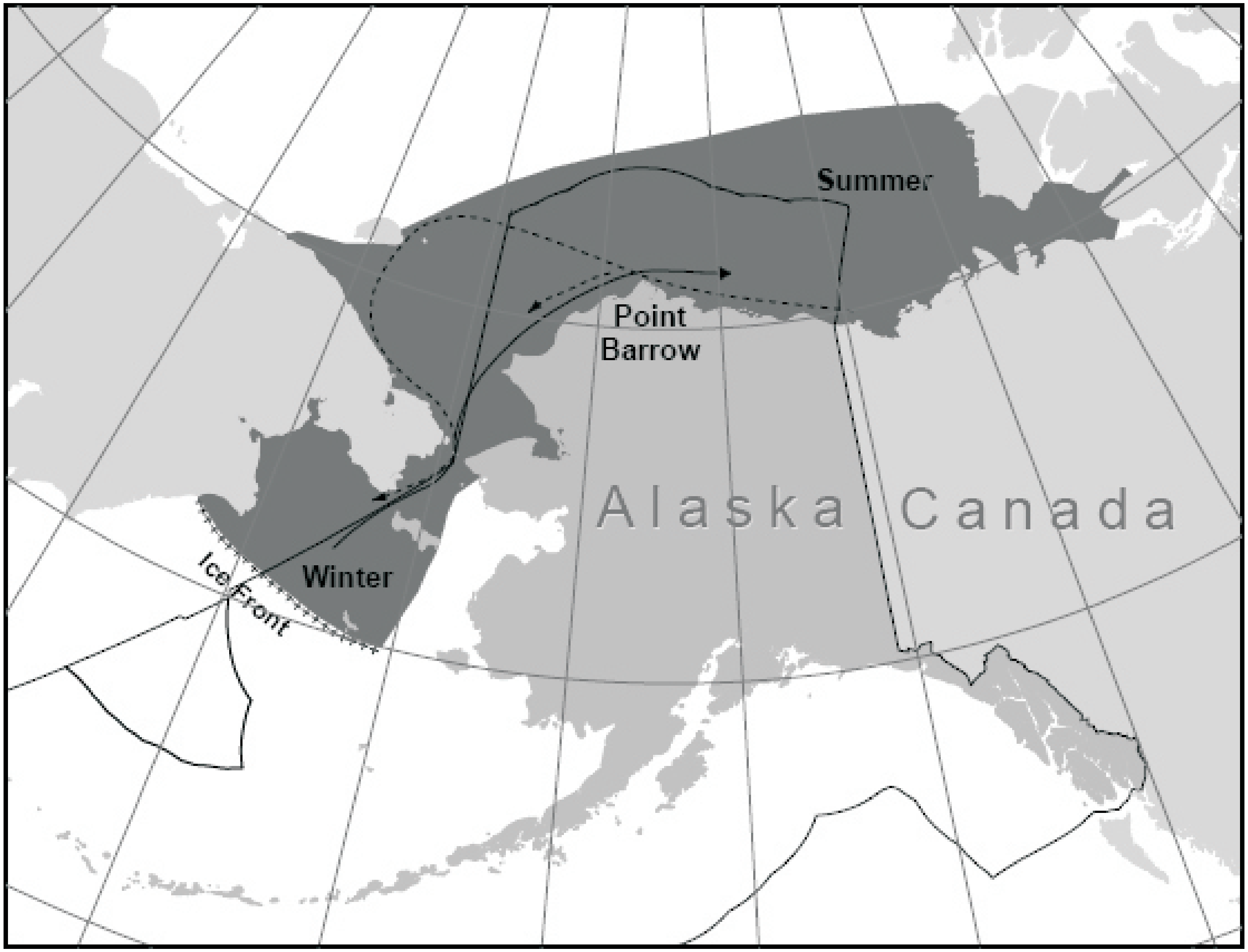
Source: Modified from Comiso (2005:Fig. 4).

Figure III.B-1 The Distribution of Average Summer Chlorophyll Concentrations, or the "Greenness" of the Surface Water. The average was calculated with the chlorophyll concentrations during August of the years 1998 through 2005. The proposed lease-sale area is in the upper right quarter of the figure.



Source: Feder et al. (1994: Fig. 8a).

Figure III.B-2. Abundance (ind/m^2) of Snails and Other Epifaunal Mollusks in the Northeastern Chukchi Sea.



Source: Angliss and Outlaw (2005[Rev. 12/23/05]; Fig. 43).

Figure III.B-3 Approximate Distribution of the Western Arctic Stock Bowhead Whales (shaded dark area). Winter, Summer, and Spring/Fall Distributions are Depicted.

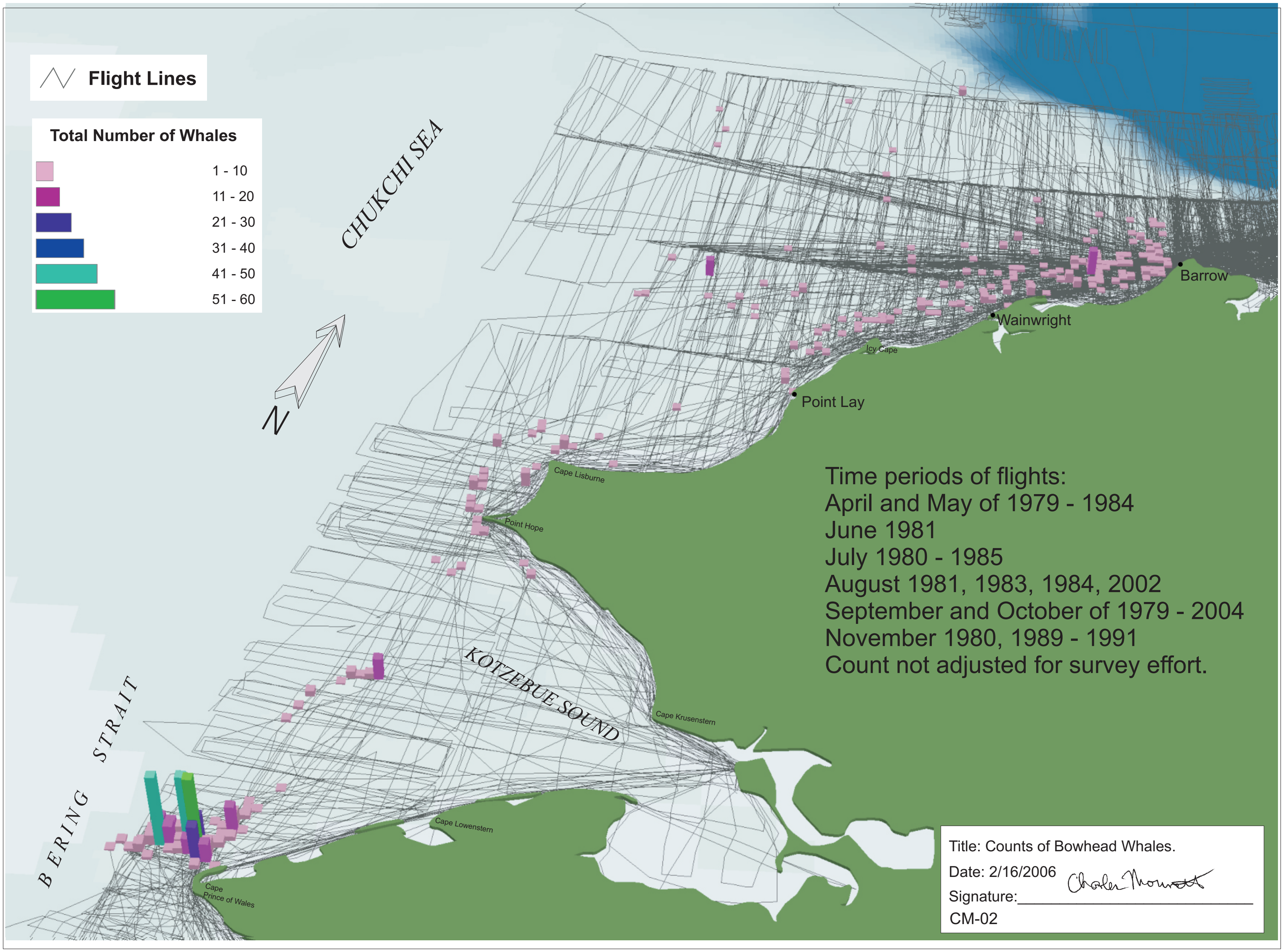
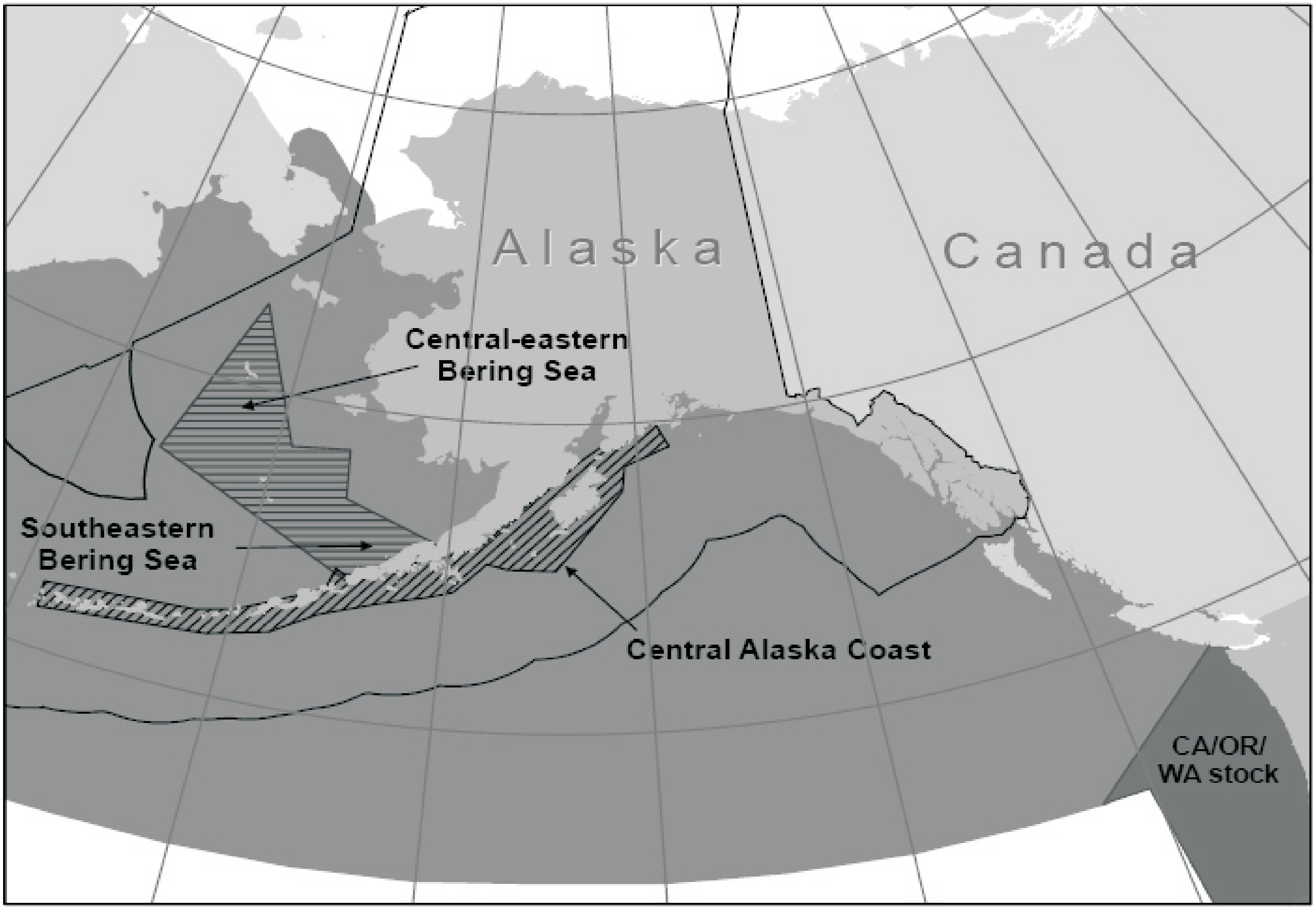
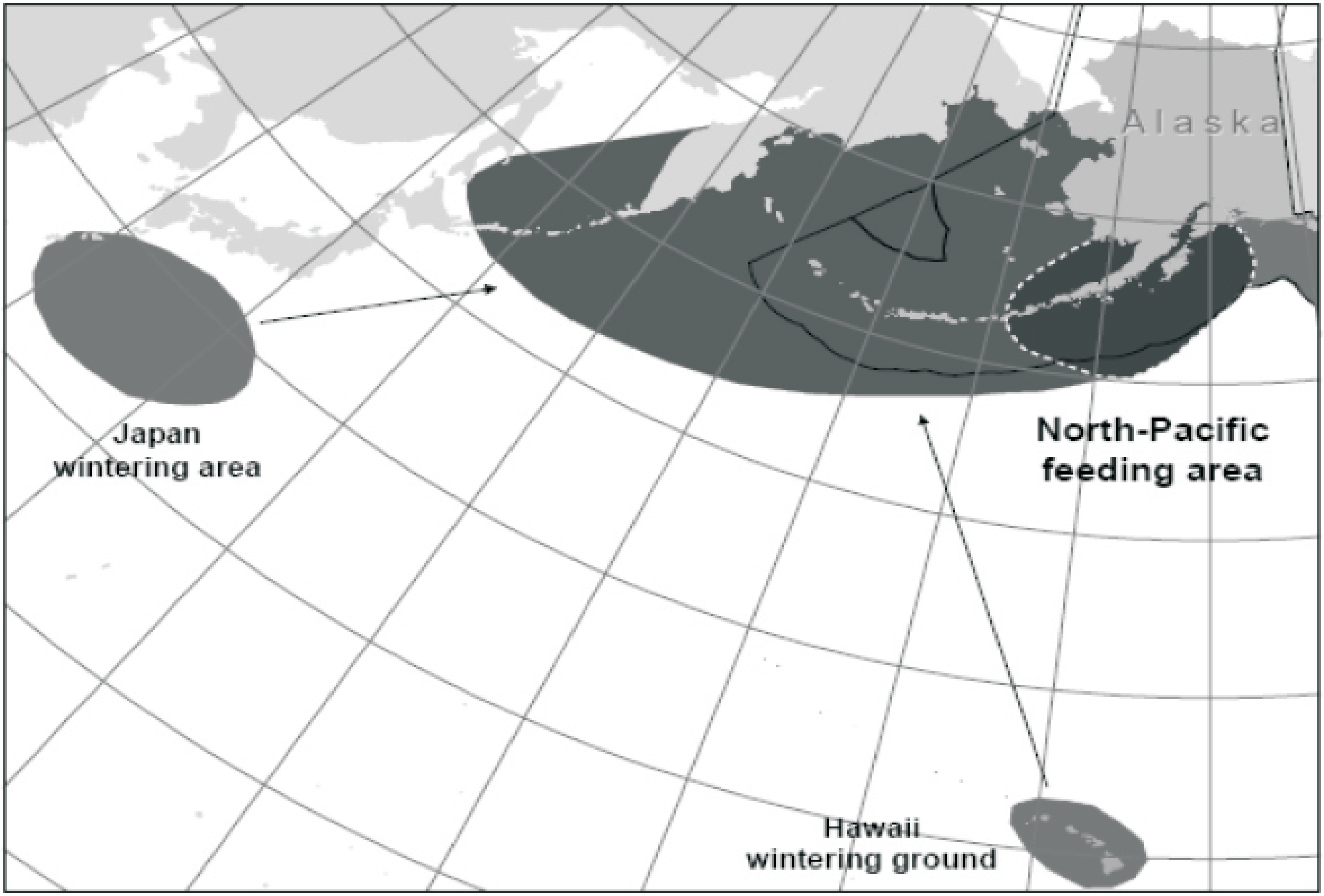


Figure III.B-4 Counts of Bowhead Whales in the Chukchi Sea taken by the MMS Bowhead Whale Aerial Survey Project (Counts are aggregated on a 5-km grid).



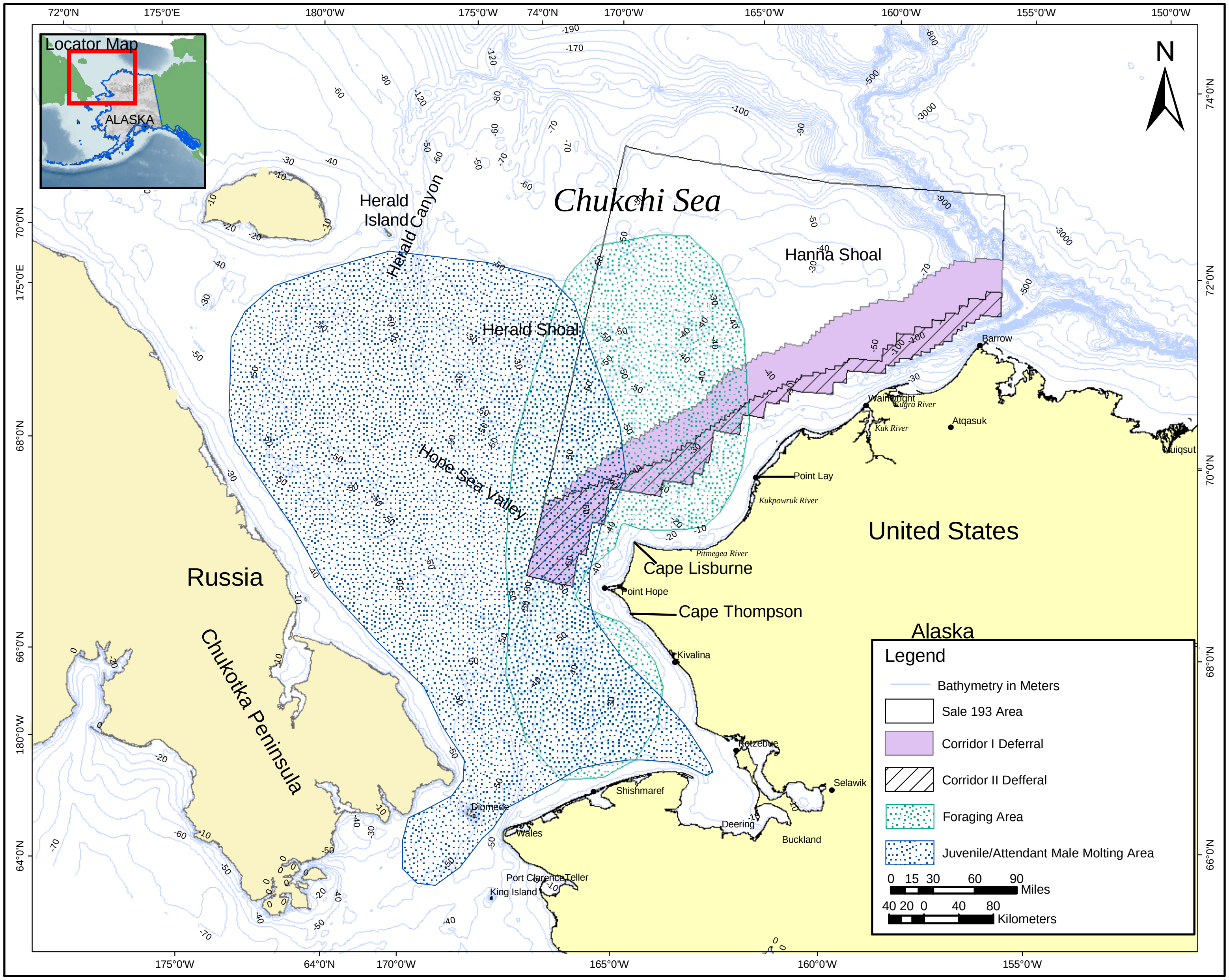
Source: Angliss and Lodge (2005 [Rev. 10/21/04]: Fig. 40).

Figure III.B-5 Approximate Distribution of Fin Whales in the Eastern North Pacific (shaded areas). Enclosed Area Indicates General Location of the Pollock Surveys from which Regional Estimates of the Fin Whale Population was made.



Source: Angliss and Outlaw (2005 [Rev. 1/12/06]: Fig. 38).

Figure III.B-6 Approximate Distribution of Humpback Whales in the Western North Pacific (shaded area). Feeding and Wintering Grounds are Presented. (Area within the dotted line is known to be an area of overlap with the Central North Pacific stock. See Figure 39 in Angliss and Outlaw (2005) for humpback whale distribution in the eastern north Pacific.)



Source: Hatch et al., 2000.

Figure III.B-7 Approximate Areas used by Common and Thick-Billed Murres from the Cape Lisburne and Cape Thompson Colonies when Foraging in Summer and by the Juvenile and Attendant Males during the Postnesting Molting Period (late August through mid-November).

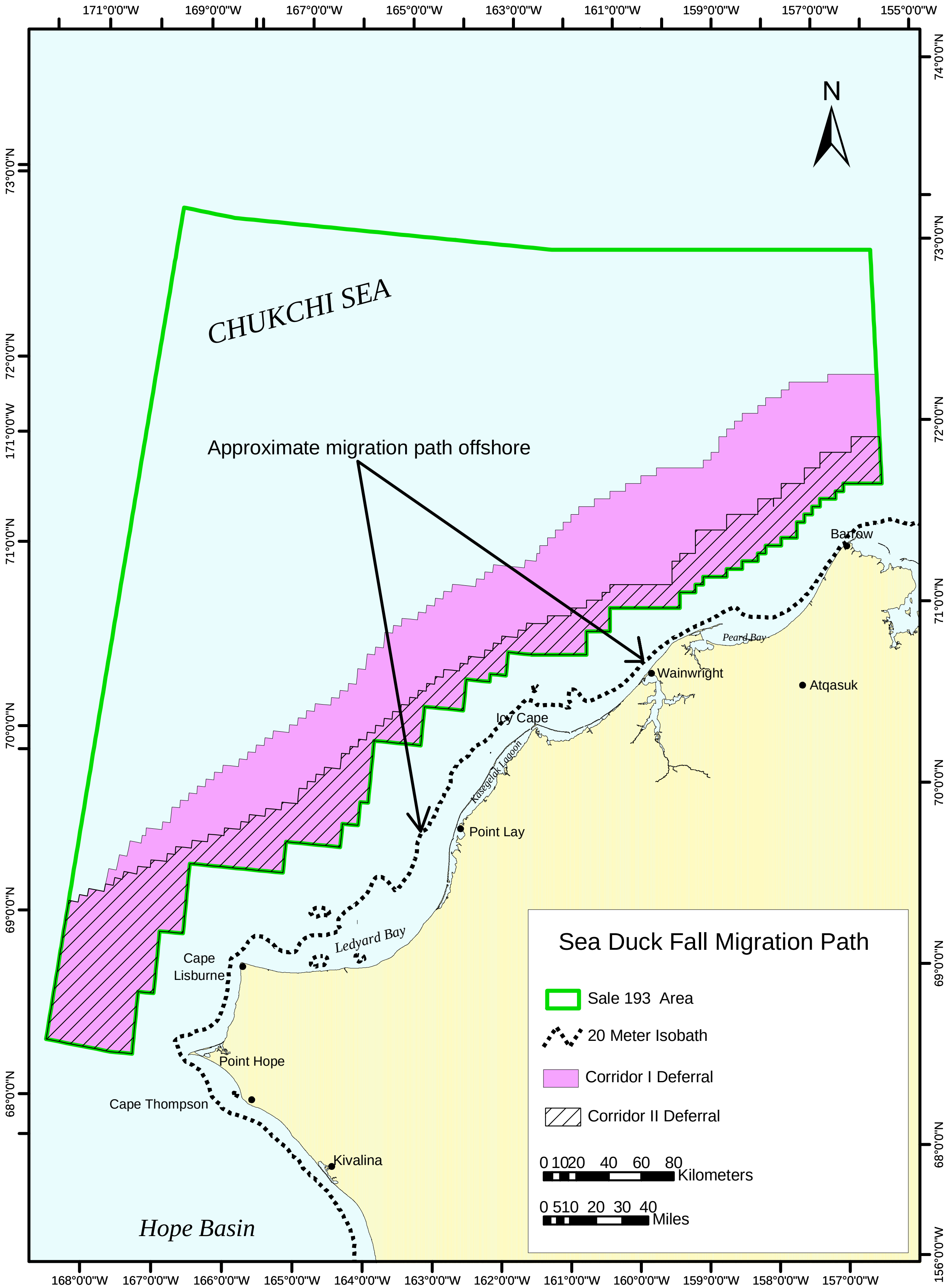


Figure III.B-8 Approximate Migration Distances from Shore for King Eiders, Common Eiders and Long-Tailed Ducks In Fall (these species tend to migrate along the 20-meter isobath).

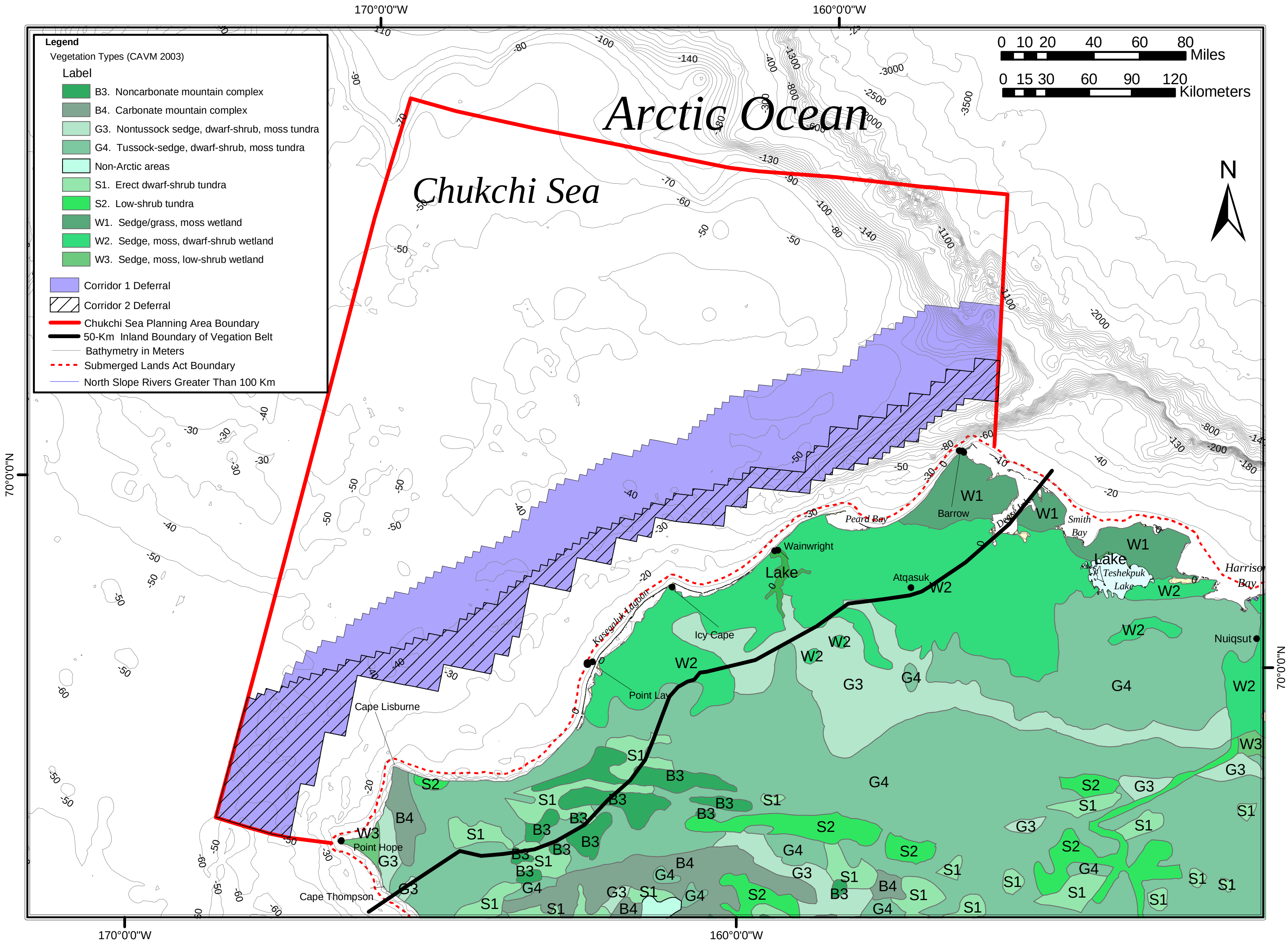
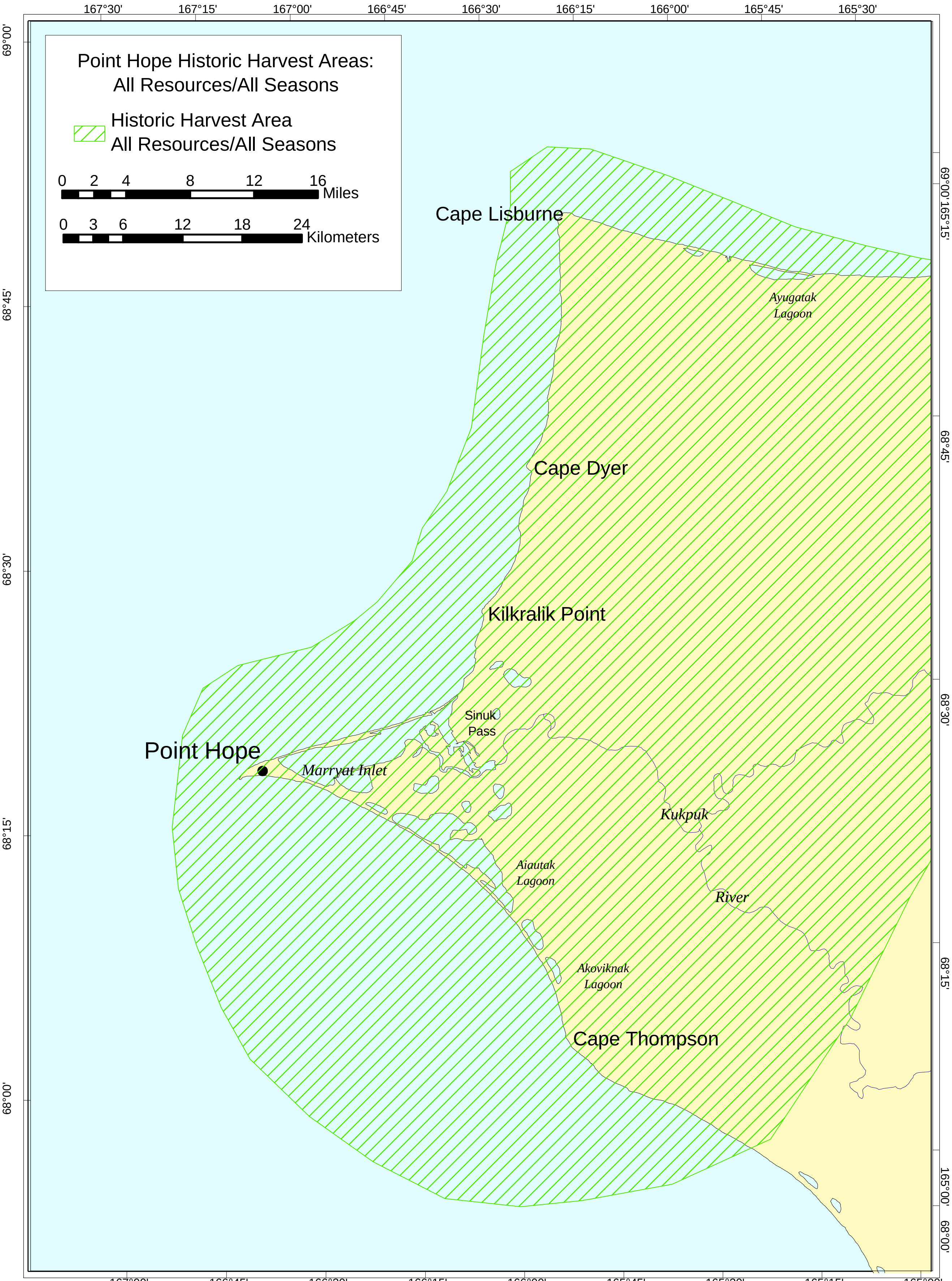
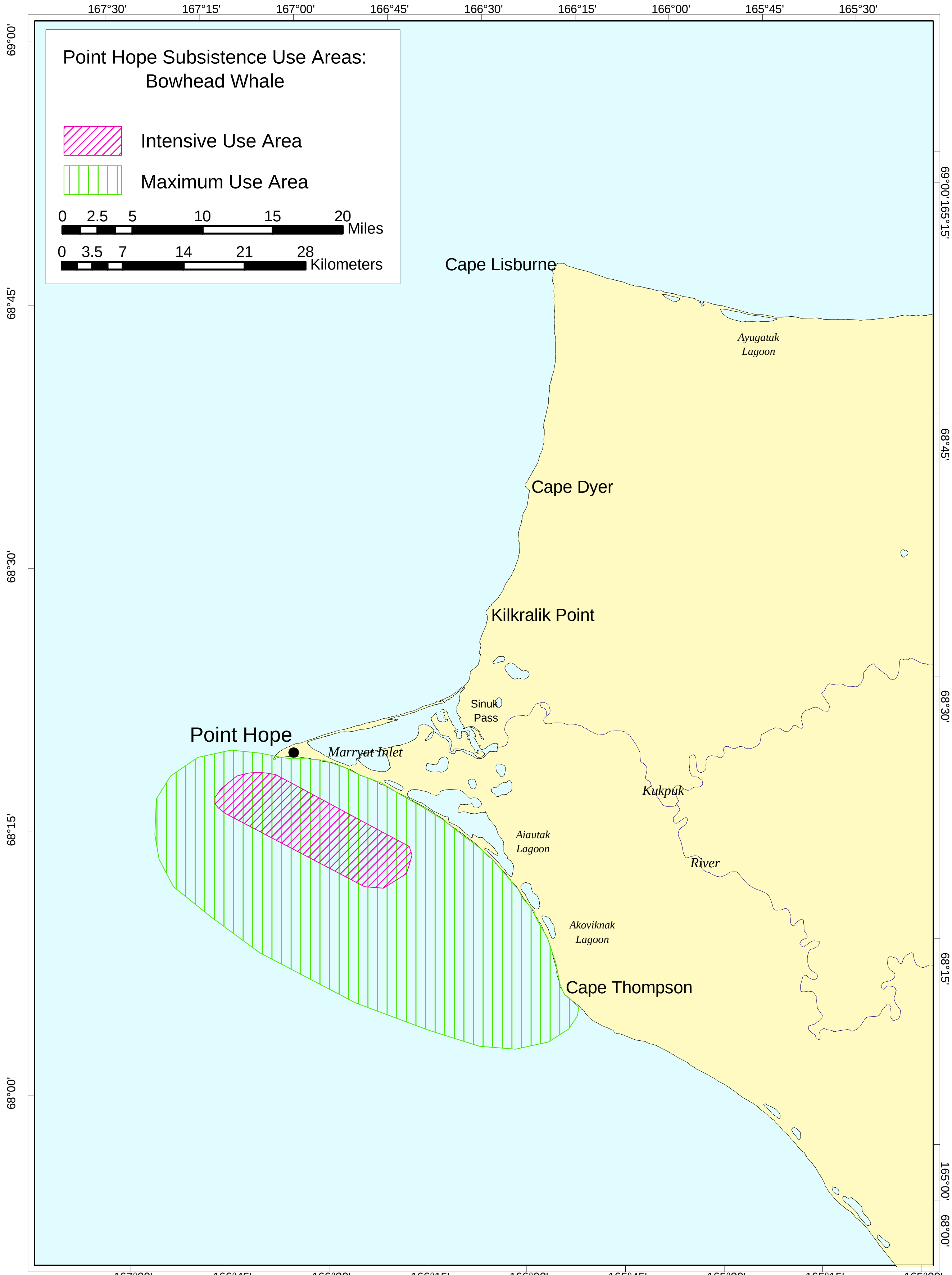


Figure III.B-9 Vegetation and Wetlands within a 50-km Belt from the Chukchi Shoreline.



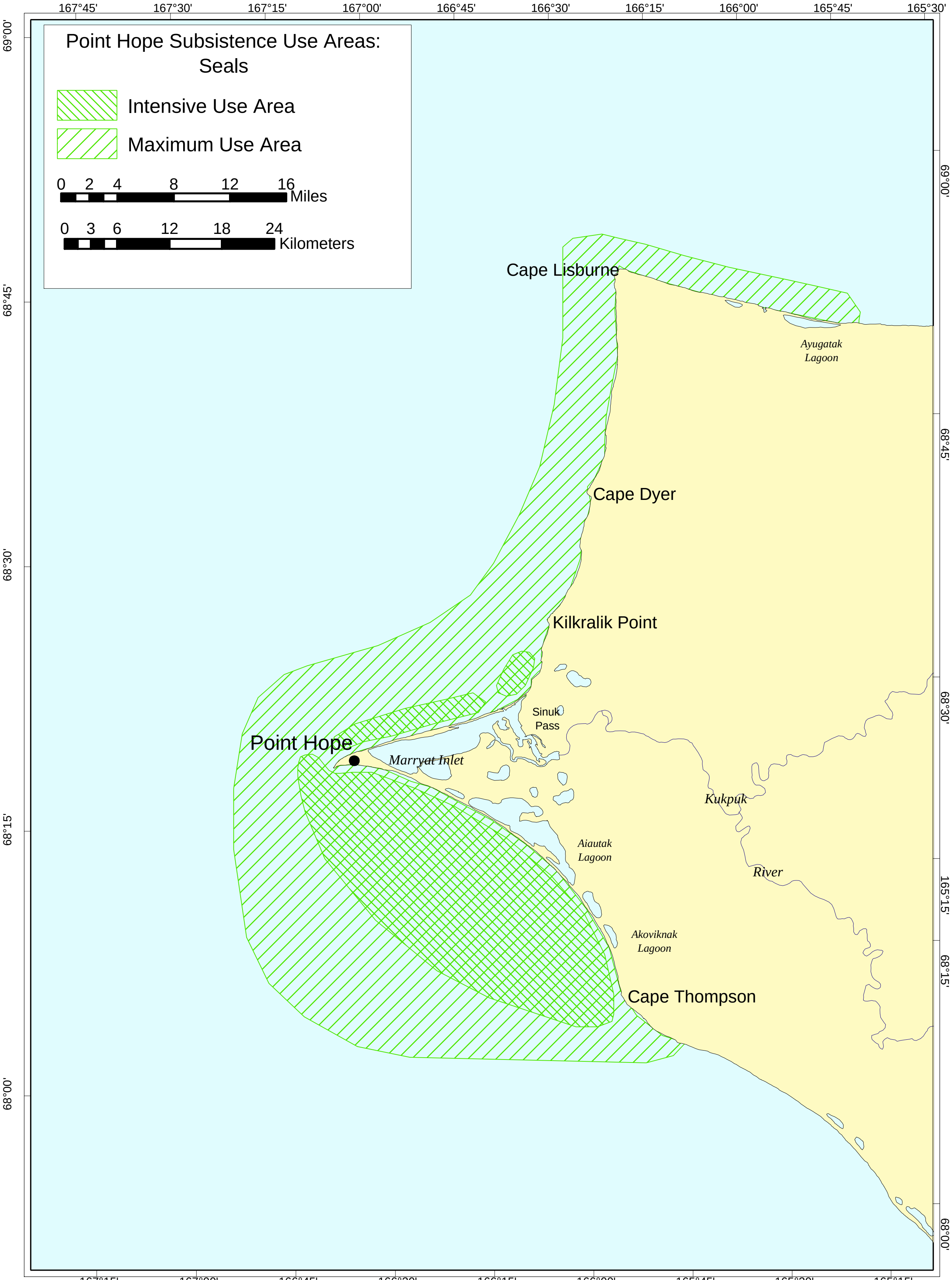
Source: From Braund and Burnham, 1984; Pedersen, 1977.

Figure III.C-1 Point Hope Historic Subsistence-Harvest Areas: All Resources/All Seasons.



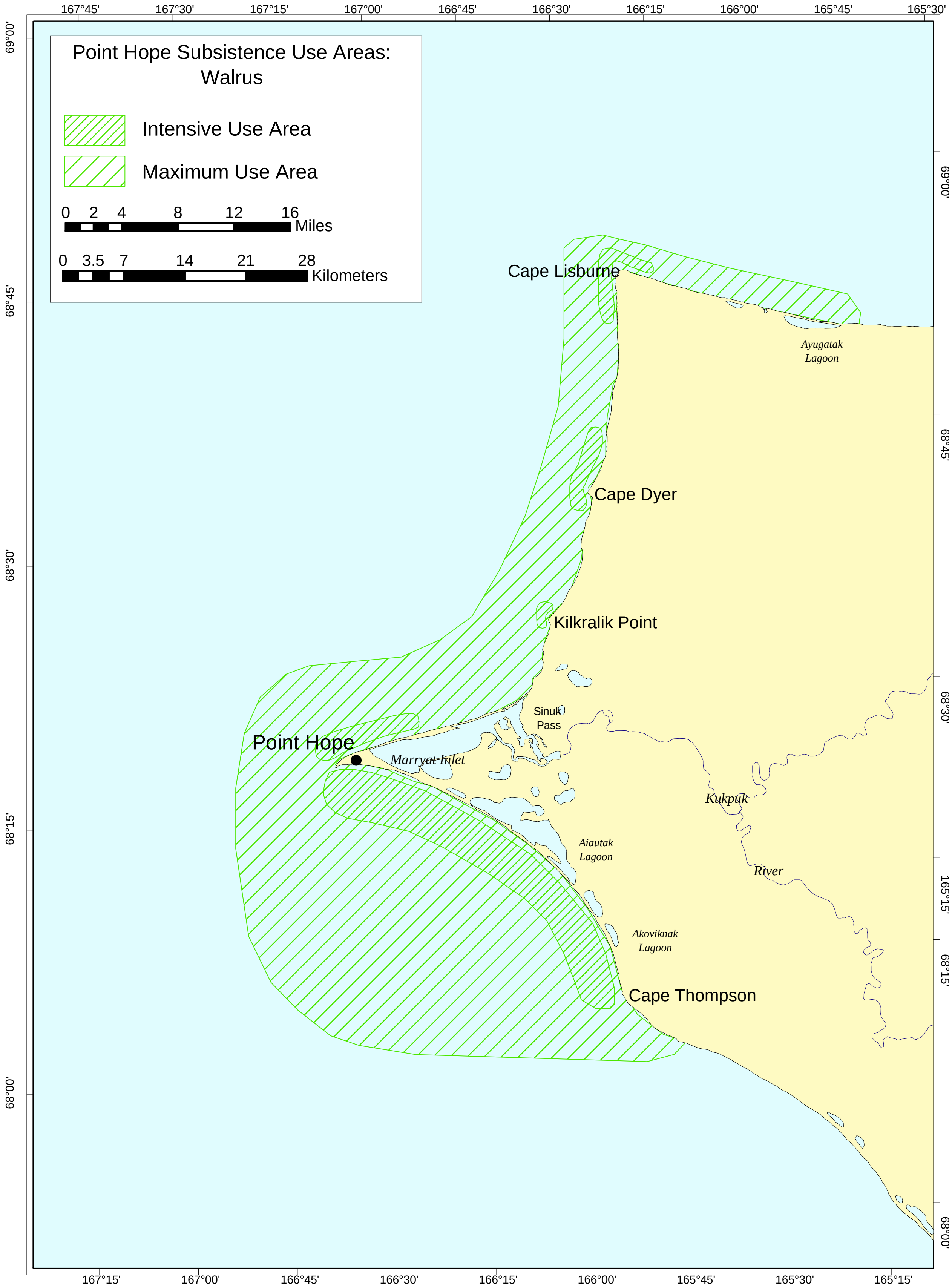
Source: Braund and Burnham, 1984.

Figure III.C-2 Point Hope Subsistence-Use Areas: Bowhead Whale.



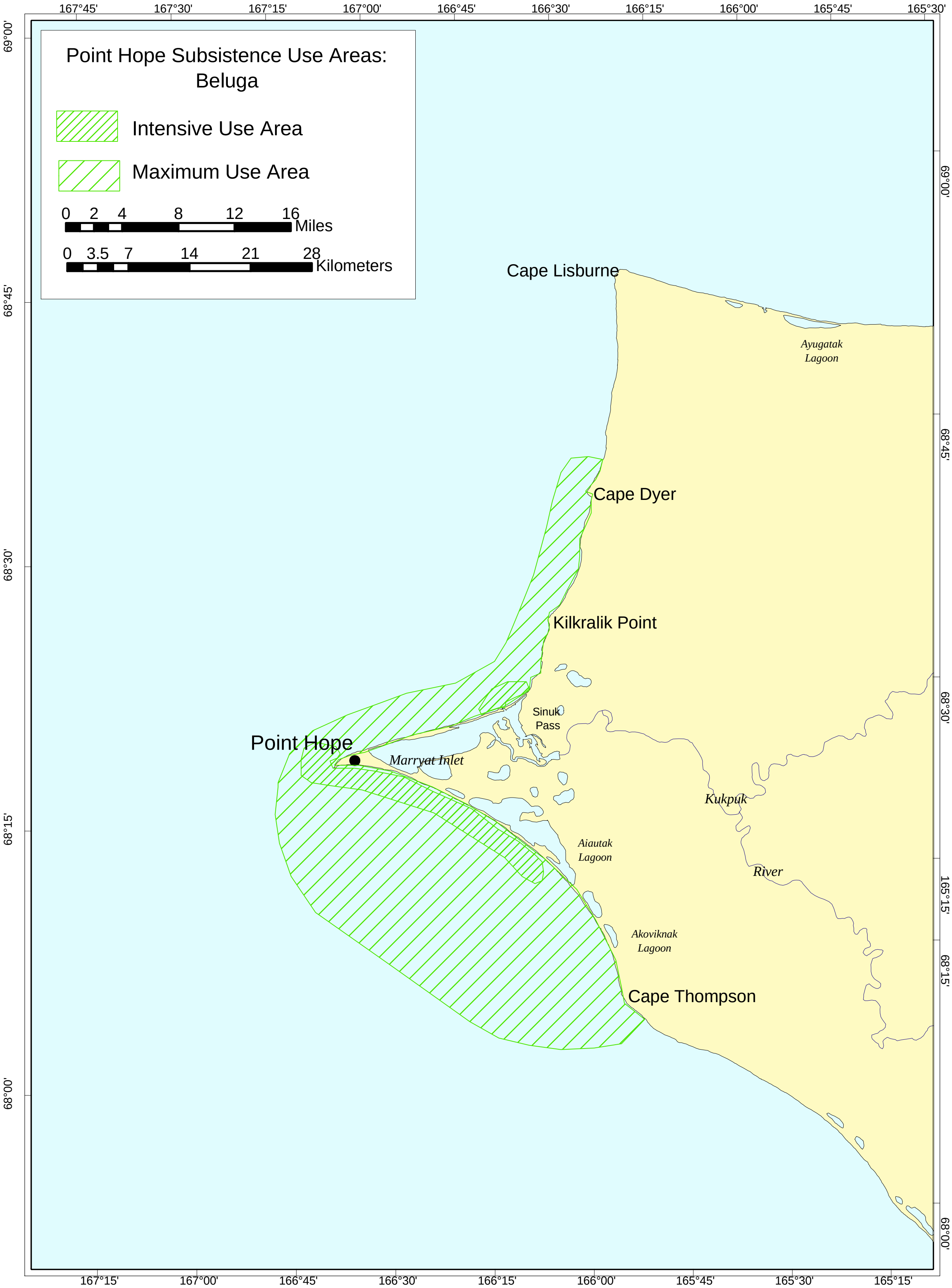
Source: Braund and Burnham, 1984.

Figure III.C-3 Point Hope Subsistence Use Areas: Seals.



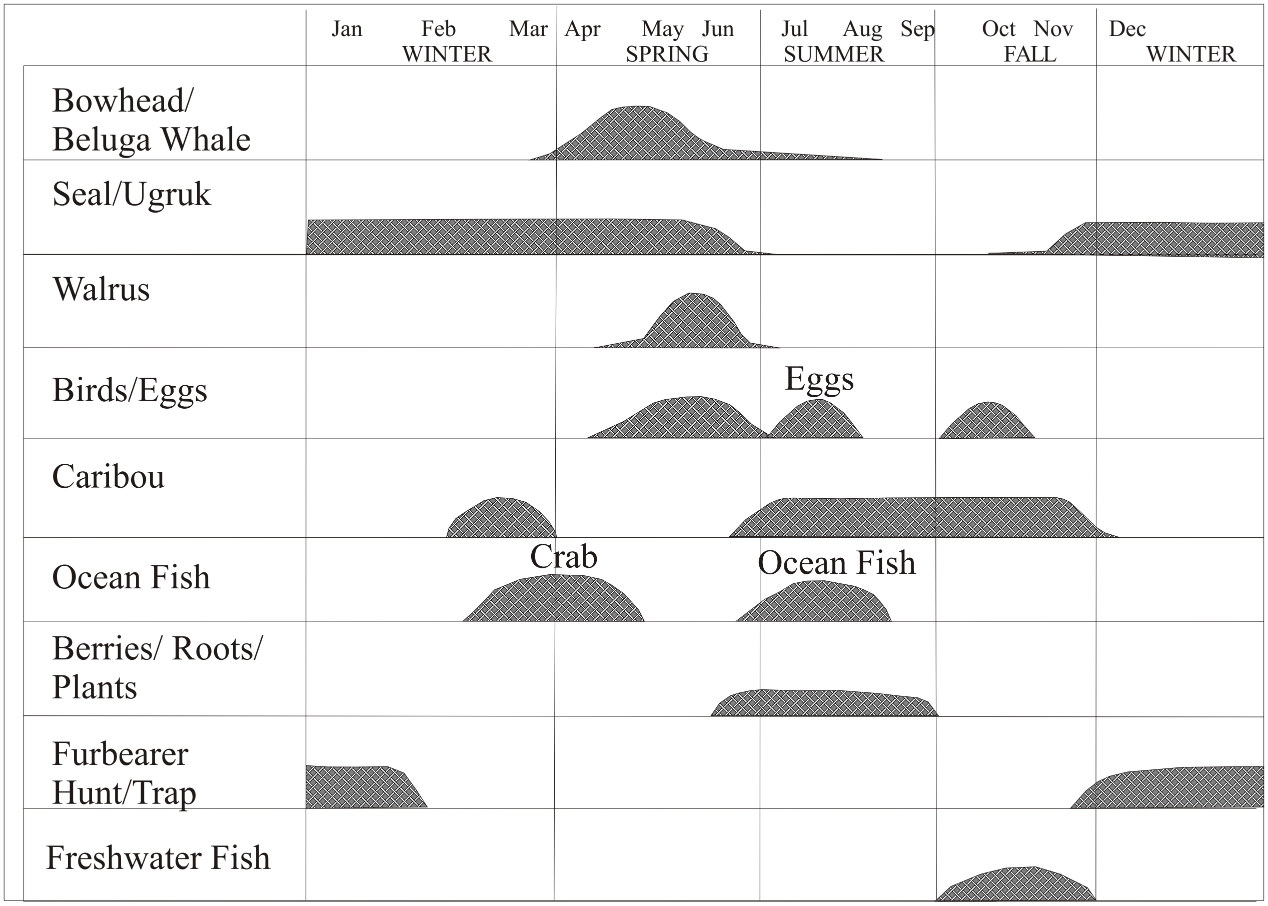
Source: Braund and Burnham, 1984.

Figure III.C-4 Point Hope Subsistence Use Areas: Walrus.



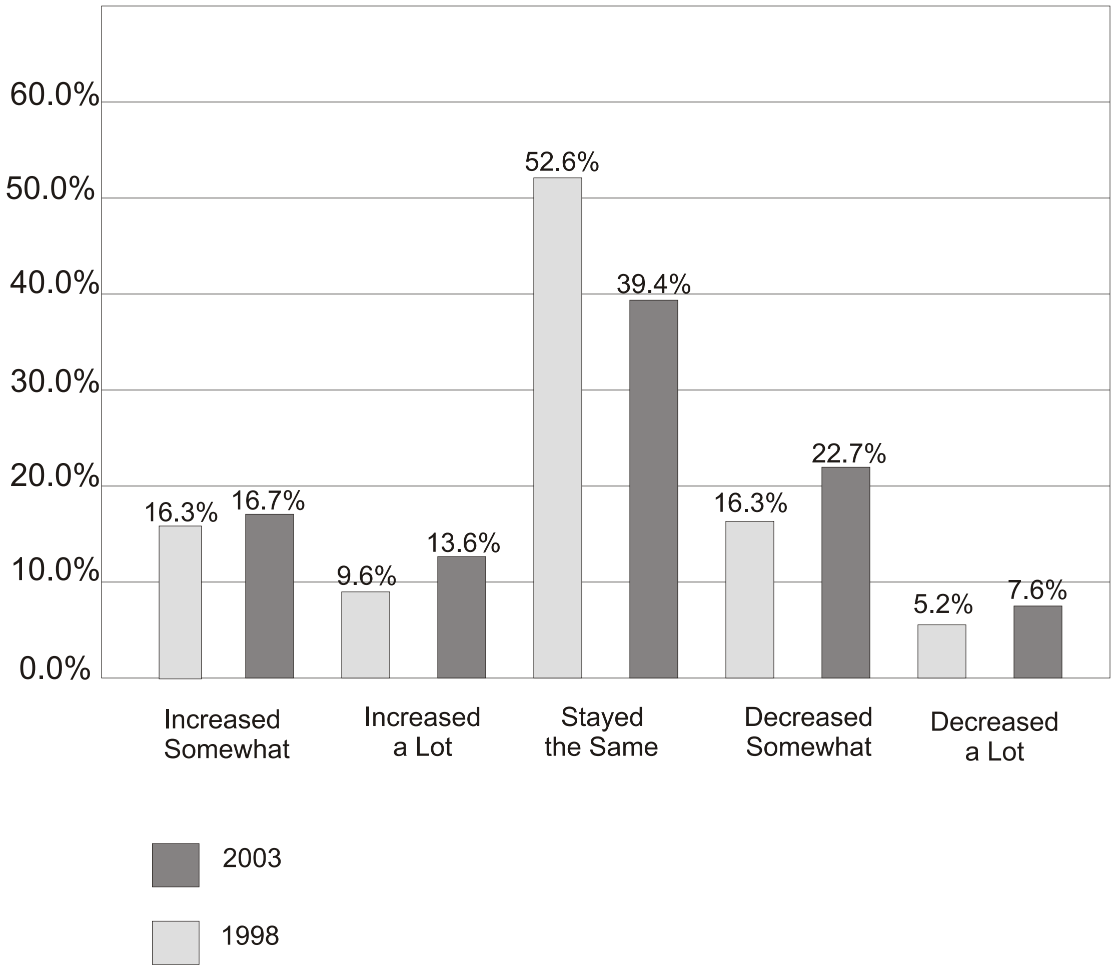
Source: Braund and Burnham, 1984.

Figure III.C-5 Point Hope Subsistence Use Areas: Beluga.



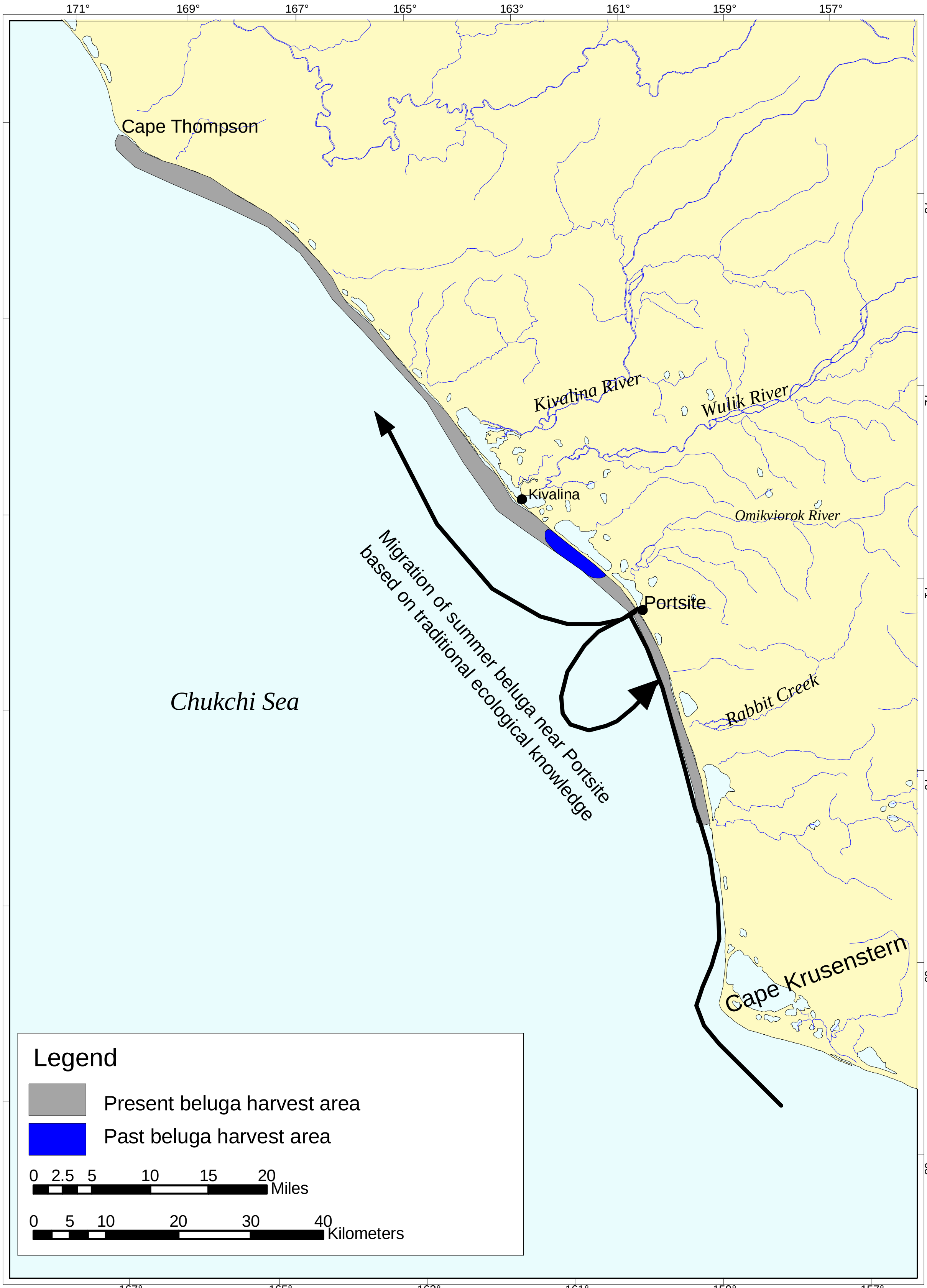
Source: Pedersen, 1977.

Figure III.C-6 Point Hope Annual Subsistence Cycle.



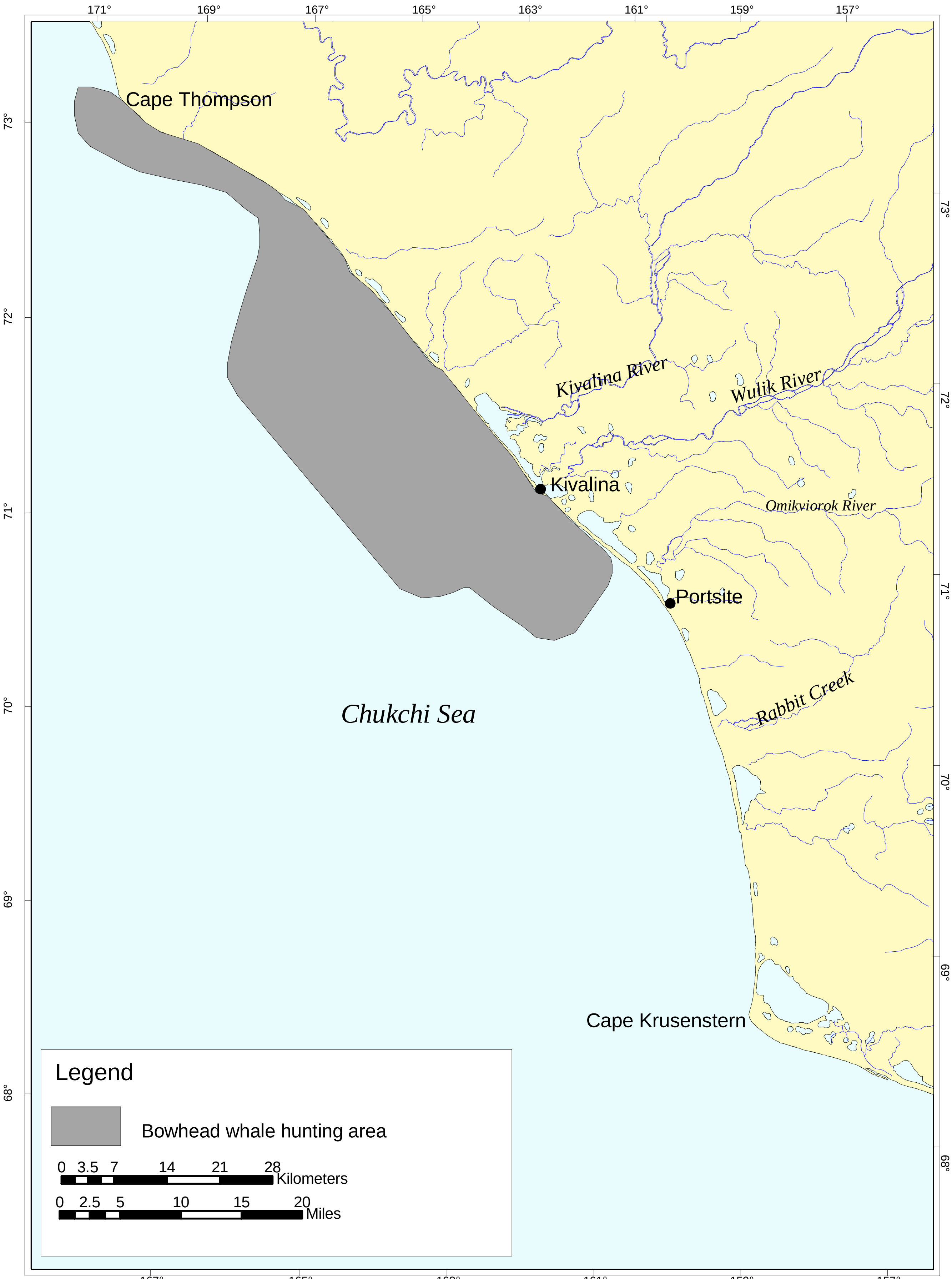
Source: Fuller and George, 1997; North Slope Borough, 2004.

Figure III.C-7 Point Hope: Changes in Subsistence Activity.



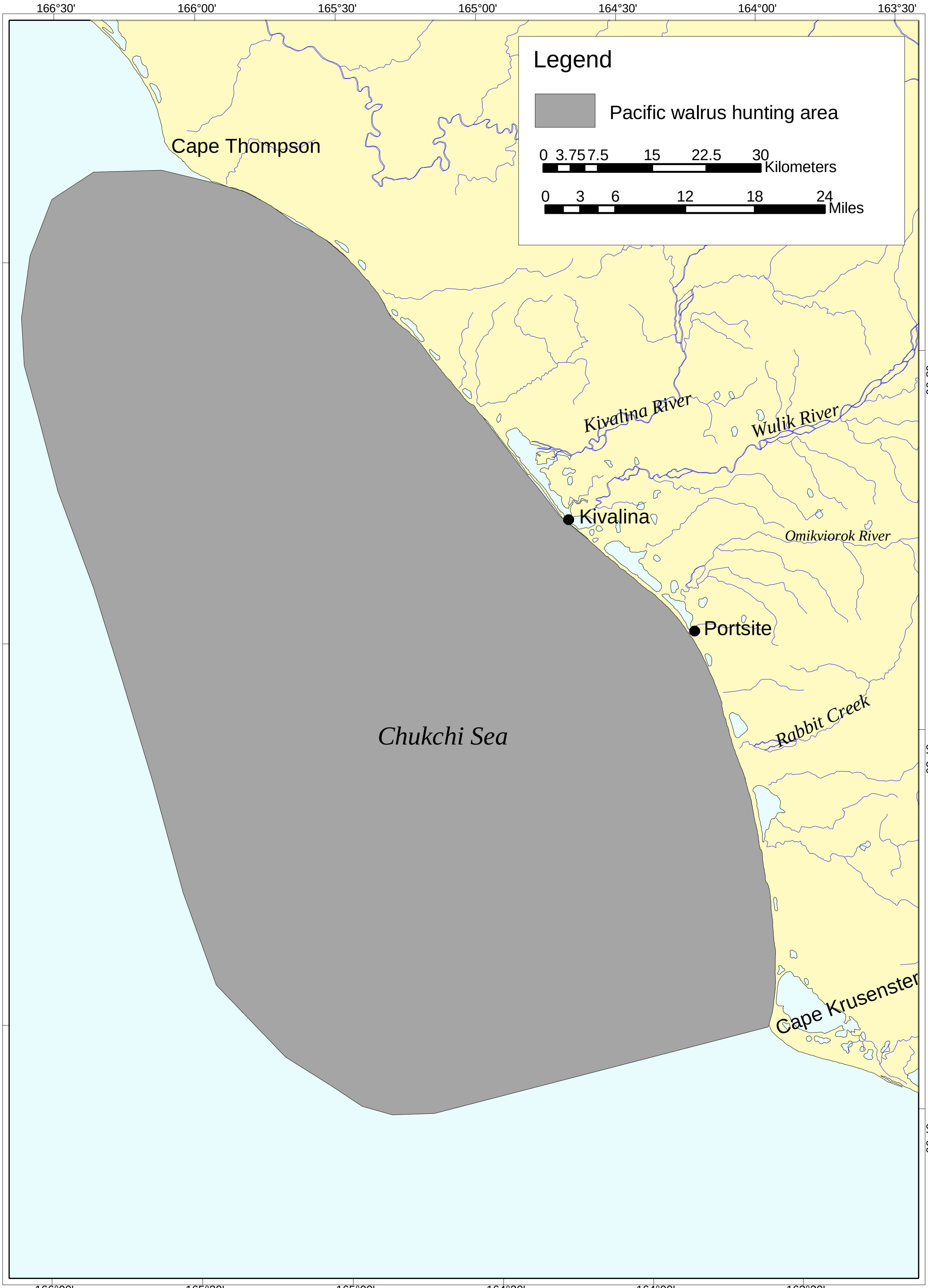
Source: Braund, 2000.

Figure III.C-8 The Past and Present Kivalina Hunting Areas for the Eastern Chukchi Sea (Summer) Stock of Beluga.



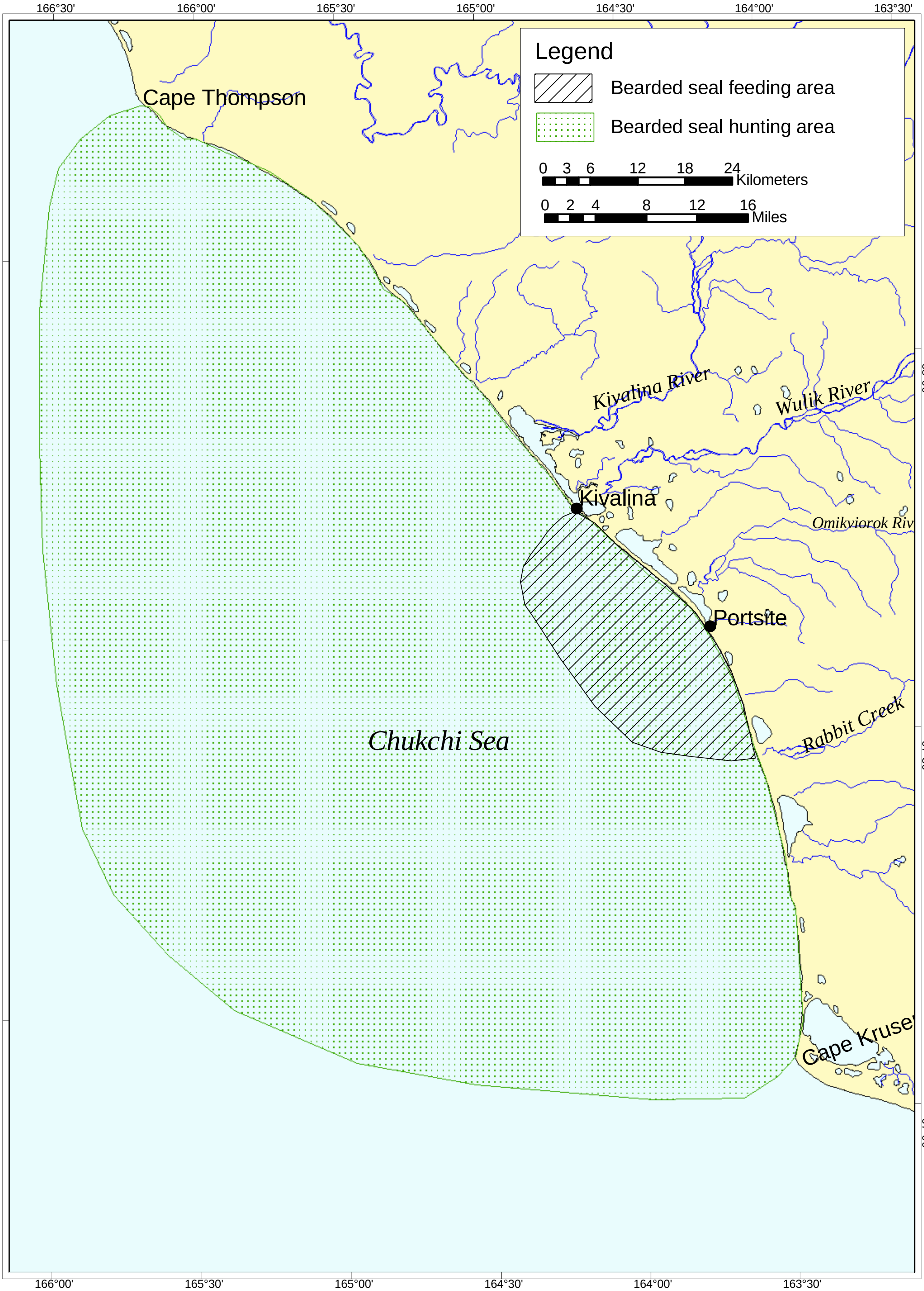
Source: Braund, 2000.

Figure III.C-9 Kivalina Hunting Area for Bowhead Whales.



Source: Braund, 2000.

Figure III.C-10. Kivalina Hunting Area for Pacific Walrus.



Source: Braund, 2000.

Figure III.C-11 Kivalina Hunting and Feeding Area of Bearded Seals.

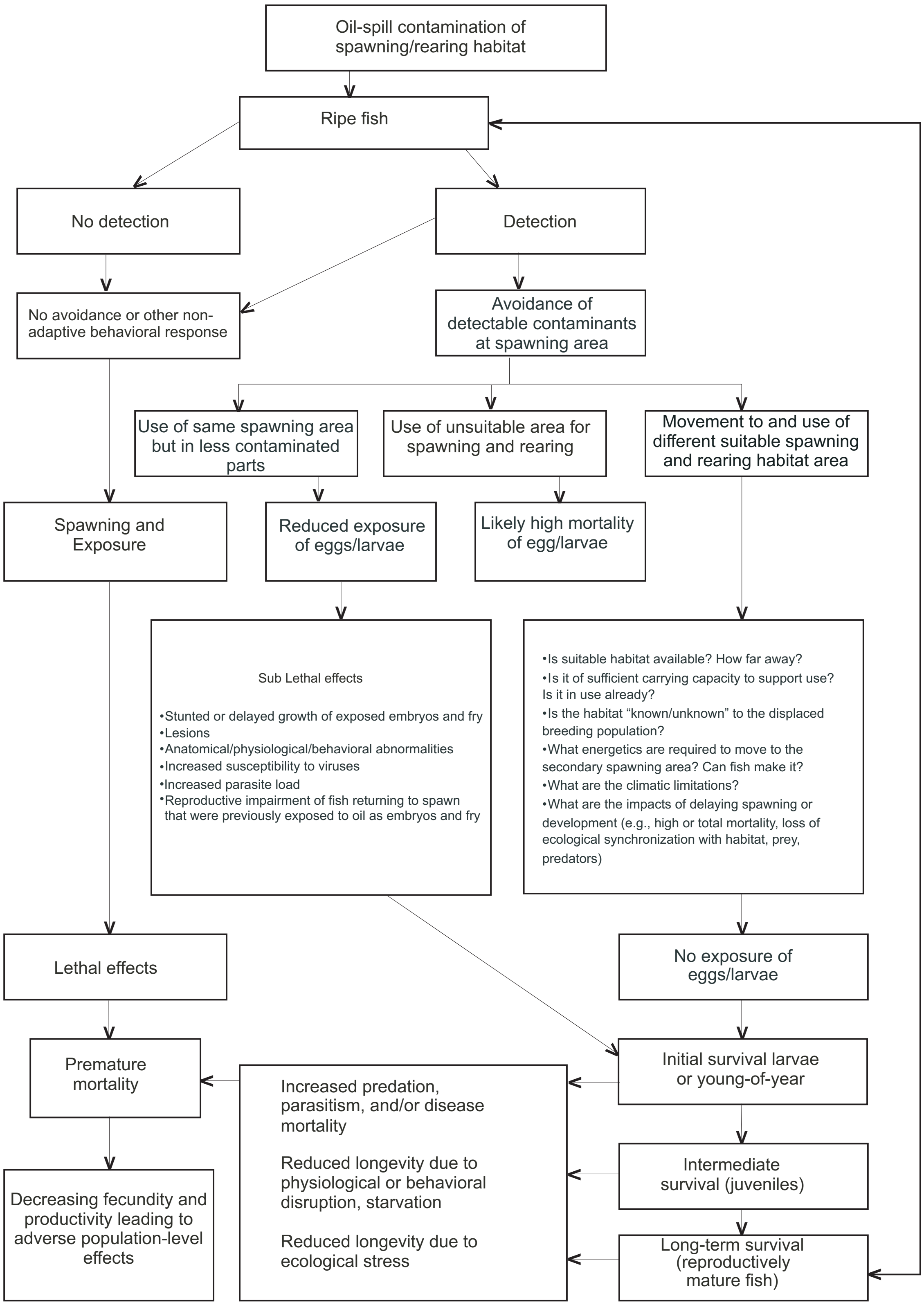
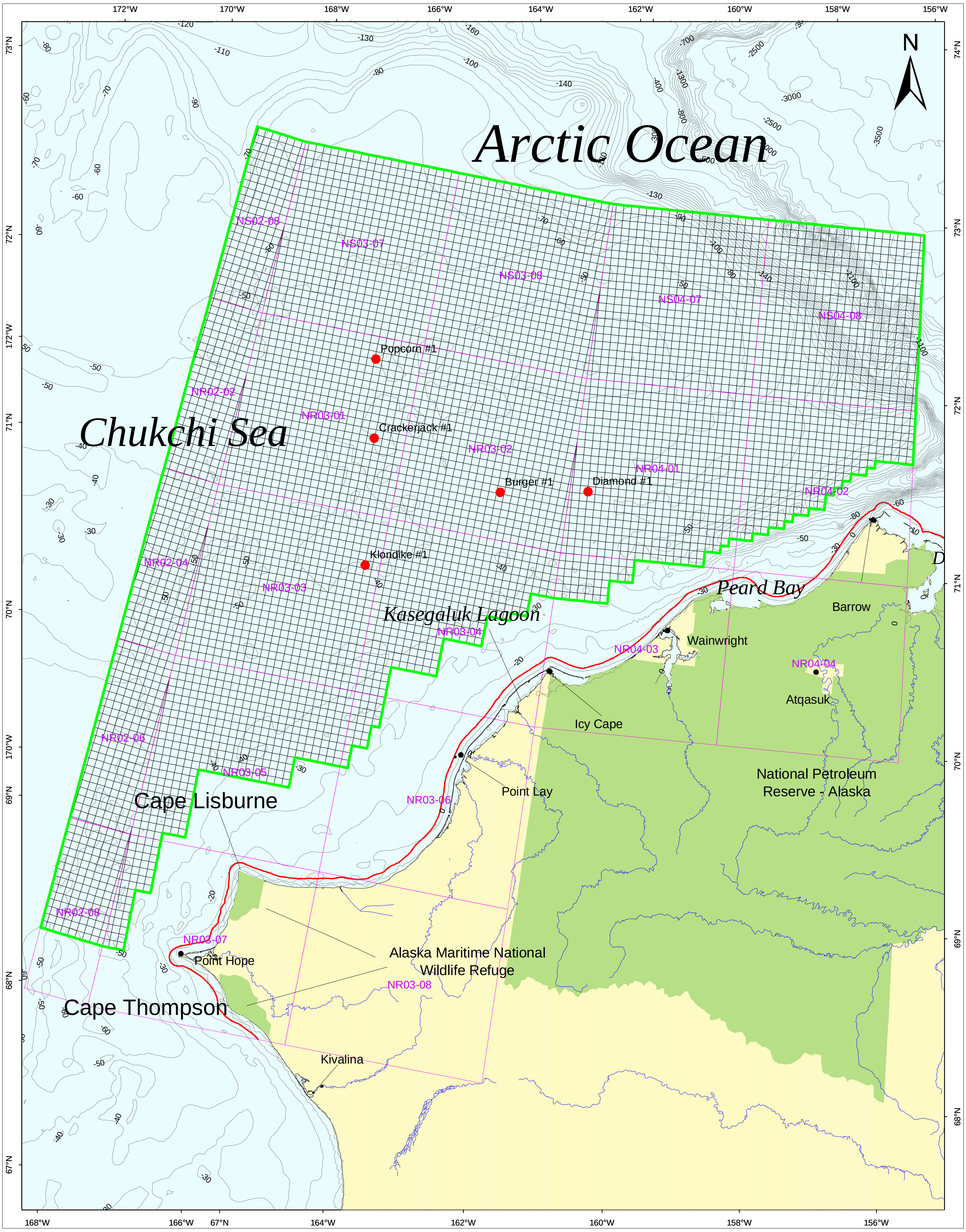
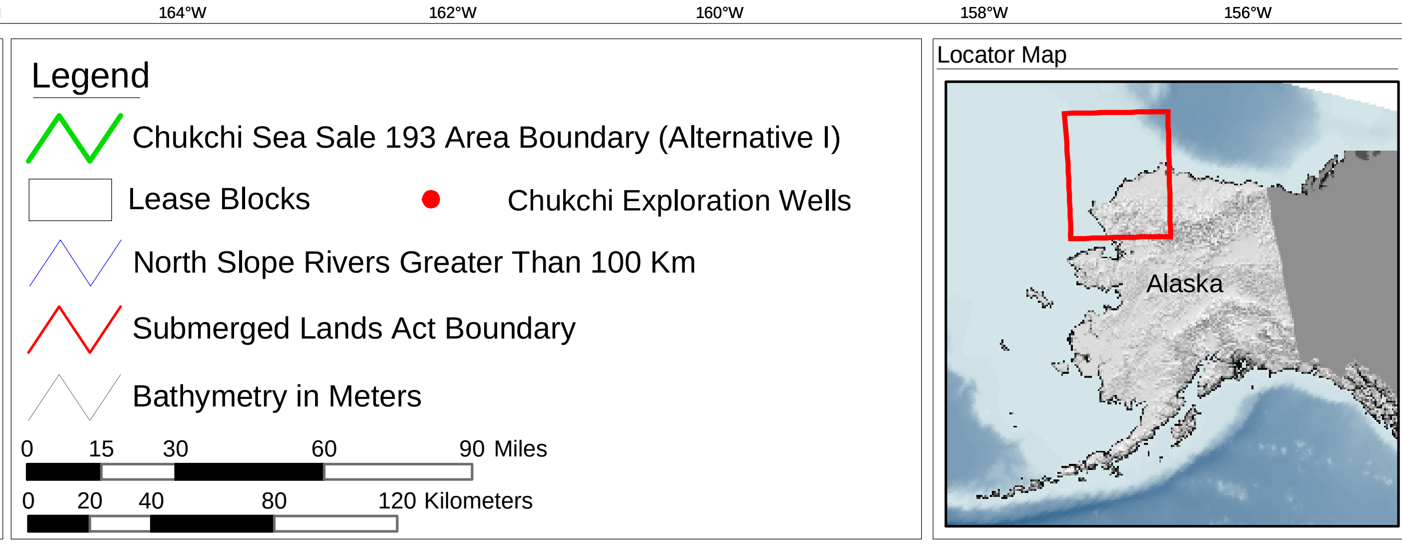
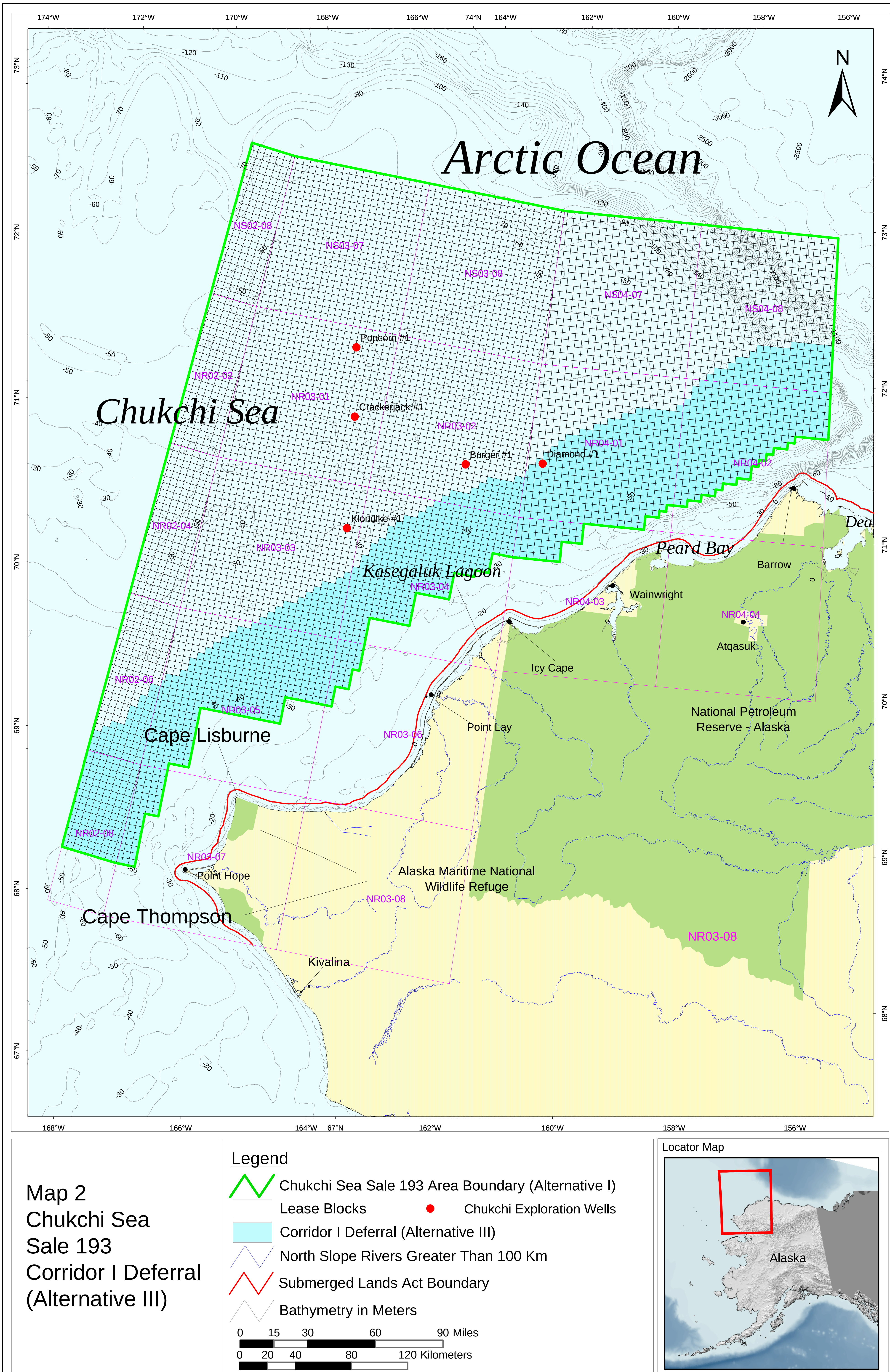


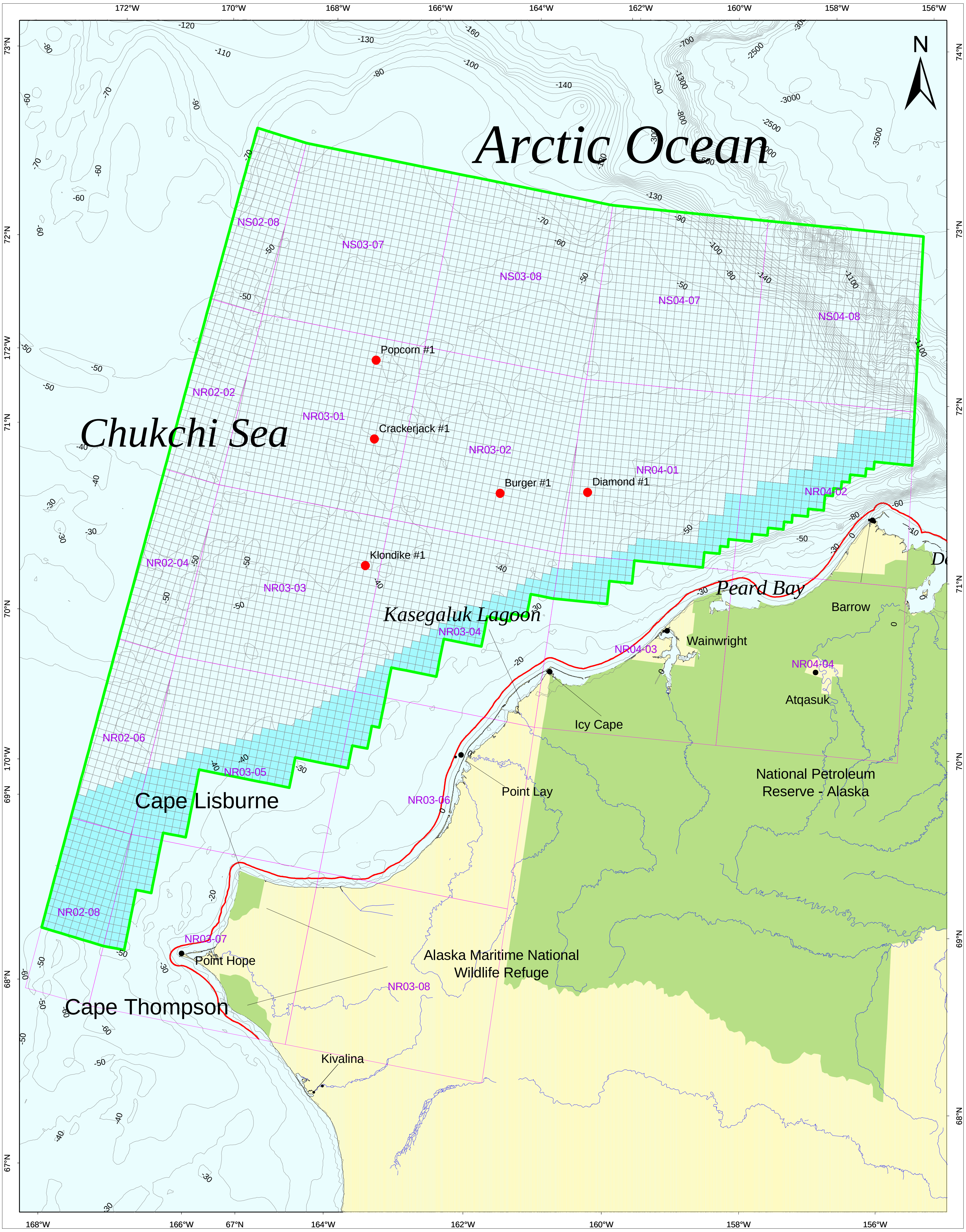
Figure IV.C-1 Oil-Spill Impacts Model for Selected Fishes using Nearshore/Intertidal Substrates as Spawning and/or Rearing Habitats (e.g., pink or chum salmon, Pacific herring, capelin).



Map 1
Program Area
Chukchi Sea
Sale 193
(Alternative I)




Arctic Ocean
Chukchi Sea
N
NS02-08
NS03-07
NS03-08
NS04-07
NS04-08
NR02-02
NR03-01
NR03-02
NR04-01
NR04-02
NR02-04
NR03-03
NR03-04
NR04-03
NR04-04
NR02-06
NR03-05
NR03-06
NR02-08
NR03-07
NR03-08
Popcorn #1
Crackerjack #1
Burger #1
Diamond #1
Klondike #1
Kasegaluk Lagoon
Peard Bay
Barrow
Wainwright
Atqasuk
Icy Cape
Point Lay
National Petroleum Reserve - Alaska
Cape Lisburne
Point Hope
Cape Thompson
Alaska Maritime National Wildlife Refuge
Kivalina
174°W
172°W
170°W
168°W
166°W
164°W
162°W
160°W
158°W
156°W
74°N
73°N
72°N
71°N
70°N
69°N
68°N
67°N
Map 2
Chukchi Sea
Sale 193
Corridor I Deferral
(Alternative III)
Legend
Chukchi Sea Sale 193 Area Boundary (Alternative I)
Lease Blocks
Chukchi Exploration Wells
Corridor I Deferral (Alternative III)
North Slope Rivers Greater Than 100 Km
Submerged Lands Act Boundary
Bathymetry in Meters
0 15 30 60 90 Miles
0 20 40 80 120 Kilometers
Locator Map
Alaska



Map 3
Chukchi Sea
Sale 193
Corridor II Deferral
(Alternative IV)

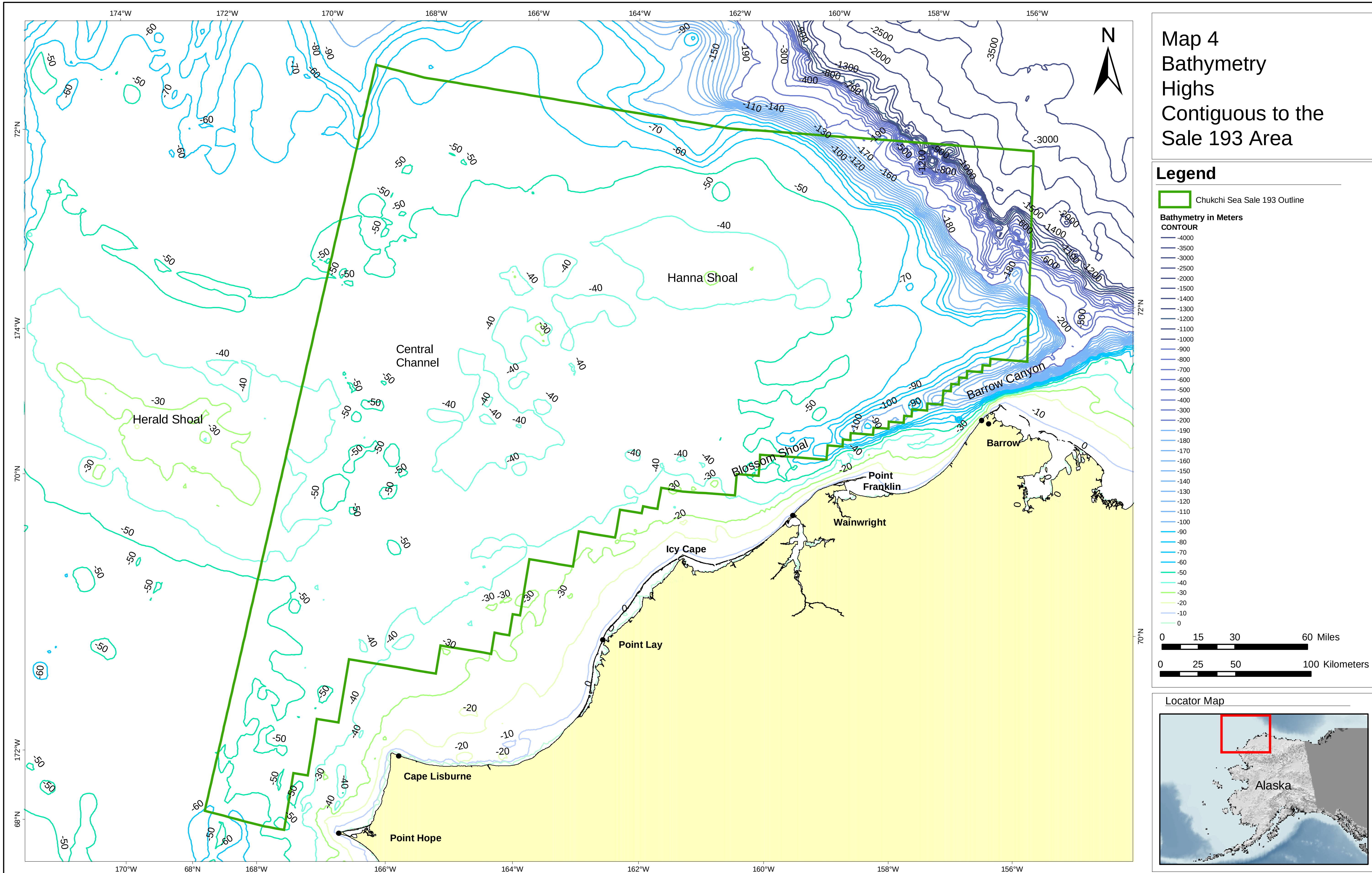
Legend

- Chukchi Sea Sale 193 Area Boundary (Alternative I)
- Lease Blocks
- Chukchi Exploration Wells
- Corridor II Deferral (Alternative IV)
- North Slope Rivers Greater Than 100 Km
- Submerged Lands Act Boundary
- Bathymetry in Meters

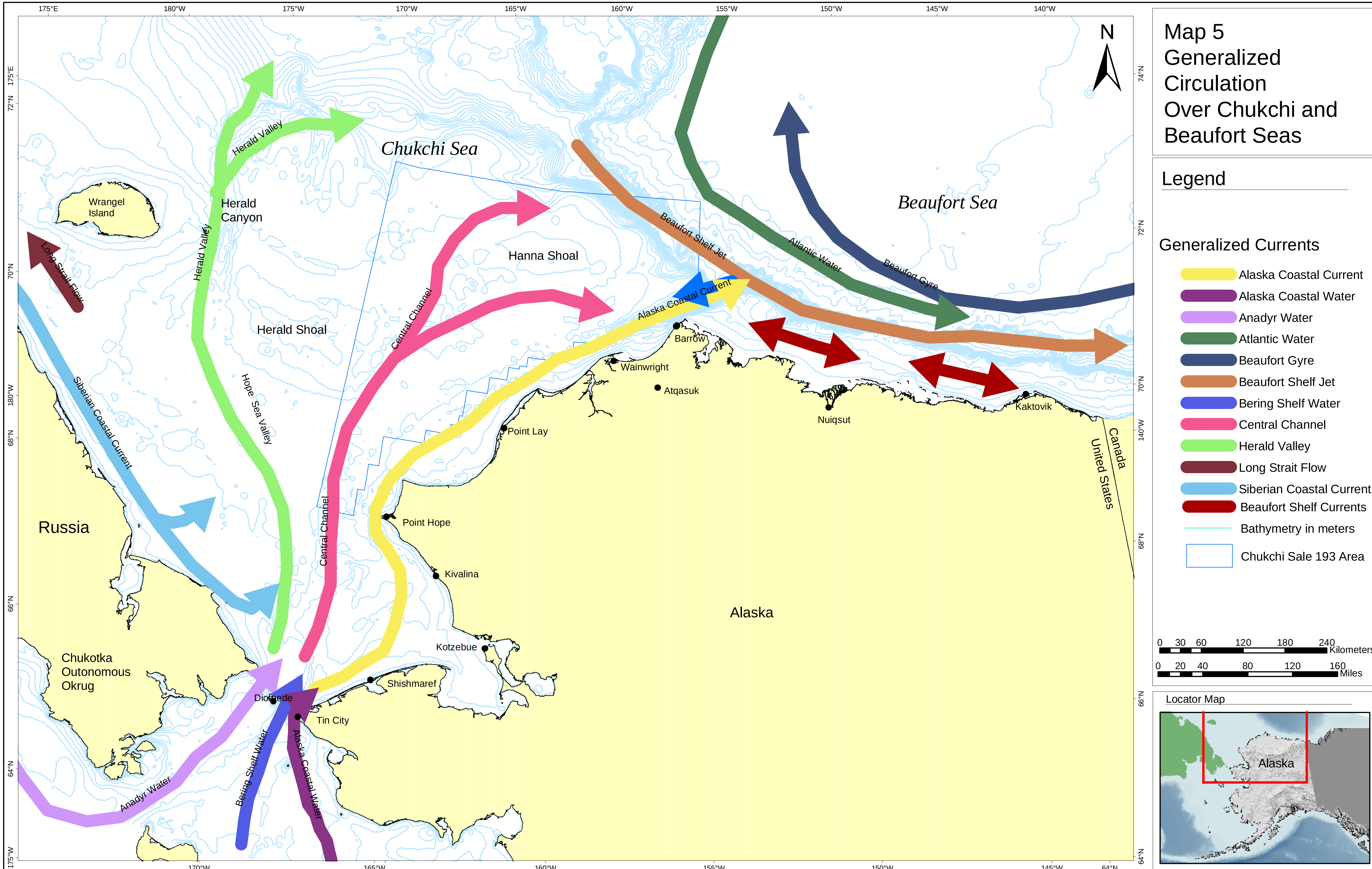
30 15 0 30 60 Miles

40 20 0 40 80 Kilometers

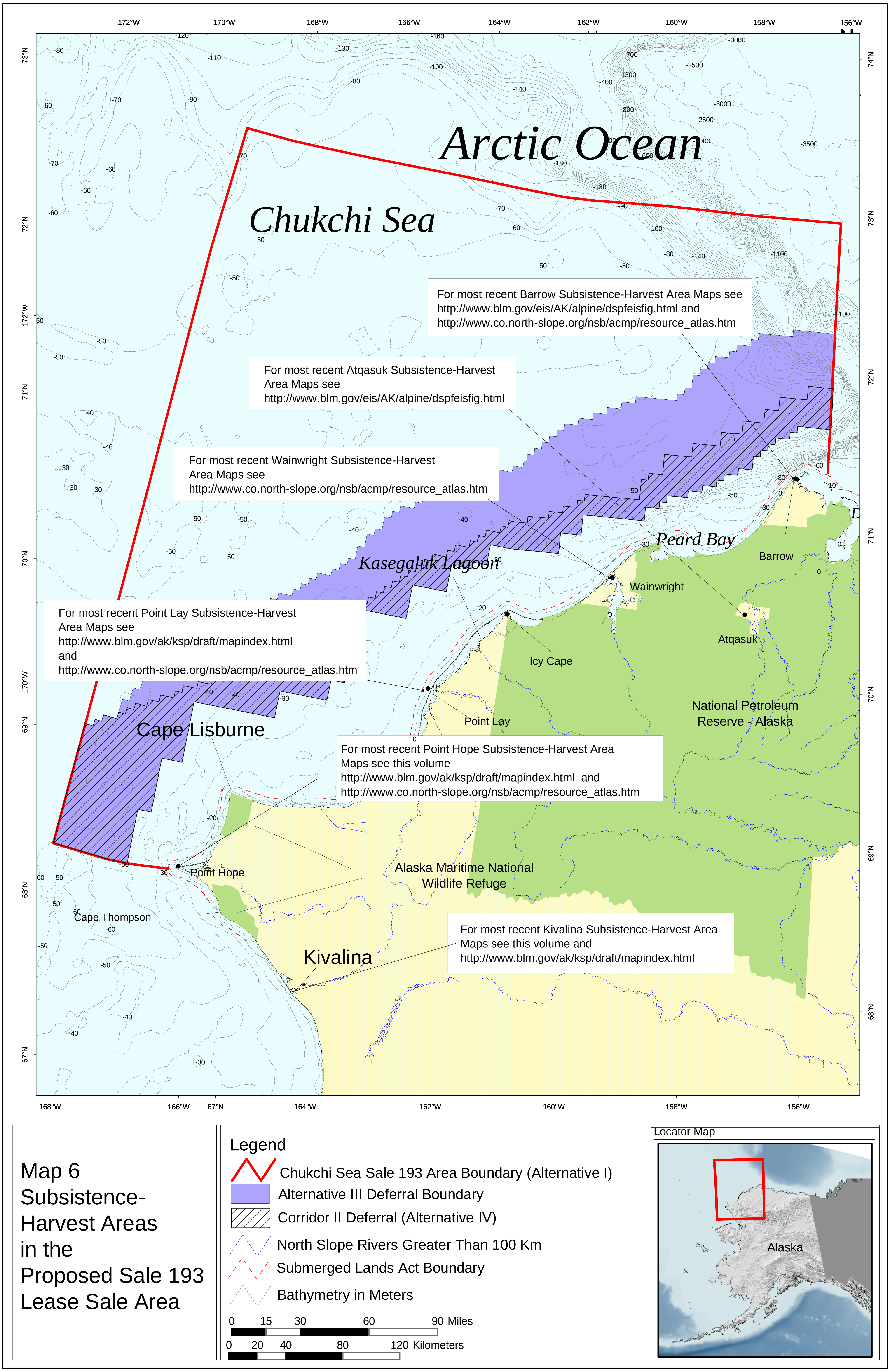
Locator Map



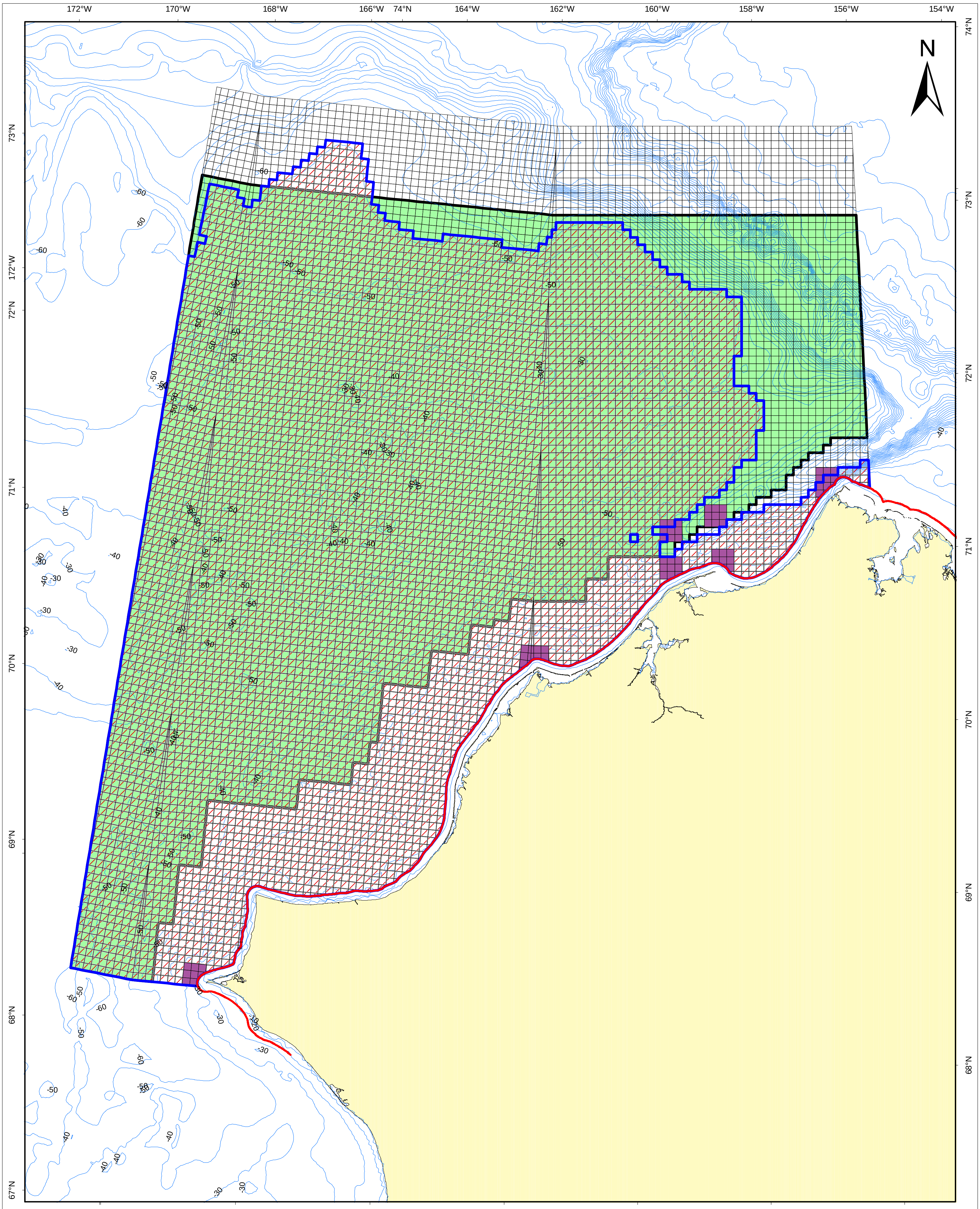
Map 4
Bathymetry Highs Contiguous to the Sale 193 Area
N
Legend
Chukchi Sea Sale 193 Outline
Bathymetry in Meters
CONTOUR
-4000
-3500
-3000
-2500
-2000
-1500
-1400
-1300
-1200
-1100
-1000
-900
-800
-700
-600
-500
-400
-300
-200
-190
-180
-170
-160
-150
-140
-130
-120
-110
-100
-90
-80
-70
-60
-50
-40
-30
-20
-10
0
0 15 30 60 Miles
0 25 50 100 Kilometers
Locator Map
Alaska
Hanna Shoal
Central Channel
Herald Shoal
Barrow Canyon
Blossom Shoal
Barrow
Point Franklin
Wainwright
Icy Cape
Point Lay
Cape Lisburne
Point Hope
174°W
172°W
170°W
168°W
166°W
164°W
162°W
160°W
158°W
156°W
72°N
70°N
68°N



Map 5
Generalized Circulation Over Chukchi and Beaufort Seas
Legend
Generalized Currents
Alaska Coastal Current
Alaska Coastal Water
Anadyr Water
Atlantic Water
Beaufort Gyre
Beaufort Shelf Jet
Bering Shelf Water
Central Channel
Herald Valley
Long Strait Flow
Siberian Coastal Current
Beaufort Shelf Currents
Bathymetry in meters
Chukchi Sale 193 Area
0 30 60 120 180 240 Kilometers
0 20 40 80 120 160 Miles
Locator Map
Alaska
N
Chukchi Sea
Beaufort Sea
Wrangel Island
Herald Canyon
Herald Valley
Herald Shoal
Hanna Shoal
Hope Sea Valley
Central Channel
Long Strait Flow
Siberian Coastal Current
Beaufort Shelf Jet
Atlantic Water
Beaufort Gyre
Alaska Coastal Current
Bering Shelf Water
Alaska Coastal Water
Anadyr Water
Russia
Chukotka Outonomous Okrug
Alaska
Canada
United States
Barrow
Wainwright
Atqasuk
Nuiqsut
Kaktovik
Point Lay
Point Hope
Kivalina
Kotzebue
Shishmaref
Diomede
Tin City
175°E
180°W
175°W
170°W
165°W
160°W
155°W
150°W
145°W
140°W
64°N
66°N
68°N
70°N
72°N
74°N



Map 6
Subsistence-Harvest Areas in the Proposed Sale 193 Lease Sale Area



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Archaeology Blocks and General Location of Shipwrecks in the Sale 193 Area

Legend

- Sale 193 Blocks
- Archaeology Blocks-Historic
  Generalized Shipwreck Locations Based on Reported Vessel Locations. See Table III.C.16
- Archaeology Blocks-Prehistoric Blocks
  In 60 Meters or Less Water Depth
- Submerged Lands Act Boundary (3-mile Limit)
- Sale 193 Lease Blocks Coincident with Archaeology Blocks

0 12.5 25 50 75 100 Miles

0 20 40 80 120 160 Kilometers

Locator Map

APPENDICES

APPENDIX A

INFORMATION,
MODELS AND ASSUMPTIONS
WE USE TO ANALYZE
THE EFFECTS OF AN OIL SPILL
IN THIS EIS

APPENDIX A

A.1 OIL SPILL

INFORMATION, MODELS, AND ASSUMPTIONS

AND

A.2 SUPPORTING TABLES

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Appendix A.1: The Information, Models, and Assumptions We Use to Analyze the Effects of Oil Spills in this EIS.

We analyze crude and refined oil spills and their relative impact to environmental, economic, and sociocultural resource areas and the coastline that could result from offshore oil development in the Chukchi Sea Sale 193 area. Estimating oil-spill occurrence or oil-spill contact is an exercise in probability. Uncertainty exists regarding whether exploration or development will occur at all and if it does, the location, number, and size of oil spill(s) and the wind, ice and current conditions at the time of a spill(s). Although some of the uncertainty reflects incomplete or imperfect data, a considerable amount of uncertainty exists simply because it is difficult to predict events 15-40 years into the future.

We make a set of assumptions to analyze the effects of oil spills in a consistent manner. To judge the effect of a large oil spill, we estimate information regarding the type of oil, the general source of an oil spill, the location and size of a spill, the chemistry of the oil, how the oil will weather, how long it will remain, and where it will go. For small spills, we estimate the type of oil and number and size of a spill. We describe the rationale for these assumptions in the following subsections. The rationale for these assumptions is a mixture of project-specific information, modeling results, statistical analysis, and professional judgment. Based on these assumptions, we assume one large spill occurs and then analyze its effects. After we analyze the effects of a large oil spill, we consider the chance of one or more large oil spills ever occurring over the production life of the project. An analysis is done for small spills considering the number and volume of small spills. We assume small spills will occur over the life of the project.

A. Estimates of the Source, Type, and Size of Oil Spills.

Table A.1-1 shows the general size categories, source of a spill(s), type of oil, size of spill(s) in barrels, and the receiving environment we assume in our analysis of the effects of oil spills in this Environmental Impact Statement (EIS) for the Alternative I, the Proposed Action; Alternative III, Corridor I; and Alternative IV, Corridor II. The sources of spills are divided generically into platform or pipeline. The type of crude oil used in this analysis is Alpine composite crude. We divide spills into two general size categories: small spills and large spills. Small spills are those less than (<)1,000 barrels (bbl). Large spills are greater than or equal to (≥)1,000 bbl. Table A.1-1 shows the EIS section where we analyze the effects of large and small spill(s).

A.1. Source and Spill-Size Assumptions. The spill-size assumptions we use for large spills are based on the reported spills from production in the Gulf of Mexico and Pacific outer continental shelf (OCS) and what we believe is likely to occur. We estimate the likely large spill size based on the median spill size in the OCS from 1985-1999. We use Gulf of Mexico and Pacific spill sizes because until recently, no large spills had occurred on the Alaska North Slope. Small spills are based on the historic spill sizes from production on the onshore Alaska North Slope from 1989-2000. Stakeholders, including the North Slope Borough Science Advisory Committee, have stated that they would like spill rates from the Alaska North Slope used in arctic Alaska OCS EIS'. The assumption is that Alaska North Slope spills occur in more similar environments to the offshore Beaufort and Chukchi seas than the Gulf of Mexico and Pacific OCS.

A.1.a. Source and Type of Oil Spills. The source of large oil spills is generalized into two general categories: platforms and pipelines. The source is considered the place where large oil spills could originate from. Large platform spills include spills from wells in addition to any storage tanks located on the platform. Large pipeline spills include spills from the riser and offshore pipeline to the shore. Large platform spills are assumed to be either crude oil or diesel oil from storage tanks. Large pipeline spills are assumed to be crude oil. From oil samples recovered from wells, the Chukchi Sea seems to be characterized by relatively low sulfur (<18%), high-gravity (≥35^{o}) American Petroleum Institute (API) crude oils (Sherwood et al., 1998:129). We looked for Alaska North Slope crude oils with similar API values and that had laboratory weathering data. Alpine composite crude oil has an API of 35^{o} and was chosen to be representative for the oil-weathering simulations.

A.1.b. Historical Crude Oil Spills Greater Than or Equal to 1,000 Barrels on the Outer Continental Shelf. The Gulf of Mexico and Pacific OCS data show that the most likely location of a large spill is from a pipeline or a platform. The median size of a crude oil spill ≥1,000 bbl from a pipeline from 1985-1999 on the OCS is 4,600 bbl, and the average is 6,700 bbl (Anderson and LaBelle, 2000). The median spill size for a platform on the OCS over the entire record from 1964-1999 based on trend analysis is 1,500 bbl, and the average is 3,300 bbl (Anderson and LaBelle, 2000). For purposes of analysis, we use the median spill size as the likely large spill size.

A.1.c. Historical Crude Oil Spills from Blowouts on the Outer Continental Shelf and Alaska North Slope. We consider blowouts to be unlikely events. Blowout events often are equated with catastrophic spills; however, in recent years very few blowout events have resulted in spilled oil, and the volumes spilled often are small. All five of the blowout events ≥1,000 bbl in the OCS database occurred between 1964 and 1970 (Table A.1-2). Following the Santa Barbara blowout in 1969, amendments to the OCS Lands Act and implementing regulations significantly strengthened safety and pollution-prevention requirements for offshore activities. Well-control training, redundant pollution-prevention equipment, and subsurface safety devices are among the provisions that were adopted in the regulatory program.

From 1971-2005, 276 exploration and development blowouts occurred, on the OCS while drilling approximately 34,000 wells and producing 15 billion barrels (Bbbl) of oil. From 1971-2005, 33 of those 276 blowouts resulted in oil spills of crude or condensate with the amount of oil spilled ranging from <1 bbl to 350 bbl. The total volume spilled from those 33 blowouts is approximately 1,600 bbl. The volume spilled from blowouts was approximately 0.0000001% of the volume produced. There were no spills ≥1,000 bbl from blowouts in the last 35 years on the OCS. Table A.1-3 shows the U.S. Gulf of Mexico OCS blowout frequencies as reported by Holland (1997). These frequencies range from 5.9×10^{-3} blowouts per well drilled for exploratory drilling to 5×10^{-5} blowouts per well for production.

The blowout record for the Alaska North Slope remains the same as previously reported in USDOI, MMS (2003) and is summarized. Of the 10 blowouts, 9 were gas and 1 was oil. The oil blowout in 1950 resulted from drilling practices that would not be relevant today. A third study confirmed that no crude oil spills ≥100 bbl from blowouts occurred from 1985-1999 (Hart Crowser, Inc., 2000). Scandpower (2001) used statistical blowout frequencies modified to reflect specific field conditions and operative systems at Northstar. This report concludes that the blowout frequency for drilling the oil-bearing zone is 1.5×10^{-5} per well drilled. This compares to a statistical blowout frequency of 7.4×10^{-5} per well (for an average development well). This same report estimates that the frequency of oil quantities per well drilled for Northstar for a spill greater than (>) 130,000 bbl is 9.4×10^{-7} per well.

A.1.d. Historical Exploration Spills on the Beaufort and Chukchi Outer Continental Shelf. The MMS estimates the chance of a large (≥1,000 bbl) oil spill from exploratory activities to be very low. On the Beaufort and Chukchi OCS, the oil industry drilled 35 exploratory wells. During the time of this drilling, industry has had 35 small spills totaling 26.7 bbl or 1,120 gallons (gal). Of the 26.7 bbl spilled, approximately 24 bbl were recovered or cleaned up. Table A.1-4 shows the exploration spills on the Beaufort and Chukchi OCS. Small (25 bbl or less) operational spills of diesel, refined fuel, or crude oil may occur. The MMS estimates this could be a typical scenario during exploratory drilling in the Beaufort and Chukchi seas. These small spills often are onto containment on platforms, facilities or gravel islands or onto ice and may be cleaned up.

No exploratory drilling blowouts have occurred on the Alaskan OCS. One exploration drilling blowout of gas has occurred on the Canadian Beaufort. Up to 1990, 85 exploratory wells were drilled in the Canadian Beaufort Sea and one shallow gas blowout has occurred. A second incident was not included at the Amaluligak wellsite with the Molikpaq drill platform. This resulted in a gas flow through the diverter, with some leakage around the flange. The incident does not qualify as a blowout by the definition used in other databases and, therefore, was excluded (Devon Canada Corporation, 2004). From 1971-2005, industry has drilled approximately 172 exploration wells in the Pacific OCS, 51 in the Atlantic OCS, 13,142 in the Gulf of Mexico OCS, and 98 in the Alaska OCS, for a total of 13,463 exploration wells. From 1971-2005, there were 66 blowouts during exploration drilling. Of those 66 blowouts, four resulted in oil spills of 200, 100, 11 and 0.8 bbl, respectively. No large spills (≥1,000 bbl) have occurred from 1971-2005 during exploration drilling. Therefore, approximately 13,000 wells have been drilled, and four spills resulted in crude reaching the environment from blowouts during exploration drilling.

B. Behavior and Fate of Crude Oils.

There are scientific laboratory data and field information from accidental and research oil spills about the behavior and fate of crude oil. We discuss the background information on the fate and behavior of oil in arctic environments and its behavior and persistence properties along various types of shorelines. We also make several assumptions about oil weathering to perform modeling simulations of oil weathering specific to the size spills we estimate for analysis purposes.

B.1. Generalized Processes Affecting the Fate and Behavior of Oil. Several processes alter the chemical and physical characteristics and toxicity of spilled oil. Collectively, these processes are referred to as weathering or aging of the oil and, along with the physical oceanography and meteorology, the weathering processes determine the oil's fate. The major oil-weathering processes are spreading, evaporation, dispersion, dissolution, emulsification, microbial degradation, photochemical oxidation, and sedimentation to the seafloor or stranding on the shoreline (Payne et al., 1987; Boehm, 1987; Lehr, 2001) (Figs. A.1-1 and A.1-2).

The physical properties of a crude oil spill, the environment it occurs in, and the source and rate of the spill will affect how an oil spill behaves and weathers. Tables A.1-5, A.1-6 and A.1-7 show the physical properties of Alpine composite crude oil and Figure A.1-3 shows the gas chromatogram.

The environment in which a spill occurs, such as the water surface or subsurface, spring ice-overflow, summer open-water, winter under ice, or winter broken ice, will affect how the spill behaves. In ice-covered waters, many of the same weathering processes are in effect; however, the sea ice changes the rates and relative importance of these processes (Payne, McNabb, and Clayton, 1991).

After a spill occurs, spreading and advection begin. The slick spreads horizontally in an elongated pattern oriented in the direction of wind and currents and nonuniformly into thin sheens (0.5-10 micrometers [µm]) and thick patches (0.1-10 millimeters[mm]) (Elliott, 1986; Elliott, Hurford, and Penn, 1986; Galt et al., 1991). In the cooler arctic waters, oil spills spread less and remain thicker than in temperate waters because of differences in the viscosity of oil due to temperature. This property will reduce spreading. An oil spill in broken ice would spread less and would spread between icefloes into any gaps greater than about 8-15 centimeters (cm) (Free, Cox, and Shultz, 1982).

The presence of broken ice tends to slow the rate of spreading (S.L. Ross Environmental Research Ltd. and D.F. Dickens Assocs. Ltd., 1987). Oil spreading and floe motion were studied to determine how floe motion, ice concentration, slush concentration, and oil types affect spreading in ice. Spreading rates were lowered as ice concentrations increased; but for ice concentrations <20-30%, there was very little effect. Slush ice rapidly decreased spreading. If the ice-cover motion increased, then spreading rates increased, especially with slush ice present (Gjosteen and Loset, 2004). Oil spilled beneath a wind-agitated field of pancake ice would be pumped up onto the surface of the ice or, if currents are slow enough, bound up in or below the ice (Payne et al., 1987). Once oil is encapsulated in ice, it has the potential to move distances from the spill site with the moving ice.

Evaporation results in a preferential loss of the lighter, more volatile hydrocarbons, increasing density and viscosity and reducing vapor pressure and toxicity (Mackay, 1985). Evaporation of volatile components accounts for 30-40% of crude loss, with approximately 25% occurring in the first 24 hours (Fingas, Duval, and Stevenson, 1979; National Research Council, 1985). The initial evaporation rate increases with increasing wind speeds, temperatures, and sea state. Evaporative processes occur on spills in ice-covered waters, although at a lower rate (Jordan and Payne, 1980). Fuel oils (diesel) evaporate more rapidly than crude, on the order of 13% within 40 hours at 23 °Celsius (73 °Fahrenheit); a larger overall percentage of diesel eventually will evaporate. Evaporation decreases in the presence of broken ice and stops if the oil is under or encapsulated in the ice (Payne et al., 1987). The lower the temperature, the less crude oil evaporates. Both Prudhoe Bay and Endicott crudes have experimentally followed this pattern (Fingas, 1996). Oil between or on icefloes is subject to normal evaporation. Oil that is frozen into the underside of ice is unlikely to undergo any evaporation until its release in spring. In spring as the ice sheet deteriorates, the encapsulated oil will rise to the surface through brine channels in the ice. As oil is released to the surface, evaporation will occur.

Dispersion of oil spills occurs from wind, waves, currents, or ice. Dispersion is an important breakup process that results in the transport of small oil particles (0.5 µm-several mm) or oil-in-water emulsions into the water column (Jordan and Payne, 1980; National Research Council, 1985). Droplets <0.5 mm or less rise slowly enough to remain dispersed in the water column (Payne and McNabb, 1985). The dispersion rate is directly influenced by sea state; the higher the sea state and breaking waves, the more rapid the dispersion rate (Mackay, 1985). The presence of broken ice promotes dispersion (Payne et al., 1987). Any waves within the ice pack tend to pump oil onto the ice. Some additional oil dispersion occurs in dense, broken ice through floe-grinding action. More viscous and/or weathered crudes may adhere to porous icefloes, essentially concentrating oil within the floe field and limiting the oil dispersion.

Dissolution results in the loss of soluble, low-molecular-weight aromatics such as benzene, toluene, and xylenes (National Research Council, 1985). low-molecular weight aromatics, which are acutely toxic, rapidly dissolve into the water column. Dissolution, however, is very slow compared with evaporation; most volatiles usually evaporate rather than dissolve. Dissolved-hydrocarbon concentrations underneath a slick, therefore, tend to remain <1 part per million (Malins and Hodgins, 1981). Dissolved-hydrocarbon concentration can increase due to the promotion of dispersion by broken ice (Payne et al., 1987).

Emulsified oil results from oil incorporating water droplets in the oil phase and generally is referred to as mousse (Mackay, 1982). The measurable increases in viscosity and specific gravity observed for mousse change its behavior, including spreading, dispersion, evaporation, and dissolution (Payne and Jordan, 1985). The formation of mousse slows the subsequent weathering of oil. The presence of slush ice and turbulence promotes oil-in-water emulsions (Payne et al., 1987).

Most of the oil droplets suspended in the water column eventually will be degraded by bacteria in the water column or deposited on the seafloor. The rate of sedimentation depends on the suspended load of the water, the water depth, turbulence, oil density, and incorporation into zooplankton fecal pellets.

Subsurface blowouts or gathering-pipeline spills disperse small oil droplets and entrained gas into the water column. With sufficient gas, turbulence, and the necessary precursors in the oils, mousse forms by the time the oil reaches the surface (Payne, 1982; Thomas and McDonagh, 1991). For subsurface spills, oil rises rapidly to the water surface to form a slick. Droplets <50 microns in size, generally 1% of the blowout volume, could be carried several kilometers downcurrent before reaching the water surface (Environmental Sciences Limited, 1982). Blowout simulations show that convective cells set up by the rising oil and gas plume result in concentric rings of waves around the central plume. Surface currents within the ring should move outward, and surface currents outside the ring should move inward, resulting in a natural containment of some oil.

The subsurface release of oil droplets increases slightly the dissolution of oil, but the rapid rise of most oil to the surface suggests that the increase in dissolution—as a percentage of total spill volume—is fairly small. The resulting oil concentration, however, could be substantial, particularly for dispersed oil in subsurface plumes.

An oil spill that moved under landfast ice would follow this sequence:

(1) The oil will rise to the under-ice surface and spread laterally, accumulating in the under-ice cavities (Glaeser and Vance 1971; NORCOR, 1975; Martin, 1979; Comfort et al., 1983).
(2) For spills that occur when the ice sheet is still growing, the pooled oil will be encapsulated in the growing ice sheet (NORCOR, 1975; Keevil and Ramseier, 1975; Buist and Dickens, 1983; Comfort et al., 1983). In the spring as the ice begins to deteriorate, the encapsulated oil will rise to the surface through brine channels in the ice (NORCOR, 1975; Purves, 1978; Martin, 1979; Kisil, 1981; Dickins and Buist, 1981; Comfort et al., 1983).

The spread of oil under the landfast ice may be affected by the presence of currents, if the magnitude of those currents is large enough. A field study near Cape Parry in the Northwest Territories reported that currents up to 10 cm per second (cm/sec) were present. This current was insufficient to strip oil from under the ice sheet after the oil had ceased to spread (NORCOR, 1975). Laboratory tests have shown that currents in excess of 15-25 cm/sec are required to strip oil from under-ice depressions (Cammaert, 1980; Cox et al., 1980). Current speeds in the nearshore Beaufort generally are <10 cm/sec during winter (Weingartner and Okkonen 2001). The area of contamination for oil under ice could increase if the ice were to move. Because the nearshore Beaufort and the very nearshore Chukchi is in the landfast ice area, the spread of oil due to ice movement would not be anticipated until spring breakup. Lately, breakout events of landfast ice, as described in Section III.A.4a and 4f, have occurred prior to spring.

Prince et al. (2003) discuss three northern spills and demonstrate that photo-oxidation and biodegradation play an important role in the long-term weathering of crude oils. Photo-oxidation and biodegradation would continue to weather the oil remaining.

Alpine composite crude oil will emulsify readily to form stable emulsions. Emulsification of some crude oils is increased in the presence of ice. With floe grinding, it is likely that Alpine crude may form mousse within a few hours, an order of magnitude more rapidly than in open water.

B.2. Oil-Spill Persistence. S.L. Ross et al. (2003) completed a study on the persistence of oil spilled on the surface of the water. The following definition of oil-slick persistence was used for this study: An oil slick is considered to be persisting on the sea surface when it can be observed to be a coherent slick, or perceptible segments of a coherent slick, by normal methods of slick detection, such as aerial surveillance.

They surveyed reports of oil-spill incidents throughout the world was completed. Major oil spill incidents from the *Torrey Canyon* in 1967 to the *Erika* in 1999/2000 have generated an immense amount of literature, but the information on oil-slick persistence (the critical parameter to this study) has seldom been detailed. The number of useable incidents was reduced, from an initial 154 to 84, by first removing the spills that occurred in inland or restricted waters (ports and harbors) then reduced further to 20 by applying other criteria (information availability, crude oil only). Of the final incident list, 13 were releases from tankers and 7 were oil-well blowouts. In addition to these, a database of 12 experimental spills was compiled, for which good persistence data existed. These experimental spills all involved much smaller oil volumes. Correlation analyses were carried out on three data sets and, although they by no means gave definitive results because of the small size of the sets, they did indicate the relative importance of different variables and their dependencies for each of the three data sets. Regression analysis with the three data sets showed that:

1. Wind speed did not have a statistically significant effect on persistence (as defined in this study).
2. Countermeasures effort did not have a statistically significant effect on persistence.
3. The following regressions of historic spill data should be used by MMS to estimate the mean persistence of slicks on open water for modeling purposes:

For spills $\geq$ 1,000 bbl in size:
$PD_{\geq 1000bbl} = 0.0001S - 1.32T + 33.1$
Where,
PD = Spill persistence in days
S = Spill size in bbl
T = Water temperature in degrees Celsius

How long an oil spill persists on water based on these equations ranges from about 29 days in summer to 34 days in winter for a 1,500- or 4,600-bbl spill. These equations are based on limited spills of this size, as most of the spills in the database are either a magnitude of order larger or smaller and these estimates should be used with caution. Refinement of quantitative estimates of oil-slick persistence will depend on collecting further information on spills and their lifetime as slicks on the water. Currently, this information is not routinely collected during the oil-spill response.

B.3. Shoreline Type. The shoreline habitats and the estimation of the behavior and persistence of oil on intertidal habitats is based on an understanding of the dynamics of the coastal environments, not just the substrate type and grain size. The sensitivity of a particular intertidal habitat is an integration of the following factors: (1) shoreline type (substrate, grain size, tidal elevation, origin); (2) exposure to wave and tidal energy; (3) biological productivity and sensitivity; and (4) ease of cleanup. All of these factors are used to determine the relative sensitivity of intertidal habitats. Key to the sensitivity ranking is an understanding of the relationships between physical processes; substrate; shoreline type; product type; fate and effect; and sediment-transport patterns. The intensity of energy expended on a shoreline by wave action, tidal currents, and river currents directly affects the persistence of stranded oil. The need for shoreline-cleanup activities is determined, in part, by the slowness of natural processes in removal of oil stranded on the shoreline. These concepts have been used in the development of the ESI, which ranks shoreline environments as to their relative sensitivity to oil spills, potential biological injury, and ease of cleanup. Generally speaking, areas exposed to high levels of physical energy, such as wave action and tidal currents, and low biological activity rank low on the scale, whereas sheltered areas with associated high biological activity rank highest. A comprehensive shoreline habitat-ranking system has been developed for the entire United States. The shoreline habitats delineated on the Northwest Alaska and North Slope of Alaska are listed in order of increasing sensitivity to spilled oil:

1A) Exposed Rocky Shore
1B) Exposed Solid Manmade Structure
3A) Fine- to Medium-Grained Sand Beaches
3C) Tundra Cliffs
4) Coarse-Grained Sand Beaches
5) Mixed Sand and Gravel Beaches
6A) Gravel Beaches
7) Exposed Tidal Flats
8A) Sheltered Rocky Shores and Sheltered Scarps in Bedrock, Mud, or Clay
8B) Sheltered, Solid Manmade Structures
8E) Peat Shorelines
9A) Sheltered Tidal Flats
9B) Sheltered Vegetated Low Banks
10A) Salt- and Brackish-Water Marshes
10E) Inundated Low-Lying Tundra
U) Unranked

The ESI rankings progress from low to high susceptibility to oil spills. In many cases, the shorelines also are ranked with multiple codes such as 10E/7. The first number is the most landward shoreline type, saltmarsh, with exposed tidal flats being the shoreline type closest to the water. For purposes of analysis, we use the shoreline type closest to the water. Table A.1-8 shows the percentage length of each ESI ranking for the most seaward shoreline type for each land segment in United States, Alaska waters. No ESI data are available for Russia.

The percentage length of each ESI type was derived by determining the length of coastline for each land segment. The length of each ESI type was determined for that land segment and then calculated as a percentage of the total land segment length.

B.4. Assumptions about Large Oil-Spill Weathering:

- The crude oil properties will be similar to Alpine composite crude oil (Table A.1-5, 6, and 7).
- The size of the crude or diesel spill is 1,500 or 4,600 bbl.
- The wind, wave, and temperature conditions are as described.
- The spill is a surface spill.
- Meltout spills occur into 50% ice cover.
- The properties predicted by the model are those of the thick part of the slick.
- The spill occurs as an instantaneous spill over a short period of time.
- The fate and behavior are as modeled (Tables A.1-9, 10 and 11).
- The oil spill persists for up to 30 days in open water.

Uncertainties exist, such as:

- the actual size of the oil spill or spills, should they occur;

- whether the spill is instantaneous or chronic;
- wind, current, wave, and ice conditions at the time of a possible oil spill; and
- the crude oil properties at the time of a possible spill.

B.5. Modeling Simulations of Oil Weathering. To judge the effect of an oil spill, we estimate information regarding how much oil evaporates, how much oil is dispersed and how much oil remains after a certain time period. We derive the weathering estimates of Alpine Composite crude oil and arctic diesel from modeling results from the SINTEF Oil Weathering Model (OWM) Version 3.0 (Reed et al., 2005a) for up to 30 days.

B.5.a. Alpine Composite Laboratory Test Results. Alpine oil composite was chosen for simulations of oil weathering, because it is a light crude oil that falls within the category of 35-40° API oils estimated to occur in the Sale 193 area. On July 21, 2001, ConocoPhillips gathered a crude oil sample from the Alpine central processing facility. The oil sample was named Alpine Composite. This sample was sent to SINTEF for Laboratory benchmark testing as described in Daling and Strom (1999) and Reed et al. (2005b). The Alpine Composite is a paraffinic crude oil, with a density of 0.834 grams per milliliter. The Alpine Composite contains a relatively large amount of lower molecular-weight compounds. The Alpine Composite contains approximately 4% wax and <0.1 % asphaltenes by weight. The Alpine composite has a high amount of lighter components, and evaporative loss will yield great changes in physical properties for the oil. The Alpine Composite has an initial pour point at –18 °C (-0.4 °F). As the Alpine composite has a large evaporative loss, it also displays the greatest change in pour point with evaporation. The low pour points are due to high amounts of light components in the oils, keeping heavier components as wax in solution. Upon evaporative loss, the chemical composition changes, and, for example, as wax is allowed to precipitate, the pour point is getting higher. The maximum water content of the Alpine Composite water-in-oil-emulsions is high (all are above 80%). The rate of formation is relatively fast, after approximately 30 minutes the Alpine Composite water in oil-emulsions reached a water content above 50 % by volume. The fast emulsification rates are typical for paraffinic crude oils.

B.5.b. Alpine Composite Simulations of Oil Weathering. We use the SINTEF OWM to perform simulations of oil weathering. The SINTEF OWM changes both oil properties and physical properties of the oil. The oil properties include density, viscosity, pour point, flash point, and water content. The physical processes include spreading, evaporation, oil-in-water dispersion, and water uptake. The SINTEF OWM Version 3.0 performs a 30-day time horizon on the model-weathering calculations, but with a warning that the model is not verified against experimental field data for more than 4-5 days. The SINTEF OWM has been tested with results from three full-scale field trials of experimental oil spills (Daling and Strom, 1999).

The SINTEF OWM does not incorporate the effects of the following:

- currents;
- beaching;
- containment;
- photo-oxidation;
- microbiological degradation;
- adsorption to particles; and
- encapsulation by ice.

The simulated Alpine composite crude oil spill sizes are 1,500 or 4,600 bbl. The diesel oil spill size is 1,500 bbl. We simulate two general scenarios: one in which the oil spills into open water and one in which the oil freezes into the ice and melts out into 50% ice cover. We assume open water is June through October, and a winter spill melts out in June. We assume the spill starts at the surface. For open water, we model the weathering of the 1,500- or 4,600-bbl spills as if they are instantaneous spills. For the meltout spill scenario, we model the entire spill volume as an instantaneous spill. Although different amounts of oil could melt out at different times, the MMS took the conservative approach, which was to assume all the oil was released at the same time. We report the results at the end of 1, 3, 10, and 30 days.

For purposes of analysis, we look at the mass balance of the oil spill; how much is evaporated, dispersed and remaining. Tables A.1-9, 10, and 11 summarize the results we assume for the amount evaporated, dispersed, and remaining for Alpine Composite crude oil and diesel oil in our analysis of the effects of oil on environmental and sociocultural resources. The Alpine Composite contains a relatively large amount of lower molecular-weight compounds, and approximately 29% and 33% of its original volume evaporated within 1 and 3 days, respectively, at both summer and winter temperatures. Alpine Composite will form water-in-oil-emulsion with a maximum water content of 80% at both winter and summer temperatures, yielding approximately five times the original spill volume (Reed et al. 2005b). At the average wind speeds over the Sale 193 area, dispersion is slow, ranging from 0-16%. However, at higher wind speeds (e.g., 15 m/s wind speed) the slick will be almost removed from the sea surface within a day.

C. Estimates of Where a Large Offshore Oil Spill May Go.

We study how and where large offshore spills move by using a computer model called the Oil-Spill-Risk Analysis model (Smith et al., 1982). By large, we mean spills ≥1,000 bbl. This model analyzes the likely paths of oil spills in relation to biological, physical, and sociocultural resource areas. The model uses information about the physical environment, including files of wind, sea ice, and current data. It also uses the locations of environmental resource areas, sociocultural resource areas, barrier islands, and the coast that are within the model study area.

C.1. Inputs to the Oil-Spill-Trajectory Model.

- study area
- arctic seasons
- location of the coastline
- location of environmental resource areas
- location of land segments
- location of boundary segments
- location of hypothetical launch areas
- location of hypothetical pipelines and transportation assumptions
- current and ice information from two general circulation models
- wind information

C.1.a. Study Area and Boundary Segments. Map A.1-1 shows the Chukchi Sea Sale 193 oil-spill-trajectory study area extends from lat. 68º N. to 75º N. and from long. 134° W. to 174° E. The study area is formed by 38 boundary segments and the Beaufort and Chukchi seas (United States and Russia) coastline. The boundary segments are vulnerable to spills in both arctic summer and winter. We chose a study area large enough to mostly contain the paths of 2,700 hypothetical oil spills each through as long as 360 days.

C.1.b. Arctic Seasons. We define three time periods for the trajectory analysis of oil spills. The first is from June 1 through October 31 and generally represents open water or arctic summer. We ran 1,125 trajectories in the arctic summer. The second is from November 1 through May 31 and generally represents ice cover or arctic winter. We also ran 1,575 trajectories in the arctic winter. The last is annual, which is from January through December, and represents the entire year. We ran 2,700 trajectories over the annual season.

C.1.c. Locations of Environmental Resource Areas. Maps A.1-2a, A.1-2b, A.1-2c and A.1-2d show the location of the 84 environmental resource areas (ERA's). These ERA's represent concentrations of wildlife, subsistence-hunting areas, and subsurface habitats. Our analysts designate these ERA's. The analysts also designate in which months these ERA's are vulnerable to spills. The names or abbreviations of the ERA's and their months in which they are vulnerable to spills are shown in Table A.1-12. Information regarding the general and specific ERA's for birds, subsistence resources, whales, and polar bears is found in Tables A.1-13, 14, 15, and 15a. We also include Land as an additional environmental resource area. Land is the entire study area coastline and is made up of the individual land segments (LS's) 1 through 126 which are described below.

C.1.d. Location of Land Segments. The coastline was further analyzed by dividing the Chukchi (United States and Russia) and Beaufort seas coastline into 126 land segments. Maps A.1-3a, A.1-3b and A.1-3c show the location of these 126 land segments. Land segments are vulnerable to spills in both summer and winter. The model defines summer as June through October and winter from November through May. The land segment identification numbers (ID) and the geographic place names within the land segment are shown in Table A.1-16. Some land segments were grouped together to represent geographic places. These grouped land segments are shown on Map A.1-3d and are as follows:

Grouped Land Segment Name	Land Segment ID's
Wrangel Island Nature Reserve Natural World Heritage Site (Russia)	1-12
Bering Land Bridge National Preserve	41, 42, 45-50
Selawik National Wildlife Refuge	56
Cape Krusenstern National Monument	57-59
Alaska Maritime National Wildlife Refuge	62, 63, 65
National Petroleum Reserve Alaska	76, 77, 80-83, 86-93
Kasegaluk Lagoon Special Area (NPR-A)	76-77
Teshekpuk Lake Special Area (NPR-A)	89-93
Arctic National Wildlife Refuge	103-111
Ivvavik National Park (Canada)	112-117
Kendall Island Bird Sanctuary (Canada)	124-125
Russia Chukchi Coast	1-39
United.States Chukchi Coast	40-84
Unites States Beaufort Coast	85-111
Canada Beaufort Coast	112-126

C.1.e. Location of Proposed and Alternative Hypothetical Launch Areas and Hypothetical Pipeline Segments. The MMS does not know where companies may lease, explore and eventually develop resources. Although we know some areas are more likely than others, we need to look at all of the Sale area that are open to leasing and cover those areas in an oil spill analysis. The maps of launch areas and pipeline segments are hypothetical locations meant to cover the Sale 193 area for analysis and are not meant to represent or suggest any particular development scenario.

Map A-4a shows the location of the 13 hypothetical launch areas (LA1-LA13) and 11 hypothetical pipeline segments (P1-P11) from 5 hypothetical pipelines, the sites where large oil spills could originate, if they were to occur. Pipeline locations are entirely hypothetical. They are not meant to represent five proposed pipelines nor any real or planned pipeline locations. They are spaced along the coast to evaluate differences in oil-spill trajectories from different locations along the coast.

Hypothetical launch points were spaced at one-tenth-degree intervals in the north-south direction (about 11.25 kilometers [km]) and one-third-degree intervals in the east-west direction (about 12.67 km). At this resolution, there were 1,002 total launch points in space, grouped into 13 launch areas (LA1-LA13).

A total of 2,700 trajectories (1,575 in winter; 1,125 in summer) from each hypothetical launch point over the 15 years of wind data (1982-1996), and results of these trajectory simulations were combined to represent platform spills from 13 launch areas (LA1 through LA13 Map A.1-4a). LA1 through LA3 are >150 mi offshore. LA4 through LA7 are approximately 90-150 mi offshore. LA9 through LA13 are approximately 30-90 mi offshore. Pipeline spills were represented by 2,700 trajectories (1,575 in winter; 1,125 in summer) launched from each grid point along each pipeline segment (P1 through P11, Map A.1-4a).

Maps A.1-4b and Map A.1-4c show the location of the launch areas and pipelines for Alternative III and IV, respectively, to indicate where launch points would be removed. Table A.1-17 shows the transportation assumptions for the launch areas and their associated pipelines.

For Sale 193 Alternative I, we assume no oil large spills occur during exploration activities. Development/production activities for Sale 193 could occur in any of the launch areas (LA1-LA13) or along any of the pipeline segments (P1-P11).

C.1.f. Current and Ice Information from a General Circulation Model. For the Chukchi Sea Sale 193, we use two general circulation models to simulate currents ($U_{current}$) or ice (U_{ice}), depending on whether the location is nearshore or offshore.

C.1.f(1) Offshore. Offshore of the 10- to 20-meter (m) bathymetry contour, the wind-driven and density-induced ocean-flow fields and the ice-motion fields are simulated using a three-dimensional, coupled, ice-ocean hydrodynamic model (Haidvogel, Hedstrom, and Francis, 2001). The model is based on the ocean model of Haidvogel, Wilkin, and Young (1991) and the ice models of Hibler (1979) and Mellor and Kantha (1989). This model simulates flow properties and sea-ice evolution in the western Arctic during the years 1982-1996. The coupled system uses the S-Coordinate Rutgers University Model (SCRUM) and Hibler viscous-plastic dynamics and the Mellor and Kantha thermodynamics. It is forced by daily surface geostrophic winds and monthly thermodynamic forces. The model is forced by thermal fields for the years 1982-1996. The thermal fields are interpolated in time from monthly fields. The location of each trajectory at each time interval is used to select the appropriate ice concentration. The pack ice is simulated as it grows and melts. The edge of the pack ice is represented on the model grid. Depending on the ice concentration, either the ice or water velocity with wind drift from the stored results of the Haidvogel, Hedstrom, and Francis (2001) coupled ice-ocean model is used. A major assumption used in this analysis is that the ice-motion velocities and the ocean daily flows calculated by the coupled ice-ocean model adequately represent the flow components. Comparisons with data illustrate that the model captures the first-order transport and the dominant flow (Haidvogel, Hedstrom, and Francis, 2001).

C.1.f(2) Nearshore. Inshore of the 10- to 20-m bathymetry contour in the Beaufort Sea, $U_{current}$ is simulated using a two-dimensional (2D) hydrodynamic model developed by the National Oceanic and Atmospheric Administration (NOAA) (Galt, 1980, Galt and Payton, 1981). This model does not have an ice component. The 2D model incorporated the barrier islands in addition to the coastline. The model of the shallow water is based on the wind forcing and the continuity equation. The model was originally developed to simulate wind-driven, shallow-water dynamics in lagoons and shallow coastal areas with a complex shoreline. The solutions are determined by a finite element model, where the primary balance is between the wind forcing friction, the pressure gradients, coriolis accelerations, and the bottom friction. The time dependencies are considered small, and the solution is determined by iteration of the velocity and sea level equations, until the balanced solution is calculated. The wind is the primary forcing function, and a sea level boundary condition of no anomaly produced by the particular wind stress is applied far offshore, the northern boundary of the oil-spill-trajectory analysis domain. An example of the currents simulated by this model for a 10-m/sec wind is shown in Figure A.1-4.

The results of the model were compared to current meter data from the Endicott Environmental Monitoring Program to determine if the model was simulating the first order transport and the dominant flow. The model simulation was similar to the current meter velocities during summer. Example time series from 1985 show the current flow at Endicott Station ED1 for the U (east-west) and V (north-south) components plotted on the same axis with the current derived from the NOAA model for U and V (Der-U and Der-V). The series show many events that coincide in time, and that the currents derived from the NOAA model generally are in good correspondence with the measured currents. Some of the events in the measured currents are not particularly well represented, and that probably is due to forcing of the current by something other than wind, such as low frequency alongshore wave motions.

C.1.f(3) Landfast Ice Mask. In both the offshore and nearshore models, we added an ice mask within the 0-m and approximately 10- to 20-m water-depth contours to simulate the observed shorefast-ice zone. For each month October through June we apply the monthly ice mask, one for each of those months. For the Beaufort Sea and a portion of the Chukchi Sea the landfast ice mask was derived from the minimum landfast ice observed each month from October to June in a study titled *Mapping and Characterization of Recurring Spring Leads and Landfast ice in the Beaufort and Chukchi Seas* (Eiken et al., 2006). For the southern Chukchi to the Bering Strait the landfast ice mask was taken from Stringer, Barrett, and Schreurs (1980) and was applied from December to May. The Canadian Beaufort minimum landfast ice limit was taken from Arctic Environmental Sensitivity Atlas System produced by Environment Canada (2000) and is applied October to June. The documentation in the Arctic Environmental Atlas describes the sources of that data as follows:

1. ATMOSPHERIC ENVIRONMENT SERVICE. 1974-1986. Canadian Ice Charts. Ice Forecasting Central, Environment Canada, Ottawa.

2. CANADA CENTRE FOR REMOTE SENSING. 1973-1983. Selected LANDSAT Imagery. Energy, Mines and Resources Canada, Ottawa.

3. SPEDDING, L.G. and B.W. DANIELEWICZ. 1983. Artificial Islands and Their Effect on Regional Landfast Ice Conditions in the Beaufort Sea. Joint Report Esso Resources Canada Limited and Dome Petroleum Limited, Calgary.

For the Russian Chukchi coast landfast minimum, we reviewed monthly National Ice Center data in ArcGIS for the period 1979-2004. We applied a query to distinguish landfast ice. We conservatively placed the minimum landfast ice line between the 10- and 20-m contour for the months in which landfast ice was present along the coast (October to June). U_{ice} is zero for the landfast ice mask for the months in which it is applied.

C.1.g. Wind Information. We use 15 of the 17-year reanalysis of the wind fields provided to us by Rutgers. The TIROS Operational Vertical Sounder (TOVS) has flown on NOAA polar-orbiting satellites since 1978. Available from July 7, 1979, through December 31, 1996, and stored in Hierarchical Data Format, the TOVS Pathfinder (Path-P) dataset provides observations of areas poleward of lat. 60° N. at a resolution of approximately 100 x 100 km. The TOVS Path-P data were obtained using a modified version of the Improved Initialization Inversion Algorithm (3I) (Chedin et al., 1985), a physical-statistical retrieval method improved for use in identifying geophysical variables in snow- and ice-covered areas (Francis, 1994). Designed to address the particular needs of the polar-research community, the dataset is centered on the North Pole and has been gridded using an equal-area azimuthal projection, a version of the Equal-Area Scalable Earth-Grid (EASE-Grid) (Armstrong and Brodzik, 1995).

Preparation of a basinwide set of surface-forcing fields for the years 1980 through 1996 has been completed (Francis, 1999). Improved atmospheric forcing fields were obtained by using the bulk boundary-layer stratification derived from the TOVS temperature profiles to correct the 10-m level geostrophic winds computed from the National Center for Environmental Prediction Reanalysis surface pressure fields. These winds are compared to observations from field experiments and coastal stations in the Arctic Basin and have an accuracy of approximately 10% in magnitude and 20 degrees in direction.

C.1.h. Oil-Spill Scenario. For purposes of this trajectory simulation, all spills occur instantaneously. For each trajectory simulation, the start time for the first trajectory was the first day of the season (winter or summer) of the first year of wind data (1982) at 6 a.m. Greenwich Mean Time (GMT). The summer season consists of June 1-October 30, and the winter season is November 1-May 31. Each subsequent trajectory was started every 2 days at 6 a.m. GMT. The spatial resolution of the trajectory simulations was well within the spatial resolution of the input data, and the interval of time between releases was sufficiently short to sample weather-scale changes in the input winds (Price et al., 2004).

C.2. Oil-Spill-Trajectory Model Assumptions:

- Oil spills occur in the hypothetical launch areas or along hypothetical pipeline segments.
- Companies transport the produced oil through pipelines.
- An oil spill reaches the water.
- An oil spill encapsulated in the landfast ice does not move until the ice moves or it melts out.
- Oil spills occur and move without consideration of weathering. The oil spills are simulated each as a point with no mass or volume. The weathering of the oil is estimated in the stand-alone SINTEF OWM model.
- Oil spills occur and move without any cleanup. The model does not simulate cleanup scenarios. The oil-spill trajectories move as though no booms, skimmers, or any other response action is taken.

- Oil spills stop when they contact the mainland coastline, but not the offshore barrier islands in Stefansson Sound.

Uncertainties exist, such as:

- the actual size of the oil spill or spills, should they occur;
- whether the spill reaches the water;
- whether the spill is instantaneous or a long-term leak;
- the wind, current, and ice conditions at the time of a possible oil spill;
- how effective cleanup is;
- the characteristics of crude oil at the time of the spill;
- how Alpine Composite crude oil will spread; and
- whether or not production occurs.

C.3. Oil-Spill-Trajectory Simulation. The trajectory-simulation portion of the model consists of many hypothetical oil-spill trajectories that collectively represent the mean surface transport and the variability of the surface transport as a function of time and space. The trajectories represent the Lagrangian motion that a particle on the surface might take under given wind, ice, and ocean-current conditions. Multiple trajectories are simulated to give a statistical representation, over time and space, of possible transport under the range of wind, ice, and ocean-current conditions that exist in the area.

Trajectories are constructed from simulations of wind-driven and density-induced ocean flow fields and the ice-motion field. The basic approach is to simulate these time- and spatially dependent currents separately, then combine them through linear superposition to produce an oil-transport vector. This vector is then used to create a trajectory. Simulations are performed for three seasons: winter (November-May), summer (June-October), and annual (January-December). The choice of this seasonal division was based on meteorological, climatological, and biological cycles and consultation with Alaska OCS Region analysts.

For cases where the ice concentration is below 80%, each trajectory is constructed using vector addition of the ocean current field and 3.5% of the instantaneous wind field—a method based on work done by Huang and Monastero (1982), Smith et al. (1982), and Stolzenbach et al. (1977). For cases where the ice concentration is 80% or greater, the model ice velocity is used to transport the oil. Equations 1 and 2 show the components of motion that are simulated and used to describe the oil transport for each spillete:

1 $U_{oil} = U_{current} + 0.035\ U_{wind}$
or

2 $U_{oil} = U_{ice}$

where:
U_{oil} = oil drift vector
$U_{current}$ = current vector (when ice concentration is <80%)
U_{wind} = wind speed at 10 m above the sea surface
U_{ice} = ice vector (when ice concentration is ≥80%)

The wind-drift factor was estimated to be 0.035, with a variable drift angle ranging from 0º-25ºclockwise. The drift angle was computed as a function of wind speed according to the formula in Samuels, Huang, and Amstutz (1982). (The drift angle is inversely related to wind speed.)

The trajectories age while they are in the water and/or on the ice. For each day that the hypothetical spill is in the water, the spill ages—up to a total of 360 days. While the spill is in the ice (≥80% concentration), the aging process is suspended. The maximum time allowed for the transport of oil in the ice is 360 days, after which the trajectory is terminated. After coming out of the ice, into open water, the trajectory ages to a maximum of 30 days.

C.4. Results of the Oil-Spill-Trajectory Model.

C.4.a. Conditional Probabilities: Definition and Application. The chance that an oil spill will contact a specific ERA or land or boundary segment within a given time of travel from a certain location or spill site is termed a conditional probability. The condition is that we assume a spill occurs. Conditional probabilities assume a spill has occurred and the transport of the spilled oil depends only on the winds, ice, and ocean currents in the study area.

For the Chukchi Sea Sale 193, we estimate conditional probabilities of contact within 3, 10, 30, 60, 180, or 360 days during summer. Summer spills are spills that begin in June through October. Therefore, if any contact to an ERA or land segment is made by a trajectory that began before the end of October, it is considered a *summer contact* and is counted along with the rest of the contacts from spills launched in summer. We also estimate the conditional probability of contact from spills that start in winter, freeze into the landfast ice, and melt out in spring. We estimate contacts from these spills for 3, 10, 30, 60, 180, or 360 days. Winter spills are spills that begin in November through May, melt out of the ice, and contact during the open-water period. Therefore, if any contact to an ERA or land segment is made by a trajectory that began by the end of May, it is considered a *winter contact* and is counted along with the rest of the contacts from spills launched in the winter.

C.4.a(1) Conditional Probabilities: Results. The chance of a spill contacting, assuming a spill has occurred, is taken from the conditional oil-spill-trajectory model results summarized generally below and listed in Tables A.2-1 through A.2-72. For specific analysis of conditional probabilities in regard to specific resources please see Section IV.C.

C.4.a(1)(a) Comparisons between Spill Location and Season. The primary differences of contact between hypothetical launch areas and pipeline segments are geographic in the perspective of west to east and nearshore versus offshore. Offshore spill locations take longer to contact the coast and nearshore ERA's, if contact occurs at all. Winter spill contact to nearshore and coastal resources is less often and, to a lesser extent, due to the landfast ice in place from December to April. Hypothetical spills have a stochastic northerly or southwesterly direction of spread.

The western edge of the proposed lease area is adjacent to Russian territory. Table A.1-91 shows the range of annual conditional probabilities that an oil spill starting at particular location will contact Russian waters within 3, 10, 30, 60, 180, or 360 days. The chance of contact is estimated to gridded boxes within the study area boundary on the Russian side of the boundary. The chance of an oil spill contacting Russian territory is 2% or less within 180 days for a spill starting in the northeast portion of the proposed lease area (LA7, LA8, and LA13; Map A.1-4A). The chance of a spill contacting Russian territory is slightly greater for launch areas in central parts of the proposed lease area (LA2, LA3, LA5, LA6, and LA11). For those launch areas, the chance of a spill contacting Russian territory is 5% or less within 60 days. The chance of a spill contacting Russian territory is higher for the western edge of the proposed lease area (LA 1, LA 4, and LA9). For those launch areas, the chance of a spill contacting Russian territory is about 9% or less within 10 days.

C.4.a(1)(b) Generalities Through Time.

3 Days: In general, contact to individual land segments (LS's) and ERA Land is due to hypothetical spills from the nearshore pipeline segments where assumed hypothetical pipelines could come ashore. There is a <0.5% chance of a large spill contacting the ERA Land or individual land segments from launch areas or pipeline segments that begin approximately 30-150 mi offshore from the coast. Launch areas or pipeline segments adjacent to or on top of ERA's have the highest percent chance of contact within 3 days.

During the entire year (annual), pipeline segments P1, P6, P9 or P11 have a <0.5-3 % chance of contacting individual LS's 64 (Point Hope), 65 (Cape Lisburne), 72-74 (Point Lay-Kasegaluk Lagoon), 79 (Wainwright), or 82 (Skull Cliff) (Table A.2-7). All other launch areas and pipeline segments have a <0.5% chance of contacting individual land segments within 3 days over the entire year. The chance of contact to ERA Land ranges from 1-6% for P1, P6, P9, or P11 (Table A.2-1). All other launch areas and pipeline segments have a <0.5% chance of contact to Land (Table A.2-1). During the summer, pipeline segments P1, P6, P9, or P11 have a <0.5-5% chance of contacting individual LS's 64 (Point Hope), 65 (Cape Lisburne), 72-74 (Point Lay-Kasegaluk Lagoon), 79

(Wainwright), or 80-83 (Eluksingiak Point-Nulavik) (Table A.2-31). All other launch areas (both nearshore and offshore) and pipeline segments have a <0.5% chance of contacting individual land segments within 3 days over summer. During the winter, pipeline segments P1, P6, or P11 have a <0.5-3 % chance of contacting individual LS's 64 (Point Hope), 65 (Cape Lisburne), 72-74 (Point Lay-Kasegaluk Lagoon), or 82 (Skull Cliff) (Table A.2-56). All other launch areas (both nearshore and offshore) and pipeline segments have a <0.5% chance of contacting individual LS's within 3 days over winter (Table A.2-56).

Launch areas or pipeline segments adjacent to or on top of ERA's have the highest percent chance of contact. During the entire year, launch areas LA1-LA13 have a <0.5-28% chance of contacting individual ERA's (Table A.2-1). Pipeline segments P1-P11 have a <0.5-39% chance of contacting individual ERA's (Table A.2-1). During summer, launch areas LA1-LA13 have a <0.5-56% chance of contacting individual ERA's (Table A.2-25). During summer, pipeline segments P1-P11 have a <0.5-57% chance of contacting individual ERA's (Table A.2-25). During winter, launch areas LA1-LA13 have a <0.5-27% chance of contacting individual ERA's (Table A.2-49). During winter, pipeline segments P1-P11 have a <0.5-40% chance of contacting individual ERA's (Table A.2-49).

10 Days: During the entire year (annual), pipeline segments P1, P3, P6, P9 or P11 have a <0.5-6 % chance of contacting individual LS's 64-66 (Point Hope-Ayugatak Lagoon), 71-75 (Sitkok Point-Icy Cape), or 78-85 (Point Collie to Barrow) (Table A.2-8). Nearshore launch areas LA9-LA13 have a <0.5-2% chance of contacting LS's 64-65 (Point Hope-Cape Lisburne), 71-75(Sitkok Point-Icy Cape), 79-80 (Wainwright-Kugrua Bay) or 84-85 (Barrow area) (Table A.2-8). All other launch areas and pipeline segments have a <0.5% chance of contacting individual land segments within 10 days over the entire year. The chance of contact to ERA Land ranges from 7-17% for P1, P3, P6, P9, or P11 (Table A.2-2) and 1-4% for LA9-LA13. All other launch areas and pipeline segments have a <0.5% chance of contact to ERA Land (Table A.2-2). During summer, pipeline segments P1, P3, P6, P9, or P11 have a <0.5-8% chance of contacting individual land segments (Point Hope-Ayugatak Lagoon), 65 (Cape Lisburne), 71-76 (Sitkok Point-Avak Inlet), or 78-85 (Nivat Point-Barrow) (Table A.2-32). Nearshore launch areas LA9-LA13 and offshore LA8 have a <0.5-4% chance of contacting LS's 64-65 (Point Hope - Cape Lisburne), 71-75(Sitkok Point-Icy Cape), 79-80 (Wainwright-Kugrua Bay) or 83-85 (Nulavik) (Table A.2-32). All other launch areas (both nearshore and offshore) and pipeline segments have a <0.5% chance of contacting individual land segments within 10 days over summer. During winter, pipeline segments P1, P6, P9, or P11 have a <0.5-6% chance of contacting individual LS's 64-65 (Point Hope-Cape Lisburne), 72-75 (Point Lay-Icy Cape),79-80 (Wainwright-Kugrua Bay) and 82-85 (Skull Cliff-Barrow) (Table A.2-56). Nearshore launch areas LA10, LA11 or LA13 have a <0.5-1% chance of contacting 72-75(Point Lay-Icy Cape) or 84-85(Barrow Area) (Table A.2-56). All other launch areas (both nearshore and offshore) and pipeline segments have a <0.5% chance of contacting individual land segments within 10 days over winter (Table A.2-56).

Launch areas or pipeline segments adjacent to or on top of ERA's have the highest percent chance of contact. During the entire year, launch areas LA1 through LA13 have a <0.5-40% chance of contacting individual ERA's (Table A.2-2). Pipeline segments P1 through P11 have a <0.5-47% chance of contacting individual ERA's (Table A.2-2). During summer, launch areas LA1 through LA13 have a <0.5-63% chance of contacting individual ERA's (Table A.2-26). During summer, pipeline segments P1 through P11 have a <0.5-67% chance of contacting individual ERA's (Table A.2-26). During winter, launch areas LA1 through LA13 have a <0.5-37% chance of contacting individual ERA's (Table A.2-50). During winter, pipeline segments P1 through P11 have a <0.5-51% chance of contacting individual ERA's (Table A.2-50).

30 Days: Within 30 days, large spills from the southern and western portion of the planning area (P1, LA4 or LA9) have a small chance (<0.5-1%) of contacting Russian Chukchi coastline individual land segments. The percent chance of contacting the grouped land segments Russia Chukchi Coastline (ERA 95) ranges from 1-5% from LA1, LA4, LA9, P1, P2, or P3. If large oil spills contact the U.S shoreline along the Chukchi coast, most of the contact occurs within 30 days.

During the entire year (annual), P1, LA4 or LA9 have a <0.5-1 % chance of contacting LS's 27or 34-39 (Rigol, Tepeken-Uelen, Russia) (Table A.2-9). P1, P3, P5, P6, P9, LA5, LA9, LA10 or LA 11 have a <0.5%-8% chance of contacting individual LS's 64-66 (Point Hope-Ayugatak Lagoon),or 71-77 (Sitkok Point-Noketlek Point) (Table A.2-9). LA7, LA8, LA11-LA13, or P8-P11 have a <0.5-5% chance of contacting individual LS's 78-86 (Point

Collie-Plover Islands) (Table A.2-9). All other launch areas (both nearshore and offshore) and pipeline segments have a <0.5% chance of contacting individual LS's within 30 days over the entire year (Table A.2-9).

During summer, P1, P3, LA4 or LA9 have a <0.5-2 % chance of contacting LS's 27or 34-39 (Rigol, Enumino, Mys Serdtse-Kamen, Uelen, Russia) and a <0.5-9% chance of contacting LS's 63-66 (Cape Seppings-Ayugatak Lagoon) (Table A.2-23). P1, P3, P5, P6, P8-P11, LA4, LA5, or LA7-LA13 have a <0.5%-13% chance of contacting at least one individual LS's 63-86 (Cape Seppings-Plover Islands) (Table A.2-9). All other launch areas (both nearshore and offshore) and pipeline segments have a <0.5% chance of contacting individual land segments within 30 days over summer (Table A.2-23).

During winter, P1, P2, LA4 or LA9 have a <0.5-1 % chance of contacting LS's 27, 35, 36 or 39 (Rigol, Tepeken-Uelen, Russia) and a <0.5-2% chance of contacting LS's 63-66 (Cape Seppings-Ayugatak Lagoon) (Table A.2-57). P1, P3, P5, P6, P8-P11, LA4, LA5, or LA7-LA13 have a <0.5%-7% chance of contacting LS's 64-65 (Point Hope-Cape Lisburne), 74-75 (Kuchaurak-Icy Cape), or 78-85 (Point Collie-Barrow) (Table A.2-57). All other launch areas (both nearshore and offshore) and pipeline segments have a <0.5% chance of contacting individual land segments within 30 days over winter (Table A.2-57).

Launch areas or pipeline segments adjacent to or on top of ERA's have the highest percent chance of contact. During the entire year, launch areas LA1-LA13 have a <0.5-51% chance of contacting individual ERA's (Table A.2-3). Pipeline segments P1-P11 have a <0.5-58% chance of contacting individual ERA's (Table A.2-3). During summer, launch areas LA1-LA13 have a <0.5-69% chance of contacting individual ERA's (Table A.2-27). During summer, pipeline segments P1-P11 have a <0.5-71% chance of contacting individual ERA's (Table A.2-27). During winter, launch areas LA1-LA13 have a <0.5-59% chance of contacting individual ERA's (Table A.2-51). During winter, pipeline segments P1-P11 have a <0.5-63% chance of contacting individual ERA's (Table A.2-51).

D. Oil-Spill-Risk Analysis.

A measure of oil-spill impact is determined by looking at the chance of one or more large spills occurring and then contacting a resource of concern. This analysis helps determine the relative spill occurrence and contact associated with oil and gas production in different regions of the proposed sale area. Combined probabilities are estimated using the conditional probabilities, the historical oil-spill rates, the resource estimates, and the assumed transportation scenarios. These are combined through matrix multiplication to estimate the mean number of one or more large spills occurring and contacting.

D.1. Chance of One or More Large Spills Occurring. The chance of one or more large spills occurring is derived from two components: (1) the spill rate and (2) the resource volume estimates. The spill rate is multiplied by the resource volume to estimate the mean number of spills. Oil spills are treated statistically as a Poisson process, meaning that they occur independently of one another. If we constructed a histogram of the chance of exactly 0 spills occurring during some period, the chance of exactly 1 spill, 2 spills, and so on, the histogram would have a shape known as a Poisson distribution. An important and interesting feature of this distribution is that it is entirely described by a single parameter, the mean number of spills. Given its value, you can calculate the entire histogram and estimate the chance of one or more large spills occurring. The oil-resource volume estimate is 1 Bbbl for Alternative I, the Proposed Action.

D.1.a. Large Spill Rates. We derive the large oil spill rates from a modeling study done by the Bercha Group, Inc. (2006a). This study examined alternative oil-spill-occurrence estimators for the Chukchi Sea using a fault-tree method. Using fault trees, oil-spill data from the Gulf of Mexico were modified and incremented to represent expected Arctic performance and included both Arctic and non-Arctic variability.

Fault-tree analysis is a method for estimating the spill rate resulting from the interactions of other events. Fault trees are logical structures that describe the causal relationship between the basic system components and events resulting in system failure. Fault-tree models are a graphical technique that provides a systematic description of the combinations of possible occurrences in a system, which can result in an undesirable outcome. Figure A-5 shows the generalized parts of a fault tree starting with the top event. The top event is defined as the failure under investigation. In this case, it is either a large pipeline or platform spill. A series of events that lead to the top event are described and connected by logic gates. Logic gates define the mathematical operations conducted between events.

Figure A-6 shows a typical fault tree for large pipeline spills. The most serious undesirable outcome, such as a large pipeline spill, was selected as the top event. A fault tree was constructed by relating the sequences of events that, individually or in combination, could lead to the leak or spill. The tree was constructed by deducing, in turn, the preconditions for the top event and then successively for the next levels of events, until the basic causes were identified. In Figure A-6, these events included corrosion, third-party impact, operation impact, mechanical failure, and natural hazards—unknown and Arctic. These sub-resultant events were further elucidated to determine their base cause. For example, corrosion could be internal or external corrosion; third-party impact could be due to fishing, trawling, jackup, or anchor impact. Figure A-7 shows a typical fault tree for a large platform spill. The most serious undesirable outcome, such as a large platform spill, was selected as the top event. Events include a process facility release, a storage tank release, structural failure, hurricane or storm, collision, and Arctic. The sub-resultant events that make up the Arctic included ice force, low temperature, and others.

Probabilities were assigned to each event so that the probability of the top event was estimated. This required knowledge of the probable failure rates for each event. At an OR gate in a fault tree, the probabilities were added to give the probability of the next event. The fault trees in the Bercha Group, Inc. (2006a) report were composed entirely of OR gates. The computation of resultant events consisted of the addition of the probabilities of events at each level of the fault tree to obtain the resultant probability at the next higher value.

In the Bercha Group Inc. (2006a) study, fault trees were used to transform historical spill statistics for non-Arctic regions to predictive spill-occurrence estimates for the Beaufort Sea program area. The Bercha Group, Inc. (2006a) fault-tree analysis focused on Arctic effects as well as the variance in non-Arctic effects such as spill size and spill frequency. Arctic effects were treated as a modification of existing spill causes as well as unique spill causes. Modification of existing spill causes included those that also occur in other OCS regions but at a different frequency, such as trawling accidents. Unique spill causes included events that occur only in the Arctic, such as ice gouging, strudel scour, upheaval buckling, thaw settlement, and other for pipelines. For platforms, unique spill causes included ice force, low temperature, and other.

The treatment of uncertainties in the probabilities assigned to each event was estimated as discussed in the following.

Treatment of Uncertainties: The measures of uncertainty calculated were expanded beyond Arctic effects in each fault-tree event to include the non-Arctic variability in spill size, spill frequency, and facility parameters including wells drilled, number of platforms and subsea wells and subsea pipeline length. The inclusion of these types of variability—Arctic effects, non-Arctic data and facility parameters—is intended to provide a realistic estimate of spill-occurrence indicators and their resultant variability.

The treatment of uncertainties was examined through numerical simulation. To assess the impact of uncertainties in the Arctic effects incorporated fault trees, ranges around the expected value were estimated for all the Arctic effects, both modified and unique for Arctic effects. The numerical distributions generated through these perturbations in the expected values were modeled as triangular distributions and input to the numerical simulation analysis conducted as part of the result generation (Bercha Group, Inc. 2006a).

In order to model the variability of the base data and its distribution through the Arctic effects, using the Monte Carlo approach, an appropriate distribution needs to be derived. As in the previous study Bercha Group, Inc. (2006b), a triangular distribution was selected. The triangular distribution typically is used as a descriptor of a population for which there is only limited sample data, as is the current case. The distribution is based on knowledge of a minimum and maximum, which was derived from the historical data here, and an educated guess as to what the modal value might be. Here, the modal value was chosen to be a function of the average historical value. Despite being a simplistic description of a population, the triangular distribution is a very useful one for modeling processes where the relationship between variables is understood, but data are scarce.

Also, when combining several variables in a functional relationship using numerical methods, as is done in Monte Carlo Simulation, the triangular distribution is a preferred one due to its simplicity and relatively accurate probabilistic resultant when evaluated by a large number of random draws, as occurs in the Monte Carlo process. The data used here typifies sparse data with a preferred or modal value and an easily identifiable maximum and minimum. Then, for the case of the simple upper and lower 100% confidence interval (called High and Low), the expected value E (or mean value) of the triangular distribution can be expressed as:

E = (High + Mode + Low) / 3

For maximum and minimum that are not at the 100% confidence interval level, such as those at 90% confidence levels, a Monte Carlo computation is used to evaluate the expected value of each distribution. Based on the historical data, the triangular distribution expected value computed from the low, mode, and high values at 90% confidence intervals are given in Tables A.1-18, A.1-19 and A.1-20 for pipelines, platforms, and wells respectively.

Numerical simulation methods are tools for evaluating the properties of complex, as well as nondeterministic processes. Problems can have an enormous number of dimensions or a process that involves a path with many possible branch points, each of which is governed by some fundamental probability of occurring.
A type of numerical simulation, called Monte Carlo simulation, was used to obtain the outcome of a set of interactions for equations in which the independent variables are described by distributions of any arbitrary form. The Monte Carlo simulation is a systematic method for selecting values from each of the independent variable distributions and computing all valid combinations of these values to obtain the distribution of the dependent variable. This was done using a computer, so that thousands of combinations can be rapidly computed and assembled to give the output distribution.

Consider the example of the following equation:

$X = X_1 S + X_2$

Where, X is the dependent variable, S is the size of the spill in bbl, and X_1 and X_2 are correlation coefficients. Suppose now that X_1 and X_2 are some arbitrary distributions that can be described by a collection of values X_1 and X_2. What we do in the Monte Carlo process, figuratively, is to put the collection of the X_1 values into one hat, the X_1 hat, and the X_2 values into an X_2 hat. We then randomly draw one value from each of the hats and compute the resultant value of the dependent variable, X. This is done several thousand times. Thus, a resultant or dependent variable distribution, X, is estimated from the computations of all valid combinations of the independent variables (X_1 and X_2), for a given S.

Generally, the resultant can be viewed as a cumulative distribution function as illustrated in Figure A.1-8. Such a cumulative distribution function (CDF) also is a measure of the accuracy or, conversely, the variance of the distribution. As can be seen from this figure, if the distribution is a vertical line, no matter where one draws on the vertical axis, the same value of the variable will result, that is, the variable is a constant. At the other extreme, if the variable is completely random, the distribution will be represented as a diagonal straight line between the minimum and maximum value. Intermediate qualitative descriptions of the randomness of the variable follow from inspection of the CDF in Figure A-7. For example, if we are interested in confidence intervals, we simply take the value of the abscissa corresponding to the appropriate confidence interval, say 0.95 or 95%.

D.1.a(1) Fault-Tree Input Data and Their Uncertainty Variations. The Arctic effects include modifications to events associated with the historical data set from other OCS regions, hereafter called Arctic modified effects, and adding spill events unique to the arctic environment, hereafter called Arctic unique effects. Arctic modified effects are those changing the frequency component of certain contributions to events such as anchor impacts which could occur both in the Arctic and temperate zones. Arctic modified effects for pipelines apply to external corrosion, internal corrosion, anchor impact, jackup rig or spud barges, trawl/fishing net, rig anchoring, workboat anchoring, mechanical connection failure or material failure, and mudslide events. Table A.1-21 shows the input rationalization of the Arctic modified effects for pipelines. Arctic modified effects for platforms apply to process facility release, storage tank release, structural failure, hurricane/storm and collision events. Table A.1-23 shows the input rationalizations of the Arctic modified effects for platform events. The frequency increments in this table are given as the median values calculated using the Monte Carlo method with inputs as the low, expected, and high values.

Arctic unique effects are additive components that are unique to the Arctic environment. Quantification of existing events for the Arctic was done in a relatively cursory way restricted to engineering judgment.

For pipelines, Arctic unique effects included ice gouging, strudel scour, upheaval buckling, thaw settlement, and other. Table A.1-21 shows the input rationalization of the Arctic unique effects for pipelines. A reproducible but relatively elementary analysis of gouging and scour effects was carried out. The ice-gouge failure rate was calculated using an exponential failure distribution for a 2.5-m cover, 0.2-m average gouge depth, and 4-gouges-per-kilometer-year flux. Strudel scour was assumed to occur only in shallow water, with an average frequency of four scours per square mile and 100 ft of bridge length with a 10% conditional pipeline failure probability. Upheaval-buckling and thaw-settlement effect assessments were included on the basis of professional judgment; no engineering analysis was carried out for the assessment of frequencies to be expected for these effects. Upheaval buckling was assumed to have a failure frequency of 20% of that of strudel scour. Thaw settlement was assumed to have a failure frequency of 10% of that of strudel scour. Table A.1-22 shows the variance in the pipeline arctic effect inputs. The existing MMS databases on pipeline mileage were used as they stood with all their inherent inaccuracies. Arctic unique effects for platforms included ice force, low temperature and other. Table A.1-24 shows the variance in the platform Arctic unique effect inputs. No Arctic unique effects were estimated for the wells, which were considered to blow out with frequencies the same as those for the Gulf of Mexico. The above information summarizes the input data to the fault trees and their uncertainty variation. For further information the reader is directed to Bercha Group, Inc. (2006a).

D.1.a(2) Results for Spill Rates.

Type	Mean	Mean
Platforms	0.21 spills per billion barrels produced	6 spills per thousand years
Pipelines	0.30 spills per billion barrels produced	8 spills per thousand years
Total	0.51 spills per billion barrels produced	14 spills per thousand years

The annual rates were weighted by the annual production over the total production or the year over the total years, and the prorated rates were summed to determine the rates over the life of the project as shown above. Bercha Group, Inc. (2006a) calculated confidence intervals on the total spill rate per billion barrels at the 95% confidence interval (CI) are as follows:

Type	Mean	95% CI
Total	0.51 spills per billion barrels produced	0.32-0.77 spills per billion barrels produced

D.1.b. Resource-Volume Estimates. The resource volume estimates are discussed in Section IV.A.2.a.

D.1.c. Transportation Assumptions. Appendix A.1 Section C - Estimates of Where an Oil Spill May Go discusses the transportation assumptions for the launch areas and their associated hypothetical pipelines.

D.1.d. Results for the Chance of One or More Large Spills Occurring. The chance of one or more large spills occurring does not factor in the chance that a development project occurs. Given the many logistical, economic, and engineering factors, there is probably a <10% chance that a commercial field will be leased, discovered, and developed. However, because leasing and exploration could lead to a development project, the MMS must evaluate what would happen if a development occurred even though the chance of that happening is probably very small in a frontier area like the Chukchi Sea. Our estimate of one or more large spills occurring assumes there is a 100% chance that a project will be developed and 1 Bbbl of oil will be produced. Clearly, this overstates the oil-spill occurrence associated with leasing and exploration in the Chukchi Sea where it is unlikely a development will occur from those activities. If a development occurs, this oil-spill analysis more accurately represents the chance of one or more large spills occurring.

The chance of one or more large spills occurring assumes there is a 100% chance that a project will be developed and 1 Bbbl of oil will be produced. The large spill rates used in this section are all based on spills per billion barrels. Using the above mean large spill rates, Table A.1-25 shows the estimated mean number of large oil spills for Alternative I, the Proposed Action and its alternatives. For Alternative I, the Proposed Action, we estimate 0.30 pipeline spills and 0.21 platform (and well) spills for a total over the life of Sale 193 production of 0.51 spills. Table A.1-27 shows the estimated total number of oil spills for the Proposed Action using spill rates at the 95% CI. For Alternative I, the Proposed Action, total spills over the life of the Sale 193 production range from 0.32-0.77 spills. For purposes of analysis, one large spill was assumed to occur and is analyzed in this EIS.

For Alternative III, Corridor I, we estimate 0.19 pipeline spills and 0.13 platform (and well) spills for a total over the life of Sale 193 production of 0.33 spills. Table A.1-27 shows the estimated total number of oil spills for the Proposed Action using spill rates at the 95% CI. For Alternative III, Corridor I, total spills over the life of the Sale 193 production range from 0.20-0.49 spills. For purposes of analysis, one large spill was assumed to occur and is analyzed in this EIS.

For Alternative IV, Corridor II, we estimate 0.25 pipeline spills and 0.18 platform (and well) spills for a total over the life of Sale 193 production of 0.43 spills. Table A.1-27 shows the estimated total number of oil spills for the Proposed Action using spill rates at the 95% CI. For Alternative IV, Corridor II, total spills over the life of the Sale 193 production range from 0.27-0.65 spills. For purposes of analysis, one large spill was assumed to occur and is analyzed in this EIS.

Using the above mean spill rates, Table A.1-26 shows the chance of one or more large pipeline spills occurring is 26% and the chance of one or more large platform (wells and platform) spills is 19% for Alternative I, the Proposed Action over the life of production. The total is derived from the sum of the platform, wells and pipeline mean number of spills. The chance of one or more large spills total occurring is 40% for Alternative I, the Proposed Action over the life of production. Figure A.1-9 shows the Poisson distribution. The chance of no spills occurring is 60% for Alternative I, the Proposed Action. Table A.1-27 shows the chance of one or more large spills total for Alternative I, the Proposed Action using spill rates at the 95% CI. For Alternative I, the Proposed Action, the percent chance of one or more large spills total ranges from 27-54% at the 95% confidence interval (Table A.1-27).

Table A.1-26 shows the chance of one or more large pipeline spills occurring is 17% and the chance of one or more large platform (wells and platform) spills is 12% for Alternative III, Corridor I over the life of production. The total is the sum of the platform, wells and pipeline mean number of spills. The chance of one or more large spills total occurring is 28% for Alternative III, Corridor I. Figure A.1-10 shows the Poisson distribution. The chance of no spills occurring is 72% for Alternative III, the Corridor I. Table A.1-27 shows the chance of one or more large spills total for Alternative III, the Corridor I using spill rates at the 95% CI. For Alternative III, the Corridor I, the percent chance of one or more large spills total ranges from 18-39% at the 95% confidence interval (Table A.1-27).

Table A.1-26 shows the chance of one or more large pipeline spills occurring is 22% and the chance of one or more large platform (wells and platform) spills is 16% for Alternative IV, Corridor II over the life of production. The total is the sum of the platform, wells and pipeline mean number of spills. The chance of one or more large spills total occurring is 35% for Alternative IV, Corridor II. Figure A.1-11 shows the Poisson distribution. The chance of no spills occurring is 65% for Alternative IV, the Corridor II. Table A.1-27 shows the chance of one or more large spills total for Alternative IV, the Corridor II using spill rates at the 95% CI. For Alternative IV, the Corridor II, the percent chance of one or more large spills total ranges from 24-48% at the 95% CI (Table A.1-27).

D.2. Chance of a Large Spill Contacting. The chance of a large spill contacting is taken from the oil-spill-trajectory model results summarized in Section C.4.b and listed in Tables A.2-1 through A.2-72.

D.3. Results of the Oil-Spill-Risk Analysis: Combined Probabilities. Tables A.2-73 through A.2-90 show the annual combined probabilities for the Proposed Action and its alternatives. The combined probabilities reflect the chance of one or more large spills occurring and contacting over the assumed production life of the lease area. For the most part, the chance of one or more large spills occurring and contacting ERAs and land segments is 7% or less over 30 days or 14% or less over 360 days for Alternative I. For ERA's, with a chance of occurrence and contact ≥0.5%, the chance of one or more large spills occurring and contacting a certain ERA ranges from 1-4%, 1-5% and 1-7% within 3,10 and 30 days respectively for Alternative I. The chance of one or more large spills occurring and contacting a certain ERA ranges from 1-2%, 1-3% and 1-3% within 3, 10, and 30 days respectively for Alternative III. The chance of one or more large spills occurring and contacting a certain ERA ranges from 1-3%, 1-4% and 1-5% within 3, 10, and 30 days, respectively, for Alternative IV. The chance of one or more large spills occurring and contacting individual land segments is 1% or less within 30 days. For Alternative I, land segments with a 1% chance of one or more spills occurring and contacting after 30 days include LS's 72 (Point Lay), 73 (Tungaich Point), 74 (Kasegaluk Lagoon), and 75 (Icy Cape). For Alternative III, land segments with a 1% chance of one or more spills occurring and contacting after 30 days include LS's 73 (Tungaich Point). For Alternative IV, land segments with a 1% chance of one or more spills occurring and contacting after 30 days include LS's 72 (Point Lay), 73 (Tungaich Point), and 74 (Kasegaluk Lagoon).

E. Small Oil Spills.

Small spills are spills that are <1,000 bbl. We analyze the effects of small spills in Section IV.C. We consider two types of small spills: crude oil and refined oil.

We use the Alaska North Slope record of small spills. We expect the same companies and regulators to participate offshore in the Chukchi Sea as those that are now operating on the onshore Alaska North Slope. We expect similar but not exact environmental conditions. We believe it is reasonable to assume that the rate in the Beaufort Sea will be similar to the rate on the Alaska North Slope. The OCS rate of crude and refined small spills is approximately 3,460 spills per billion barrels, and the North Slope rate is approximately 618 spills per billion barrels. For whatever reason, the spill rate on the Alaska North Slope is significantly less than the OCS rate.

The analysis of operational small oil spills uses historical oil-spill databases and simple statistical methods to derive general information about small crude and refined oil spills that occur on the Alaska North Slope. This information includes estimates of how often a spill occurs for every billion barrels of oil produced (oil-spill rates), the mean (average) number of oil spills, and the mean and median size of oil spills from facilities, pipelines, and flowlines combined. We then use this information to estimate the number, size, and distribution of operational small spills that may occur from Chukchi Sea Sale 193. The analysis of operational small oil spills considers the entire production life of the Chukchi Sea sale and assumes the following:

- commercial quantities of hydrocarbons are present in the multiple-sale Program Area, and
- these hydrocarbons will be developed and produced at the estimated resource levels.

Uncertainties exist, such as

- the estimates required for the assumed resource levels, or
- the actual size of a crude- or refined-oil spill.

We use the history of crude and refined oil spills reported to the State of Alaska, Department of Environmental Conservation (ADEC) and the Joint Pipeline Office to determine crude and refined oil-spill rates and patterns from Alaska North Slope oil and gas exploration and development activities for spills ≥1gallon and <1,000 bbl. Refined oil includes aviation fuel, diesel fuel, engine lube, fuel oil, gasoline, grease, hydraulic oil, transformer oil, and transmission oil. The Alaska North Slope oil-spill analysis includes onshore oil and gas exploration and development spills from the Point Thompson Unit, Badami Unit, Kuparuk River Unit, Milne Point Unit, Prudhoe Bay West Operating Area, Prudhoe Bay East Operating Area, and Duck Island Unit.

The Alaska North Slope oil-spill database of all spills ≥1 gallon is from ADEC. Oil-spill information is provided to ADEC by private industry according to the State of Alaska Regulations 18 AAC 75. The totals are based on initial spill reports and may not contain updated information. The ADEC database integrity is most reliable for the period 1989 and after due to increased scrutiny after the *Exxon Valdez* oil spill (Volt, 1997, pers. commun.). For this analysis, the database integrity cannot be validated thoroughly. However, we use this information, because it is the only information available to us about small spills. For this analysis, the ADEC database is spot-checked against spill records from ARCO Alaska, Inc. and British Petroleum, Inc. All spills ≥1 gallon are included in the dataset.

We use the time period January 1989 through December 2000 in this analysis of small oil spills for the Chukchi Sea.

A simple analysis of operational small oil-spills is performed. Alaska North Slope oil-spill rates are estimated without regard to differentiating operation processes. The ADEC database base structure does not facilitate quantitative analysis of Alaska North Slope oil-spill rates separately for platforms, pipelines, or flowlines.

E.1. Results for Small Operational Crude Oil Spills. The analysis of Alaska North Slope crude oil spills is performed collectively for all facilities, pipelines, and flowlines. The pattern of crude oil spills on the Alaska North Slope is one of numerous small spills. Of the crude oil spills that occurred between 1989 and 2000, 31% were ≤2 gallons (gal); 55% were ≤5 gal. Ninety-eight percent of the crude oil spills were <1,050 gal (25 bbl), and 99% were <2,520 gal (60 bbl). The spill sizes in the database range from <1 gal-38,850 gal (925 bbl). The average crude oil-spill size on the Alaska North Slope is 113.4 gal (2.7 bbl), and the median spill size is 5 gal. For purposes of analysis, this EIS assumes an average crude oil-spill size of 126 gal (3 bbl).

Table A.1-28 shows the estimated crude oil-spill rate for the Alaska North Slope is 178 spills per billion barrels produced for spills less than 500 bbl and 0.64 spills per billion barrels produced for spills ≥500 bbls. Table A.1-29 shows the assumed number, size, and total volume of small spills for the Proposed Action and alternatives. Table A.1-30 shows the assumed size distribution of those spills for the Proposed Action and alternatives.

The causes of Alaska North Slope crude oil spills, in decreasing order of occurrence by frequency, are leaks, faulty valve/gauges, vent discharges, faulty connections, ruptured lines, seal failures, human error, and explosions. The cause of approximately 30% of the spills is unknown.

E.2. Results for Small Operational Refined Oil Spills. The typical refined products spilled are aviation fuel, diesel fuel, engine lube, fuel oil, gasoline, grease, hydraulic oil, transformer oil, and transmission oil. Diesel spills are 58% of refined oil spills by frequency and 83% by volume. Engine lube oil spills are 10% by frequency and 3% by volume. Hydraulic oil is 26% by frequency and 10% by volume. All other categories are <1% by frequency and volume. Refined oil spills occur in conjunction with oil exploration and production. The refined oil spills correlate to the volume of Alaska North Slope crude oil produced. As production of crude oil has declined, so has the number of refined oil spills. Table A.1-31 shows that from January 1989-December 2000, the spill rate for refined oil is 440 spills per billion barrels produced. Table A.1-32 shows the assumed refined oil spills during the lifetime of the Proposed Action and its alternatives.

E.3. Assumptions for Purposes of Small Spill Analysis. The average crude-oil spill size is 126 gal (3 bbl) for spills less than 500 bbl. An estimated 178 small crude oil spills could occur during the 25-year oil-production period for Alternative I (Table A.1-29), an average of over 7 per year. The average refined-oil spill size is 29 gal (0.7 bbl) and an estimated 440 refined-oil spills would occur during the 25-year oil-production period for Alternative I (Table A.1-32), an average of 17.6 per year. Overall, an estimated 25 crude and refined oil spills less than 500 barrels would occur each year of production for Alternative I. The average crude-oil spill size is 680 bbl for spills ≥ 500 bbl. An estimated 1 small crude oil spill ≥ 500 bbl could occur during the 25-year oil-production period for Alternative I, III, or IV (Table A.1-29).

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Table A.1-1
Large and Small Spill Sizes, Source of Spill, Type of Oil, Number and Size of Spill and Receiving Environment We Assume for Analysis in this EIS by Section

EIS Section	Source of Spill	Type of Oil	Number and Size of Spill(s) (Barrels)	Receiving Environment
Large Spills (≥1,000 barrels)				
IV.C	**Offshore** Pipeline Platform/Storage Tank	Crude Or Diesel	1 spill 4,600 Or 1,500 barrels	Open Water Under Ice On Top of Sea Ice Broken Ice Coastal Shoreline
Small Spills[1] (< 1,000 barrels)				
IV.C	**Offshore and/or Onshore** Operational Spills from All Sources	Diesel or Crude	133 spills <1 barrel 43 spills ≥1 barrel but <25 barrels 2 spills ≥ 25 and <500 barrels 1 spill ≥500 and <1,000 barrels	Open Water On Top of Sea Ice Broken Sea Ice Snow/Ice Tundra Coastal Shoreline
	Onshore and/or Offshore Operational Spills from All Sources	Refined	440 spills of 0.7 barrels each	

Note:

[1] These numbers are for Alternative I, the Proposed Action. Tables A.1-29 through A.1-32 in Appendix A.1 show the distribution of small crude and refined spills by Alternative.

Source:
USDOI, MMS, Alaska OCS Region (2006).

Table A.1-2
Number of Blowouts per Year in the Gulf of Mexico and Pacific OCS Regions

		Total with Condensate/ Oil	Amount of Condensate/Oil (Barrels)			Production				Drilling				Workover/ Completion	Wells Drilled
Year	Number of Blowouts		Development	Exploration	Total Exploration and Development	Total	Fire	Hurricane	Other	Total	Exploration	Development	Unknown	Total	Total
1956	1	0	—	—	0	—	—	—	—	—	—	—	—	—	—
1957	1	0	—	—	0	—	—	—	—	—	—	—	—	—	—
1958	2	1	Minimal	—	1	1	1	—	—	—	—	—	—	—	—
1959	1	0	—	—	0	—	—	—	—	—	—	—	—	—	—
1960	2	0	—	—	0	—	—	—	—	—	—	—	—	—	—
1961	0	0	—	—	0	—	—	—	—	—	—	—	—	—	—
1962	1	0	—	—	0	—	—	—	—	—	—	—	—	—	—
1963	1	0	—	—	0	—	—	—	—	—	—	—	—	—	—
1964	7	3	10,380	—	10,380	3	1	2	—	—	—	—	—	—	—
1965	5	2	1688	—	1,688	1		1	—	1	—	—	1	—	—
1966	2	2	Minimal	—	1	—	—	—	—	1	—	—	1	—	—
1967	1	1	Minimal	—	1	1	—	—	1	—	—	—	—	—	—
1968	9	0	—	—	0	—	—	—	—	—	—	—	—	—	—
1969	3	3	82500	—	82500	2	—	—	2	1	—	1	—	—	—
1970	23	3	83000	—	83000	2	2	—	—	1	—	1	—	—	—
1971	9	1	450	—	450	1	1	—	—	—	—	—	—	—	851
1972	5	1	Minimal	—	1	—	—	—	—	1	—	—	1	—	845
1973	3	1	Minimal	—	1	—	—	—	—	1	—	1	—	—	820
1974	6	2	275	—	275	2	—	2	—	—	—	—	—	—	802
1975	7	1	Minimal	—	1	—	—	—	—	—	—	—	—	1	842
1976	6	0	—	—	0	—	—	—	—	—	—	—	—	—	1078
1977	10	0	—	—	0	—	—	—	—	—	—	—	—	—	1240
1978	12	1	Minimal	—	1	—	—	—	—	—	—	—	—	1	1164
1979	5	2	Minimal	—	1	—	—	—	—	2	—	2	—	—	1140
1980	8	2	1	—	1	1	—	—	1	1	—	1	—	—	1158
1981	10	4	64	—	64	—	—	—	—	2	—	2	—	2	1208
1982	9	2	Minimal	—	1	—	—	—	—	1	—	1	—	1	1255
1983	12	0	—	—	0	—	—	—	—	—	—	—	—	—	1180
1984	5	0	—	—	0	—	—	—	—	—	—	—	—	—	1352
1985	6	1	40	—	40	1	—	—	1	—	—	—	—	—	1169
1986	2	0	—	—	0	—	—	—	—	—	—	—	—	—	694
1987	13	1	60	—	60	—	—	—	—	1	—	1	—	—	845
1988	3	0	—	—	0	—	—	—	—	—	—	—	—	—	950
1989	12	0	—	—	0	—	—	—	—	—	—	—	—	—	947
1990	7	3	20.5	—	20.5	1	—	—	1	—	—	—	—	2	1018
1991	6	1	—	0.8	0.8	—	—	—	—	1	1	—	—	—	726
1992	1	1	—	100	100	—	—	—	—	1	1	—	—	—	431
1993	2	0	—	—	0	—	—	—	—	—	—	—	—	—	879
1994	0	0	—	—	0	—	—	—	—	—	—	—	—	—	845
1995	1	0	—	—	0	—	—	—	—	—	—	—	—	—	798
1996	4	0	—	—	0	—	—	—	—	—	—	—	—	—	889
1997	5	0	—	—	0	—	—	—	—	—	—	—	—	—	954
1998	7	1	1.5	—	1.5	1	—	—	1	—	—	—	—	—	993
1999	5	0	—	—	0	—	—	—	—	—	—	—	—	—	962
2000	9	3	—	200	200	—	—	—	—	2	2	—	—	1	1315
2001	10	1	1	—	1	—	—	—	—	—	—	—	—	1	1261
2002	6	1	350	—	350	1	—	1	—	—	—	—	—	—	929
2003	5	1	10	—	10	—	—	—	—	—	—	—	—	1	886
2004	4	2	5.4	11	16.4	1	—	—	1	—	—	—	—	1	894
2005	4	0	—	—	—	—	—	—	—	—	—	—	—	—	659
Total	278	43	178,480	311.8		17	—	—	—	17	—	—	—	9	33979

Source: USDOI, MMS, Alaska OCS Region (2006).

Table A.1-3
Gulf of Mexico Blowout Frequencies Recommended for Analyses

Phase		U.S. Gulf of Mexico OCS Experienced and Recommended Frequency	Units
Exploration Drilling	Shallow Gas	0.00382	Blowouts per well drilled
	Deep	0.00210	Blowouts per well drilled
	Total	0.00593	Blowouts per well drilled
Development Drilling	Shallow Gas	0.00257	Blowouts per well drilled
	Deep	0.00142	Blowouts per well drilled
	Total	0.00399	Blowouts per well drilled
Workover	–	0.00136	Blowouts per well workover[1]
	–	0.00017	Blowouts per well-year
Production	–	0.00005	Blowouts per well-year
Wireline	–	0.000007	Blowouts per wireline run [2]
	–	0.000017	Blowouts per wireline job [2]
	–	0.000028	Blowouts per well-year
Completion	–	0.00021[3]	Blowouts per well completion

Notes:
[1] One workover every 8 well-years.
[2] 4.2 wireline runs per well-year, 1.7 wireline jobs per well-year.
[3] Based on trend analyses.

Source:
Holland (1997).

Table A.1-4
Exploration Spills on the Arctic OCS

Lease No.	Sale Area	Operator	Date	Time 24 Hr	Facility	Substance	Amt. (Gal)	Cause of Spill	Response Action	Amount Recovered
0344	71	Sohio	7/22/1981	11:00	Mukluk Island	Diesel	0.50	Leaking line on portable fuel trailer	Sorbents used to remove spill. Contaminated gravel removed.	0.05
0344	71	Sohio	7/22/1981	14:00	Mukluk Island	Diesel	1.00	Overfilled fuel tank on equipment	Sorbents used to remove spill. Contaminated gravel removed.	1.00
0280	71	Exxon	8/7/1981		Beaufort Sea I	Hydraulic Fluid	1.00	Broken hydraulic line on ditch witch.	Fluid picked up with shovels.	1.00
0280	71	Exxon	8/8/1981		Beaufort Sea I	Trans. Fluid	0.25	Overfilling of transmission fluid.	Fluid picked up and placed in plastic bags.	0.25
0280	71	Exxon	1/11/1982		Beaufort Sea I	Hydraulic Fluid	0.50	Broken hydraulic line.	Fluid picked up and stored in plastic bags.	0.50
0280	71	Exxon	1/11/1982		Alaska Beaufort Sea I	Diesel	3.00	Overfilled catco 90-3 tank.	Fluid picked up.	3.00
0280	71	Exxon	1/17/1982		Beaufort Sea I	Diesel	1.00	Tank on catco 90-14 overfilled.	Fluid picked up and stored in plastic bags.	1.00
0280	71	Exxon	1/21/1982		Beaufort Sea I	Hydraulic Fluid	0.25	Broken hydraulic line on ditch witch.	Fluid picked up.	0.25
0371	71	Amoco	3/16/1982	N/A	Sandpiper Gravel Island	Unknown	1.00	Seeping from Gravel Island.	Sorbent pads.	Unknown
0849	87	Union Oil	9/4/1982	14:00	Canmar Explorer II	Unknown	1.00	Transfer of test tank from drillship to barge.	None	None
0871	87	Shell Western	9/5/1982	18:55	Canmar Explorer II	Light Oil	0.50	Washing down cement unit, drains not plumbed to oil/water seperator.	None	None
N/A	87	Shell	9/14/1982	19:00	Canmar II Drillship	Diesel	30.00	Tank vent overflowed during fuel transfer.	Deployed sorbent pads and pump.	30.00
0191	BF	Exxon	11/11/1982	10:00	Beechey Pt. Gravel Is.	Lube Oil	1.00	Loader tipped over lube oil drum	Oil cleaned up with sorbents. Contaminated gravel removed	1.00
0191	BF	Exxon	1/15/1983	10:00	Beechey Pt. Gravel Is.	Diesel	0.12	Fuel truck spilled diesel as it climbed a 40 degree ramp to island	Sorbents used and contaminated gravel removed	0.12
0191	BF	Exxon	1/23/1983	9:00	Beechey Pt. Gravel Is.	Hydraulic Fluid	2.50	Hydraulic line on backhoe broke	1 gallon in water. Boom deployed with sorbents, Contaminated gravel removed	2.50
0191	BF	Exxon	8/29/1983	6:30	Beechey Pt. Gravel Is.	Hydraulic Fluid	0.20	Hydraulic line on backhoe broke	Spill contained on island surface. Sorbents used and contaminated gravel removed.	0.25
0196	BF	Shell	8/30/1983		Ice Road to Tern Island	Hydraulic Fluid	10.0	Broken hydraulic line on rollogon	Unknown	Unknown
0191	BF	Exxon	2/26/1985	17:30	Beechey Pt. Gravel Is.	Hydraulic Fluid	0.37	Hydraulic line broke	Contaminated Snow Removed	0.37
0196	BF	Shell	3/1/1985	1:30	Ice Road to Tern Island	Hydraulic Fluid	3.00	Hydraulic line broke	Unknown	3.00
0191	BF	Exxon	3/2/1985		Beechey Pt. Gravel Is.	Gasoline	0.01	Operational Spill	Snow shoved into plastic bag.	0.01
0191	BF	Exxon	¾/1985		Beechey Pt. Gravel Is.	Waste Oil	2.00	Drum of waste oil punctured	Snow recovered	2.00
0196	BF	Shell	¾/1985	15:30	Tern Gravel Island	Crude Oil	1.00	Well Separator overflowed, crude oil escaped	Line boom deployed	Unknown

Table A.1-4 (Continued)
Exploration Spills on the Arctic OCS

Lease No.	Sale Area	Operator	Date	Time 24 Hr	Facility	Substance	Amt. (Gal)	Cause of Spill	Response Action	Amount Recovered
0196	BF	Shell	3/6/1985	16:30	Tern Gravel Island	Crude Oil	15.00	Test burner was operating poorly	Containment Boom deployed	Unknown
0196	BF	Shell	9/24/1985	16:00	Tern Gravel Island	Crude Oil	2.00	Oil released from steam heat coil when Halliburton tank moved	Sorbents and hand shovel used	2.00
0191	BF	Shell	10/4/1985	8:45	Enroute to Tern Gravel Island	Jet fuel B	800.00	Wire sling broke during helicopter transport of fuel blivits	Contaminated Snow Removed. Test holes drilled with no fuel below snow.	Unknown
0196	BF	Shell	10/29/1985	14:00	Tern Gravel Island	Crude Oil	2.00	Test oil burner malfunction	Contaminated snow removed	2.00
0196	BF	Shell	6/27/1986	13:30	Tern Gravel Island	Crude Oil	3.00	Test oil burner malfunction	Spray picked up with sorbents. Bladed up dirty snow.	2.00
1482	109	SWEPI	7/7/1989	3:00	Explorer III Drillship	Hydraulic fluid	10.0	Hydraulic line connector	Sorbent pads	0.84
1092	97	AMOCO	10/1/1991	2:00	CANMAR Explorer	Hydraulic fluid	2.00	Hydraulic line rupture	None	None
0865	87	ARCO	7/24/1993		Beaudril Kulluk	Diesel	0.06	Residual fuel in bilge water	None	None
0866	87	ARCO	9/8/1993	18:30	CANMAR Kulluk	Hydraulic fluid	1.26	Seal on shale shaker failed	None	None
0866	87	ARCO	9/24/1993		CANMAR Kulluk	Fuel	4.00	Fuel transfer in rough weather	3 gallons on deck of barge recovered, none in sea	3.00
1597	124	ARCO	10/31/1993		CANMAR Kulluk	Fuel	0.50	Released during emptying of disposal caisson	None	None
0943	87	Tenneco	1/24/1998	13:00	SSDC/MAT	Gear oil	220.0	Helicopter sling failure during transfer of drums to SSDC	Scooped up contaminated snow and ice	220.0
1585	124	BP Alaska	1/20/1997		Ice Road to Tern Island	Diesel, Hydraulic Fluid	10.5	Truck went through ice; fuel line ruptured	Scooped up contaminated snow and ice. Some product entered water	Unknown

Source:
USDOI, MMS, Alaska OCS Region (2006).

Table A.1-5
Properties of Alpine Crude Oil (Composite)

Physical and Chemical Data for the Alpine Composite	
Chemical/Physical Property	
Specific Gravity (60°F/15.56°C)	0.834
Pour Point	-18
Reference Temperature 1 (°C)	10
Viscosity at Reference Temperature 1(cP)	103
Wax (weight %)	3.2
Asphaltenes (weight %)	0.06

Table A.1-6
The True Boiling Point Values used for the Alpine Composite Sample

Temperature [°C]	Evaporated [volume%]
85	8
105	13
135	19
175	27
205	33
235	38
265	45
310	54
350	62
420	72
525	89

Table A.1-7
Experimental Results from the Bench-Scale Laboratory Testing at 10°C (50°F) for the Alpine Composite Sample

Chemical/Physical Property	Fresh	150ºC+	200ºC+	250ºC+
Boiling Point [ºC]	-	167	246	296
Evaporation [vol%]	0	22	34	44
Residue [weight%]	100	81	69	60
Specific Gravity [g/L]	0.8340	0.8668	0.8845	0.8981
Pour Point [ºC]	-18	-3	9	18
Viscosity at Shear $10s^{-1}$ [cP]	103	118	839	1,160
Viscosity of 50% Emulsion at Shear $10s^{-1}$ [cP]	-	120	920	2,940
Viscosity of 75% Emulsion at Shear $10s^{-1}$ [cP]	-	780	2,970	7,130
Viscosity of Max Water Emulsion at Shear $10s^{-1}$ [cP]	-	-	5,960	11,700
Maximum Water Content in Emulsion [vol%]	-	80	80	80
Halftime for Water Uptake [h]	-	0.1	0.2	0.5
Stability Ratio	-	0	1	0.8

Key:
- = Not determined
% = percent
vol = volume
°C = degrees Celsius
°F = degrees Fahrenheit
cP = Centipoise
g/L = grams per Liter
h = hour

Source: Lerivik, F., T.J Schrader, and M.O. Moldestad, (2005).

Table A.1-8
Land Segment ID and the Percent Type of Environmental Sensitivity Index Shoreline Closest to the Ocean for United States, Alaska Shoreline

ID	Geographic Place Names	1B	1B	2A	3A	3C	4	5	6A	6B	7	8A	8B	8E	9A	9B	10 A	10 E	U
40	Ah-Gude-Le-Rock, Dry Creek, Lopp Lagoon, Mint River	—	—	1	16	0	—	29	0	—	19	6	—	—	8	—	15	1	—
41	Ikpek, Ikpek Lagoon, Pinguk River, Yankee River	—	—	4	30	2	—	0	—	—	22	5	—	—	9	—	14	2	—
42	Arctic Lagoon, Kugrupaga Inlet, Nuluk River	—	—	3	10	2	—	7	0	—	9	17	—	—	17	—	31	2	—
43	Sarichef Island, Shishmaref Airport	—	—	1	24	3	1	3	—	—	9	13	—	—	31	0	9	2	—
44	Cape Lowenstern, Egg Island, Shishmaref, Shishmaref Inlet	—	—	10	9	3	0	1	—	—	10	2	—	—	22	—	26	—	—
45		—	—	1	5	5	—	—	—	—	5	18	—	—	15	—	51	—	—
46	Cowpack Inlet and River, Kalik River, Kividlo, Singeak, Singeakpuk River	—	—	4	17	2	—	—	—	—	26	2	—	—	12	1	28	—	—
47	Kitluk River, Northwest Corner Light, West Fork Espenberg River	—	—	—	24	12	—	—	—	—	16	14	—	—	4	—	18	3	—
48	Cape Espenberg, Espenberg, Espenberg River	0	—	7	13	5	—	6	9	—	12	12	—	—	12	—	20	1	—
49	Kungealoruk Creek, Kougachuk Creek, Pish River	—	—	0	5	7	—	20	—	—	3	4	—	—	16	—	33	—	—
50	Clifford Point, Cripple River, Goodhope River, Rex Point, Sullivan Bluffs	—	—	—	—	—	—	24	18	—	0	22	—	—	1	—	14	—	—
51	Cape Deceit, Deering, Kugruk Lagoon and River, Sullivan Lake, Toawlevic Point	1	—	—	—	1	1	23	6	—	9	8	1	—	2	—	41	6	—
52	Motherwood Point, Ninemile Point, Willow Bay	17	—	—	—	3	—	12	32	—	2	—	—	—	5	—	17	12	—
53	Kiwalik, Kiwalik Lagoon, Middle Channel Kiwalk River, Minnehaha Creek, Mud Channel Creek, Mud Creek	4	—	—	1	1	—	13	10	—	11	10	—	—	26	—	22	2	—
54	Baldwin Peninsula, Lewis Rich Channel	2	—	—	—	2	—	43	3	—	3	6	—	—	0	—	35	3	—
55	Cape Blossom, Pipe Spit	—	—	—	—	10	—	35	10	—	—	2	—	—	6	—	9	20	—
56	Kinuk Island, Kotzebue, Noatak River	—	—	—	—	3	—	2	8	—	4	5	0	—	29	—	47	—	—
57	Aukulak Lagoon, Igisukruk Mountain, Noak, Mount, Sheshalik, Sheshalik Spit	—	—	1	—	—	—	37		—	—	1	—	—	22	—	36	—	—
58	Cape Krusenstern, Eigaloruk, Evelukpalik River, Kasik Lagoon, Krusenstern Lagoon,	—	—	—	—	8	0	30	7	—	4	3	—	—	2	—	30	16	—
59	Imik Lagoon, Ipiavik Lagoon, Kotlik Lagoon, Omikviorok River	0	0	—	—	1	—	62	6	—	3	6	—	—	2	—	6	14	—
60	Imikruk Lagoon, Imnakuk Bluff, Kivalina, Kivalina Lagoon, Singigrak Spit, Kivalina River, Wulik River	—	—	—	—	0	2	23	2	—	1	5	—	—	8	—	35	22	—
61	Asikpak Lagoon,Cape Seppings,Kavrorak Lagoon,Pusaluk Lagoon,Seppings Lagoon	—	—	—	—	—	3	32	13	—	—	2	—	—	—	—	—	49	—
62	Atosik Lagoon,Chariot,Ikaknak Pond,Kisimilok Mountain,Kuropak Creek,Mad Hill	—	—	—	—	—	—	100	—	—	—	—	—	—	—	—	—	—	—
63	Akoviknak Lagoon, Cape Thompson, Crowbill Point, Igilerak Hill, Kemegrak Lagoon	7	—	—	—	—	—	93	—	—	—	—	—	—	—	—	—	—	—
64	Aiautak Lagoon, Ipiutak Lagoon, Kowtuk Point, Kukpuk River, Pingu Bluff, Point Hope, Sinigrok Point,	16	—	—	—	—	—	82	3	—	—	—	—	—	—	—	—	—	—
65	Buckland, Cape Dyer, Cape Lewis, Cape Lisburne	29	—	—	—	—	—	60	5	—	—	—	—	—	—	—	—	—	—
66	Ayugatak Lagoon	51	—	—	—	—	—	46	—	—	—	—	—	—	—	—	—	—	—
67	Cape Sabine, Pitmegea River	51	—	—	—	9	—	40	—	—	—	—	—	—	—	—	—	—	—
68	Agiak Lagoon, Punuk Lagoon	—	—	—	—	10	—	86	—	—	—	—	—	—	—	—	—	—	—
69	Cape Beaufort, Omalik Lagoon	—	—	—	—	45	—	50	—	—	—	—	—	—	—	—	—	—	—

Table A.1-8 (continued)

Land Segment ID and the Percent Type of Environmental Sensitivity Index Shoreline Closest to the Ocean for United States, Alaska Shoreline

ID	Geographic Place Names	1A	1B	2A	3A	3C	4	5	6A	6B	7	8A	8B	8E	9A	9B	10 A	10 E	U
70	Kuchaurak Creek, Kuchiak Creek	—	—	—	20	3	—	34	—	—	—	—	—	1	12	9	10	10	—
71	Kukpowruk River, Naokok, Sitkok Point	—	—	—	34	7	—	21	—	—	—	—	—	—	25	7	2	2	3
72	Kokolik River, Point Lay, Siksrikpak Point	—	—	—	30	3	—	7	—	—	—	—	—	3	19	19	—	5	14
73	Akunik Pass, Tungaich Point, Tungak Creek	—	—	—	27	14	—	7	—	—	—	—	—	—	19	8	—	3	22
74	Kasegaluk Lagoon, Solivik Island, Utukok River	—	—	—	21	8	—	1	—	—	—	—	—	—	19	9	—	—	43
75	Akeonik, Icy Cape, Icy Cape Pass	—	—	—	25	12	—	14	—	—	—	—	—	3	16	18	—	2	10
76	Akoliakatat Pass, Avak Inlet, Tunalik River	—	—	—	21	21	—	7	—	—	—	—	—	4	10	7	—	10	20
77	Nivat Point, Nokotlek Point, Ongorakvik River	—	—	—	47	10	—	30	—	—	—	—	—	—	2	9	1	1	1
78	Kuk River, Point Collie, Sigeakruk Point,	—	—	—	46	13	—	23	—	—	—	—	—	1	3	2	—	9	3
79	Point Belcher, Wainwright, Wainwright Inlet	—	—	—	26	26	—	37	—	—	—	—	—	—	—	11	—	—	—
80	Eluksingiak Point, Igklo River, Kugrua Bay	—	—	—	23	42	—	16	—	—	—	—	—	9	4	2	—	5	—
81	Peard Bay, Point Franklin, Seahorse Islands, Tachinisok Inlet	—	—	—	60	26	—	7	—	—	—	—	—	5	—	2	—	—	—
82	Skull Cliff	5	—	—	—	78	—	17	—	—	—	—	—	—	—	—	—	—	—
83	Nulavik, Loran Radio Station	1	—	—	—	91	—	8	—	—	—	—	—	—	—	—	—	—	—
84	Walakpa River, Will Rogers and Wiley Post Memorial	—	—	—	—	4	—	96	—	—	—	—	—	—	—	—	—	—	—
85	Barrow, Browerville, Elson Lagoon	—	—	—	—	—	20	38	—	—	2	—	—	28	—	—	—	10	1
86	Dease Inlet, Plover Islands, Sanigaruak Island	—	—	—	11	—	15	23	—	—	13	—	—	35	—	—	—	3	—
87	Igalik Island, Kulgurak Island, Kurgorak Bay, Tangent Point	—	—	—	7	—	4	5	—	—	7	—	—	34	27	3	—	13	—
88	Cape Simpson, Piasuk River, Sinclair River, Tulimanik Island	—	—	—	—	—	4	5	—	—	3	—	—	19	48	2	—	4	15
89	Ikpikpuk River, Point Poleakoon, Smith Bay	—	—	—	—	—	—	—	—	—	-	—	—	8	73	—	—	—	19
90	Drew Point, Kolovik, McLeod Point,	—	—	—	—	—	25	—	—	—	15	—	—	60	—	—	—	—	—
91	Lonely, Pitt Point, Pogik Bay, Smith River	—	—	—	—	—	9	8	—	—	4	—	—	27	30	—	—	—	22
92	Cape Halkett, Esook Trading Post, Garry Creek	—	—	—	0	3	16	—	—	—	5	—	—	72	—	—	—	4	—
93	Atigaru Point, Eskimo Islands, Harrison Bay,	—	—	—	15	27	8	2	—	—	2	—	—	16	—	—	1	22	7
94	Fish Creek, Tingmeachsiovik River	—	—	—	11	4	—	—	—	—	12	—	—	3	32	—	—	38	—
95	Anachlik Island, Colville River, Colville River Delta	—	—	—	7	2	—	—	—	—	42	—	—	2	36	—	1	8	—
96	Kalubik Creek, Oliktok Point, Thetis Mound,	—	—	—	19	0	—	12	1	—	8	—	—	9	1	—	—	25	25
97	Beechey Point, Bertoncini Island, Bodfish Island, Cottle Island, Jones Islands, Milne Point, Simpson Lagoon	—	—	—	41	5	—	18	—	—	7	—	—	8	0	—	—	10	11
98	Gwydyr Bay, Kuparuk River, Long Island	—	—	—	10	1	—	23	—	—	6	—	—	3	23	—	—	26	7
99	Duck Island, Foggy Island, Gull Island, Heald Point, Howe Island, Niakuk Islands, Point Brower	—	—	—	—	4	—	14	1	—	9	—	1	2	51	—	—	10	4

Table A.1-8 (continued)
Land Segment ID and the Percent Type of Environmental Sensitivity Index Shoreline Closest to the Ocean for United States, Alaska Shoreline

ID	Geographic Place Names	1A	1B	2A	3A	3C	4	5	6A	6B	7	8A	8B	8E	9A	9B	10 A	10 E	U
100	Foggy Island Bay, Kadleroshilik River, Lion Point, Shaviovik River, Tigvariak Island	—	—	—	10	1	—	8	—	—	27	—	—	4	5	—	—	39	5
101	Bullen Point, Point Gordon, Reliance Point	—	—	—	10	3	—	39	—	—	5	—	—	3	—	—	—	25	15
102	Flaxman Island, Maguire Islands, North Star Island, Point Hopson, Point Sweeney, Point Thomson, Staines River	—	—	—	11	3	—	37	2	—	8	—	—	7	—	—	—	14	18
103	Brownlow Point, Canning River, Tamayariak River	—	—	—	—	2	18	6	—	—	12	—	—	7	35	—	—	1	19
104	Camden Bay, Collinson Point, Katakturuk River, Konganevik Point, Simpson Cove	—	—	—	—	—	8	30	—	—	9	—	—	14	2	2	—	10	26
105	Anderson Point, Carter Creek, Itkilyariak Creek, Kajutakrok Creek, Marsh Creek, Sadlerochit River	—	—	—	—	—	14	30	—	—	21	—	—	6	5	—	2	—	23
106	Arey Island, Arey Lagoon, Barter Island, Hulahula River, Okpilak River	—	—	—	—	—	2	7	—	—	23	—	—	14	10	—	—	—	43
107	Bernard Harbor, Jago Lagoon, Kaktovik, Kaktovik Lagoon	—	—	—	—	—	4	23	—	—	19	—	—	6	15	—	—	—	34
108	Griffin Point, Oruktalik Lagoon, Pokok Lagoon	—	—	—	—	—	13	24	—	—	20	—	—	15	12	—	1	—	15
109	Angun Lagoon, Beaufort Lagoon, Nuvagapak Lagoon,	—	—	—	—	—	28	11	—	—	32	—	—	15	0	—	—	1	13
110	Aichilik River, Egaksrak Lagoon, Egaksrak River, Icy Reef, Kongakut River, Siku Lagoon	—	—	—	—	—	3	12	—	—	7	—	—	3	39	—	—	3	34
111	Demarcation Bay, Demarcation Point, Gordon, Pingokraluk Lagoon	—	—	—	—	—	9	51	—	—	14	—	—	8	1	—	—	—	17

Key:
ID = identification (number).
1A= Exposed Rocky Shore
1B= Exposed Solid Man Made Structure
2A = Exposed Wave-cut Platforms in Bedrock, Mud or Clay
3A = Fine- to Medium-grained Sand Beaches.
3C = Tundra Cliffs.
4 = Coarse Grained Sand Beaches
5= Mixed Sand and Gravel Beaches.
6A = Gravel Beaches.
7 = Exposed Tidal Flats.
8A=Sheltered Rocky Shores and Sheltered Scarps in Bedrock, Mud or Clay
8B = Sheltered, Solid Man-made Structures.
8E = Peat Shorelines.
9A= Sheltered Tidal Flats
9B = Sheltered Vegetated Low Banks
10A = Salt- and Brackish- water Marshes.
10E = Inundated Low-lying Tundra.
U= Unranked.

Source:
USDOC, NOAA, (2002), Research Planning, Inc (2002).

Table A.1-9
Fate and Behavior of a Hypothetical 1,500-Barrel Crude Oil Spill from a Platform in the Chukchi Sea

	Summer Spill[1]				Meltout Spill[2]			
Time After Spill in Days	1	3	10	30	1	3	10	30
Oil Remaining (%)	71	67	62	41	71	66	61	55
Oil Dispersed (%)	0	0	1	2	0	1	2	5
Oil Evaporated (%)	29	33	37	57	29	33	37	40
Thickness (mm)	1	1	1	1	1.3	1	1	1
Discontinuous Area (km^2)[3, 4]	7	29	139	577	2	10	23	188
Estimated Coastline Oiled (km)[5]	25				30			

Table A.1-10
Fate and Behavior of a Hypothetical 4,600-Barrel Crude Oil Spill from a Pipeline in the Chukchi Sea

	Summer Spill[1]				Meltout Spill[2]			
Time After Spill in Days	1	3	10	30	1	3	10	30
Oil Remaining (%)	70	64	56	44	71	66	61	55
Oil Dispersed (%)	1	3	7	16	0	1	2	5
Oil Evaporated (%)	29	33	37	40	29	33	37	40
Thickness (mm)	1.01	1	1	1	1.3	1	1	1
Discontinuous Area (km^2)[3, 4]	12	51	243	1008	4	16	80	332
Estimated Coastline Oiled (km)[5]	42				51			

Table A.1-11
Fate and Behavior of a Hypothetical 1,500-Barrel Diesel Oil Spill from a Platform in the Chukchi Sea

	Summer Spill[1]				Meltout Spill[2]			
Time After Spill in Days	1	3	10	30	1	3	10	30
Oil Remaining (%)	80	47	68	-	88	65	20	0
Oil Dispersed (%)	11	40	68	-	3	11	40	53
Oil Evaporated (%)	9	23	31	-	9	24	40	47
Thickness (mm)	0.6	0.3	0.1	-	0.7	0.4	0.2	0.1

Notes:
Calculated with the SINTEF oil-weathering model Version 3.0 of Reed et al. (2005) and assuming an Alpine Composite crude type or Diesel oil. For the Alternative I Sale 193 and its alternatives, the median pipeline spill is assumed to be 4,600 barrels. For the Alternative I Sale193 and its alternatives, the median platform spill is assumed to be 1,500 barrels.

[1] Summer (June 1-October 31), 8-knot wind speed, 2.7 degrees Celsius, 0.4-meter wave height.
[2] Meltout Spill (November 1-May 31). Spill is assumed to occur into first-year pack ice, pools 2-centimeter thick on ice surface for 2 days at -1 degrees Celsius prior to meltout into 50% ice cover, 10-knot wind speed, and 0.1 meter wave heights.
[3] This is the area of oiled surface.
[4] Calculated from Equation 6 of Table 2 in Ford (1985) and is the discontinuous area of a continuing spill or the area swept by an instantaneous spill of a given volume. Note that ice dispersion occurs for about 30 days before meltout.
[5] Calculated from Equation 17 of Table 4 in Ford (1985) and is the result of stepwise multiple regressions for length of historical coastline affected.

Source:
USDOI, MMS, Alaska OCS Region (2006).

Table A.1-12 Identification Number (ID) and Name of Environmental Resource Areas, Their Vulnerable Period in the Oil Spill Trajectory Model and Their Location on Environmental Resource Area Map A.1-2a, Map A.1-2b, Map A.1-2c, or Map A.1-2d

ID	NAME	NAME 2	VULNERABLE	MAP	ID	NAME	VULNERABLE	MAP
1	Kasegaluk Lagoon	Solivik Isl., Icy Cape	May-October	**A.1-2b**	**43**	Nuiqsut Subsistence Area	August-October	**A.1-2d**
2	Point Barrow, Plover Islands	Elson Lag., Dease Inlet	May-October	**A.1-2a**	**44**	Kaktovik Subsistence Area	August-October	**A.1-2c**
3	ERA 3		September –October	**A.1-2a**	**45**	ERA 45	April –October	**A.1-2b**
4	ERA 4		January-December	**A.1-2a**	**46**	Herald Shoal Polynya	January-December	**A.1-2a**
5	ERA 5		April-September	**A.1-2a**	**47**	Ice/Sea Segment 10	January-December	**A.1-2b**
6	ERA 6		April –October	**A.1-2c**	**48**	Ice/Sea Segment 11	January-December	**A.1-2a**
7	Endicott Causeway		May-October	**A.1-2d**	**49**	Hanna's Shoal Polynya	January-December	**A.1-2a**
8	Maguire, Flaxman Islands		May-October	**A.1-2c**	**50**	Ice/Sea Segment 12	January-December	**A.1-2a**
9	Stockton Islands		May-October	**A.1-2d**	**51**	Ice/Sea Segment 13	January-December	**A.1-2a**
10	Ledyard Bay SPEI Critical Habitat		May-October	**A.1-2d**	**52**	Ice/Sea Segment 14	January-December	**A.1-2b**
11	Wrangel Island 12 nmi Buffer		January-December	**A.1-2a**	**53**	Ice/Sea Segment 15	January-December	**A.1-2b**
12	ERA 12		April-June	**A.1-2d**	**54**	Ice/Sea Segment 16a	January-December	**A.1-2b**
13	ERA 13		January-December	**A.1-2a**	**55**	Ice/Sea Segment 17	January-December	**A.1-2d**
14	Cape Thompson Seabird Colony Area		May-October	**A.1-2d**	**56**	ERA 56	August – October	**A.1-2b**
15	Cape Lisburne Seabird Colony Area		May-October	**A.1-2c**	**57**	Ice/Sea Segment 19	January-December	**A.1-2d**
16	ERA 16		April-June	**A.1-2a**	**58**	Ice/Sea Segment 20a	January-December	**A.1-2d**
17	Angun and Beaufort Lagoons		May-October	**A.1-2c**	**59**	ERA 59	May-November	**A.1-2a**
18	ERA 18		May-October	**A.1-2a**	**60**	Ice/Sea Segment 22	January-December	**A.1-2d**
19	Chukchi Spring Lead 1		April-June	**A.1-2a**	**61**	ERA 61	April-December	**A.1-2a**
20	Chukchi Spring Lead 2		April-June	**A.1-2b**	**62**	Ice/Sea Segment 24a	January-December	**A.1-2d**
21	Chukchi Spring Lead 3		April-June	**A.1-2b**	**63**	ERA 63	July-October	**A.1-2a**
22	Chukchi Spring Lead 4		April-June	**A.1-2b**	**64**	Peard Bay	May-October	**A.1-2d**
23	Chukchi Spring Lead 5		April-June	**A.1-2b**	**65**	Smith Bay	May-October	**A.1-2b**
24	Beaufort Spring Lead 6		April-June	**A.1-2b**	**66**	ERA 66	May-October	**A.1-2b**
25	Beaufort Spring Lead 7		April-June	**A.1-2b**	**67**	Herschel Island	May-October	**A.1-2c**
26	Beaufort Spring Lead 8		April-June	**A.1-2b**	**68**	Harrison Bay	May-October	**A.1-2b**
27	Beaufort Spring Lead 9		April-June	**A.1-2b**	**69**	Harrison Bay/Colville Delta	May-October	**A.1-2b**
28	Beaufort Spring Lead 10		April-June	**A.1-2b**	**70**	ERA 70	July-October	**A.1-2a**
29	Ice/Sea Segment 1		September-October	**A.1-2c**	**71**	Simpson Lagoon, Thetis and Jones Island	May-October	**A.1-2c**
30	Ice/Sea Segment 2		September-October	**A.1-2c**	**72**	Gwyder Bay, Cottle, Return Islands W. Dock	May-October	**A.1-2c**
31	Ice/Sea Segment 3		September-October	**A.1-2c**	**73**	Prudhoe Bay	May-October	**A.1-2c**
32	Ice/Sea Segment 4		September-October	**A.1-2c**	**74**	Cross Island ERA	May-October	**A.1-2d**
33	Ice/Sea Segment 5		September-October	**A.1-2c**	**75**	Water over Boulder Patch	January-December	**A.1-2c**
34	Ice/Sea Segment 6		September-October	**A.1-2c**	**76**	ERA 76	January-December	**A.1-2d**
35	ERA 35		August-October	**A.1-2c**	**77**	Foggy Island Bay	May-October	**A.1-2c**
36	ERA 36		August-October	**A.1-2b**	**78**	Mikkelsen Bay	May-October	**A.1-2c**
37	ERA 37		April – June	**A.1-2c**	**79**	ERA 79	May-October	**A.1-2c**
38	Point Hope Subsistence Area		January-December	**A.1-2a**	**80**	ERA 80	May-October	**A.1-2c**
39	Point Lay Subsistence Area		January-December	**A.1-2a**	**81**	Simpson Cove	May-October	**A.1-2c**
40	Wainwright Subsistence Area		January-December	**A.1-2a**	**82**	ERA 82	September	**A.1-2a**
41	Barrow Subsistence Area 1		April-May	**A.1-2a**	**83**	Kaktovik ERA	May-October	**A.1-2c**
42	Barrow Subsistence Area 2		August-October	**A.1-2a**	**99**	ERA 99	May-October	***A.1-2b***

Source: USDOI, MMS, Alaska OCS Region (2006).

Table A.1-13
Environmental Resource Areas Used in the Analysis of Oil Spill Effects on Birds in Section IV.C

ID	NAME	MAP	VULNERABLE	GENERAL RESOURCE	SPECIFIC RESOURCE	REFERENCE
1	Kasegaluk Lagoon	A.1-2b	May-October	Birds, Barrier Island	**Birds**: BLBR, LTDU, STEI, COEI, loons (PALO, RTLO, and YBLO)	Lehnhausen and Quinlan, 1981; Johnson, 1993; Johnson, Wiggins, and Wainwright, 1993; Laing and Platte, 1994, Dau and Larned, 2004.
2	Point Barrow, Plover Islands	A.1-2a	May-October	Birds, Barrier Island	**Birds**: SPEI, LTDU	Troy, 2003; Fischer and Larned, 2004.
7	Endicott Causeway	A.1-2d	May-October	Birds, Barrier Island	**Birds**: nesting COEI, molting LTDU, Pacific loons	Johnson, Wiggins, and Wainwright, 1993; Johnson, 2000; Fischer and Larned, 2004.
8	Maguire, Flaxman Islands	A.1-2c	May-October	Birds, Barrier Island	**Birds**: nesting COEI, molting LTDU, Pacific loons	Johnson, Wiggins, and Wainwright, 1993; Johnson, 2000; Fischer and Larned, 2004; Flint et al., 2004; Johnson et al., 2005; Noel et al., 2005.
9	Stockton Islands	A.1-2d	May-October	Birds, Barrier Island	**Birds**: nesting COEI, molting LTDU, staging SPEI	Johnson, Wiggins, and Wainwright, 1993;; Johnson, 2000, Table 2; Troy, 2003; Fischer and Larned, 2004; Flint et al., 2004; Johnson et al., 2005; Noel et al., 2005, Table 1.
10	Ledyard Bay SPEI Critical Habitat	A.1-2d	May-October	Birds	**Birds**: seabirds, molting/staging SPEI, staging YBLO	Federal Register; 2001; Laing and Platte, 1994; Petersen et al., 1999; Piatt and Springer, 2003.
14	Cape Thompson Seabird Colony Area	A.1-2d	May-October	Birds	**Birds**: seabirds, gulls, shorebirds, waterfowl, staging YBLO	Springer et al., 1984; Piatt et al., 1991; Piatt and Springer, 2003; Stephenson and Irons, 2003.
15	Cape Lisburne Seabird Colony Area	A.1-2c	May-October	Birds	**Birds:** seabird breeding colony, staging YBLO	Springer et al., 1984; Piatt et al., 1991; Roseneau et al., 2000; Piatt and Springer, 2003; Stephenson and Irons, 2003.
17	Angun and Beaufort Lagoons	A.1-2c	May-October	Birds, Barrier Island	**Birds**: molting LTDU, scoters, staging shorebirds	Johnson and Herter, 1989.
18	ERA 18	A.1-2a	May-October	Birds	**Birds**: seabird foraging area	Springer et al., 1984; Piatt and Springer, 2003.
19	Chukchi Spring Lead 1	A.1-2a	April-June	Whales, Birds, Marine Mammals, Birds	**Birds**: seabird foraging area; spring migration area for LTDU, eiders (KIEI and COEI), loons (spp?)	Connors, Myers, and Pitelka,1979; Sowls et al., 1978; Johnson and Herter, 1989; Piatt et al., 1991; Piatt and Springer, 2003.
20	Chukchi Spring Lead 2	A.1-2b	April-June	Whales, Birds, Marine Mammals	**Birds**: spring migration axis via lead system for LTDU, eiders (KIEI, COEI, probably SPEI), loons (spp?)	Swartz, 1967; Johnson and Herter, 1989; Stringer and Groves, 1991.
21	Chukchi Spring Lead 3	A.1-2b	April-June	Whales, Birds, Marine Mammals	**Birds**: spring migration axis via lead system for LTDU, eiders (KIEI and COEI), loons (spp?)	Swartz, 1967; Johnson and Herter, 1989; Stringer and Groves, 1991.
22	Chukchi Spring Lead 4	A.1-2b	April-June	Whales, Birds, Marine Mammals	**Birds**: spring migration axis via lead system for LTDU, eiders (KIEI and COEI), loons (spp?)	Swartz 1967; Johnson and Herter, 1989; Stringer and Groves, 1991.
23	Chukchi Spring Lead 5	A.1-2b	April-June	Whales, Birds, Marine Mammals	**Birds**: probable spring staging by SPEI and STEI; spring migration area for LTDU, eiders (KIEI and COEI), shorebirds, loons (spp?)	Connors, Myers, and Pitelka,1979; Sowls et al., 1978; Gill et al., 1985; Johnson and Herter, 1989.
64	Peard Bay	A.1-2d	July-October	Birds	**Birds**: eiders (SPEI, STEI, KIEI, COEI), loons (PALO, RTLO, and YBLO)	Laing and Platte, 1994; Fischer and Larned, 2004.
65	Smith Bay	A.1-2b	May-October	Birds, Marine Mammals	**Birds**: eiders (SPEI, KEI), loons (YBLO)	Earnst, et al., 2005; Powell, et al., 2005; Ritchie, Burgess, and Suydam, 2000; Ritchie et al., 2004; Troy, 2003.
67	Herschel Island	A.1-2c	May-October	Birds	**Birds**: LTDU, BLBR, scoters, eiders (spp?), loons (spp?), shorebirds	Vermeer and Anweiler, 1975; Richardson and Johnson, 1981; Johnson and Richardson, 1982.

Table A.1-13 (Continued)
Environmental Resource Areas Used in the Analysis of Oil Spill Effects on Birds in Section IV.C

ID	NAME	MAP	VULNERABLE	GENERAL RESOURCE	SPECIFIC RESOURCE	REFERENCE
68	Harrison Bay	A.1-2b	May-October	Birds, fish, marine mammals	**Birds**: eiders (KIEI, COEI), scoters (BLSC, SUSC), geese (BLBR, CAGO, WFGO), loons (spp?), and shorebirds	Connors et al., 1984; Dau and Larned, 2004; 2005; Fischer and Larned, 2004.
69	Harrison Bay/Colville Delta	A.1-2b	May-October	Birds, fish, marine mammals	**Birds**: geese (BLBR), eiders (KIEI, COEI), LTDU, scoters (BLSC, SUSC), and loons (PALO, RTLO, and YBLO)	Bergman et al.. 1977; Johnson and Herter. 1989; Dau and Larned. 2004; 2005; Fischer and Larned. 2004.
71	Simpson Lagoon, Thetis and Jones Island	A.1-2c	May-October	Birds, fish, marine mammals	**Birds**: geese (BLBR, LSGO, WFGO), eiders (COEI, KIEI), LTDU, scoters (SUSC, WWSC), shorebirds, and loons (PALO, RTLO, and YBLO)	Richardson and Johnson, 1981; Connors et al., 1984; Divoky, 1984; Johnson et al., 1987; Johnson and Herter, 1989; Stickney and Ritchie, 1996; Noel and Johnson, 1997; Truett et al., 1997; Johnson 2000.
72	Gwyder Bay, Cottle, Return Islands and West Dock	A.1-2c	May-October	Birds, Fish, Marine Mammals	**Birds**: geese (BLBR, LSGO, WFGO), eiders (COEI, KIEI), LTDU, scoters (SUSC, WWSC), shorebirds, and loons (PALO, RTLO, and YBLO)	Stickney and Ritchie, 1996; Noel and Johnson, 1997; Truett et al., 1997; Johnson, 2000; Troy, 2003; Fischer and Larned, 2004,; Noel et al., 2005; Powell et al., 2005.
73	Prudhoe Bay	A.1-2c	May-October	Birds, Fish, Marine Mammals	**Birds**: geese (BLBR, LSGO, WFGO), eiders (COEI, KIEI), LTDU, scoters (SUSC, WWSC), shorebirds, and loons (PALO, RTLO, and YBLO)	Richardson and Johnson, 1981; Johnson and Richardson, 1982; Stickney and Ritchie, 1996; Noel and Johnson, 1997; Truett et al. 1997; Troy 2003; Dau and Larned 2004; 2005; Fischer and Larned 2004; Noel et al. 2005; Powell et al. 2005
74	Cross Island ERA	A.1-2d	May-October	Birds	**Birds**: eiders (SPEI, COEI, LTDU, scoters (all 3 species), and loons (PALO, RTLO, and YBLO)	Divoky 1984; Johnson 2000; Troy 2003; Fig. 3; Dau and Larned 2004; 2005; Fischer and Larned 2004
76	ERA 76	A.1-2d	May-October	Birds	**Birds**: eiders (KIEI, COEI), LTDU, scoters (all 3 species), and loons (PALO, RTLO, and YBLO)	Divoky 1984; Richardson and Johnson 1981; Johnson and Richardson 1982; Alexander et al. 1997; Dickson et al. 1997;
77	Foggy Island Bay	A.1-2c	May-October	Birds	**Birds**: eiders SPEI, COEI, LTDU, scoters (all 3 species), and loons (PALO, RTLO, and YBLO)	Divoky 1984; Johnson 2000; Troy 2003; Dau and Larned 2004; 2005; Fischer and Larned 2004
78	Mikkelsen Bay	A.1-2c	May-October	Birds	**Birds**: eiders (KIEI, COEI), LTDU, scoters, and loons (PALO and RTLO)	Divoky 1984; Johnson 2000; Troy 2003; Dau and Larned 2004; 2005; Fischer and Larned 2004; Flint et al. 2004; Noel et al. 2005
79	ERA 79	A.1-2c	May-October	Birds	**Birds**: eiders (KIEI, COEI), LTDU, scoters (SUSC, WWSC), and loons (spp?)	Richardson and Johnson 1981; Johnson and Richardson 1982; Johnson and Herter 1989; Dau and Larned 2004; 2005; Fischer and Larned 2004
81	Simpson Cove	A.1-2c	May-October	Birds	**Birds**: COEI, LTDU, PALO, scoters (SUSC, WWSC)	Johnson and Herter 1989; Dau and Larned 2004; 2005; Fischer and Larned 2004
83	Kaktovik ERA	A.1-2c	May-October	Birds	**Birds**: COEI, LTDU, loons (PALO, RTLO, and YBLO)	Divoky 1984; Johnson and Herter 1989; Dau and Larned 2004; 2005; Fischer and Larned 2004

Notes: Yellow-billed Loon (YBLO), Red-throated Loon (RTLO), Pacific Loon (PALO), Arctic Loon (ARLO), COEI (Common Eider), KIEI (King Eider), SPEI (Spectacled Eider), STEI (Steller's Eider), LTDU (Long-tailed Duck), Black Scoter (BLSC), Surf Scoter (SUSC), White-winged Scoter (WWSC), Black Brant (BLBR), White-fronted Goose (WFGO), Canada Goose (CAGO), Lesser Snow Goose (LSGO)

Source: USDOI, MMS, Alaska OCS Region (2006).

Table A.1-14
Environmental Resource Areas Used in the Analysis of Oil Spill Effects on Whales in Section IV.C

ID	NAME	MAP	VULNERABLE	GENERAL RESOURCE	SPECIFIC RESOURCE	REFERENCE
6	ERA 6	A.1-2c	April-October	Whales	Bowhead Whales	Mel'nikov et al., 2004.
12	ERA 12	A.1-2d	April-June	Whales	Bowhead Whales	Ljungblad, D.K. et al., 1986.
16	ERA 16	A.1-2b	June-September	Whales	Bowhead Whales, Grey Whales	Mel'nikov and Bobkov, 1993.
19	Chukchi Spring Lead 1	A.1-2a	April-June	Whales, Birds, Marine Mammals	Bowhead Whales, Grey Whales	Stringer and Groves, 1991; Ljungblad, D.K. et al., 1986.
20	Chukchi Spring Lead 2	A.1-2b	April-June	Whales, Birds, Marine Mammals	Bowhead Whales, Grey Whales	Stringer and Groves, 1991; Ljungblad, D.K. et al., 1986.
21	Chukchi Spring Lead 3	A.1-2b	April-June	Whales, Birds, Marine Mammals	Bowhead Whales, Grey Whales	Stringer and Groves, 1991; Ljungblad, D.K. et al., 1986.
22	Chukchi Spring Lead 4	A.1-2b	April-June	Whales, Birds, Marine Mammals	Bowhead Whales, Grey Whales	Stringer and Groves, 1991; Ljungblad, D.K. et al., 1986.
23	Chukchi Spring Lead 5	A.1-2b	April-June	Whales, Birds, Marine Mammals	Bowhead Whales, Grey Whales	Stringer and Groves, 1991; Ljungblad, D.K. et al., 1986.
24	Beaufort Spring Lead 6	A.1-2b	April-June	Whales, Birds, Marine Mammals	Bowhead Whales	Ljungblad, D.K. et al., 1986.
25	Beaufort Spring Lead 7	A.1-2b	April-June	Whales, Birds, Marine Mammals	Bowhead Whales	Ljungblad, D.K. et al., 1986.
26	Beaufort Spring Lead 8	A.1-2b	April-June	Whales, Birds, Marine Mammals	Bowhead Whales	Ljungblad, D.K. et al., 1986
27	Beaufort Spring Lead 9	A.1-2b	April-June	Whales, Birds, Marine Mammals	Bowhead Whales	Ljungblad, D.K. et al., 1986.
28	Beaufort Spring Lead 10	A.1-2b	April-June	Whales, Birds, Marine Mammals	Bowhead Whales	Ljungblad, D.K. et al., 1986.
29	Ice/Sea Segment 1	A.1-2c	September-October	Whales, Birds, Marine Mammals	Bowhead Whales	Ljungblad, D.K. et al., 1986; Treacy, 1988, 1989, 1990, 1991, 1992, 1993, 1994, 1995, 1996, 1997, 1998, 2000, 2001, 2002; Monnett and Treacy 2005.
30	Ice/Sea Segment 2	A.1-2c	September-October	Whales, Birds, Marine Mammals	Bowhead Whales	Ljungblad, D.K. et al., 1986; Treacy, 1988, 1989, 1990, 1991, 1992, 1993, 1994, 1995, 1996, 1997, 1998, 2000, 2001, 2002; Monnett and Treacy 2005.
31	Ice/Sea Segment 3	A.1-2c	September-October	Whales, Birds, Marine Mammals	Bowhead Whales	Ljungblad, D.K. et al., 1986; Treacy, 1988, 1989, 1990, 1991, 1992, 1993, 1994, 1995, 1996, 1997, 1998, 2000, 2001, 2002; Monnett and Treacy 2005.
32	Ice/Sea Segment 4	A.1-2c	September-October	Whales, Birds, Marine Mammals	Bowhead Whales	Ljungblad, D.K. et al., 1986; Treacy, 1988, 1989, 1990, 1991, 1992, 1993, 1994, 1995, 1996, 1997, 1998, 2000, 2001, 2002; Monnett and Treacy 2005.

Table A.1-14 (Continued)
Environmental Resource Areas Used in the Analysis of Oil Spill Effects on Whales in Section IV.C

ID	NAME	MAP	VULNERABLE	GENERAL RESOURCE	SPECIFIC RESOURCE	REFERENCE
33	Ice/Sea Segment 5	A.1-2c	September-October	Whales, Birds, Marine Mammals	Bowhead Whales	Ljungblad, D.K. et al., 1986; Treacy, 1988, 1989, 1990, 1991, 1992, 1993, 1994, 1995, 1996, 1997, 1998, 2000, 2001, 2002; Monnett and Treacy, 2005.
34	Ice/Sea Segment 7	A.1-2c	September-October	Whales, Birds, Marine Mammals	Bowhead Whales	Ljungblad, D.K. et al., 1986; Treacy, 1988, 1989, 1990, 1991, 1992, 1993, 1994, 1995, 1996, 1997, 1998, 2000, 2001, 2002; Monnett and Treacy, 2005.
35	ERA 35	A.1-2c	August-October	Whales	Bowhead Whales	Ljungblad, D.K. et al., 1986.
36	ERA 36	A.1-2b	August-October	Whales	Bowhead Whales	Ljungblad, D.K. et al., 1986.
37	ERA 37	A.1-2c	April-June	Whales		Ljungblad, D.K. et al., 1986; Treacy, 1988, 1989, 1990, 1991, 1992, 1993, 1994, 1995, 1996, 1997, 1998, 2000, 2001, 2002; Monnett and Treacy, 2005.
45	ERA 45	A.1-2b	April-October	Whales		Ljungblad, D.K. et al., 1986.
49	Hanna's Shoal Polynya	A.1-2a	January-December	Whales		Ljungblad, D.K. et al., 1986; Stringer and Groves 1991.
56	ERA 56	A.1-2b	August-October	Whales		Ljungblad, D.K. et al., 1986.
61	ERA 61	A.1-2a	April-December	Whales	Fin Whales	Melnikov
63	ERA 63	A.1-2a	July-October	Whales	Bowhead Whales	
65	Smith Bay	A.1-2b	May-October	Whales, Birds	Bowhead Whales	Ljungblad, D.K. et al., 1986; Treacy, 1988, 1989, 1990, 1991, 1992, 1993, 1994, 1995, 1996, 1997, 1998, 2000, 2001, 2002; Monnett and Treacy, 2005.
70	ERA 70	A.1-2a	July-October	Whales	Bowhead Whales	
80	ERA 80	A.1-2c	April-June	Whales,	Bowhead Whales	Ljungblad, D.K. et al., 1986; Treacy, 1988, 1989, 1990, 1991, 1992, 1993, 1994, 1995, 1996, 1997, 1998, 2000, 2001, 2002; Monnett and Treacy, 2005.
82	ERA 82	A.1-2a	September	Whales		Mel'nikov and Bobkov, 1993

Source:
USDOI, MMS, Alaska OCS Region (2006).

Table A.1-15
Environmental Resource Areas Used in the Analysis of Oil Spill Effects on Subsistence Resources in Section IV.C

ID	NAME	MAP	VULNERABLE	GENERAL RESOURCE	SPECIFIC RESOURCE	REFERENCE
3	ERA 3	Map A.1-2a	September-October	Subsistence	Bowhead Whales, Grey Whales, Walrus	Mel’nikov and Bobkov, 1993
4	ERA 4	Map A.1-2a	January-December	Subsistence	Bowhead Whales, Grey Whales, Walrus	Mel'nikov and Bobkov, 1993
5	ERA 5	Map A.1-2a	April-September	Subsistence	Polar Bears, Walrus, Seals	Sobelman, 1985; Wisniewski, 2005
13	ERA 13	Map A.1-2a	January-December	Subsistence	Polar Bears, Walrus, Seals, Bowhead Whales, Beluga Whales	Burch, 1985
38	Point Hope Subsistence Area	Map A.1-2a	January-December	Subsistence	Beluga Whales, Bowhead Whales, Walrus, Seals	Braund & Burnham, 1984
39	Point Lay Subsistence Area	Map A.1-2a	January-December	Subsistence	Fish, Seals, Waterfowl, Beluga Whales	Braund & Burnham, 1984; Impact Assessment, 1989; Huntington and Mymrin, 1996; USDOI, BLM, 2003
40	Wainwright Subsistence Area	Map A.1-2a	January-December	Subsistence	Bowhead Whales, Beluga Whales	Braund & Burnham, 1984; Braund & Associates, 1993, Kassam and Wainwright Traditional Council, 2001; USDOI, BLM, 2003
41	Barrow Subsistence Area 1	Map A.1-2a	April-May	Subsistence	Bowhead Whales, Beluga Whales, Walrus, Waterfowl, Seals, Ocean Fish	Braund & Burnham, 1984; S.R. Braund & Associates, 1993; North Slope Borough, 2001; USDOI, BLM, 2003
42	Barrow Subsistence Area 2	Map A.1-2a	August-October	Subsistence	Bowhead Whales, Beluga Whales, Walrus, Waterfowl, Seals, Ocean Fish	Braund & Burnham, 1984; Braund & Associates, 1993; North Slope Borough, 2001; USDOI, BLM, 2003
43	Nuiqsut Subsistence Area	Map A.1-2d	August-October	Subsistence	Bowhead Whales, Seals, Waterfowl, Ocean Fish	Impact Assessment, 1990; USDOI, MMS, 2001; North Slope Borough, 2001
44	Kaktovik Subsistence Area	Map A.1-2c	August-October	Subsistence	Bowhead Whales, Seals, Walrus, Beluga Whales, Waterfowl, Ocean Fish	Impact Assessment, 1990; USDOI, MMS, 1997; North Slope Borough, 2001

Source:
USDOI, MMS, Alaska OCS Region (2006).

Table A.1-15a
Environmental Resource Areas Used in the Analysis of Oil Spill Effects on Marine Mammals in Section IV.C

ID	NAME	MAP	VULNERABLE	GENERAL RESOURCE	SPECIFIC RESOURCE	REFERENCE
ERA1	Kasegaluk Lagoon	Map A.1-2b	May-October	Marine Mammals	Beluga Whales	Suydam et al., 2001; Suydam et al., 2005
ERA 11	Wrangel Island 12 nmi buffer	Map A.1-2a	January - December	Marine Mammals	Polar Bears, Walrus	Kochnev, 2002; Kochnev et al., 2003; Kochnev, In prep.
ERA 59	ERA 59	Map A.1-2a	May -November	Marine Mammals	Polar Bears	Kochnev et al., 2003; Kochnev, In prep.
LS 1, 11, 28, 29, 33, 34, 35, 36, 38,39,65		Maps A.1-3a & b	January-December	Marine Mammals	Walrus	Ovsyanikov, 2003; Kochnev, 2004; Kochnev, In prep.; USDOI, FWS, pers. commun.
LS 85	Barrow, Browerville, Elson Lagoon	Map A.1-3b	January-December	Marine Mammals	Polar Bears	USDOI, FWS, pers. commun.
LS 95	Russian Coastliine	Map A.1-3d	January-December	Marine Mammals	Polar Bears, Walrus	Kochnev, In prep.

Source:
USDOI, MMS, Alaska OCS Region (2006).

Table A.1-16
Land Segment ID and the Geographic Place Names within the Land Segment

ID	Geographic Place Names	ID	Geographic Place Names
1	Mys Blossom, Mys Fomy, Khishchnikov, Neozhidannaya, Laguna Vaygan	32	Mys Dzhenretlen, Eynenekvyk, Lit'khekay-Polar Station
2	Mys Gil'der, Ushakovskiy, Mys Zapadnyy	33	Neskan, Laguna Neskan, Mys Neskan
3	Mys Florens, Gusinaya	34	Emelin, Ostrov Idlidlya, I, Memino, Tepken,
4	Mys Ushakova, Laguna Drem-Khed	35	Enurmino, Mys Keylu, Netakeniskhvin, Mys Neten,
5	Mys Evans, Neizvestnaya, Bukhta Pestsonaya	36	Mys Chechan, Mys Ikigur, Keniskhvik, Mys Serditse Kamen
6	Ostrov Mushtakova	37	Chevgtun, Utkan, Mys Volnistyy
7	Kosa Bruch	38	Enmytagyn, Inchoun, Inchoun, Laguna Inchoun, Mitkulino, Uellen, Mys Unikin
8	Klark, Mys Litke, Mys Pillar, Skeletov, Mys Uering	39	Cape Dezhnev, Mys Inchoun, Naukan, Mys Peek, Uelen, Laguna Uelen, Mys Uelen
9	Nasha, Mys Proletarskiy, Bukhta Rodzhers	40	Ah-Gude-Le-Rock, Dry Creek, Lopp Lagoon, Mint River
10	Reka Berri, Bukhta Davidova, , Khishchnika, Reka Khishchniki	41	, Ikpek, Ikpek Lagoon, Pinguk River, Yankee River
11	Bukhta Somnitel'naya	42	Arctic Lagoon, Kugrupaga Inlet, Nuluk River
12	Zaliv Krasika, Mamontovaya, Bukhta Predatel'skaya	43	Sarichef Island, Shishmaref Airport
13	Mys Kanayen, Mys Kekurnyy, Mys Shalaurova, Veyeman	44	Cape Lowenstern, Egg Island, Shishmaref, Shishmaref Inlet
14	Innukay, Laguna Innukay, Umkuveyem, Mys Veuman	45	
15	Laguna Adtaynung, Mys Billingsa, Ettam, Gytkhelen, Laguna Uvargina	46	Cowpack Inlet, Cowpack River, Kalik River, Kividlo, Singeak, Singeakpuk River, White Fish Lake
16	Mys Emmatagen, Mys Enmytagyn, Uvargin	47	Kitluk River, Northwest Corner Light, West Fork Espenberg River
17	Enmaat'khyr, Kenmankautir, Mys Olennyy, Mys Yakan, Yakanvaam, Yakan	48	Cape Espenberg, Espenberg, Espenberg River
18	Mys Enmykay, Laguna Olennaya, Pil'khikay, Ren, Rovaam, Laguna Rypil'khin	49	Kungealoruk Creek, Kougachuk Creek, Pish River
19	Laguna Kuepil'khin, Leningradskiy	50	Clifford Point, Cripple River, Goodhope Bay, Goodhope River, Rex Point, Sullivan Bluffs
20	, Kuekvun', Notakatryn, Pil'gyn, Tynupytku	51	Cape Deceit, Deering, Kugruk Lagoon, Kugruk River, Sullivan Lake, Toawlevic Point
21	Laguna Kinmanyakicha, Laguna Pil'khikay, Amen, Pil'khikay, Bukhta Severnaya, Val'korkey	52	Motherwood Point, Ninemile Point, Willow Bay
22	Ekiatan', Laguna Ekiatan, Kelyun'ya, Mys Shmidta, Rypkarpi	53	Kiwalik, Kiwalik Lagoon, Middle Channel Kiwalk River, Minnehaha Creek, Mud Channel Creek, Mud Creek
23	Emuem, Kemuem, Koyvel'khveyergin, Laguna Tengergin, Tenkergin	54	Baldwin Peninsula, Lewis Rich Channel
24		55	Cape Blossom, Pipe Spit
25	Laguna Amguema, Ostrov Leny, Yulinu	56	Kinuk Island, Kotzebue, Noatak River
26	Ekugvaam, Reka Ekugvam, Kepin, Pil'khin	57	Aukulak Lagoon, Igisukruk Mountain, Noak, Mount, Sheshalik, Sheshalik Spit
27	Laguna Nut, Rigol'	58	Cape Krusenstern, Eigaloruk, Evelukpalik River, Kasik Lagoon, Krusenstern Lagoon,
28	Kamynga, Ostrov Kardkarpko, Kovlyuneskin, Mys Vankarem, Vankarema, Laguna Vankarema	59	Imik Lagoon, Ipiavik Lagoon, Kotlik Lagoon, Omikviorok River
29	Akanatkhyrgyn, Nel'teyveyam, Mys Onman, Vel'may	60	Imikruk Lagoon, Imnakuk Bluff, Kivalina, Kivalina Lagoon, Singigrak Spit, Kivalina River, Wulik River
30	Laguna Kunergin, Nutepynmyn, Pyngopil'khin, Laguna Pyngopil'khin	61	Asikpak Lagoon,Cape Seppings,Kavrorak Lagoon,Pusaluk Lagoon,Seppings Lagoon
31	Alyatki, Zaliv Tasytkhin, Kolyuchin Bay	62	Atosik Lagoon,Chariot,Ikaknak Pond,Kisimilok Mountain,Kuropak Creek,Mad Hill

Table A.1-16(Continued)
Land Segment ID and the Geographic Place Names within the Land Segment

ID	Geographic Place Names	ID	Geographic Place Names
63	Akoviknak Lagoon, Cape Thompson, Crowbill Point, Igilerak Hill, Kemegrak Lagoon	96	Kalubik Creek, Oliktok Point, Thetis Mound,
64	Aiautak Lagoon, Ipiutak Lagoon, Kowtuk Point, Kukpuk River, Pingu Bluff, Point Hope, Sinigrok Point, Sinuk	97	Beechey Point, Bertoncini , Bodfish, Cottle and, Jones Islands, Milne Point, Simpson Lagoon
65	Buckland, Cape Dyer, Cape Lewis, Cape Lisburne	98	Gwydyr Bay, Kuparuk River, Long Island
66	Ayugatak Lagoon	99	Duck Island, Foggy Island, Gull Island, Heald Point, Howe Island, Niakuk Islands, Point Brower
67	Cape Sabine, Pitmegea River	100	Foggy Island Bay, Kadleroshilik River, Lion Point, Shaviovik River, Tigvariak Island
68	Agiak Lagoon, Punuk Lagoon	101	Bullen Point, Point Gordon, Reliance Point
69	Cape Beaufort, Omalik Lagoon	102	Flaxman Island, Maguire Islands, North Star Island, Point Hopson, Point Sweeney, Point Thomson, Staines River
70	Kuchaurak Creek, Kuchiak Creek	103	Brownlow Point, Canning River, Tamayariak River
71	Kukpowruk River, Naokok, Naokok Pass, Sitkok Point	104	Camden Bay, Collinson Point, Katakturuk River, Konganevik Point, Simpson Cove
72	Epizetka River, Kokolik River, Point Lay, Siksrikpak Point	105	Anderson Point, Carter Creek, Itkilyariak Creek, Kajutakrok Creek, Marsh Creek, Sadlerochit River
73	Akunik Pass, Tungaich Point, Tungak Creek	106	Arey Island, Arey Lagoon, Barter Island, Hulahula River, Okpilak River
74	Kasegaluk Lagoon, , Solivik Island, Utukok River	107	Bernard Harbor, Jago Lagoon, Kaktovik, Kaktovik Lagoon
75	Akeonik, Icy Cape, Icy Cape Pass	108	Griffin Point, Oruktalik Lagoon, Pokok Lagoon
76	Akoliakatat Pass, Avak Inlet, Tunalik River	109	Angun Lagoon, Beaufort Lagoon, Nuvagapak Lagoon,
77	Mitliktavik, Nivat Point, Nokotlek Point, Ongorakvik River	110	Aichilik River, Egaksrak Lagoon, Egaksrak River, Icy Reef, Kongakut River, Siku Lagoon
78	Kilmantavi, Kuk River, Point Collie, Sigeakruk Point,	101	Demarcation Bay, Demarcation Point, Gordon, Pingokraluk Lagoon
79	Point Belcher, Wainwright, Wainwright Inlet	112	Clarence Lagoon, Backhouse River
80	Eluksingiak Point, Igklo River, Kugrua Bay	113	Komakuk Beach, Fish Creek
81	Peard Bay, Point Franklin, Seahorse Islands, Tachinisok Inlet	114	Nunaluk Spit
82	Skull Cliff	115	Herschel Island
83	Nulavik, Loran Radio Station	116	Ptarmagin Bay
84	Walakpa River, Will Rogers and Wiley Post Memorial	117	Roland & Phillips Bay, Kay Point
85	Barrow, Browerville, Elson Lagoon	118	Sabine Point
86	Dease Inlet, Plover Islands, Sanigaruak Island	119	Shingle Point
87	Igalik Island, Kulgurak Island, Kurgorak Bay, Tangent Point	120	Trent and Shoalwater Bays
88	Cape Simpson, Piasuk River, Sinclair River, Tulimanik Island	121	Shallow Bay, West Channel
89	Ikpikpuk River, Point Poleakoon, Smith Bay	120	Trent and Shoalwater Bays
90	Drew Point, Kolovik, McLeod Point,	121	Shallow Bay, West Channel
91	Lonely AFS Airport, Pitt Point, Pogik Bay, Smith River	122	
92	Cape Halkett, Esook Trading Post, Garry Creek	123	Outer Shallow Bay, Olivier Islands
93	Atigaru Point, Eskimo Islands, Harrison Bay, Kalikpik River, Saktuina Point	124	Middle Channel, Gary Island
94	Fish Creek, Tingmeachsiovik River	125	Kendall Island
95	Anachlik Island, Colville River, Colville River Delta	126	North Point, Pullen Island

Key: ID = identification (number).

Table A.1-17
Assumptions about How Launch Areas are Serviced by Pipelines for the Oil-Spill-Trajectory Analysis for the Alternative I, The Proposed Action, Alternative III, Corridor I and Alternative IV, Corridor II

Alternative I		Alternative III		Alternative IV	
Spill Box	Serviced by Pipelines	Spill Box	Serviced by Pipelines	Spill Box	Serviced by Pipelines
LA01	P02, P03, P04, P05, P06	LA01	P02, P03, P04, P05, P06	LA01	P02, P03, P04, P05, P06
LA02	P04, P05, P06	LA02	P04, P05, P06	LA02	P04, P05, P06
LA03	P07, P08, P09	LA03	P07, P08, P09	LA03	P07, P08, P09
LA04	P02, P03	LA04	P02, P03	LA04	P02, P03
LA05	P05, P06	LA05	P05, P06	LA05	P05, P06
LA06	P08, P09	LA06	P08, P09	LA06	P08, P09
LA07	P10, P11	LA07	P10, P11	LA07	P10, P11
LA08	P10, P11	LA08a	P10, P11	LA08	P10, P11
LA09	P01	LA09a	P01	LA09c	P01
LA10	P03	LA10a	P03	LA10c	P03
LA11	P06	LA11a	P06	LA11c	P06
LA12	P09	LA12a	P09	LA12c	P09
LA13	P11	LA13a	P11	LA13c	P11

Source:
USDOI, MMS, Alaska OCS Region (2006).

Table A.1-18
Pipeline Spill Frequency Triangular Distribution Properties

GOM OCS Pipeline Spills, Categorized 1972-99		Low Factor	High Factor	Frequency spill per 10^5 km-years				
				Historical	Low	Mode	High	Expected
By Diameter, By Spill Size								
<10"	**Small**	0	2.57	3.7974	0	1.6329	9.7592	5.1720
	Medium	0	2.57	6.6454	0	2.8575	17.0786	9.0510
	Large	0	2.57	3.7974	0	1.6329	9.7592	5.1720
	Huge	0	2.57	0.9493	0	0.4082	2.4398	1.2930
≥10"	**Small**	0	2.57	2.4436	0	1.0507	6.2800	3.3282
	Medium	0	2.57	6.1090	0	2.6269	15.7001	8.3205
	Large	0	2.57	7.3308	0	3.1522	18.8401	9.9846
	Huge	0	2.57	2.4436	0	1.0507	6.2800	3.3282

Source:
Bercha Group, Inc. (2006a).

Table A.1-19
Platform Spill Frequency Triangular Distribution Properties

Spill Size	Frequency Unit	Low Factor	High Factor	Historical	Low	Mode	High	Expected
Small and Medium Spills 50-999 bbl	**spill per 10^4 well-year**	0	2.88	1.5036	0.0000	0.1804	4.3303	2.1571
Large and Huge Spills ≥ 1000 bbl	**spill per 10^4 well-year**	0	2.88	0.2506	0.0000	0.0301	0.7217	0.3595

Source:
Bercha Group, Inc. (2006a).

Table A.1-20
Well Blowout Spill Frequency Triangular Distribution Properties

Event	FREQUENCY UNIT	Low Factor	High Factor	Frequencies				
				Historical	Low	Mode	High	Expected
				Small and Medium Spills 50-999 bbl				
Production Well	spill per 10^4 well-year	0.448	1.545	0.147	0.066	0.148	0.227	0.147
Exploration Well Drilling	spill per 10^4 wells	0.439	2.036	1.966	0.863	1.032	4.002	2.262
Development Well Drilling	spill per 10^4 wells	0.437	1.760	0.654	0.286	0.526	1.151	0.692
				Large Spills 1000-9999 bbl				
Production Well	spill per 10^4 well-year	0.448	1.545	1.028	0.460	1.037	1.588	1.026
Exploration Well Drilling	spill per 10^4 wells	0.439	2.036	13.754	6.039	7.220	28.001	15.824
Development Well Drilling	spill per 10^4 wells	0.437	1.760	4.570	1.998	3.671	8.041	4.833
				Small, Medium and Large Spills 50-9999 bbl				
Production Well	spill per 10^4 well-year	0.448	1.545	1.175	0.526	1.185	1.815	1.173
Exploration Well Drilling	spill per 10^4 wells	0.439	2.036	15.719	6.903	8.252	32.003	18.086
Development Well Drilling	spill per 10^4 wells	0.437	1.760	5.224	2.284	4.197	9.192	5.525
				Large Spill 10000-149999 bbl				
Production Well	spill per 10^4 well-year	0.448	1.545	0.441	0.197	0.444	0.681	0.440
Exploration Well Drilling	spill per 10^4 wells	0.439	2.036	5.909	2.595	3.102	12.031	6.799
Development Well Drilling	spill per 10^4 wells	0.437	1.760	1.963	0.858	1.577	3.454	2.076
				Huge Spill ≥150000 bbl				
Production Well	spill per 10^4 well-year	0.448	1.545	0.294	0.132	0.296	0.454	0.293
Exploration Well Drilling	spill per 10^4 wells	0.439	2.036	3.421	1.502	1.796	6.965	3.936
Development Well Drilling	spill per 10^4 wells	0.437	1.760	1.963	0.858	1.577	3.454	2.076

Source:
Bercha Group, Inc. (2006a).

Table A.1-21 Pipeline Arctic Effect Derivation Summary

CAUSE CLASSIFICATION	Spill Size	Shallow	Medium	Deep	Reason
		Historical Expected Frequency Change %			
CORROSION					
External	**All**	(30)	(30)	(30)	Low temperature and bio effects. Extra smart pigging.
Internal	**All**	(30)	(30)	(30)	Extra smart pigging.
THIRD PARTY IMPACT					
Anchor Impact	**All**	(50)	(50)	(50)	Low traffic.
Jackup Rig or Spud Barge	**All**	(50)	(50)	(50)	Low facility density.
Trawl/Fishing Net	**All**	(50)	(60)	(70)	Low fishing activity. Less bottom fishing in deeper water.
OPERATION IMPACT					
Rig Anchoring	**All**	(20)	(20)	(20)	Low marine traffic during ice season (8 months).
Work Boat Anchoring	**All**	(20)	(20)	(20)	Low work boat traffic during ice season (8 months).
MECHANICAL					
Connection Failure	**All**				
Material Failure	**All**				
NATURAL HAZARD					
Mud Slide	**All**	(60)	(50)	(40)	Gradient low. Mud slide potential (gradient) increases with water depth.
Storm/ Hurricane	**All**	(50)	(50)	(50)	Fewer severe storms.
		Freq. Increment per 10^5 km-year			
		Expected	Expected	Expected	
		Mode	Mode	Mode	
ARCTIC					
Ice Gouging	**S**	0.3495	0.2796		Ice gouge failure rate calculated using exponential failure distribution for 2.5-m cover, 0.2-m average gouge depth, 2 gouges per km-yr flux. Spill size Distribution explained in text Section 2.5.2. Medium depth has 0.8 as many gouges as shallow.
		0.0680	0.0544		
	M	0.6178	0.4943		
		0.1210	0.0968		
	L	1.3438	1.0750		
		0.2610	0.2088		
	H	0.3762	0.3010		
		0.0730	0.0584		
Strudel Scour	**S**	0.0021			Only in shallow water. Average frequency of 4 scours/mile2 and 100 ft of bridge length with 10% conditional Pipelines failure probability. The same spill size distribution as above.
		0.0012			
	M	0.0038			
		0.0020			
	L	0.0082			
		0.0045			
	H	0.0023			
		0.0012			
Upheaval Buckling	**S**	0.0004	0.0004	0.0004	All water depth. The failure frequency is 20% of that of Strudel Scour.
		0.0002	0.0002	0.0002	
	M	0.0008	0.0008	0.0008	
		0.0004	0.0004	0.0004	
	L	0.0016	0.0016	0.0016	
		0.0009	0.0009	0.0009	
	H	0.0005	0.0005	0.0005	
		0.0002	0.0002	0.0002	
Thaw Settlement	**S**	0.0002	0.0002	0.0002	All water depth. The failure frequency is 10% of that of Strudel Scour.
		0.0001	0.0001	0.0001	
	M	0.0004	0.0004	0.0004	
		0.0002	0.0002	0.0002	
	L	0.0008	0.0008	0.0008	
		0.0004	0.0004	0.0004	
	H	0.0002	0.0002	0.0002	
		0.0001	0.0001	0.0001	
Other	**S**	0.8881	0.0701	0.0002	25% Sum of above.
		0.0174	0.0137	0.0001	
	M	0.1557	0.01238	0.0003	
		0.0309	0.0244	0.0002	
	L	0.3386	0.2694	0.0006	
		0.06667	0.0525	0.0003	
	H	0.0948	0.0754	0.0002	
		0.0187	0.0147	0.0001	

Source: Bercha Group, Inc (2006a).

Table A.1-22
Pipeline Arctic Effect Distribution Derivation Summary

CAUSE CLASSIFICATION	Spill Size	Shallow			Medium			Deep		
		Frequency Change %								
		Min	Mode	Max	Min	Mode	Max	Min	Mode	Max
CORROSION										
External	**All**	(90)	(30)	(10)	(90)	(30)	(10)	(90)	(30)	(10)
Internal	**All**	(90)	(30)	(10)	(90)	(30)	(10)	(90)	(30)	(10)
THIRD PARTY IMPACT										
Anchor Impact	**All**	(90)	(50)	(10)	(90)	(50)	(10)	(90)	(50)	(10)
Jackup Rig or Spud Barge	**All**	(90)	(50)	(10)	(90)	(50)	(10)	(90)	(50)	(10)
Trawl/Fishing Net	**All**	(90)	(50)	(10)	(90)	(60)	(10)	(90)	(70)	(10)
OPERATION IMPACT										
Rig Anchoring	**All**	(50)	(20)	(10)	(50)	(20)	(10)	(50)	(20)	(10)
Work Boat Anchoring	**All**	(50)	(20)	(10)	(50)	(20)	(10)	(50)	(20)	(10)
MECHANICAL										
Connection Failure	**All**									
Material Failure	**All**									
NATURAL HAZARD										
Mud Slide	**All**	(90)	(60)	(10)	(90)	(50)	(10)	(90)	(40)	(10)
Storm/ Hurricane	**All**	(90)	(50)	(10)	(90)	(50)	(10)	(90)	(50)	(10)
		Frequency Increment per 10^5 km-year								
ARCTIC										
Ice Gouging	**S**	0.0060	0.0680	0.8290	0.0048	0.0544	0.6632			
	M	0.0090	0.1210	1.4670	0.0072	0.0968	1.1736			
	L	0.0210	0.2610	3.1900	0.0168	0.2088	2.5520			
	H	0.0060	0.0730	0.8930	0.0048	0.0584	0.7144			
Strudel Scour	**S**	0.0004	0.0012	0.0044						
	M	0.0006	0.0020	0.0078						
	L	0.0014	0.0045	0.0170						
	H	0.0004	0.0012	0.0048						
Upheaval Buckling	**S**	0.00007	0.00023	0.00088	0.00007	0.00023	0.00088	0.00007	0.00023	0.00088
	M	0.00013	0.00041	0.00156	0.00013	0.00041	0.00156	0.00013	0.00041	0.00156
	L	0.00028	0.00089	0.00340	0.00028	0.00089	0.00340	0.00028	0.00089	0.00340
	H	0.00008	0.00025	0.00095	0.00008	0.00025	0.00095	0.00008	0.00025	0.00095
Thaw Settlement	**S**									
	M									
	L									
	H									
Other	**S**	0.00161	0.01735	0.20858	0.00122	0.01366	0.16602	0.00002	0.00006	0.00022
	M	0.00244	0.03086	0.36910	0.00183	0.02430	0.29379	0.00003	0.00010	0.00039
	L	0.00567	0.06659	0.80260	0.00427	0.05242	0.63885	0.00007	0.00022	0.00085
	H	0.00162	0.01862	0.22468	0.00122	0.01466	0.17884	0.00002	0.00006	0.00024

Key:
S= Small
M= Medium
L=Large
H=Huge

Source:
Bercha Group, Inc. (2006a).

Table A.1-23
Platform Arctic Effect Derivation Summary

CAUSE CLASSIFICATION	Spill Size	Shallow	Medium	Deep	Reason
		Historical Expected Frequency Change %			
CORROSION					
External	**All**	(30)	(30)	(30)	Low temperature and bio effects. Extra smart pigging.
Internal	**All**	(30)	(30)	(30)	Extra smart pigging.
THIRD PARTY IMPACT					
Anchor Impact	**All**	(50)	(50)	(50)	Low traffic.
Jackup Rig or Spud Barge	**All**	(50)	(50)	(50)	Low facility density.
Trawl/Fishing Net	**All**	(50)	(60)	(70)	Low fishing activity. Less bottom fishing in deep water.
OPERATION IMPACT					
Rig Anchoring	**All**	(20)	(20)	(20)	Low marine traffic during ice season (8 months).
Work Boat Anchoring	**All**	(20)	(20)	(20)	Low work boat traffic during ice season (8 months).
MECHANICAL					
Connection Failure	**All**				
Material Failure	**All**				
NATURAL HAZARD					
Mud Slide	**All**	(60)	(50)	(40)	Gradient low. Mud slide potential (gradient) increases with water depth.
Storm/ Hurricane	**All**	(50)	(50)	(50)	Fewer severe storms.
		Freq. Increment per 10^5 km-year			
		Expected Mode	Expected Mode	Expected Mode	
ARCTIC					
Ice Gouging	**S**	0.3495	0.2796		Ice gouge failure rate calculated using exponential failure distribution for 2.5-m cover, 0.2-m average gouge depth, 2 gouges per km-yr flux. Spill size Distribution explained in text Section 2.5.2. Medium depth has 0.8 as many gouges as shallow.
		0.0680	0.0544		
	M	0.6178	0.4943		
		0.1210	0.0968		
	L	1.3438	1.0750		
		0.2610	0.2088		
	H	0.3762	0.3010		
		0.0730	0.0584		
Strudel Scour	**S**	0.0021			Only in shallow water. Average frequency of 2 scours/mile^2 and 100 ft of bridge length with 10% conditional P/L failure probability. The same spill size distribution as above.
		0.0012			
	M	0.0038			
		0.0020			
	L	0.0082			
		0.0045			
	H	0.0023			
		0.0012			
Upheaval Buckling	**S**	0.0004	0.0004	0.0004	All water depth. The failure frequency is 20% of that of Strudel Scour.
		0.0002	0.0002	0.0002	
	M	0.0008	0.0008	0.0008	
		0.0004	0.0004	0.0004	
	L	0.0016	0.0016	0.0016	
		0.0009	0.0009	0.0009	
	H	0.0005	0.0005	0.0005	
		0.0002	0.0002	0.0002	
Thaw Settlement	**S**				
	M				
	L				
	H				
Other	**S**	0.0880	0.0700	0.0001	To be assessed as 25% of above.
		0.0173	0.0137	0.0001	
	M	0.1556	0.1238	0.0002	
		0.0309	0.0243	0.0001	
	L	0.3384	0.2692	0.0004	
		0.0666	0.0524	0.0002	
	H	0.0947	0.0754	0.0001	
		0.0186	0.0147	0.0001	

Source: Bercha Group, Inc.(2006a).

Table A.1-24
Platform Arctic Effect Distribution Derivation Summary

CAUSE CLASSIFICATION	Spill Size	Shallow			Medium			Deep		
		Frequency Change %								
		Min	Mode	Max	Min	Mode	Max	Min	Mode	Max
CORROSION										
External	**All**	(90)	(30)	(10)	(90)	(30)	(10)	(90)	(30)	(10)
Internal	**All**	(90)	(30)	(10)	(90)	(30)	(10)	(90)	(30)	(10)
THIRD PARTY IMPACT										
Anchor Impact	**All**	(90)	(50)	(10)	(90)	(50)	(10)	(90)	(50)	(10)
Jackup Rig or Spud Barge	**All**	(90)	(50)	(10)	(90)	(50)	(10)	(90)	(50)	(10)
Trawl/Fishing Net	**All**	(90)	(50)	(10)	(90)	(60)	(10)	(90)	(70)	(10)
OPERATION IMPACT										
Rig Anchoring	**All**	(50)	(20)	(10)	(50)	(20)	(10)	(50)	(20)	(10)
Work Boat Anchoring	**All**	(50)	(20)	(10)	(50)	(20)	(10)	(50)	(20)	(10)
MECHANICAL										
Connection Failure	**All**									
Material Failure	**All**									
NATURAL HAZARD										
Mud Slide	**All**	(90)	(60)	(10)	(90)	(50)	(10)	(90)	(40)	(10)
Storm/ Hurricane	**All**	(90)	(50)	(10)	(90)	(50)	(10)	(90)	(50)	(10)
		Frequency Increment per 10^5 km-year								
ARCTIC										
Ice Gouging	**S**	0.0060	0.0680	0.8290	0.0048	0.0544	0.6632			
	M	0.0090	0.1210	1.4670	0.0072	0.0968	1.1736			
	L	0.0210	0.2610	3.1900	0.0168	0.2088	2.5520			
	H	0.0060	0.0730	0.8930	0.0048	0.0584	0.7144			
Strudel Scour	**S**	0.0004	0.0012	0.0044						
	M	0.0006	0.0020	0.0078						
	L	0.0014	0.0045	0.0170						
	H	0.0004	0.0012	0.0048						
Upheaval Buckling	**S**	0.00007	0.00023	0.00088	0.00007	0.00023	0.00088	0.00007	0.00023	0.00088
	M	0.00013	0.00041	0.00156	0.00013	0.00041	0.00156	0.00013	0.00041	0.00156
	L	0.00028	0.00089	0.00340	0.00028	0.00089	0.00340	0.00028	0.00089	0.00340
	H	0.00008	0.00025	0.00095	0.00008	0.00025	0.00095	0.00008	0.00025	0.00095
Thaw Settlement	**S**									
	M									
	L									
	H									
Other	**S**	0.00161	0.01735	0.20858	0.00122	0.01366	0.16602	0.00002	0.00006	0.00022
	M	0.00244	0.03086	0.36910	0.00183	0.02430	0.29379	0.00003	0.00010	0.00039
	L	0.00567	0.06659	0.80260	0.00427	0.05242	0.63885	0.00007	0.00022	0.00085
	H	0.00162	0.01862	0.22468	0.00122	0.01466	0.17884	0.00002	0.00006	0.00024

Key:
S= Small
M= Medium
L=Large
H=Huge

Source:
Bercha Group, Inc. (2006a).

Table A.1-25
Estimated Mean Number of Large Platform, Pipeline and Total Spills for Alternative I, the Proposed Action (Sale 193) and its Alternatives Over the Production Life

Alternative		Mean Number of Platform Spills	Mean Number of Pipeline Spills	Mean Number of Spills Total
I	Proposed Action	0.21	0.30	0.51
II	No Sale	0	0	0
III	Corridor I	0.13	0.19	0.33
IV	Corridor II	0.18	0.25	0.43

Note: Total equals the sum of mean platform and pipeline spills

Source:
USDOI, MMS, Alaska OCS Region (2006).

Table A.1-26
Estimated Chance of One or More Large Platform, Pipeline and Total Spills for Alternative I, the Proposed Action (Sale 193) and its Alternatives Over the Production Life

Alternative		Percent Chance of One or More Platform Spills	Percent Chance of One or More Pipeline Spills	Percent Chance of One or More Spills Total
I	Proposed Action	19	26	40
II	No Sale	0	0	0
III	Corridor I	12	17	28
IV	Corridor II	16	22	35

Source:
USDOI, MMS, Alaska OCS Region (2006).

Table A.1-27

Estimated Mean Number of Total Spills and Chance of One or More for Alternative I, the Proposed Action (Sale 193) and its Alternatives Using Spill Rates at the 95% Confidence Interval Over the Production Life

Alternative		95% CI Mean Number of Spills Total	Percent Chance of One or More Spills Total
I	Proposed Action	0.32-0.77	27-54
II	No Sale	0	0
III	Corridor I	0.20-0.49	18-39
IV	Corridor II	0.27-0.65	24-48

Source:
USDOI, MMS, Alaska OCS Region (2006).

Table A.1-28
Small Crude-Oil Spills: Estimated Spill Rates for the Alaska North Slope

Small Crude-Oil Spills <500 barrels, 1989-2000		
Total Volume of Spills	135,127 gallons	**Note:** Oil-spill databases are from the ADEC, Anchorage, Juneau, and Fairbanks. Alaska North Slope production data are derived from the TAPS throughput data from Alyeska Pipeline. **Source:** USDOI, MMS, Alaska OCS Region (2003).
—	3,217 barrels	
Total Number of Spills	1,178 spills	
Average Spill Size	2.7 barrels	
Production (Crude Oil)	6.6 billion barrels	
Spill Rate	178 spills/billion barrels of crude oil produced	
Small Crude-Oil Spills ≥ 500 barrels and <1,000, 1985-2000		
Total Volume of Spills	171,150 gallons	
—	4,075 barrels	
Total Number of Spills	6	**Note:** Oil-spill databases are from the ADEC, Anchorage, Juneau, and Fairbanks. BP Alaska Inc. and Arco. Alaska North Slope production data are derived from the TAPS throughput data from Alyeska Pipeline. **Source:** USDOI, MMS, Alaska OCS Region (2003).
Average Spill Size	680 barrels	
Production (Crude Oil)	9.36 billion barrels	
Spill Rate	0.64 spills/billion barrels of crude oil produced	

Table A.1-29
Small Crude-Oil Spills: Assumed Spills over the Production Life of the Chukchi Sea Sale 193

Sale 193 Alternative	Assumed Small Crude-Oil Spills <500 barrels				
	Resources (Bbbl)[1]	Spill Rate (Spills/Bbbl)	Assumed Spill Size (bbl)	Estimated Number of Spills	Estimated Total Spill Volume (bbl)
I Proposed Action	1	178	3	178	534
II No Sale	0	178	3	0	0
III Corridor I	0.640	178	3	114	342
IV Corridor II	0.845	178	3	152	453
Alternative	**Assumed Small Crude-Oil Spills ≥ 500 and ≤1,000 barrels**				
I Proposed Action	1	0.64	680	0.64	680
II No Sale	0	0.64	680	0	0
III Corridor I	0.640	0.64	680	0.41	680
IV Corridor II	0.845	0.64	680	0.54	680

Note:
[1]The estimation of oil spills is based on the estimated resources. If these resources are not produced then no oil spills occur.

Source:
USDOI, MMS, Alaska OCS Region (2006).

Table A.1-30
Small Crude-Oil Spills: Assumed Size Distribution over the Production Life of the Chukchi Sea Sale 193

Size[2]	Distribution % in ADEC database	Alternative I Proposed Action	Alternative II No Sale	Alternative III Corridor I	Alternative IV Corridor II
<1 gallon	19.14	34	0	22	29
>1 and ≤5 gallons	35.37	63	0	40	53
>5 gallons and <1 bbl	20.41	36	0	23	31
Total <1 bbl		133	0	85	113
≥1 bbl and ≤bbl 5	20.61	36	0	23	31
>5 and ≤25 bbl	3.92	7	0	4	6
> 25 and <500 bbl	1.4	2	0	2	2
≥500 and ≤1,000 bbl	--	1	0	1	1
Total >1 and ≤1,000 bbl		46	0	30	40
Total Volume (bbl)		1,214	0	1,022	1,133

Notes:
[1] Estimated number of spills is rounded to the nearest whole number.
[2] Spill-size distributions are allocated by multiplying the total estimated number of spills by the fraction of spills in that size category from the Alaska Department of Environmental Conservation (ADEC) database.

Source:
USDOI, MMS, Alaska OCS Region (2006).

Table A.1-31
Small Refined-Oil Spills: Estimated Rate for the Alaska North Slope

Estimated Small Refined Spill Rate for the Alaska North Slope, 1989-2000	
Total Volume of Spills	94,195 gallons
	2,243 barrels
Total Number of Spills	2,915 spills
Average Spill Size	0.7 barrels (29 gallons)
Production (Crude Oil)	6.6 billion barrels
Spill Rate	440 spills/billion barrels of crude oil produced

Source: USDOI, MMS, Alaska OCS Region (2003).

Table A.1-32
Small Refined-Oil Spills: Assumed Spills over the Production Life of the Chukchi Sea Sale 193

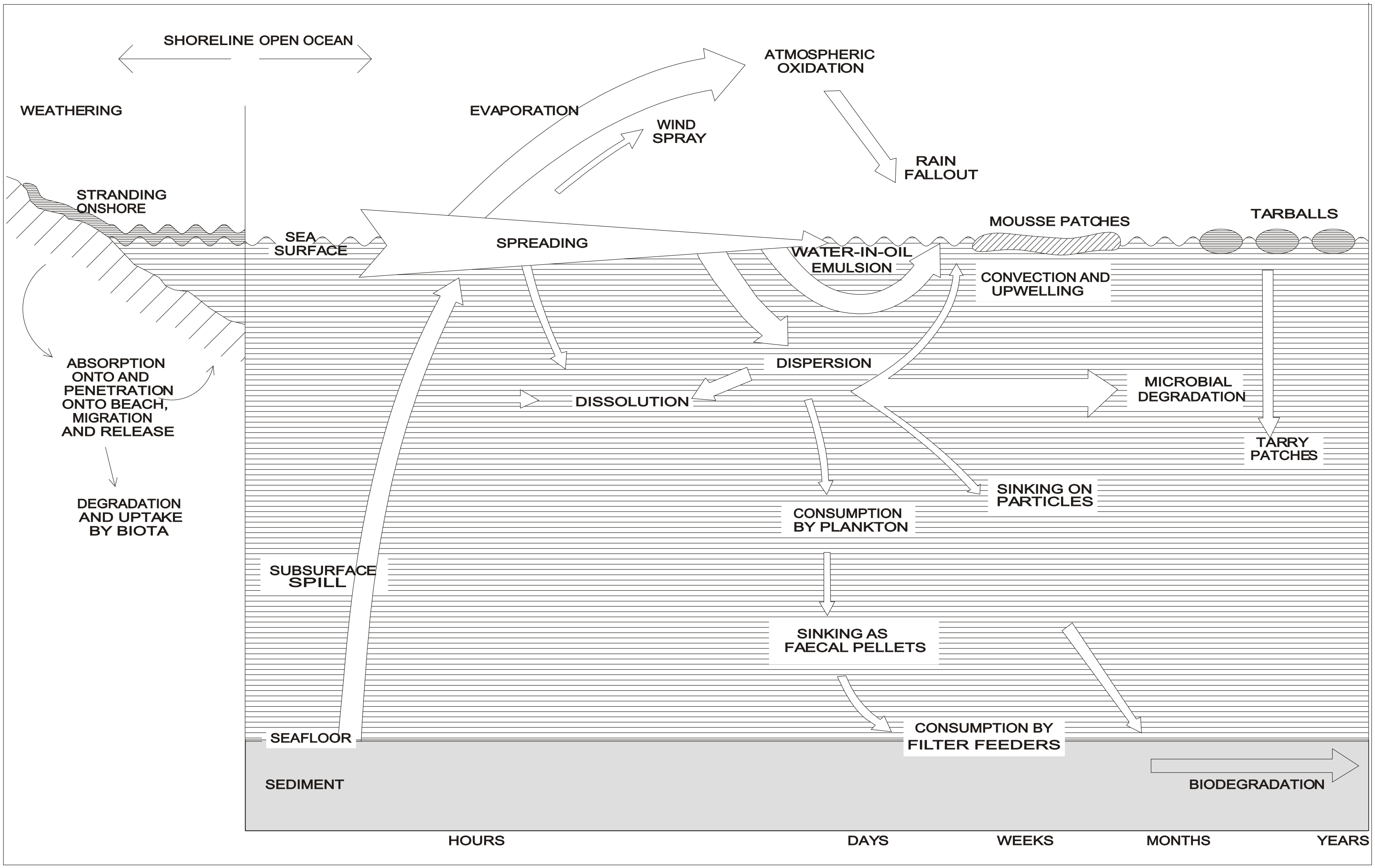
Sale193 and its Alternatives	Resource Range (Bbbl)	Spill Rate (Spills/Bbbl)	Average Spill Size (bbl)	Estimated Number of Spills[1]	Estimated Total Spill Volume (bbl)[1]
I Proposed Action	1	440	0.7 (29 gal)	440	308
II No Sale	0	440	0.7 (29 gal)	0	0
III Corridor I	0.6402	440	0.7 (29 gal)	282	197
IV Corridor II	0.8457	440	0.7 (29 gal)	373	250

Note:
[1] The fractional estimated mean spill number and volume is rounded to the nearest whole number.

Key:

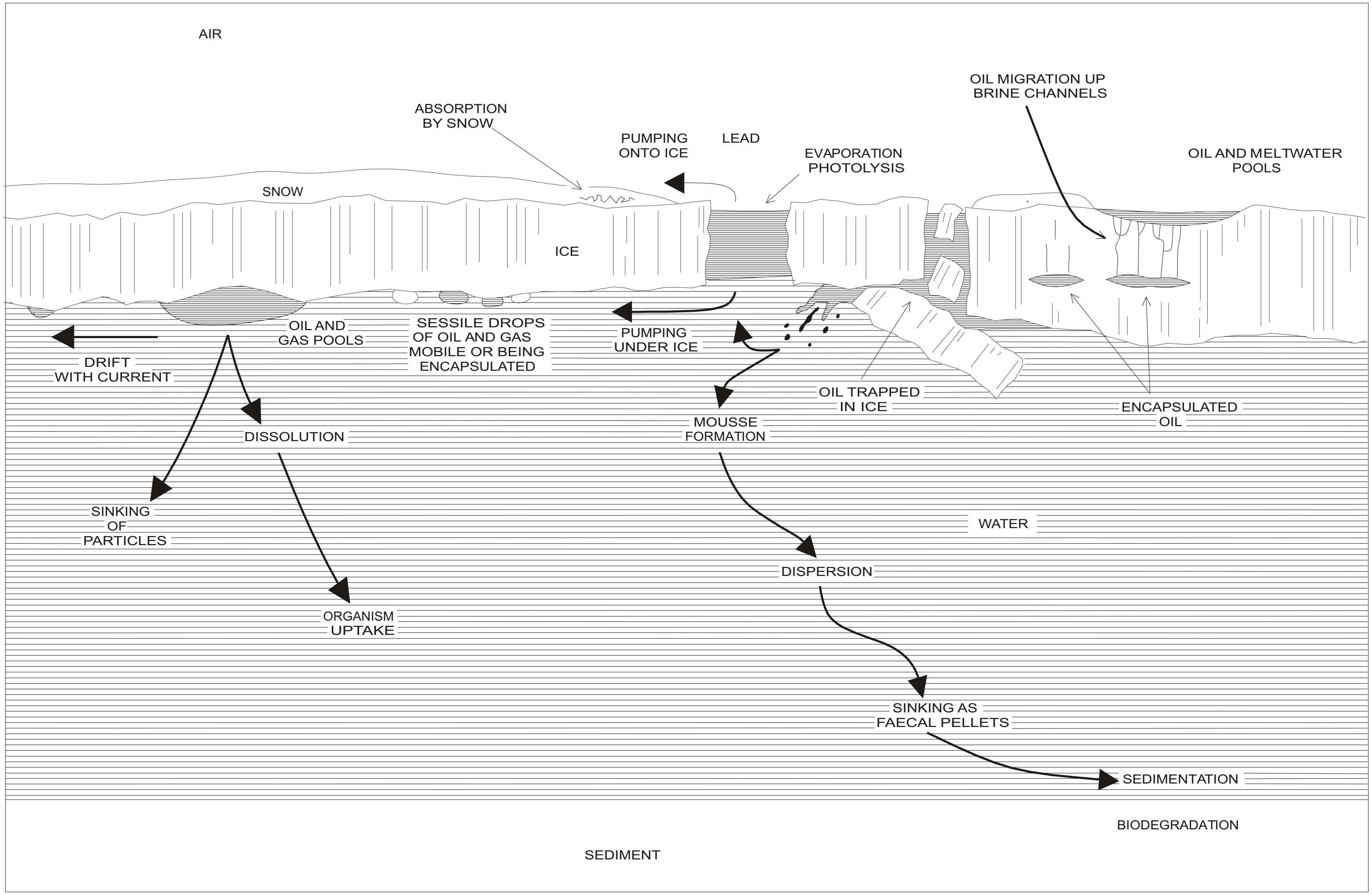
Bbbl = Billion barrels.
bbl = barrel.
gal = gallon.

Source:
USDOI, MMS, Alaska OCS Region (2006).



Source: After MacKay, 1985, and Rasmussen, (1985).

Figure A.1-1. Fate of Oil Spills in the Ocean During Arctic Summer



Source: After Hillman and Shafer (1983), and Mackay, (1985).

Figure A-2. Fate of Oil Spills in the Ocean During Arctic Winter

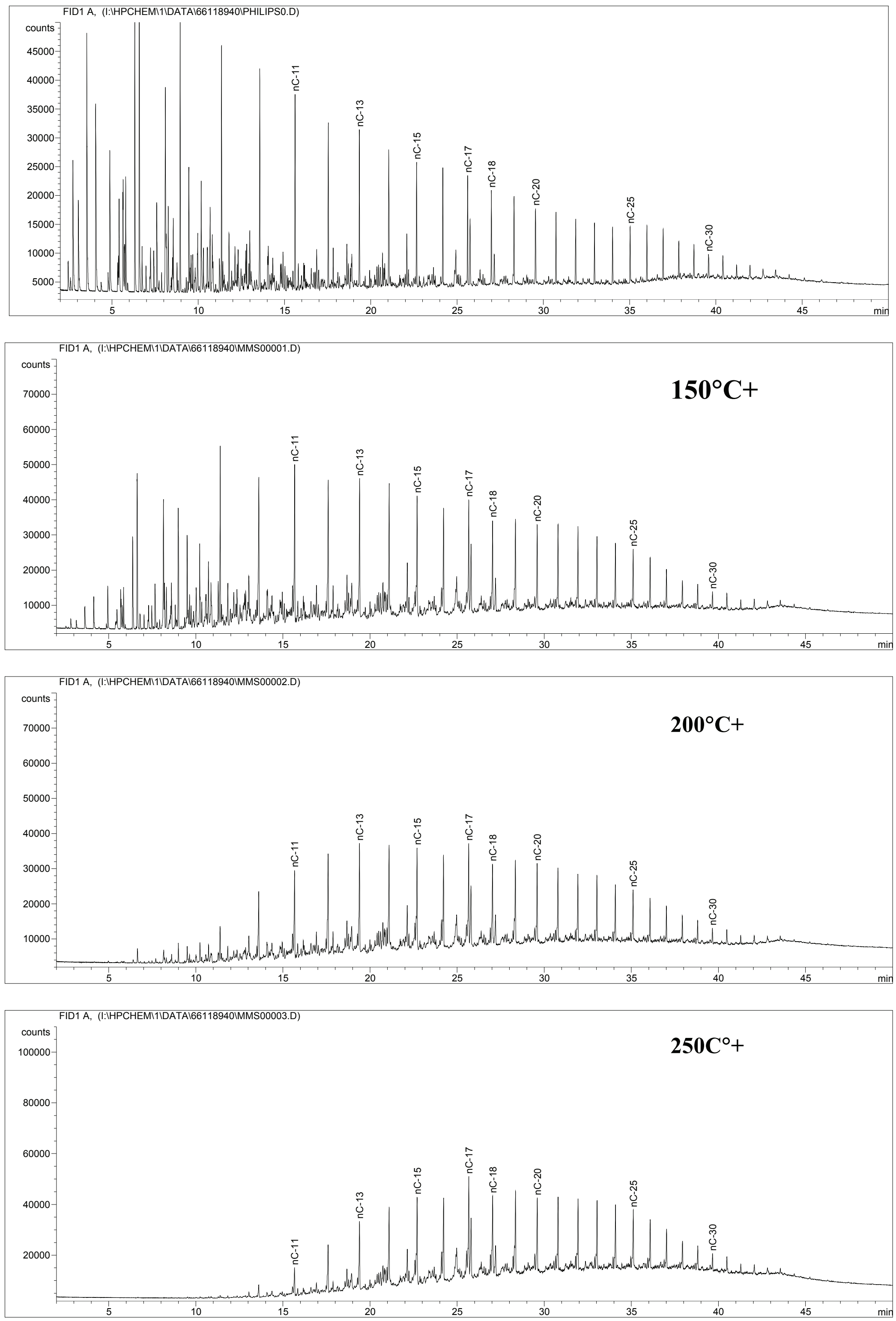


Figure A.1-3. Gas Chromatograms for the Fresh Alpine Composite and its Evaporated Residues

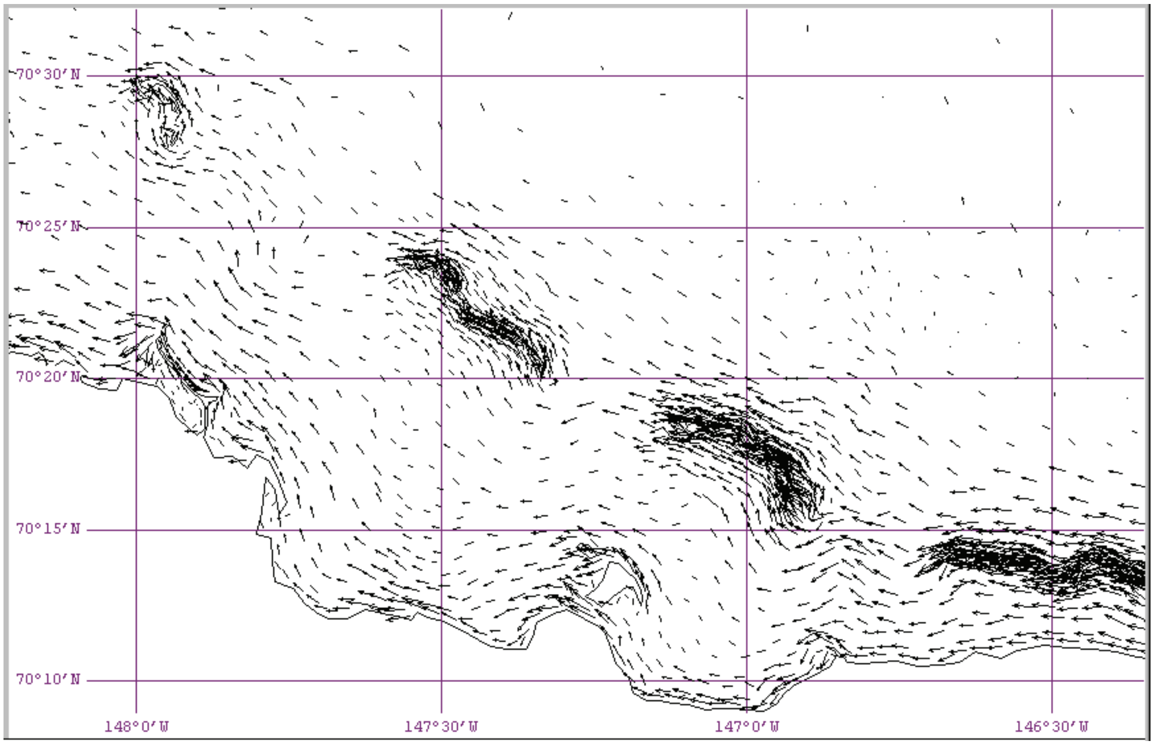


Figure A.1-4. Nearshore Surface Currents Simulated by the NOAA Model for a Wind from the East at 10 Meters Per Second

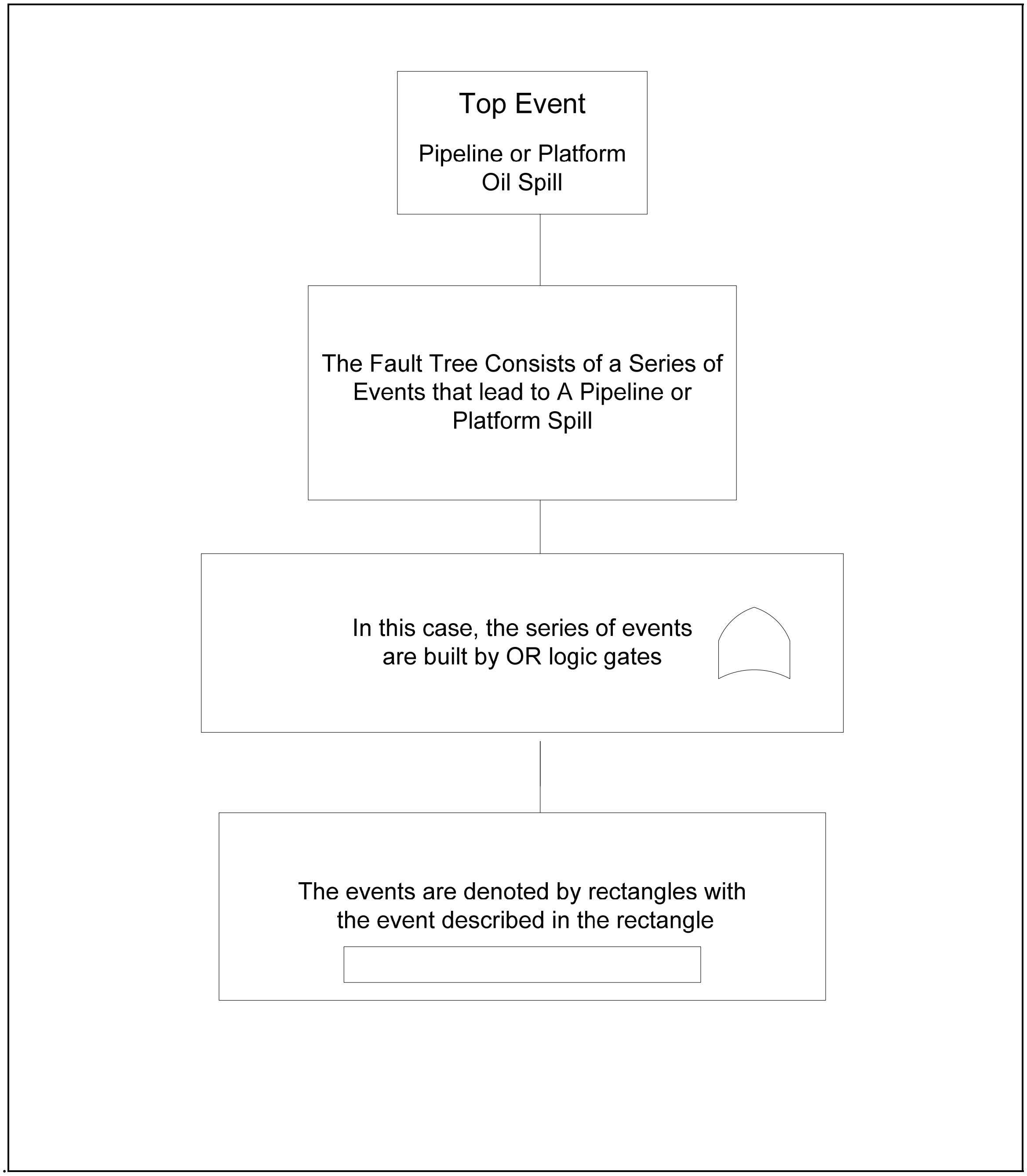


Figure A.1-5. Basic Parts of a Fault Tree

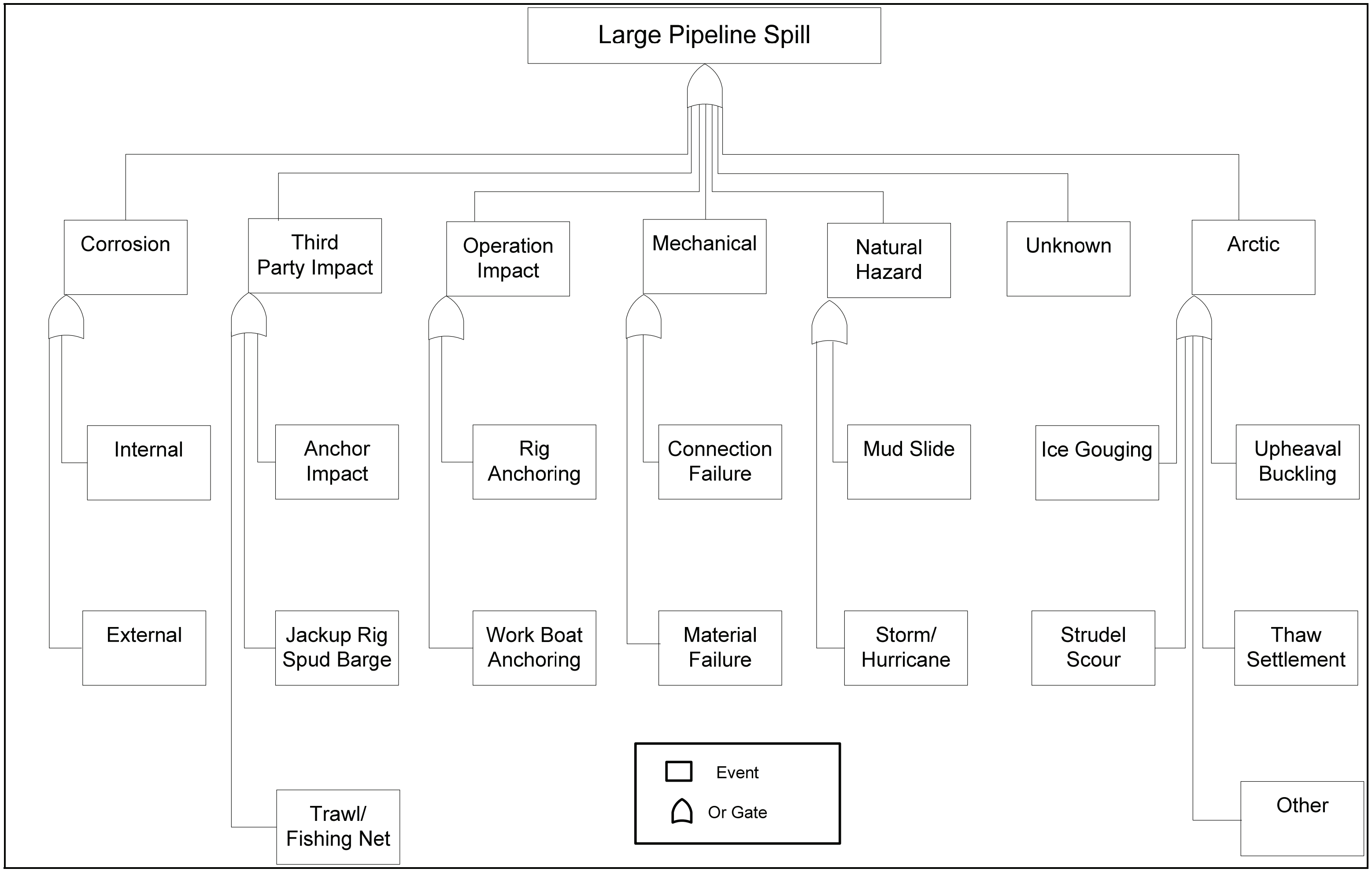


Figure A.1-6. Typical Fault Tree for A Pipeline Spill

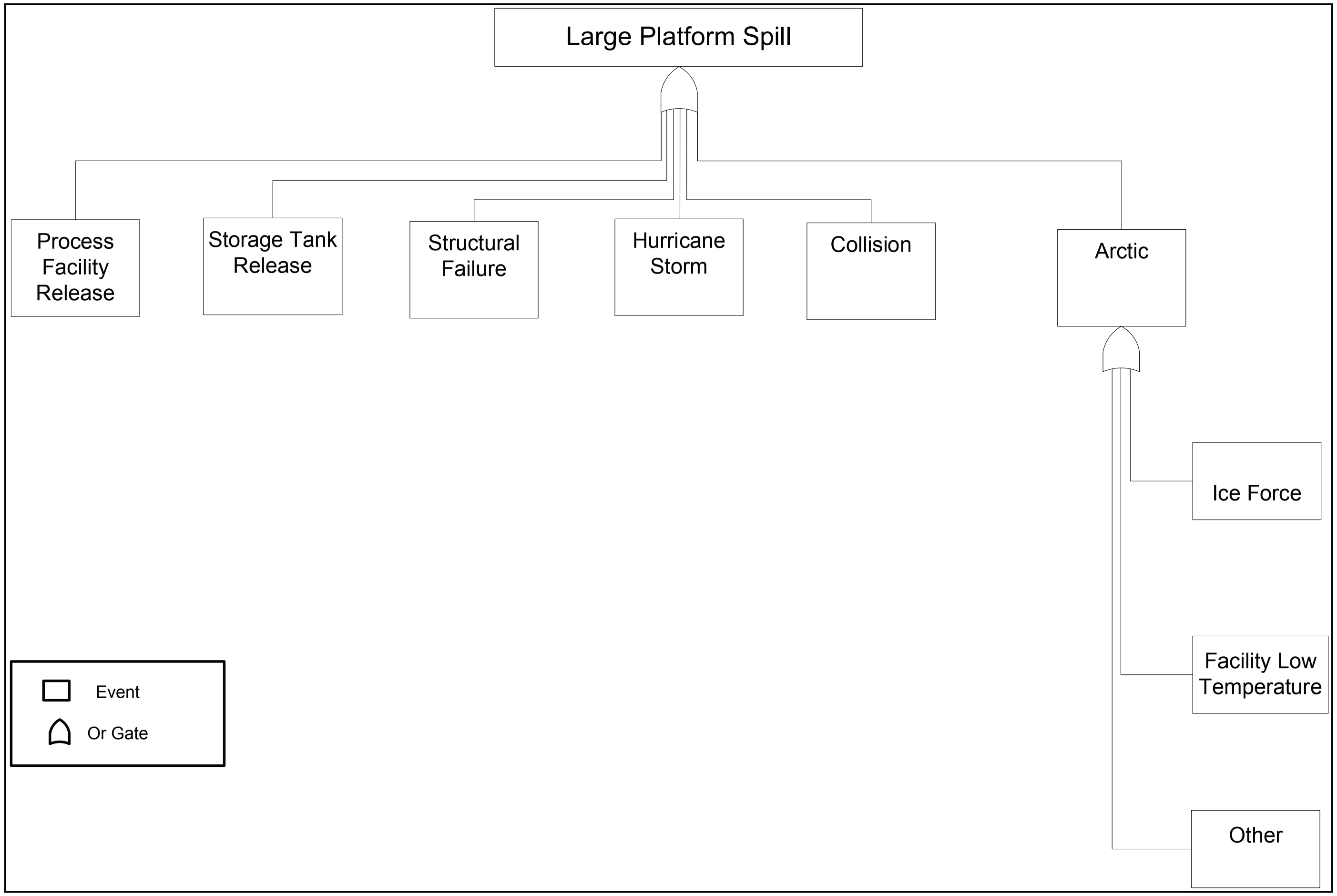


Figure A.1-7. Typical Fault Tree for a Platform Spill

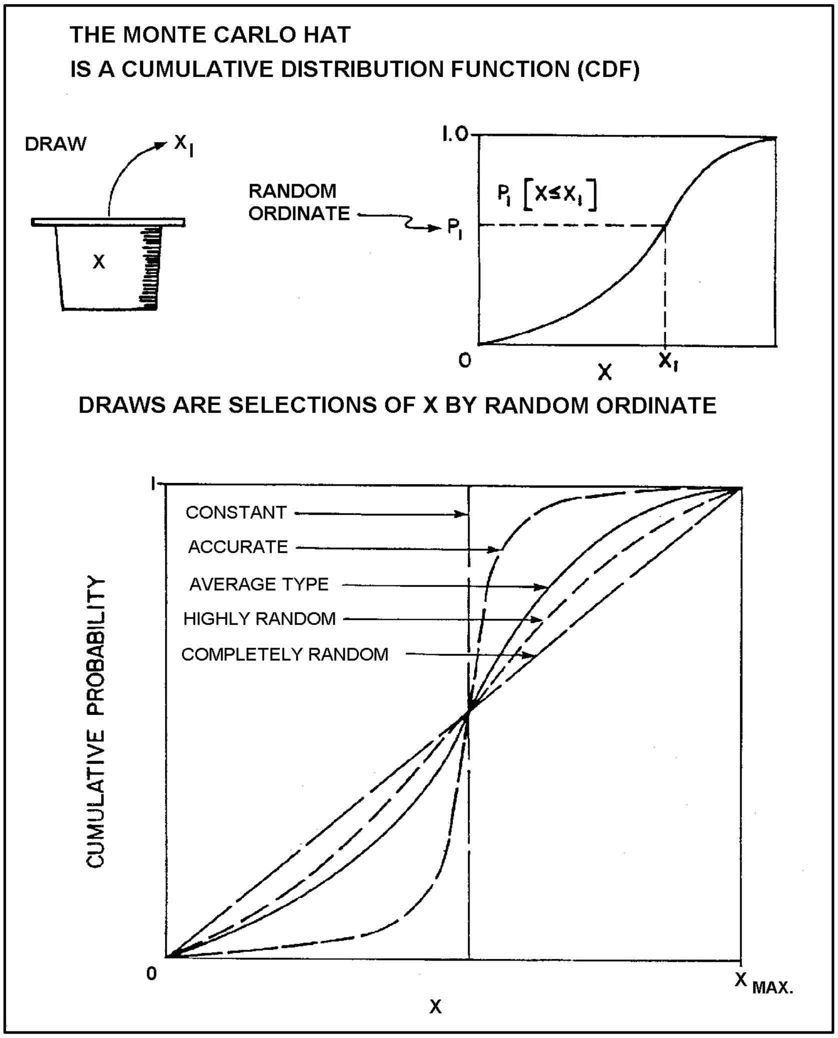
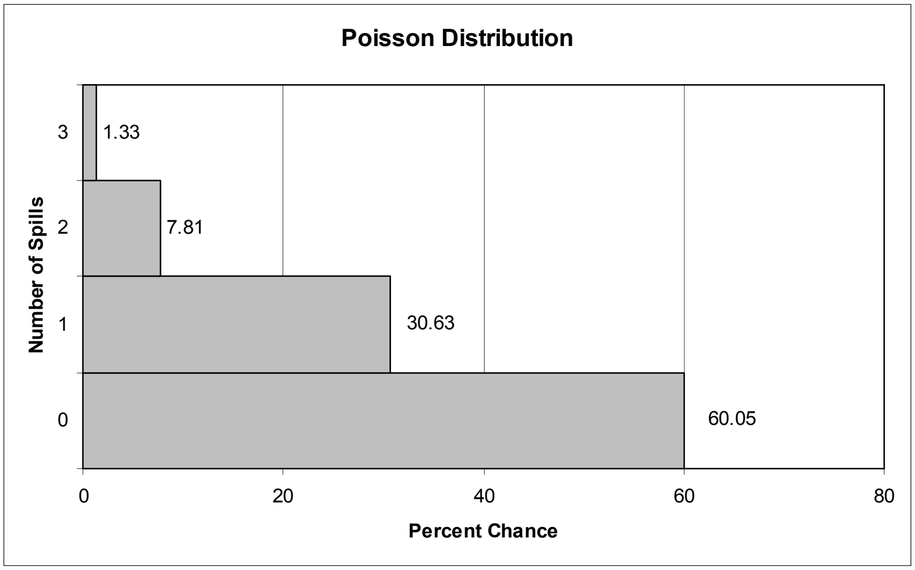
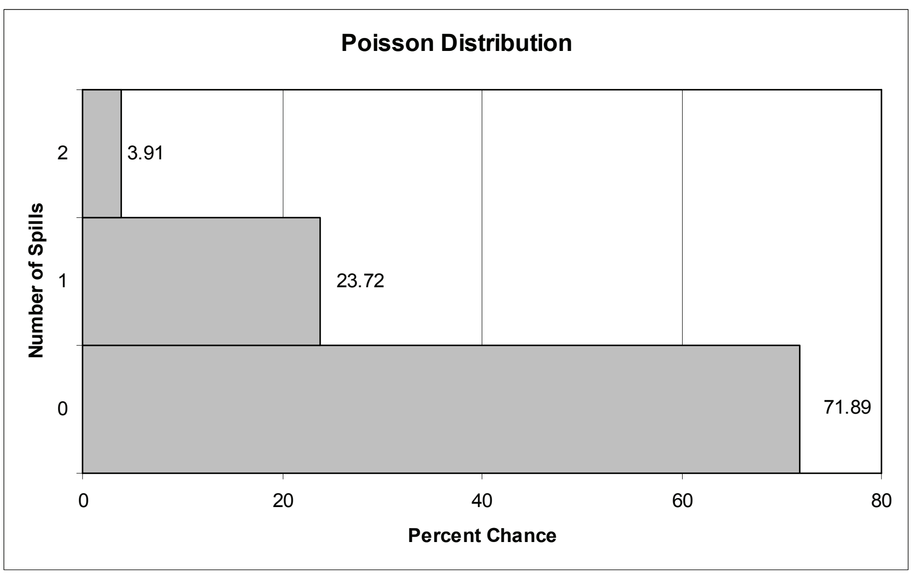


Figure A.1-8. Schematic of Monte Carlo Process as a Cumulative Distribution Function



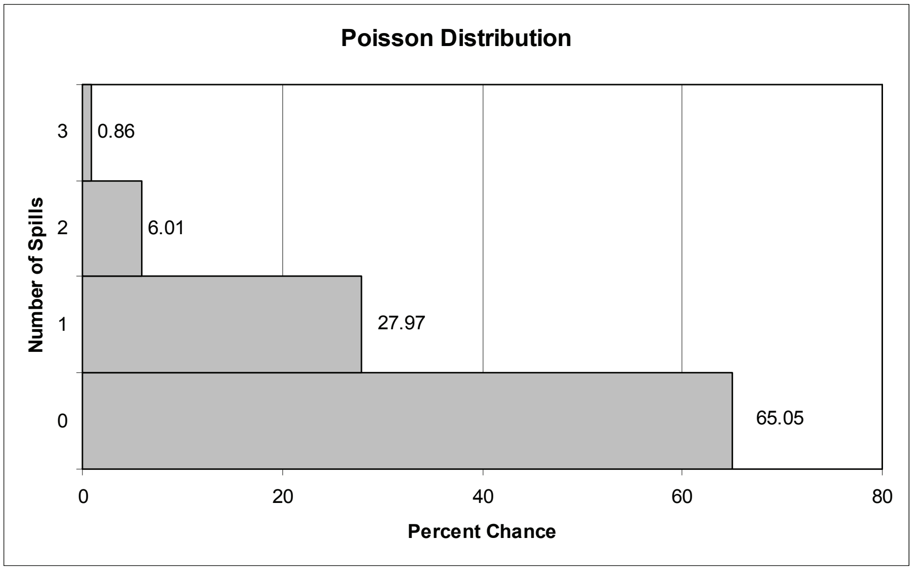
Mean Number of Spills = 0.51
Percent Chance of One or More = 40%
Percent Chance of No Spills = 60%
Most Likely Number = 0

Figure A.1-9. Poisson Distribution: Alternative I, Proposed Action, Total (Pipeline and Platform) over the Production Life



Mean Number of Spills = 0.33
Percent Chance of One or More = 28%
Percent Chance of No Spills = 72%
Most Likely Number = 0

Figure A.1-10. Poisson Distribution Alternative III, Corridor I Total (Pipeline and Platform) over the Production Life



Mean Number of Spills = 0.43
Percent Chance of One or More = 35%
Percent Chance of No Spills = 65%
Most Likely Number = 0

Figure A.1-11. Poisson Distribution Alternative IV, Corridor II, Total (Pipeline and Platform) over the Production Life

APPENDIX A.2

SUPPORTING TABLES FOR THE OSRA APPENDIX

Appendix A.2 Table List

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Table A.2-9	Annual Conditional Probabilities (Expressed as Percent Chance) that a Large Oil Spill Starting at a Particular Location Will Contact a Certain Land Segment Within 30 Days, Chukchi Sale 193
Table A.2-10	Annual Conditional Probabilities (Expressed as Percent Chance) that a Large Oil Spill Starting at a Particular Location Will Contact a Certain Land Segment Within 60 Days, Chukchi Sale 193
Table A.2-11	Annual Conditional Probabilities (Expressed as Percent Chance) that a Large Oil Spill Starting at a Particular Location Will Contact a Certain Land Segment Within 180 Days, Chukchi Sale 193
Table A.2-12	Annual Conditional Probabilities (Expressed as Percent Chance) that a Large Oil Spill Starting at a Particular Location Will Contact a Certain Land Segment Within 360 Days, Chukchi Sale 193
Table A.2-13	Annual Conditional Probabilities (Expressed As Percent Chance) That A Large Oil Spill Starting at a Particular Location Will Contact A Certain Group of Land Segments Within 3 Days, Chukchi Sale 193
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Table A.2-15	Annual Conditional Probabilities (Expressed As Percent Chance) That A Large Oil Spill Starting at a Particular Location Will Contact A Certain Group of Land Segments Within 30 Days, Chukchi Sea Sale 193
Table A.2-16	Annual Conditional Probabilities (Expressed As Percent Chance) That A Large Oil Spill Starting at a Particular Location Will Contact A Certain Group of Land Segments Within 60 Days, Chukchi Sea Sale 193
Table A.2-17	Annual Conditional Probabilities (Expressed As Percent Chance) That A Large Oil Spill Starting at a Particular Location Will Contact A Certain Group of Land Segments Within 180 Days, Chukchi Sea Sale 193
Table A.2-18	Annual Conditional Probabilities (Expressed As Percent Chance) That A Large Oil Spill Starting at a Particular Location Will Contact A Certain Group of Land Segments Within 360 Days, Chukchi Sea Sale 193
Table A.2-19	Annual Conditional Probabilities (Expressed as Percent Chance) that a Large Oil Spill Starting at a Particular Location Will Contact a Certain Boundary Segment Within 3 Days, Chukchi Sale 193

Table A.2-20 Annual Conditional Probabilities (Expressed as Percent Chance) that a Large Oil Spill Starting at a Particular Location Will Contact a Certain Boundary Segment Within 10 Days, Chukchi Sale 193

Table A.2-21 Annual Conditional Probabilities (Expressed as Percent Chance) that a Large Oil Spill Starting at a Particular Location Will Contact a Certain Boundary Segment Within 30 Days, Chukchi Sale 193

Table A.2-22 Annual Conditional Probabilities (Expressed as Percent Chance) that a Large Oil Spill Starting at a Particular Location Will Contact a Certain Boundary Segment Within 60 Days, Chukchi Sale 193

Table A.2-23 Annual Conditional Probabilities (Expressed as Percent Chance) that a Large Oil Spill Starting at a Particular Location Will Contact a Certain Boundary Segment Within 180 Days, Chukchi Sale 193

Table A.2-24 Annual Conditional Probabilities (Expressed as Percent Chance) that a Large Oil Spill Starting at a Particular Location Will Contact a Certain Boundary Segment Within 360 Days, Chukchi Sale 193

Table A.2-25 Summer Conditional Probabilities (Expressed as Percent Chance) that a Large Oil Spill Starting at a Particular Location Will Contact a Certain Environmental Resource Area Within 3 Days, Chukchi Sale 193

Table A.2-26 Summer Conditional Probabilities (Expressed as Percent Chance) that a Large Oil Spill Starting at a Particular Location Will Contact a Certain Environmental Resource Area Within 10 Days, Chukchi Sale 193

Table A.2-27 Summer Conditional Probabilities (Expressed as Percent Chance) that a Large Oil Spill Starting at a Particular Location Will Contact a Certain Environmental Resource Area Within 30 Days, Chukchi Sale 193

Table A.2-28 Summer Conditional Probabilities (Expressed as Percent Chance) that a Large Oil Spill Starting at a Particular Location Will Contact a Certain Environmental Resource Area Within 60 Days, Chukchi Sale 193

Table A.2-29 Summer Conditional Probabilities (Expressed as Percent Chance) that a Large Oil Spill Starting at a Particular Location Will Contact a Certain Environmental Resource Area Within 180 Days, Chukchi Sale 193

Table A.2-30 Summer Conditional Probabilities (Expressed as Percent Chance) that a Large Oil Spill Starting at a Particular Location Will Contact a Certain Environmental Resource Area Within 360 Days, Chukchi Sale 193

Table A.2-31 Summer Conditional Probabilities (Expressed as Percent Chance) that a Large Oil Spill Starting at a Particular Location Will Contact a Certain Land Segment Within 3 Days, Chukchi Sale 193

Table A.2-32 Summer Conditional Probabilities (Expressed as Percent Chance) that a Large Oil Spill Starting at a Particular Location Will Contact a Certain Land Segment Within 10 Days, Chukchi Sale 193

Table A.2-33 Summer Conditional Probabilities (Expressed as Percent Chance) that a Large Oil Spill Starting at a Particular Location Will Contact a Certain Land Segment Within 30 Days, Chukchi Sale 193

Table A.2-34 Summer Conditional Probabilities (Expressed as Percent Chance) that a Large Oil Spill Starting at a Particular Location Will Contact a Certain Land Segment Within 60 Days, Chukchi Sale 193

Table A.2-35 Summer Conditional Probabilities (Expressed as Percent Chance) that a Large Oil Spill Starting at a Particular Location Will Contact a Certain Land Segment Within 180 Days, Chukchi Sale 193

Table A.2-36 Summer Conditional Probabilities (Expressed as Percent Chance) that a Large Oil Spill Starting at a Particular Location Will Contact a Certain Land Segment Within 360 Days, Chukchi Sale 193

Table A.2-37 Summer Conditional Probabilities (Expressed As Percent Chance) That A Large Oil Spill Starting at a Particular Location Will Contact A Certain Group of Land Segments Within 3 Days, Chukchi Sale 193

Table A.2-38 Summer Conditional Probabilities (Expressed As Percent Chance) That A Large Oil Spill Starting at a Particular Location Will Contact A Certain Group of Land Segments Within 10 Days, Chukchi Sale 193

Table A.2-39 Summer Conditional Probabilities (Expressed As Percent Chance) That A Large Oil Spill Starting at a Particular Location Will Contact A Certain Group of Land Segments Within 30 Days, Chukchi Sea Sale 193

Table A.2-40 Summer Conditional Probabilities (Expressed As Percent Chance) That A Large Oil Spill Starting at a Particular Location Will Contact A Certain Group of Land Segments Within 60 Days, Chukchi Sea Sale 193

Table A.2-41 Summer Conditional Probabilities (Expressed As Percent Chance) That A Large Oil Spill Starting at a Particular Location Will Contact A Certain Group of Land Segments Within 180 Days, Chukchi Sea Sale 193

Table A.2-42 Summer Conditional Probabilities (Expressed As Percent Chance) That A Large Oil Spill Starting at a Particular Location Will Contact A Certain Group of Land Segments Within 360 Days, Chukchi Sea Sale 193

Table A.2-43 Summer Conditional Probabilities (Expressed as Percent Chance) that a Large Oil Spill Starting at a Particular Location Will Contact a Certain Boundary Segment Within 3 Days, Chukchi Sale 193

Table A.2-44 Summer Conditional Probabilities (Expressed as Percent Chance) that a Large Oil Spill Starting at a Particular Location Will Contact a Certain Boundary Segment Within 10 Days, Chukchi Sale 193

Table A.2-45 Summer Conditional Probabilities (Expressed as Percent Chance) that a Large Oil Spill Starting at a Particular Location Will Contact a Certain Boundary Segment Within 30 Days, Chukchi Sale 193

Table A.2-46 Summer Conditional Probabilities (Expressed as Percent Chance) that a Large Oil Spill Starting at a Particular Location Will Contact a Certain Boundary Segment Within 60 Days, Chukchi Sale 193

Table A.2-47 Summer Conditional Probabilities (Expressed as Percent Chance) that a Large Oil Spill Starting at a Particular Location Will Contact a Certain Boundary Segment Within 180 Days, Chukchi Sale 193

Table A.2-48 Summer Conditional Probabilities (Expressed as Percent Chance) that a Large Oil Spill Starting at a Particular Location Will Contact a Certain Boundary Segment Within 360 Days, Chukchi Sale 193

Table A.2-49 Winter Conditional Probabilities (Expressed as Percent Chance) that a Large Oil Spill Starting at a Particular Location Will Contact a Certain Environmental Resource Area Within 3 Days, Chukchi Sale 193

Table A.2-50 Winter Conditional Probabilities (Expressed as Percent Chance) that a Large Oil Spill Starting at a Particular Location Will Contact a Certain Environmental Resource Area Within 10 Days, Chukchi Sale 193

Table A.2-51 Winter Conditional Probabilities (Expressed as Percent Chance) that a Large Oil Spill Starting at a Particular Location Will Contact a Certain Environmental Resource Area Within 30 Days, Chukchi Sale 193

Table A.2-52 Winter Conditional Probabilities (Expressed as Percent Chance) that a Large Oil Spill Starting at a Particular Location Will Contact a Certain Environmental Resource Area Within 60 Days, Chukchi Sale 193

Table A.2-53 Winter Conditional Probabilities (Expressed as Percent Chance) that a Large Oil Spill Starting at a Particular Location Will Contact a Certain Environmental Resource Area Within 180 Days, Chukchi Sale 193

Table A.2-54 Winter Conditional Probabilities (Expressed as Percent Chance) that a Large Oil Spill Starting at a Particular Location Will Contact a Certain Environmental Resource Area Within 360 Days, Chukchi Sale 193

Table A.2-55 Winter Conditional Probabilities (Expressed as Percent Chance) that a Large Oil Spill Starting at a Particular Location Will Contact a Certain Land Segment Within 3 Days, Chukchi Sale 193

Table A.2-56 Winter Conditional Probabilities (Expressed as Percent Chance) that a Large Oil Spill Starting at a Particular Location Will Contact a Certain Land Segment Within 10 Days, Chukchi Sale 193

Table A.2-57 Winter Conditional Probabilities (Expressed as Percent Chance) that a Large Oil Spill Starting at a Particular Location Will Contact a Certain Land Segment Within 30 Days, Chukchi Sale 193

Table A.2-58 Winter Conditional Probabilities (Expressed as Percent Chance) that a Large Oil Spill Starting at a Particular Location Will Contact a Certain Land Segment Within 60 Days, Chukchi Sale 193

Table A.2-59 Winter Conditional Probabilities (Expressed as Percent Chance) that a Large Oil Spill Starting at a Particular Location Will Contact a Certain Land Segment Within 180 Days, Chukchi Sale 193

Table A.2-60 Winter Conditional Probabilities (Expressed as Percent Chance) that a Large Oil Spill Starting at a Particular Location Will Contact a Certain Land Segment Within 360 Days, Chukchi Sale 193

Table A.2-61 Winter Conditional Probabilities (Expressed As Percent Chance) That A Large Oil Spill Starting at a Particular Location Will Contact A Certain Group of Land Segments Within 3 Days, Chukchi Sale 193

Table A.2-62 Winter Conditional Probabilities (Expressed As Percent Chance) That A Large Oil Spill Starting at a Particular Location Will Contact A Certain Group of Land Segments Within 10 Days, Chukchi Sale 193

Table A.2-63 Winter Conditional Probabilities (Expressed As Percent Chance) That A Large Oil Spill Starting at a Particular Location Will Contact A Certain Group of Land Segments Within 30 Days, Chukchi Sea Sale 193

Table A.2-64 Winter Conditional Probabilities (Expressed As Percent Chance) That A Large Oil Spill Starting at a Particular Location Will Contact A Certain Group of Land Segments Within 60 Days, Chukchi Sea Sale 193

Table A.2-65 Winter Conditional Probabilities (Expressed As Percent Chance) That A Large Oil Spill Starting at a Particular Location Will Contact A Certain Group of Land Segments Within 180 Days, Chukchi Sea Sale 193

Table A.2-66 Winter Conditional Probabilities (Expressed As Percent Chance) That A Large Oil Spill Starting at a Particular Location Will Contact A Certain Group of Land Segments Within 360 Days, Chukchi Sea Sale 193

Table A.2-67 Winter Conditional Probabilities (Expressed as Percent Chance) that a Large Oil Spill Starting at a Particular Location Will Contact a Certain Boundary Segment Within 3 Days, Chukchi Sale 193

Table A.2-68 Winter Conditional Probabilities (Expressed as Percent Chance) that a Large Oil Spill Starting at a Particular Location Will Contact a Certain Boundary Segment Within 10 Days, Chukchi Sale 193

Table A.2-69 Winter Conditional Probabilities (Expressed as Percent Chance) that a Large Oil Spill Starting at a Particular Location Will Contact a Certain Boundary Segment Within 30 Days, Chukchi Sale 193

Table A.2-70 Winter Conditional Probabilities (Expressed as Percent Chance) that a Large Oil Spill Starting at a Particular Location Will Contact a Certain Boundary Segment Within 60 Days, Chukchi Sale 193

Table A.2-71 Winter Conditional Probabilities (Expressed as Percent Chance) that a Large Oil Spill Starting at a Particular Location Will Contact a Certain Boundary Segment Within 180 Days, Chukchi Sale 193

Table A.2-72 Winter Conditional Probabilities (Expressed as Percent Chance) that a Large Oil Spill Starting at a Particular Location Will Contact a Certain Boundary Segment Within 360 Days, Chukchi Sale 193

Table A.2-73 Combined Probabilities (Expressed as Percent Chance) of one or More Large Spills Greater than or Equal to 1,000 Barrels, and the Estimated Number of Spills (Mean), Occurring and Contacting a Certain Environmental Resource over the Assumed Production Life of the Lease Area Within 3 Days, Chukchi Sale 193

Table A.2-74 Combined Probabilities (Expressed as Percent Chance) of one or More Large Spills Greater than or Equal to 1,000 Barrels, and the Estimated Number of Spills (Mean), Occurring and Contacting a Certain Environmental Resource over the Assumed Production Life of the Lease Area Within 10 Days, Chukchi Sale 193

Table A.2-75 Combined Probabilities (Expressed as Percent Chance) of one or More Large Spills Greater than or Equal to 1,000 Barrels, and the Estimated Number of Spills (Mean), Occurring and Contacting a Certain Environmental Resource over the Assumed Production Life of the Lease Area Within 30 Days, Chukchi Sale 193

Table A.2-76 Combined Probabilities (Expressed as Percent Chance) of one or More Large Spills Greater than or Equal to 1,000 Barrels, and the Estimated Number of Spills (Mean), Occurring and Contacting a Certain Environmental Resource over the Assumed Production Life of the Lease Area Within 60 Days, Chukchi Sale 193

Table A.2-77 Combined Probabilities (Expressed as Percent Chance) of one or More Large Spills Greater than or Equal to 1,000 Barrels, and the Estimated Number of Spills (Mean), Occurring and Contacting a Certain Environmental Resource Area over the Assumed Production Life of the Lease Area Within 180 Days, Chukchi Sale 193

Table A.2-78 Combined Probabilities (Expressed as Percent Chance) of one or More Large Spills Greater than or Equal to 1,000 Barrels, and the Estimated Number of Spills (Mean), Occurring and Contacting a Certain Environmental Resource Area over the Assumed Production Life of the Lease Area Within 360 Days, Chukchi Sale 193

Table A.2-79 Combined Probabilities (Expressed as Percent Chance) of one or More Large Spills Greater than or Equal to 1,000 Barrels, and the Estimated Number of Spills (Mean), Occurring and Contacting a Certain Land Segment over the Assumed Production Life of the Lease Area Within 3 Days, Chukchi Sale 193

Table A.2-80 Combined Probabilities (Expressed as Percent Chance) of one or More Large Spills Greater than or Equal to 1,000 Barrels, and the Estimated Number of Spills (Mean), Occurring and Contacting a Certain Land Segment over the Assumed Production Life of the Lease Area Within 10 Days, Chukchi Sale 193

Table A.2-81 Combined Probabilities (Expressed as Percent Chance) of one or More Large Spills Greater than or Equal to 1,000 Barrels, and the Estimated Number of Spills (Mean), Occurring and Contacting a Certain Land Segment over the Assumed Production Life of the Lease Area Within 30 Days, Chukchi Sale 193

Table A.2-82 Combined Probabilities (Expressed as Percent Chance) of one or More Large Spills Greater than or Equal to 1,000 Barrels, and the Estimated Number of Spills (Mean), Occurring and Contacting a Certain Land Segment over the Assumed Production Life of the Lease Area Within 60 Days, Chukchi Sale 193

Table A.2-83 Combined Probabilities (Expressed as Percent Chance) of one or More Large Spills Greater than or Equal to 1,000 Barrels, and the Estimated Number of Spills (Mean), Occurring and Contacting a Certain Land Segment over the Assumed Production Life of the Lease Area Within 180 Days, Chukchi Sale 193

Table A.2-84 Combined Probabilities (Expressed as Percent Chance) of one or More Large Spills Greater than or Equal to 1,000 Barrels, and the Estimated Number of Spills (Mean), Occurring and Contacting a Certain Land Segment over the Assumed Production Life of the Lease Area Within 360 Days, Chukchi Sale 193

Table A.2-85 Combined Probabilities (Expressed as Percent Chance) of one or More Large Spills Greater than or Equal to 1,000 Barrels, and the Estimated Number of Spills (Mean), Occurring and Contacting a Certain Group of Land Segments over the Assumed Production Life of the Lease Area Within 3 Days, Chukchi Sale 193

Table A.2-86 Combined Probabilities (Expressed as Percent Chance) of one or More Large Spills Greater than or Equal to 1,000 Barrels, and the Estimated Number of Spills (Mean), Occurring and Contacting a Certain Group of Land Segment over the Assumed Production Life of the Lease Area Within 10 Days, Chukchi Sale 193

Table A.2-87 Combined Probabilities (Expressed as Percent Chance) of one or More Large Spills Greater than or Equal to 1,000 Barrels, and the Estimated Number of Spills (Mean), Occurring and Contacting a Certain Group of Land Segments over the Assumed Production Life of the Lease Area Within 30 Days, Chukchi Sale 193

Table A.2-88 Combined Probabilities (Expressed as Percent Chance) of one or More Large Spills Greater than or Equal to 1,000 Barrels, and the Estimated Number of Spills (Mean), Occurring and Contacting a Certain Group of Land Segments over the Assumed Production Life of the Lease Area Within 60 Days, Chukchi Sale 193

Table A.2-89 Combined Probabilities (Expressed as Percent Chance) of one or More Large Spills Greater than or Equal to 1,000 Barrels, and the Estimated Number of Spills (Mean), Occurring and Contacting a Certain Group of Land Segments over the Assumed Production Life of the Lease Area Within 180 Days, Chukchi Sale 193

Table A.2-90 Combined Probabilities (Expressed as Percent Chance) of one or More Large Spills Greater than or Equal to 1,000 Barrels, and the Estimated Number of Spills (Mean), Occurring and Contacting a Certain Group of Land Segments over the Assumed Production Life of the Lease Area Within 360 Days, Chukchi Sale 193

Table A.2-91 Range of Annual Conditional Probabilities (Expressed as Percent Chance) that a Large Oil Spill Starting at a Particular Location Will Contact Russian Waters Within 3, 10, 30, 60, 180 and 360 Days, Chukchi Sale 193

Table A.2-1 Annual Conditional Probabilities (Expressed as Percent Chance) that a Large Oil Spill Starting at a Particular Location Will Contact a Certain Environmental Resource Area Within 3 Days, Chukchi Sale 193

ID	Environmental Resource Area Name	LA 1	LA 2	LA 3	LA 4	LA 5	LA 6	LA 7	LA 8	LA 9	LA 10	LA 11	LA 12	LA 13	P 1	P 2	P 3	P 4	P 5	P 6	P 7	P 8	P 9	P 10	P 11
—	Land	-	-	-	-	-	-	-	-	-	-	-	-	-	3	-	1	-	-	6	-	-	2	-	4
1	Kasegaluk Lagoon	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4	-	-	-	-	-
6	ERA 6	-	-	-	-	-	-	-	-	-	-	-	2	3	-	-	-	-	-	-	-	-	15	-	25
10	Ledyard Bay Spectacled Eider Critical Habitat	-	-	-	-	-	-	-	-	-	6	4	-	-	-	-	12	-	-	31	-	-	-	-	-
14	Cape Thompson Seabird Colony Area	-	-	-	-	-	-	-	-	3	-	-	-	-	18	-	1	-	-	-	-	-	-	-	-
15	Cape Lisburne Seabird Colony Area	-	-	-	-	-	-	-	-	3	1	-	-	-	24	-	14	-	-	-	-	-	-	-	-
18	ERA 18	-	-	-	-	-	-	-	-	1	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-
19	Chukchi Spring Lead 1	-	-	-	-	-	-	-	-	-	-	-	-	-	8	-	-	-	-	-	-	-	-	-	-
20	Chukchi Spring Lead 2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5	-	-	1	-	-	-	-	-
21	Chukchi Spring Lead 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	8	-	-	-	-	-
22	Chukchi Spring Lead 4	-	-	-	-	-	-	-	-	-	-	1	2	-	-	-	-	-	-	-	-	-	14	-	-
23	Chukchi Spring Lead 5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	9
24	Beaufort Spring Lead 6	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-
35	ERA 35	-	-	-	-	-	-	-	-	-	-	3	16	13	-	-	-	-	-	-	-	6	17	-	18
36	ERA 36	-	-	-	-	3	-	-	-	-	11	14	-	-	-	-	1	-	6	15	-	-	-	-	-
38	Pt. Hope Subsistence Area	-	-	-	-	-	-	-	-	-	-	-	-	-	8	-	2	-	-	-	-	-	-	-	-
39	Point Lay Subsistence Area	-	-	-	-	-	-	-	-	-	1	1	-	-	-	-	-	-	-	26	-	-	-	-	-
40	Wainwright Subsistence Area	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	4	-	-	23	-	2
41	Barrow Subsistence Area 1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
45	ERA 45	-	-	-	-	-	-	-	-	3	-	-	-	-	14	-	5	-	-	-	-	-	-	-	-
46	Herald Shoal Polynya	-	-	-	2	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-
47	Ice/Sea Segment 10	2	-	-	10	13	-	-	-	-	-	-	-	-	-	3	-	1	7	-	-	-	-	-	-
48	Ice/Sea Segment 11	-	-	-	-	2	25	-	-	-	-	2	1	-	-	-	-	-	1	-	9	39	-	-	-
49	Hanna's Shoal Polynya	-	1	22	-	-	2	1	-	-	-	-	-	-	-	-	-	-	-	-	8	-	-	-	-
50	Ice/Sea Segment 12	-	-	-	-	-	-	-	-	-	-	3	17	-	-	-	-	-	-	-	-	27	1	-	-
51	Ice/Sea Segment 13	-	-	-	-	-	-	-	-	-	-	-	10	10	-	-	-	-	-	-	-	-	-	-	25
52	Ice/Sea Segment 14	-	-	-	-	-	-	-	8	-	-	-	-	17	-	-	-	-	-	-	-	-	-	-	-
56	ERA 56	-	-	-	-	-	7	5	-	-	-	1	14	1	-	-	-	-	-	-	3	18	2	-	1
64	Peard Bay	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	15
99	ERA 99	-	-	-	-	5	-	-	-	-	21	28	-	-	-	-	1	-	12	29	-	-	-	-	-

Notes- ** = Greater than 99.5 percent; - = less than 0.5 percent; LA = Launch Area, P = Pipeline. Rows with all values less than 0.5 percent are not shown.

Table A.2-2 Annual Conditional Probabilities (Expressed as Percent Chance) that a Large Oil Spill Starting at a Particular Location Will Contact a Certain Environmental Resource Area Within 10 Days, Chukchi Sale 193

ID	Environmental Resource Area Name	LA 1	LA 2	LA 3	LA 4	LA 5	LA 6	LA 7	LA 8	LA 9	LA 10	LA 11	LA 12	LA 13	P 1	P 2	P 3	P 4	P 5	P 6	P 7	P 8	P 9	P 10	P 11
—	LAND	-	-	-	-	-	-	-	-	1	4	3	2	4	7	-	4	-	-	17	-	-	7	-	10
1	Kasegaluk Lagoon	-	-	-	-	-	-	-	-	-	2	2	-	-	-	-	1	-	-	10	-	-	1	-	-
2	Point Barrow, Plover Islands	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-
6	ERA 6	-	-	-	-	-	-	-	1	-	-	1	6	9	-	-	-	-	-	-	-	-	21	1	30
10	Ledyard Bay Spectacled Eider Critical Habitat	-	-	-	-	1	-	-	-	1	12	7	-	-	2	-	16	-	-	34	-	-	-	-	-
14	Cape Thompson Seabird Colony Area	-	-	-	-	-	-	-	-	5	1	-	-	-	21	-	3	-	-	-	-	-	-	-	-
15	Cape Lisburne Seabird Colony Area	-	-	-	-	-	-	-	-	7	4	-	-	-	27	-	17	-	-	1	-	-	-	-	-
18	ERA 18	-	-	-	1	-	-	-	-	9	1	-	-	-	7	1	2	-	-	-	-	-	-	-	-
19	Chukchi Spring Lead 1	-	-	-	-	-	-	-	-	1	-	-	-	-	9	-	1	-	-	-	-	-	-	-	-
20	Chukchi Spring Lead 2	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	6	-	-	2	-	-	-	-	-
21	Chukchi Spring Lead 3	-	-	-	-	-	-	-	-	-	1	2	-	-	-	-	-	-	-	11	-	-	-	-	-
22	Chukchi Spring Lead 4	-	-	-	-	-	-	-	-	-	-	2	3	-	-	-	-	-	-	1	-	-	16	-	-
23	Chukchi Spring Lead 5	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	11
24	Beaufort Spring Lead 6	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-
25	Beaufort Spring Lead 7	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-
29	Ice/Sea Segment 1	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-
35	ERA 35	-	-	-	-	-	1	1	2	-	-	5	19	16	-	-	-	-	1	1	-	9	19	2	21
36	ERA 36	-	-	-	3	5	1	-	-	-	13	17	2	-	-	3	2	-	9	18	-	2	3	-	-
38	Pt. Hope Subsistence Area	-	-	-	-	-	-	-	-	2	-	-	-	-	13	-	4	-	-	-	-	-	-	-	-
39	Point Lay Subsistence Area	-	-	-	-	-	-	-	-	-	6	5	-	-	-	-	3	-	-	34	-	-	-	-	-
40	Wainwright Subsistence Area	-	-	-	-	-	-	-	-	-	2	4	4	-	-	-	-	-	-	10	-	-	31	-	4
41	Barrow Subsistence Area 1	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	3
42	Barrow Subsistence Area 2	-	-	-	-	-	-	-	1	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-
45	ERA 45	-	-	-	-	-	-	-	-	9	1	-	-	-	24	-	9	-	-	-	-	-	-	-	-
46	Herald Shoal Polynya	2	-	-	10	1	-	-	-	1	-	-	-	-	-	10	1	-	-	-	-	-	-	-	-
47	Ice/Sea Segment 10	4	-	-	13	19	2	-	-	-	2	2	-	-	-	6	-	3	15	1	-	-	-	-	-
48	Ice/Sea Segment 11	1	4	4	-	8	36	3	-	-	2	12	4	-	-	-	-	4	11	3	16	47	1	1	1
49	Hanna's Shoal Polynya	1	7	40	-	2	12	10	2	-	-	1	-	1	-	-	-	2	1	-	25	4	-	5	-
50	Ice/Sea Segment 12	-	-	-	-	-	3	1	-	-	-	5	25	3	-	-	-	-	-	-	1	35	4	-	6
51	Ice/Sea Segment 13	-	-	-	-	-	-	-	-	-	-	-	16	14	-	-	-	-	-	-	-	1	5	1	38
52	Ice/Sea Segment 14	-	-	-	-	-	-	1	14	-	-	-	-	23	-	-	-	-	-	-	-	-	-	2	3
56	ERA 56	-	1	2	-	1	10	8	-	-	-	3	17	4	-	-	-	1	1	-	6	21	5	3	5
64	Peard Bay	-	-	-	-	-	-	-	-	-	-	-	1	4	-	-	-	-	-	-	-	-	1	-	18
70	ERA 70	2	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-
99	ERA 99	-	-	-	3	10	2	-	-	-	25	32	2	-	-	3	3	-	18	34	-	2	3	-	-

Notes- ** = Greater than 99.5 percent; - = less than 0.5 percent; LA = Launch Area, P = Pipeline. Rows with all values less than 0.5 percent are not shown.

Table A.2-3 Annual Conditional Probabilities (Expressed as Percent Chance) that a Large Oil Spill Starting at a Particular Location Will Contact a Certain Environmental Resource Area Within 30 Days, Chukchi Sale 193

ID	Environmental Resource Area Name	LA 1	LA 2	LA 3	LA 4	LA 5	LA 6	LA 7	LA 8	LA 9	LA 10	LA 11	LA 12	LA 13	P 1	P 2	P 3	P 4	P 5	P 6	P 7	P 8	P 9	P 10	P 11
—	Land	1	1	-	4	3	1	1	4	11	15	11	9	11	19	4	16	1	3	27	-	3	19	3	18
1	Kasegaluk Lagoon	-	-	-	1	2	-	-	-	1	6	7	1	-	-	1	3	-	2	16	-	1	3	-	-
2	Pt. Barrow, Plover Islands	-	-	-	-	-	-	-	2	-	-	-	-	3	-	-	-	-	-	-	-	-	-	1	1
3	ERA 3	-	-	-	1	-	-	-	-	3	1	-	-	-	3	-	2	-	-	-	-	-	-	-	-
4	ERA 4	-	-	-	-	-	-	-	-	4	-	-	-	-	6	-	1	-	-	-	-	-	-	-	-
6	ERA 6	-	-	-	-	2	2	2	4	-	1	6	15	15	-	-	-	-	3	2	-	5	32	4	36
10	Ledyard Bay Spectacled Eider Critical Habitat	-	-	-	3	3	1	-	-	5	19	11	1	-	5	2	22	-	3	37	-	1	2	-	-
11	Wrangel Island 12nmi Buffer	2	1	-	1		-	-	-	-	-	-	-	-	-	2	-	1	-	-	-	-	-	-	-
14	Cape Thompson Seabird Colony Area	-	-	-	1	-	-	-	-	8	2	-	-	-	24	-	5	-	-	1	-	-	-	-	-
15	Cape Lisburne Seabird Colony Area	-	-	-	1	1	-	-	-	10	8	1	-	-	30	1	20	-	1	3	-	-	-	-	-
16	ERA 16	-	-	-	-	-	-	-	-	3		-	-	-	3	-	1	-	-	-	-	-	-	-	-
18	ERA 18	1	-	-	7	3	-	-	-	17	8	2	-	-	16	5	10	1	2	3	-	-	-	-	-
19	Chukchi Spring Lead 1	-	-	-	-	-	-	-	-	1	-	-	-	-	10	-	2	-	-	-	-	-	-	-	-
20	Chukchi Spring Lead 2	-	-	-	-	-	-	-	-	-	4	1	-	-	1	-	9	-	-	3	-	-	-	-	-
21	Chukchi Spring Lead 3	-	-	-	-	1	-	-	-	-	4	4	-	-	-	-	2	-	1	13	-	-	-	-	-
22	Chukchi Spring Lead 4	-	-	-	-	1	-	-	-	-	1	5	5	-	-	-	-	-	1	3	-	1	20	-	-
23	Chukchi Spring Lead 5	-	-	-	-	-	-	-	-	-	-	-	1	2	-	-	-	-	-	-	-	-	1	-	12
24	Beaufort Spring Lead 6	-	-	-	-	-	-	-	1	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-
25	Beaufort Spring Lead 7	-	-	-	-	-	-	-	1	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-
29	Ice/Sea Segment 1	-	-	-	-	-	-	-	1	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	1
30	Ice/Sea Segment 2	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
35	ERA 35	1	1	1	-	2	4	5	5	-	-	7	23	19	-	-	-	1	2	1	2	13	22	6	23
36	ERA 36	2	1	1	6	9	3	1	-	2	15	19	5	1	1	6	5	2	13	20	1	5	7	-	1
38	Pt. Hope Subsistence Area	-	-	-	1	-	-	-	-	4	2	-	-	-	17	-	6	-	-	1	-	-	-	-	-
39	Point Lay Subsistence Area	-	-	-	2	2	-	-	-	1	15	9	1	-	1	2	10	-	2	40	-	1	2	-	-
40	Wainwright Subsistence Area	-	-	-	1	3	1	-	-	-	7	11	13	2	-	1	3	-	4	17	-	4	45	-	8
41	Barrow Subsistence Area 1	-	-	-	-	-	-	-	1	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	5
42	Barrow Subsistence Area 2	-	-	-	-	-	-	-	3	-	-	-	-	3	-	-	-	-	-	-	-	-	-	1	1
45	ERA 45	-	-	-	1	1	-	-	-	14	5	1	-	-	30	1	14	-	-	3	-	-	-	-	-
46	Herald Shoal Polynya	7	1	-	18	4	1	-	-	4	3	1	-	-	1	19	4	2	3	1	-	1	-	-	-
47	Ice/Sea Segment 10	7	2	1	18	26	4	1	-	1	6	6	2	-	-	11	2	6	22	5	1	3	2	-	-
48	Ice/Sea Segment 11	5	11	10	3	19	44	10	2	-	9	26	12	4	-	3	2	11	24	13	23	58	5	6	4
49	Hanna's Shoal Polynya	5	17	51	1	9	27	26	12	-	3	8	6	9	-	1	1	10	9	4	39	17	1	20	6
50	Ice/Sea Segment 12	1	1	1	-	3	8	5	1	-	1	10	34	9	-	-	-	2	3	2	4	41	12	3	16
51	Ice/Sea Segment 13	-	-	-	-	-	1	3	1	-	-	2	24	18	-	-	-	-	1	-	1	5	17	3	45
52	Ice/Sea Segment 14	-	-	-	-	-	-	2	20	-	-	-	2	28	-	-	-	-	-	-	-	-	1	5	7
53	Ice/Sea Segment 15	-	-	-	-	-	-	-	1	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-
56	ERA 56	2	4	6	-	2	14	13	3	-	-	6	21	8	-	-	-	3	2	1	10	24	9	8	10
59	ERA 59	-	-	-	1	-	-	-	-	2	-	-	-	-	1	-	1	-	-	-	-	-	-	-	-
61	ERA 61	-	-	-	-	-	-	-	-	3	-	-	-	-	4	-	1	-	-	-	-	-	-	-	-
63	ERA 63	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-
64	Peard Bay	-	-	-	-	-	-	1	2	-	-	1	4	8	-	-	-	-	-	-	-	2	2	3	21
66	ERA 66	-	-	-	-	-	-	-	1	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-
70	ERA 70	3	4	2	-	1	1	-	-	-	-	-	-	-	-	-	-	3	-	-	2	1	-	-	-
99	ERA 99	2	1	1	9	18	6	1	-	2	29	37	7	1	1	9	8	3	26	39	2	8	9	-	1

Notes- ** = Greater than 99.5 percent; - = less than 0.5 percent; LA = Launch Area, P = Pipeline. Rows with all values less than 0.5 percent are not shown.

Table A.2-4 Annual Conditional Probabilities (Expressed as Percent Chance) that a Large Oil Spill Starting at a Particular Location Will Contact a Certain Environmental Resource Area Within 60 Days, Chukchi Sale 193

ID	Environmental Resource Area Name	LA 1	LA 2	LA 3	LA 4	LA 5	LA 6	LA 7	LA 8	LA 9	LA 10	LA 11	LA 12	LA 13	P 1	P 2	P 3	P 4	P 5	P 6	P 7	P 8	P 9	P 10	P 11
—	LAND	2	1	1	7	7	3	4	9	15	22	17	16	17	23	7	22	2	7	33	1	7	27	6	24
1	Kasegaluk Lagoon	-	-	-	2	3	1	-	-	1	9	9	3	-	1	2	4	-	3	19	-	2	4	-	-
2	Point Barrow Plover Islands	-	-	-	-	-	-	1	4	-	-	-	-	4	-	-	-	-	-	-	-	-	-	1	1
3	ERA 3	-	-	-	1	-	-	-	-	3	1	-	-	-	3	-	2	-	-	-	-	-	-	-	-
4	ERA 4	-	-	-	-	-	-	-	-	4	1	-	-	-	6	-	1	-	-	-	-	-	-	-	-
6	ERA 6	1	1	1	1	4	4	6	8	-	2	10	21	20	-	1	-	1	5	4	2	9	39	8	41
10	Ledyard Bay Spectacled Eider Critical Habitat	-	-	-	4	5	1	-	-	6	23	13	2	-	5	4	25	-	5	39	-	2	3	-	-
11	Wrangel Island 12nmi Buffer	3	1	-	1	1	-	-	-	-	-	-	-	-	-	2	-	2	1	-	-	-	-	-	-
14	Cape Thompson Seabird Colony Area	-	-	-	1	-	-	-	-	8	3	-	-	-	24	1	6	-	-	1	-	-	-	-	-
15	Cape Lisburne Seabird Colony Area	-	-	-	2	1	-	-	-	11	10	2	-	-	30	1	22	-	1	4	-	-	-	-	-
16	ERA 16	-	-	-	-	-	-	-	-	4	1	-	-	-	4	-	1	-	-	-	-	-	-	-	-
18	ERA 18	1	-	-	7	3	-	-	-	18	8	2	-	-	16	5	11	1	2	3	-	-	-	-	-
19	Chukchi Spring Lead 1	-	-	-	-	-	-	-	-	1	-	-	-	-	10	-	2	-	-	-	-	-	-	-	-
20	Chukchi Spring Lead 2	-	-	-	-	1	-	-	-	1	5	2	-	-	1	-	9	-	1	4	-	-	-	-	-
21	Chukchi Spring Lead 3	-	-	-	1	1	-	-	-	1	5	4	-	-	-	1	3	-	2	14	-	-	-	-	-
22	Chukchi Spring Lead 4	-	-	-	1	2	1	-	-	-	3	7	7	-	-	1	1	-	3	5	-	3	23	-	1
23	Chukchi Spring Lead 5	-	-	-	-	-	-	-	-	-	-	-	3	3	-	-	-	-	-	-	-	1	3	-	13
24	Beaufort Spring Lead 6	-	-	-	-	-	-	-	1	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-
25	Beaufort Spring Lead 7	-	-	-	-	-	-	-	1	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	1
29	Ice/Sea Segment 1	-	-	-	-	-	-	1	2	-	-	-	-	2	-	-	-	-	-	-	-	-	-	1	1
30	Ice/Sea Segment 2	-	-	-	-	-	-	1	1	-	-	-	-	1	-	-	-	-	-	-	-	-	-	1	-
31	Ice/Sea Segment 3	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
35	ERA 35	1	2	3	1	3	7	8	8	-	1	9	25	21	-	1	-	2	4	2	4	16	24	10	25
36	ERA 36	2	2	1	7	11	4	2	-	2	16	21	7	1	1	7	5	3	15	21	2	7	9	1	2
38	Pt. Hope Subsistence Area	-	-	-	1	-	-	-	-	5	3	1	-	-	18	-	7	-	-	2	-	-	-	-	-
39	Point Lay Subsistence Area	-	-	-	3	4	1	-	-	2	19	12	2	-	1	3	13	-	4	43	-	2	3	-	-
40	Wainwright Subsistence Area	-	-	-	3	6	3	1	1	1	10	16	19	4	-	3	5	1	7	22	1	8	53	1	11
41	Barrow Subsistence Area 1	-	-	-	-	-	-	-	1	-	-	-	1	3	-	-	-	-	-	-	-	-	1	-	6
42	Barrow Subsistence Area 2	-	-	-	-	-	-	1	5	-	-	-	-	4	-	-	-	-	-	-	-	-	-	1	2
45	ERA 45	-	-	-	1	1	-	-	-	15	7	2	-	-	31	1	16	-	1	4	-	-	-	-	-
46	Herald Shoal Polynya	7	2	-	19	5	1	-	-	4	3	2	-	-	1	21	5	3	4	2	-	1	1	-	-
47	Ice/Sea Segment 10	8	4	1	19	28	6	1	-	1	8	9	3	1	1	12	3	8	24	7	2	4	3	1	1
48	Ice/Sea Segment 11	7	14	14	7	25	48	16	6	1	14	34	19	10	1	6	6	14	30	19	27	63	10	12	10
49	Hanna's Shoal Polynya	9	23	56	4	15	34	36	21	1	7	16	15	18	-	3	2	15	15	10	46	26	5	31	15
50	Ice/Sea Segment 12	2	4	4	1	5	11	9	3	-	3	14	39	13	-	1	1	4	7	4	7	45	20	7	21
51	Ice/Sea Segment 13	1	1	2	-	2	4	6	3	-	1	4	31	21	-	-	-	1	2	1	3	9	28	6	49
52	Ice/Sea Segment 14	-	-	1	-	-	1	4	22	-	-	-	4	29	-	-	-	-	-	-	1	1	2	7	9
53	Ice/Sea Segment 15	-	-	-	-	-	-	1	3	-	-	-	-	2	-	-	-	-	-	-	-	-	-	1	-
54	Ice/Sea Segment 16a	-	-	-	-	-	-	-	1	-	-	-	-	1	-	-	-	-	-	-	-	-	-	1	-
56	ERA 56	3	6	9	1	4	17	17	6	-	1	8	23	11	-	1	-	5	4	2	13	27	11	12	13
59	ERA 59	-	-	-	1	-	-	-	-	2	-	-	-	-	1	-	1	-	-	-	-	-	-	-	-
61	ERA 61	-	-	-	-	-	-	-	-	3	1	-	-	-	5	-	1	-	-	-	-	-	-	-	-
63	ERA 63	1	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-
64	Peard Bay	-	1	1	-	1	2	3	4	-	-	2	7	10	-	-	-	1	1	-	1	4	4	5	24
66	ERA 66	-	-	-	-	-	-	-	2	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-
70	ERA 70	4	5	3	-	1	2	1	1	-	-	-	-	-	-	-	-	4	1	-	3	1	-	1	-
99	ERA 99	3	3	1	13	22	9	2	-	3	32	41	10	2	1	11	10	4	30	41	3	12	13	1	2

Notes- ** = Greater than 99.5 percent; - = less than 0.5 percent; LA = Launch Area, P = Pipeline. Rows with all values less than 0.5 percent are not shown.

Table A.2-5 Annual Conditional Probabilities (Expressed as Percent Chance) that a Large Oil Spill Starting at a Particular Location Will Contact a Certain Environmental Resource Area Within 180 Days, Chukchi Sale 193

ID	Environmental Resource Area Name	LA 1	LA 2	LA 3	LA 4	LA 5	LA 6	LA 7	LA 8	LA 9	LA 10	LA 11	LA 12	LA 13	P 1	P 2	P 3	P 4	P 5	P 6	P 7	P 8	P 9	P 10	P 11
—	LAND	5	4	4	14	13	7	9	15	27	30	24	27	25	37	13	31	5	13	41	5	13	41	12	35
1	Kasegaluk Lagoon	-	-	-	4	5	1	-	-	1	12	11	3	-	1	4	7	-	5	22	-	2	5	-	-
2	Point Barrow, Plover Islands	1	1	2	-	-	1	3	7	-	-	-	2	6	-	-	-	1	-	-	1	1	2	3	3
3	ERA 3	-	-	-	1	-	-	-	-	3	1	-	-	-	3	-	2	-	-	-	-	-	-	-	-
4	ERA 4	-	-	-	-	-	-	-	-	4	1	-	-	-	6	-	1	-	-	-	-	-	-	-	-
6	ERA 6	1	2	3	3	8	7	10	12	-	5	15	29	25	-	2	2	3	10	9	4	13	46	13	47
10	Ledyard Bay Spectacled Eider Critical Habitat	1	-	-	6	7	2	-	-	6	25	15	3	-	6	5	27	1	8	41	1	3	4	-	-
11	Wrangel Island 12 nmi Buffer	3	1	1	1	1	1	-	-	-	-	-	-	-	-	2	-	2	1	-	1	-	-	-	-
14	Cape Thompson Seabird Colony Area	-	-	-	1	-	-	-	-	8	3	-	-	-	25	1	7	-	-	2	-	-	-	-	-
15	Cape Lisburne Seabird Colony Area	-	-	-	2	2	-	-	-	11	11	2	1	-	32	1	23	-	2	5	-	-	1	-	-
16	ERA 16	-	-	-	1	-	-	-	-	8	1	-	-	-	8	1	3	-	-	-	-	-	-	-	-
18	ERA 18	1	-	-	7	3	-	-	-	18	8	2	-	-	16	5	11	1	2	3	-	-	-	-	-
19	Chukchi Spring Lead 1	-	-	-	-	-	-	-	-	1	-	-	-	-	11	-	2	-	-	-	-	-	-	-	-
20	Chukchi Spring Lead 2	-	-	-	-	1	-	-	-	1	6	2	1	-	1	-	10	-	1	5	-	1	1	-	-
21	Chukchi Spring Lead 3	-	-	-	2	2	-	-	-	1	6	5	1	-	1	2	4	-	3	15	-	1	1	-	-
22	Chukchi Spring Lead 4	-	-	-	2	4	1	-	-	-	4	8	9	1	-	2	2	1	4	7	-	4	26	-	2
23	Chukchi Spring Lead 5	-	-	-	-	-	1	1	1	-	-	1	4	4	-	-	-	-	-	1	-	1	6	1	16
24	Beaufort Spring Lead 6	-	-	-	-	-	-	1	2	-	-	-	1	3	-	-	-	-	-	-	-	-	1	1	2
25	Beaufort Spring Lead 7	-	-	-	-	-	-	1	2	-	-	-	1	3	-	-	-	-	-	-	-	-	1	1	2
26	Beaufort Spring Lead 8	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
27	Beaufort Spring Lead 9	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
29	Ice/Sea Segment 1	-	-	-	-	-	1	1	3	-	-	-	1	2	-	-	-	-	-	-	-	-	-	2	1
30	Ice/Sea Segment 2	-	-	1	-	-	1	2	2	-	-	-	-	1	-	-	-	-	-	-	1	1	-	2	-
31	Ice/Sea Segment 3	-	-	1	-	-	1	1	1	-	-	-	-	-	-	-	-	-	-	-	1	1	-	1	-
32	Ice/Sea Segment 4	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-
35	ERA 35	3	5	6	2	7	11	13	12	-	2	12	29	25	-	2	-	5	8	3	7	20	28	14	29
36	ERA 36	3	3	2	8	13	6	2	1	2	17	23	9	2	1	7	5	4	18	22	3	9	12	1	3
38	Pt. Hope Subsistence Area	-	-	-	1	1	-	-	-	5	3	1	-	-	18	1	8	-	1	2	-	-	-	-	-
39	Point Lay Subsistence Area	1	-	-	5	6	1	-	-	2	22	14	3	-	1	5	16	1	6	45	-	2	4	-	-
40	Wainwright Subsistence Area	1	1	1	6	10	4	2	2	1	15	21	24	6	1	5	8	2	11	27	1	10	58	2	14
41	Barrow Subsistence Area 1	-	-	-	-	-	-	-	1	-	-	-	2	4	-	-	-	-	-	-	-	-	2	1	9
42	Barrow Subsistence Area 2	1	1	2	-	1	1	3	7	-	-	-	2	6	-	-	-	1	-	-	1	1	1	3	3
45	ERA 45	-	-	-	2	1	-	-	-	15	7	2	-	-	32	1	16	-	1	4	-	-	1	-	-
46	Herald Shoal Polynya	7	2	-	20	5	1	-	-	4	4	2	-	-	1	21	5	3	5	3	-	1	1	-	-
47	Ice/Sea Segment 10	9	5	2	20	29	7	2	-	1	10	11	5	1	1	12	4	9	26	9	4	7	6	1	2
48	Ice/Sea Segment 11	10	18	19	9	29	52	23	11	2	18	38	28	17	1	7	8	18	34	24	31	67	19	19	18
49	Hanna's Shoal Polynya	12	29	60	6	21	41	44	31	1	12	24	27	29	1	5	6	21	21	16	51	35	16	39	25
50	Ice/Sea Segment 12	4	7	6	2	9	15	12	5	-	5	18	44	16	-	2	2	7	11	8	10	47	27	10	25
51	Ice/Sea Segment 13	2	3	3	1	5	7	9	7	-	3	9	37	24	-	1	1	3	6	4	5	14	37	10	52
52	Ice/Sea Segment 14	1	3	4	-	1	4	8	24	-	-	2	6	31	-	-	-	2	1	-	4	4	4	10	11
53	Ice/Sea Segment 15	-	1	1	-	-	2	2	4	-	-	-	1	2	-	-	-	-	-	-	2	1	1	2	1
54	Ice/Sea Segment 16a	-	1	2	-	-	2	2	3	-	-	-	1	2	-	-	-	-	-	-	2	1	-	2	1
55	Ice/Sea Segment 17	-	-	-	-	-	-	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
56	ERA 56	6	11	15	2	7	23	23	11	-	2	10	27	16	-	2	-	9	7	3	19	32	15	18	18
59	ERA 59	-	-	-	2	-	-	-	-	3	1	-	-	-	2	1	1	-	-	-	-	-	-	-	-
61	ERA 61	-	-	-	-	-	-	-	-	3	1	-	-	-	6	-	1	-	-	-	-	-	-	-	-
63	ERA 63	2	2	1	-	-	1	1	1	-	-	-	-	-	-	-	-	2	-	-	1	-	-	1	-
64	Peard Bay	1	1	2	-	2	4	7	6	-	1	4	12	14	-	-	-	2	3	1	3	6	7	8	31
66	ERA 66	-	-	-	-	-	-	-	3	-	-	-	-	2	-	-	-	-	-	-	-	-	1	1	1
69	Colville/Harrison Bay	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
70	ERA 70	4	6	4	-	2	3	2	2	-	1	2	1	2	-	-	-	5	2	1	4	2	1	2	1
99	ERA 99	5	5	3	15	27	12	4	2	4	35	45	16	3	2	13	12	7	34	44	5	16	20	3	6

Notes- ** = Greater than 99.5 percent; - = less than 0.5 percent; LA = Launch Area, P = Pipeline. Rows with all values less than 0.5 percent are not shown.

Table A.2-6 Annual Conditional Probabilities (Expressed as Percent Chance) that a Large Oil Spill Starting at a Particular Location Will Contact a Certain Environmental Resource Area Within 360 Days, Chukchi Sale 193

ID	Environmental Resource Area Name	LA 1	LA 2	LA 3	LA 4	LA 5	LA 6	LA 7	LA 8	LA 9	LA 10	LA 11	LA 12	LA 13	P 1	P 2	P 3	P 4	P 5	P 6	P 7	P 8	P 9	P 10	P 11
—	LAND	7	5	6	17	15	10	12	22	33	33	27	29	29	42	16	36	6	15	43	6	15	44	15	39
1	Kasegaluk Lagoon	-	-	-	4	5	1	-	-	1	12	11	3	-	1	4	7	-	5	22	-	2	5	-	-
2	Point Barrow, Plover Islands	1	2	3	1	1	3	5	9	-	1	1	2	7	-	1	-	2	1	1	3	3	2	5	3
3	ERA 3	-	-	-	1	-	-	-	-	3	1	-	-	-	3	-	2	-	-	-	-	-	-	-	-
4	ERA 4	-	-	-	-	-	-	-	-	4	1	-	-	-	6	-	1	-	-	-	-	-	-	-	-
6	ERA 6	2	3	4	3	8	8	12	14	-	6	15	29	26	-	2	2	3	10	9	5	14	46	14	47
10	Ledyard Bay Spectacled Eider Critical Habitat	1	-	-	6	7	2	-	-	6	25	15	3	-	6	5	27	1	8	41	1	3	4	-	-
11	Wrangel Island	3	1	1	1	1	1	-	-	-	-	-	-	-	-	2	-	2	1	-	1	-	-	-	-
14	Cape Thompson Seabird Colony Area	-	-	-	1	-	-	-	-	8	3	-	-	-	25	1	7	-	-	2	-	-	-	-	-
15	Cape Lisburne Seabird Colony Area	-	-	-	2	2	-	-	-	11	11	2	1	-	32	1	23	-	2	5	-	-	1	-	-
16	ERA 16	-	-	-	1	-	-	-	-	10	2	-	-	-	10	1	4	-	-	-	-	-	-	-	-
18	ERA 18	1	-	-	7	3	-	-	-	18	8	2	-	-	16	5	11	1	2	3	-	-	-	-	-
19	Chukchi Spring Lead 1	-	-	-	-	-	-	-	-	1	-	-	-	-	11	-	2	-	-	-	-	-	-	-	-
20	Chukchi Spring Lead 2	-	-	-	-	1	-	-	-	1	6	2	1	-	1	-	10	-	1	5	-	1	1	-	-
21	Chukchi Spring Lead 3	-	-	-	2	2	-	-	-	1	6	5	1	-	1	2	4	-	3	15	-	1	1	-	-
22	Chukchi Spring Lead 4	-	-	-	2	4	1	-	-	-	4	9	10	1	-	2	2	1	4	7	-	4	26	-	2
23	Chukchi Spring Lead 5	-	-	-	-	-	1	1	1	-	-	1	4	4	-	-	-	-	-	1	-	1	6	1	16
24	Beaufort Spring Lead 6	-	-	1	-	-	1	2	4	-	-	1	2	4	-	-	-	-	-	-	1	1	1	2	2
25	Beaufort Spring Lead 7	-	1	2	-	1	2	3	4	-	-	1	2	4	-	-	-	1	1	-	2	2	1	3	2
26	Beaufort Spring Lead 8	-	-	-	-	-	-	-	1	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	1
27	Beaufort Spring Lead 9	-	-	-	-	-	-	-	1	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-
29	Ice/Sea Segment 1	-	-	1	-	-	1	2	3	-	-	-	1	3	-	-	-	-	-	-	1	1	-	2	1
30	Ice/Sea Segment 2	-	1	1	-	-	1	2	2	-	-	-	-	1	-	-	-	-	-	-	1	1	-	2	-
31	Ice/Sea Segment 3	-	1	1	-	-	1	2	2	-	-	-	-	1	-	-	-	-	-	-	1	1	-	1	-
32	Ice/Sea Segment 4	-	-	-	-	-	1	-	1	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-
35	ERA 35	3	5	6	2	7	11	13	12	-	2	13	30	25	-	2	1	5	8	4	8	20	29	15	30
36	ERA 36	3	3	2	8	13	6	2	1	2	17	23	9	2	1	8	6	4	18	22	3	9	12	1	4
38	Pt. Hope Subsistence Area	-	-	-	1	1	-	-	-	5	3	1	-	-	18	1	8	-	1	2	-	-	-	-	-
39	Point Lay Subsistence Area	1	-	-	5	6	1	-	-	2	22	14	3	-	1	5	16	1	6	45	-	2	4	-	-
40	Wainwright Subsistence Area	1	1	1	6	10	4	2	2	1	15	21	24	6	1	5	8	2	11	27	2	10	58	2	14
41	Barrow Subsistence Area 1	-	-	-	-	-	-	1	1	-	-	-	2	4	-	-	-	-	-	1	-	-	2	1	9
42	Barrow Subsistence Area 2	1	2	3	1	2	2	4	8	-	1	1	2	6	-	1	-	2	2	1	2	2	2	4	3
45	ERA 45	-	-	-	2	1	-	-	-	15	7	2	-	-	32	1	16	-	1	4	-	-	1	-	-
46	Herald Shoal Polynya	7	2	-	20	5	1	-	-	4	4	2	-	-	1	21	5	3	5	3	-	1	1	-	-
47	Ice/Sea Segment 10	9	5	2	20	29	7	2	-	1	10	11	5	1	1	12	4	9	26	9	4	7	6	1	2
48	Ice/Sea Segment 11	10	19	19	9	29	52	23	12	2	18	38	29	18	1	7	8	19	34	24	32	67	20	20	19
49	Hanna's Shoal Polynya	13	29	61	6	21	42	45	31	1	13	24	28	30	1	5	6	22	22	16	52	36	17	40	27
50	Ice/Sea Segment 12	4	7	7	2	10	15	13	6	-	6	18	44	16	-	2	2	7	11	8	10	48	27	11	26
51	Ice/Sea Segment 13	2	3	4	1	5	7	9	7	-	3	9	37	25	-	1	1	3	6	5	5	14	37	10	52
52	Ice/Sea Segment 14	2	3	5	1	2	5	8	25	-	1	3	7	32	-	1	-	2	2	1	5	5	4	11	11
53	Ice/Sea Segment 15	-	1	2	-	1	2	3	5	-	-	1	1	3	-	-	-	1	1	1	2	2	1	3	1
54	Ice/Sea Segment 16a	-	1	2	-	1	2	3	4	-	-	1	1	3	-	-	-	1	1	-	2	2	-	3	1
55	Ice/Sea Segment 17	-	-	1	-	-	1	1	1	-	-	-	-	-	-	-	-	-	-	-	1	-	-	1	-
56	ERA 56	6	11	16	2	8	23	24	12	-	3	11	29	18	-	2	1	9	8	4	20	32	16	19	19
58	Ice/Sea Segment 20a	-	-	-	-	-	-	1	3	-	-	-	-	2	-	-	-	-	-	-	-	-	-	1	-
59	ERA 59	-	-	-	2	-	-	-	-	3	1	-	-	-	2	1	2	-	-	-	-	-	-	-	-
60	Ice/Sea Segment 22	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
61	ERA 61	-	-	-	-	-	-	-	-	3	1	-	-	-	6	-	1	-	-	-	-	-	-	-	-
62	Ice/Sea Segment 24a	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
63	ERA 63	2	2	1	-	1	1	1	1	-	-	1	1	1	-	-	-	2	1	-	1	1	1	1	1
64	Peard Bay	1	2	3	1	3	4	8	7	-	1	4	12	15	-	1	-	2	3	2	3	7	8	9	31
65	Smith Bay	-	-	-	-	-	-	-	1	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-
66	ERA 66	1	2	3	-	1	2	3	4	-	-	1	1	2	-	-	-	1	1	1	2	2	1	3	1
69	Harrison Bay/Colville Delta	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-
70	ERA 70	4	6	4	-	2	3	2	2	-	1	2	2	2	-	-	-	5	2	1	4	3	1	2	2
83	Kaktovik ERA	-	-	-	-	-	-	1	2	-	-	-	-	1	-	-	-	-	-	-	-	-	-	1	-
99	ERA 99	5	5	3	15	27	12	4	2	4	35	45	16	4	2	13	12	7	34	44	5	16	21	3	6

Notes- ** = Greater than 99.5 percent; - = less than 0.5 percent; LA = Launch Area, P = Pipeline. Rows with all values less than 0.5 percent are not shown.

Table A.2-7 Annual Conditional Probabilities (Expressed as Percent Chance) that a Large Oil Spill Starting at a Particular Location Will Contact a Certain Land Segment Within 3 Days, Chukchi Sale 193

ID	Land Segment Name	LA 1	LA 2	LA 3	LA 4	LA 5	LA 6	LA 7	LA 8	LA 9	LA 10	LA 11	LA 12	LA 13	P 1	P 2	P 3	P 4	P 5	P 6	P 7	P 8	P 9	P 10	P 11
64	Kukpuk River, Point Hope	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-
65	Buckland, Cape Lisburne	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-
72	Point Lay, Siksrikpak Point	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-
73	Tungaich Point, Tungak Creek	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	-	-	-	-	-
74	Kasegaluk Lagoon, Solivik Isl.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-
79	Point Belcher, Wainwright	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-
82	Skull Cliff	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3

Notes- ** = Greater than 99.5 percent; - = less than 0.5 percent; LA = Launch Area, P = Pipeline. Rows with all values less than 0.5 percent are not shown.

Table A.2-8 Annual Conditional Probabilities (Expressed as Percent Chance) that a Large Oil Spill Starting at a Particular Location Will Contact a Certain Land Segment Within 10 Days, Chukchi Sale 193

ID	Land Segment Name	LA 1	LA 2	LA 3	LA 4	LA 5	LA 6	LA 7	LA 8	LA 9	LA 10	LA 11	LA 12	LA 13	P 1	P 2	P 3	P 4	P 5	P 6	P 7	P 8	P 9	P 10	P 11
64	Kukpuk River, Point Hope	-	-	-	-	-	-	-	-	-	-	-	-	-	3	-	-	-	-	-	-	-	-	-	-
65	Buckland, Cape Lisburne	-	-	-	-	-	-	-	-	1	-	-	-	-	3	-	1	-	-	-	-	-	-	-	-
66	Ayugatak Lagoon	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-
71	Kukpowruk River, Sitkok Point	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	1	-	-	-	-	-
72	Point Lay, Siksrikpak Point	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	4	-	-	-	-	-
73	Tungaich Point, Tungak Creek	-	-	-	-	-	-	-	-	-	1	1	-	-	-	-	-	-	-	6	-	-	-	-	-
74	Kasegaluk Lagoon, Solivik Isl.	-	-	-	-	-	-	-	-	-	1	1	-	-	-	-	-	-	-	3	-	-	-	-	-
75	Akeonik, Icy Cape	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	2	-	-	-	-	-
78	Point Collie, Sigeakruk Point	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-
79	Point Belcher, Wainwright	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	4	-	-
80	Eluksingiak Point, Kugrua Bay	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	2	-	-
81	Peard Bay, Point Franklin	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
82	Skull Cliff	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4
83	Nulavik, Loran Radio Station	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
84	Will Rogers & Wiley Post Mem.	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	2
85	Barrow, Browerville, Elson Lag.	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	1

Notes- ** = Greater than 99.5 percent; - = less than 0.5 percent; LA = Launch Area, P = Pipeline. Rows with all values less than 0.5 percent are not shown.

Table A.2-9 Annual Conditional Probabilities (Expressed as Percent Chance) that a Large Oil Spill Starting at a Particular Location Will Contact a Certain Land Segment Within 30 Days, Chukchi Sale 193

ID	Land Segment Name	LA 1	LA 2	LA 3	LA 4	LA 5	LA 6	LA 7	LA 8	LA 9	LA 10	LA 11	LA 12	LA 13	P 1	P 2	P 3	P 4	P 5	P 6	P 7	P 8	P 9	P 10	P 11
27	Laguna Nut, Rigol'	-	-	-	1	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
34	Tepken, Memino	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-
35	Enurmino, Mys Neten	-	-	-	-	-	-	-	-	1	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-
36	Mys Serdtse-Kamen	-	-	-	-	-	-	-	-	1	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-
37	Chegitun, Utkan, Mys Volnistyy	-	-	-	-	-	-	-	-	1	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-
38	Enmytagyn, Inchoun, Mitkulen	-	-	-	-	-	-	-	-	-	-	-	-		1	-	-	-	-	-	-	-	-	-	-
39	Cape Dezhnev, Naukan, Uelen	-	-	-	-	-	-	-	-	1	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-
64	Kukpuk River, Point Hope	-	-	-	-	-	-	-	-	1	-	-	-	-	5	-	1	-	-	-	-	-	-	-	-
65	Buckland, Cape Lisburne	-	-	-	-	-	-	-	-	1	1	-	-	-	4	-	2	-	-	-	-	-	-	-	-
66	Ayugatak Lagoon	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-
70	Kuchaurak and Kuchiak Creek	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	1	-	-	1	-	-	-	-	-
71	Kukpowruk River, Sitkok Point	-	-	-	-	-	-	-	-	-	2	1	-	-	-	-	2	-	-	2	-	-	-	-	-
72	Point Lay, Siksrikpak Point	-	-	-	-	-	-	-	-	-	3	1	-	-	-	-	2	-	-	5	-	-	-	-	-
73	Tungaich Point, Tungak Creek	-	-	-	-	-	-	-	-	-	3	1	-	-	-	-	2	-	-	8	-	-	-	-	-
74	Kasegaluk Lagoon, Solivik Isl.	-	-	-	-	-	-	-	-	-	2	2	-	-	-	-	1	-	1	5	-	-	-	-	-
75	Akeonik, Icy Cape	-	-	-	-	1	-	-	-	-	1	2	-	-	-	-	1	-	1	3	-	-	-	-	-
76	Avak Inlet, Tunalik River	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	1	-	-	-	-	-
77	Nivat Point, Nokotlek Point,	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	1	-	-	1	-	-
78	Point Collie, Sigeakruk Point	-	-	-	-	-	-	-	-	-	-	1	1	-	-	-	-	-	-	-	-	-	4	-	-
79	Point Belcher, Wainwright	-	-	-	-	-	-	-	-	-	-	1	2	-	-	-	-	-	-	-	-	1	7	-	-
80	Eluksingiak Point, Kugrua Bay	-	-	-	-	-	-	-	-	-	-	-	2	1	-	-	-	-	-	-	-	1	4	-	1
81	Peard Bay, Point Franklin	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	1	-	2
82	Skull Cliff	-	-	-	-	-	-	-	-	-	-	-	1	1	-	-	-	-	-	-	-	-	-	-	5
83	Nulavik, Loran Radio Station	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	3
84	Will Rogers & Wiley Post Mem.	-	-	-	-	-	-	-	1	-	-	-	1	3	-	-	-	-	-	-	-	-	-	1	4
85	Barrow, Browerville, Elson Lag.	-	-	-	-	-	-	1	2	-	-	-	-	5	-	-	-	-	-	-	-	-	-	1	3
86	Dease Inlet, Plover Islands	-	-	-	-	-	-	-	1	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-

Notes- ** = Greater than 99.5 percent; - = less than 0.5 percent; LA = Launch Area, P = Pipeline. Rows with all values less than 0.5 percent are not shown.

Table A.2-10 Annual Conditional Probabilities (Expressed as Percent Chance) that a Large Oil Spill Starting at a Particular Location Will Contact a Certain Land Segment Within 60 Days, Chukchi Sale 193

ID	Land Segment Name	LA 1	LA 2	LA 3	LA 4	LA 5	LA 6	LA 7	LA 8	LA 9	LA 10	LA 11	LA 12	LA 13	P 1	P 2	P 3	P 4	P 5	P 6	P 7	P 8	P 9	P 10	P 11
8	E. Wrangel Island, Skeletov	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-
27	Laguna Nut, Rigol'	-	-	-	1	-	-	-	-	1	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-
32	Mys Dzhenretlen, Eynenekvyk	-	-	-	-	-	-	-	-	1	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-
33	Neskan, Laguna Neskan	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
34	Tepken, Memino	-	-	-	-	-	-	-	-	1	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-
35	Enurmino, Mys Neten	-	-	-	-	-	-	-	-	2	-	-	-	-	2	-	1	-	-	-	-	-	-	-	-
36	Mys Serdtse-Kamen	-	-	-	-	-	-	-	-	1	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-
37	Chegitun, Utkan	-	-	-	-	-	-	-	-	1	-	-	-	-	1	-	1	-	-	-	-	-	-	-	-
38	Enmytagyn, Inchoun, Mitkulen	-	-	-	-	-	-	-	-	1	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-
39	Cape Dezhnev, Naukan, Uelen	-	-	-	-	-	-	-	-	1	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-
64	Kukpuk River, Point Hope	-	-	-	-	-	-	-	-	1	1	-	-	-	5	-	1	-	-	-	-	-	-	-	-
65	Buckland, Cape Lisburne	-	-	-	-	-	-	-	-	1	1	-	-	-	5	-	2	-	-	1	-	-	-	-	-
66	Ayugatak Lagoon	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	1	-	-	1	-	-	-	-	-
67	Cape Sabine, Pitmegea River	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-
68	Agiak Lagoon, Punuk Lagoon	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-
69	Cape Beaufort, Omalik Lagoon	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-
70	Kuchaurak and Kuchiak Creek	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	1	-	-	1	-	-	-	-	-
71	Kukpowruk River, Sitkok Point	-	-	-	-	-	-	-	-	-	2	1	-	-	-	-	2	-	-	2	-	-	-	-	-
72	Point Lay, Siksrikpak Point	-	-	-	-	-	-	-	-	-	3	1	-	-	-	-	3	-	-	6	-	-	-	-	-
73	Tungaich Point, Tungak Creek	-	-	-	-	1	-	-	-	-	4	2	-	-	-	1	2	-	-	8	-	-	-	-	-
74	Kasegaluk Lagoon, Solivik Isl.	-	-	-	1	1	-	-	-	-	3	3	-	-	-	1	2	-	1	7	-	-	1	-	-
75	Akeonik, Icy Cape	-	-	-	1	1	-	-	-	-	2	3	-	-	-	1	1	-	1	4	-	-	1	-	-
76	Avak Inlet, Tunalik River	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	1	-	-	1	-	-
77	Nivat Point, Nokotlek Point,	-	-	-	-	-	-	-	-	-	-	1	1	-	-	-	-	-	-	1	-	-	1	-	-
78	Point Collie, Sigeakruk Point	-	-	-	-	-	-	-	-	-	-	1	1	-	-	-	-	-	1	1	-	-	6	-	-
79	Point Belcher, Wainwright,	-	-	-	-	-	1	-	-	-	-	1	4	1	-	-	-	-	1	-	-	1	9	-	1
80	Eluksingiak Point, Kugrua Bay	-	-	-	-	-	-	-	-	-	-	1	3	1	-	-	-	-	1	-	-	2	5	-	2
81	Peard Bay, Point Franklin	-	-	-	-	-	-	-	-	-	-	1	2	1	-	-	-	-	1	-	-	1	2	-	2
82	Skull Cliff	-	-	-	-	-	-	-	-	-	-	-	1	1	-	-	-	-	-	-	-	-	1	-	7
83	Nulavik, Loran Radio Station	-	-	-	-	-	-	-	-	-	-	-	1	1	-	-	-	-	-	-	-	1	-	1	3
84	Will Rogers & Wiley Post Mem.	-	-	-	-	-	-	1	1	-	-	-	1	4	-	-	-	-	-	-	-	-	-	1	5
85	Barrow, Browerville, Elson Lag.	-	-	-	-	-	-	1	4	-	-	-	1	6	-	-	-	-	-	-	-	-	-	3	4
86	Dease Inlet, Plover Islands	-	-	-	-	-	-	-	1	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-
87	Igalik & Kulgurak Island,	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Notes- ** = Greater than 99.5 percent; - = less than 0.5 percent; LA = Launch Area, P = Pipeline. Rows with all values less than 0.5 percent are not shown.

Table A.2-11 Annual Conditional Probabilities (Expressed as Percent Chance) that a Large Oil Spill Starting at a Particular Location Will Contact a Certain Land Segment Within 180 Days, Chukchi Sale 193

ID	Land Segment Name	LA 1	LA 2	LA 3	LA 4	LA 5	LA 6	LA 7	LA 8	LA 9	LA 10	LA 11	LA 12	LA 13	P 1	P 2	P 3	P 4	P 5	P 6	P 7	P 8	P 9	P 10	P 11
8	E. Wrangel Island, Skeletov	1	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	1	-	-	-	-	-	-	-
27	Laguna Nut, Rigol'	-	-	-	1	-	-	-	-	1	-	-	-	-	1	1	-	-	-	-	-	-	-	-	-
28	Vankarem,Vankarem Laguna	-	-	-	1	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-
30	Nutepynmin, Pyngopil'gyn	-	-	-	1	-	-	-	-	1	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-
31	Alyatki, Zaliv Tasytkhin	-	-	-	-	-	-	-	-	1	-	-	-	-	1	-	1	-	-	-	-	-	-	-	-
32	Mys Dzhenretlen, Eynenekvyk	-	-	-	1	-	-	-	-	2	-	-	-	-	1	-	1	-	-	-	-	-	-	-	-
33	Neskan, Laguna Neskan	-	-	-	-	-	-	-	-	2	-	-	-	-	1	-	1	-	-	-	-	-	-	-	-
34	Tepken, Memino	-	-	-	-	-	-	-	-	2	-	-	-	-	2	-	1	-	-	-	-	-	-	-	-
35	Enurmino, Mys Neten	-	-	-	-	-	-	-	-	4	1	-	-	-	4	-	1	-	-	-	-	-	-	-	-
36	Mys Serdtse-Kamen	-	-	-	-	-	-	-	-	3	-	-	-	-	4	-	1	-	-	-	-	-	-	-	-
37	Chegitun, Utkan	-	-	-	-	-	-	-	-	2	-	-	-	-	3	-	1	-	-	-	-	-	-	-	-
38	Enmytagyn, Inchoun, Mitkulen	-	-	-	-	-	-	-	-	1	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-
39	Cape Dezhnev, Naukan, Uelen	-	-	-	-	-	-	-	-	1	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-
64	Kukpuk River, Point Hope	-	-	-	-	-	-	-	-	1	1	-	-	-	5	-	1	-	-	-	-	-	-	-	-
65	Buckland, Cape Lisburne	-	-	-	-	-	-	-	-	1	1	-	-	-	5	-	3	-	-	1	-	-	-	-	-
66	Ayugatak Lagoon	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	1	-	-	1	-	-	-	-	-
67	Cape Sabine, Pitmegea River	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-
68	Agiak Lagoon, Punuk Lagoon	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-
69	Cape Beaufort, Omalik Lagoon	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-
70	Kuchaurak and Kuchiak Creek	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	2	-	-	1	-	-	-	-	-
71	Kukpowruk River, Sitkok Point	-	-	-	-	-	-	-	-	-	3	1	-	-	-	-	3	-	-	2	-	-	-	-	-
72	Point Lay, Siksrikpak Point	-	-	-	1	1	-	-	-	-	4	1	-	-	-	1	3	-	-	6	-	-	-	-	-
73	Tungaich Point, Tungak Creek	-	-	-	1	1	-	-	-	-	4	2	-	-	-	1	3	-	1	9	-	-	-	-	-
74	Kasegaluk Lagoon, Solivik Isl.	-	-	-	1	2	-	-	-	-	4	3	1	-	-	1	2	-	2	7	-	1	1	-	-
75	Akeonik, Icy Cape	-	-	-	1	2	-	-	-	-	3	3	1	-	-	1	1	-	2	5	-	-	1	-	-
76	Avak Inlet, Tunalik River	-	-	-	-	1	-	-	-	-	1	1	-	-	-	-	-	-	1	1	-	-	1	-	-
77	Nivat Point, Nokotlek Point,	-	-	-	-	-	-	-	-	-	1	1	1	-	-	-	-	-	-	1	-	-	1	-	-
78	Point Collie, Sigeakruk Point	-	-	-	-	1	-	-	-	-	1	2	3	-	-	-	-	-	1	1	-	1	8	-	1
79	Point Belcher, Wainwright,	-	-	-	-	1	1	-	-	-	1	2	4	1	-	-	-	-	1	1	-	2	11	-	2
80	Eluksingiak Point, Kugrua Bay	-	-	-	-	1	1	-	-	-	-	1	5	2	-	-	-	-	1	1	-	2	8	-	4
81	Peard Bay, Point Franklin	-	-	-	-	1	1	-	-	-	-	1	3	1	-	-	-	-	1	1	-	1	3	-	3
82	Skull Cliff	-	-	-	-	-	1	-	-	-	-	1	3	2	-	-	-	-	-	-	-	1	3	1	8
83	Nulavik, Loran Radio Station	-	-	-	-	1	1	1	1	-	-	1	2	2	-	-	-	-	1	-	1	1	1	1	5
84	Will Rogers & Wiley Post Mem.	-	-	-	-	-	-	2	2	-	-	-	2	5	-	-	-	-	-	-	-	1	1	2	6
85	Barrow, Browerville, Elson Lag.	-	-	-	-	-	-	3	6	-	-	-	3	9	-	-	-	-	-	-	-	1	2	5	6
86	Dease Inlet, Plover Islands	-	-	-	-	-	-	1	1	-	-	-	-	2	-	-	-	-	-	-	-	-	-	1	1
87	Igalik & Kulgurak Island,	1	1	1	-	-	1	1	1	-	-	-	-	1	-	-	-	1	-	-	1	-	-	1	-
88	Cape Simpson, Piasuk River	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Notes- ** = Greater than 99.5 percent; - = less than 0.5 percent; LA = Launch Area, P = Pipeline. Rows with all values less than 0.5 percent are not shown.

Table A.2-12 Annual Conditional Probabilities (Expressed as Percent Chance) that a Large Oil Spill Starting at a Particular Location Will Contact a Certain Land Segment Within 360 Days, Chukchi Sale 193

ID	Land Segment Name	LA 1	LA 2	LA 3	LA 4	LA 5	LA 6	LA 7	LA 8	LA 9	LA 10	LA 11	LA 12	LA 13	P 1	P 2	P 3	P 4	P 5	P 6	P 7	P 8	P 9	P 10	P 11
8	E. Wrangel Island, Skeletov	1	-	-	-	-	-	-	1	-	-	-	-	-	-	1	-	1	-	-	-	-	-	-	-
25	Ostrov Leny, Yulinu	-	-	-	1	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-
26	Ekugvaam, Kepin, Pil'khin	-	-	-	1	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-
27	Laguna Nut, Rigol'	-	-	-	1	-	-	-	-	1	-	-	-	-	1	1	-	-	-	-	-	-	-	-	-
28	Laguna Nut, Rigol'	-	-	-	1	-	-	-	-	1	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-
29	Vankarem,Vankarem Laguna	-	-	-	1	-	-	-	-	1	-	-	-	-	1	1	-	-	-	-	-	-	-	-	-
30	Nutepynmin, Pyngopil'gyn	-	-	-	1	-	-	-	-	1	-	-	-	-	1	1	1	-	-	-	-	-	-	-	-
31	Alyatki, Zaliv Tasytkhin	-	-	-	1	-	-	-	-	1	-	-	-	-	1	-	1	-	-	-	-	-	-	-	-
32	Mys Dzhenretlen, Eynenekvyk	-	-	-	1	-	-	-	-	2	-	-	-	-	2	-	1	-	-	-	-	-	-	-	-
33	Neskan, Laguna Neskan	-	-	-	1	-	-	-	-	2	-	-	-	-	2	-	1	-	-	-	-	-	-	-	-
34	Tepken, Memino	-	-	-	-	-	-	-	-	3	-	-	-	-	3	-	1	-	-	-	-	-	-	-	-
35	Enurmino, Mys Neten	-	-	-	-	-	-	-	-	4	1	-	-	-	5	-	2	-	-	-	-	-	-	-	-
36	Mys Serdtse-Kamen	-	-	-	-	-	-	-	-	3	-	-	-	-	4	-	1	-	-	-	-	-	-	-	-
37	Chegitun, Utkan	-	-	-	-	-	-	-	-	2	-	-	-	-	4	-	1	-	-	-	-	-	-	-	-
38	Enmytagyn, Inchoun, Mitkulen	-	-	-	-	-	-	-	-	1	-	-	-	-	2	-	1	-	-	-	-	-	-	-	-
39	Cape Dezhnev, Naukan, Uelen	-	-	-	-	-	-	-	-	1	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-
64	Kukpuk River, Point Hope	-	-	-	-	-	-	-	-	1	1	-	-	-	5	-	1	-	-	-	-	-	-	-	-
65	Buckland, Cape Lisburne	-	-	-	-	-	-	-	-	1	1	-	-	-	5	-	3	-	-	1	-	-	-	-	-
66	Ayugatak Lagoon	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	1	-	-	1	-	-	-	-	-
67	Cape Sabine, Pitmegea River	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-
68	Agiak Lagoon, Punuk Lagoon	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-
69	Cape Beaufort, Omalik Lagoon	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-
70	Kuchaurak and Kuchiak Creek	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	2	-	-	1	-	-	-	-	-
71	Kukpowruk River, Sitkok Point	-	-	-	-	-	-	-	-	-	3	1	-	-	-	-	3	-	-	2	-	-	-	-	-
72	Point Lay, Siksrikpak Point	-	-	-	1	1	-	-	-	-	4	1	-	-	-	1	3	-	-	6	-	-	-	-	-
73	Tungaich Point, Tungak Creek	-	-	-	1	1	-	-	-	-	4	2	-	-	-	1	3	-	1	9	-	-	-	-	-
74	Kasegaluk Lagoon, Solivik Isl.	-	-	-	1	2	-	-	-	-	4	3	1	-	-	1	2	-	2	7	-	1	1	-	-
75	Akeonik, Icy Cape	-	-	-	1	2	-	-	-	-	3	3	1	-	-	1	1	-	2	5	-	-	1	-	-
76	Avak Inlet, Tunalik River	-	-	-	-	1	-	-	-	-	1	1	-	-	-	-	-	-	1	1	-	-	1	-	-
77	Nivat Point, Nokotlek Point,	-	-	-	-	-	-	-	-	-	1	1	1	-	-	-	-	-	-	1	-	-	1	-	-
78	Point Collie, Sigeakruk Point	-	-	-	1	1	-	-	-	-	1	2	3	-	-	-	-	-	1	2	-	1	8	-	1
79	Point Belcher, Wainwright,	-	-	-	-	1	1	-	-	-	1	2	4	1	-	-	-	-	1	1	-	2	11	-	2
80	Eluksingiak Point, Kugrua Bay	-	-	-	-	1	1	-	-	-	1	2	5	2	-	-	-	-	1	1	-	2	9	-	4
81	Peard Bay, Point Franklin	-	-	-	-	1	1	-	-	-	1	1	3	1	-	-	-	-	1	1	-	1	3	-	3
82	Skull Cliff	-	-	-	-	-	1	-	-	-	-	1	3	2	-	-	-	-	1	-	-	1	3	1	9
83	Nulavik, Loran Radio Station	-	-	-	-	1	1	1	1	-	-	1	2	2	-	-	-	-	1	-	1	2	1	1	5
84	Will Rogers & Wiley Post Mem.	-	-	1	-	-	1	3	3	-	-	-	2	5	-	-	-	-	-	-	1	1	1	3	6
85	Barrow, Browerville, Elson Lag.	-	-	1	-	-	1	3	7	-	-	-	3	10	-	-	-	-	-	-	1	1	2	5	6
86	Dease Inlet, Plover Islands	-	-	-	-	-	-	1	2	-	-	-	1	2	-	-	-	-	-	-	-	-	1	1	1
87	Igalik & Kulgurak Island	1	1	1	-	1	1	1	1	-	-	1	1	1	-	-	-	1	1	-	1	1	-	1	-
88	Cape Simpson, Piasuk River	-	-	1	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-
91	Lonely, Pitt Point, Pogik Bay	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Notes- ** = Greater than 99.5 percent; - = less than 0.5 percent; LA = Launch Area, P = Pipeline. Rows with all values less than 0.5 percent are not shown.

Table A.2-13 Annual Conditional Probabilities (Expressed as Percent Chance) that a Large Oil Spill Starting at a Particular Location Will Contact a Certain Group of Land Segments Within 3 Days, Chukchi Sale 193

ID	Land Segment Name	LA 1	LA 2	LA 3	LA 4	LA 5	LA 6	LA 7	LA 8	LA 9	LA 10	LA 11	LA 12	LA 13	P 1	P 2	P 3	P 4	P 5	P 6	P 7	P 8	P 9	P 10	P 11
88	Alaska Maritime National Wildlife Refuge	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-
89	National Petroleum Reserve Alaska	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
96	United States Chukchi Coast	-	-	-	-	-	-	-	-	-	-	-	-	-	3	-	1	-	-	6	-	-	2	-	3

Notes- ** = Greater than 99.5 percent; - = less than 0.5 percent; LA = Launch Area, P = Pipeline. Rows with all values less than 0.5 percent are not shown.

Table A.2-14 Annual Conditional Probabilities (Expressed as Percent Chance) that a Large Oil Spill Starting at a Particular Location Will Contact a Certain Group of Land Segments Within 10 Days, Chukchi Sale 193

ID	Land Segments Name	LA 1	LA 2	LA 3	LA 4	LA 5	LA 6	LA 7	LA 8	LA 9	LA 10	LA 11	LA 12	LA 13	P 1	P 2	P 3	P 4	P 5	P 6	P 7	P 8	P 9	P 10	P 11
88	Alaska Maritime National Wildlife Refuge	-	-	-	-	-	-	-	-	1	-	-	-	-	3	-	1	-	-	-	-	-	-	-	-
89	National Petroleum Reserve Alaska	-	-	-	-	-	-	-	-	-	-	-	1	1	-	-	-	-	-	-	-	-	2	-	7
96	United States Chukchi Coast	-	-	-	-	-	-	-	-	1	4	3	2	2	6	-	4	-	-	17	-	-	7	-	9
97	United States Beaufort Coast	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	1

Notes- ** = Greater than 99.5 percent; - = less than 0.5 percent; LA = Launch Area, P = Pipeline. Rows with all values less than 0.5 percent are not shown.

Table A.2-15 Annual Conditional Probabilities (Expressed as Percent Chance) that a Large Oil Spill Starting at a Particular Location Will Contact a Certain Group of Land Segments Within 30 Days, Chukchi Sale 193

ID	Land Segment Name	LA 1	LA 2	LA 3	LA 4	LA 5	LA 6	LA 7	LA 8	LA 9	LA 10	LA 11	LA 12	LA 13	P 1	P 2	P 3	P 4	P 5	P 6	P 7	P 8	P 9	P 10	P 11
84	Wrangel Is Nat Res Natural World Heritage Site	1	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-
88	Alaska Maritime National Wildlife Refuge	-	-	-	-	-	-	-	-	1	1	-	-	-	5	-	2	-	-	-	-	-	-	-	-
89	National Petroleum Reserve Alaska	-	-	-	-	-	-	-	1	-	-	2	5	4	-	-	-	-	1	1	-	2	7	1	11
90	Kasegaluk Lagoon Special Use Area	-	-	-	-	-	-	-	-	-	-	1	1	-	-	-	-	-	-	1	-	-	1	-	-
95	Russia Chukchi Coast	1	-	-	2	1	-	-	-	7	1	-	-	-	8	2	2	1	-	-	-	-	-	-	-
96	United States Chukchi Coast	-	-	-	2	3	1	1	1	4	14	11	9	6	11	2	13	-	3	27	-	3	19	1	15
97	United States Beaufort Coast	-	-	-	-	-	-	1	3	-	-	-	-	6	-	-	-	-	-	-	-	-	-	1	3

Notes- ** = Greater than 99.5 percent; - = less than 0.5 percent; LA = Launch Area, P = Pipeline. Rows with all values less than 0.5 percent are not shown.

Table A.2-16 Annual Conditional Probabilities (Expressed as Percent Chance) that a Large Oil Spill Starting at a Particular Location Will Contact a Certain Group of Land Segments Within 60 Days, Chukchi Sale 193

ID	Land Segment Name	LA 1	LA 2	LA 3	LA 4	LA 5	LA 6	LA 7	LA 8	LA 9	LA 10	LA 11	LA 12	LA 13	P 1	P 2	P 3	P 4	P 5	P 6	P 7	P 8	P 9	P 10	P 11
84	Wrangel Is Nat Res Natural World Heritage Site	1	1	-	1	-	-	-	-	-	-	-	-	-	-	1	-	1	-	-	-	-	-	-	-
88	Alaska Maritime National Wildlife Refuge	-	-	-	-	-	-	-	-	2	1	-	-	-	5	-	3	-	-	1	-	-	-	-	-
89	National Petroleum Reserve Alaska	-	-	-	-	1	2	1	3	-	1	4	8	6	-	-	-	-	2	2	1	4	10	2	15
90	Kasegaluk Lagoon Special Use Area	-	-	-	-	1	-	-	-	-	1	2	1	-	-	-	-	-	1	2	-	-	2	-	-
91	Teshekpuk Lake Special Use Area	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
95	Russia Chukchi Coast	2	1	-	3	1	-	-	-	10	2	-	-	-	11	3	4	1	1	-	-	-	-	-	-
96	United States Chukchi Coast	-	-	1	3	6	3	2	2	5	20	16	15	9	12	3	18	1	7	33	1	7	27	3	20
97	United States Beaufort Coast	-	-	-	-	-	-	2	6	-	-	-	1	8	-	-	-	-	-	-	-	-	-	3	4

Notes- ** = Greater than 99.5 percent; - = less than 0.5 percent; LA = Launch Area, P = Pipeline. Rows with all values less than 0.5 percent are not shown.

Table A.2-17 Annual Conditional Probabilities (Expressed as Percent Chance) that a Large Oil Spill Starting at a Particular Location Will Contact a Certain Group of Land Segments Within 180 Days, Chukchi Sale 193

ID	Land Segment Name	LA 1	LA 2	LA 3	LA 4	LA 5	LA 6	LA 7	LA 8	LA 9	LA 10	LA 11	LA 12	LA 13	P 1	P 2	P 3	P 4	P 5	P 6	P 7	P 8	P 9	P 10	P 11
84	Wrangel Is Nat Res Natural World Heritage Site	2	1	-	1	1	-	-	-	-	-	-	-	-	-	1	-	1	1	-	-	-	-	-	-
88	Alaska Maritime National Wildlife Refuge	-	-	-	-	-	-	-	-	2	1	-	-	-	6	-	3	-	-	1	-	-	-	-	-
89	National Petroleum Reserve Alaska	1	2	2	1	4	4	4	6	-	2	7	13	9	-	1	1	2	5	4	3	7	17	4	21
90	Kasegaluk Lagoon Special Use Area	-	-	-	1	1	-	-	-	-	1	2	1	-	-	-	-	-	1	2	-	1	2	-	-
91	Teshekpuk Lake Special Use Area	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
95	Russia Chukchi Coast	4	2	1	7	1	1	-	1	21	4	1	-	-	23	6	8	2	1	1	1	-	-	-	-
96	United States Chukchi Coast	1	1	1	7	11	6	4	5	6	26	23	23	13	14	7	23	2	12	40	3	12	39	5	28
97	United States Beaufort Coast	1	1	2	-	1	1	5	11	-	-	-	3	12	-	-	-	1	1	-	2	1	2	7	7

Notes- ** = Greater than 99.5 percent; - = less than 0.5 percent; LA = Launch Area, P = Pipeline. Rows with all values less than 0.5 percent are not shown.

Table A.2-18 Annual Conditional Probabilities (Expressed as Percent Chance) that a Large Oil Spill Starting at a Particular Location Will Contact a Certain Group of Land Segments Within 360 Days, Chukchi Sale 193

ID	Land Segment Name	LA 1	LA 2	LA 3	LA 4	LA 5	LA 6	LA 7	LA 8	LA 9	LA 10	LA 11	LA 12	LA 13	P 1	P 2	P 3	P 4	P 5	P 6	P 7	P 8	P 9	P 10	P 11
84	Wrangel Is Nat Res Natural World Heritage Site	2	1	-	1	1	-	-	2	-	-	-	1	1	-	1	-	1	1	-	-	-	1	1	1
88	Alaska Maritime National Wildlife Refuge	-	-	-	-	-	-	-	-	2	1	-	-	-	6	-	3	-	-	1	-	-	-	-	-
89	National Petroleum Reserve Alaska	2	3	3	2	5	5	5	8	-	4	8	15	11	-	2	2	3	6	5	4	9	19	6	23
90	Kasegaluk Lagoon Special Use Area	-	-	-	1	1	-	-	-	-	1	2	1	-	-	-	-	-	1	2	-	1	2	-	-
91	Teshekpuk Lake Special Use Area	-	-	-	-	-	-	-	2	-	-	-	-	1	-	-	-	-	-	-	-	-	-	1	-
95	Russia Chukchi Coast	4	2	1	9	2	1	1	3	27	5	1	1	2	28	9	12	3	1	1	1	1	1	1	1
96	United States Chukchi Coast	1	1	2	7	11	6	6	6	6	27	24	24	13	14	7	23	2	12	41	3	12	40	6	29
97	United States Beaufort Coast	1	2	3	1	2	3	6	14	-	1	2	5	14	-	1	1	2	2	1	3	3	4	9	9

Notes- ** = Greater than 99.5 percent; - = less than 0.5 percent; LA = Launch Area, P = Pipeline. Rows with all values less than 0.5 percent are not shown.

Table A.2-19 Annual Conditional Probabilities (Expressed as Percent Chance) that a Large Oil Spill Starting at a Particular Location Will Contact a Certain Boundary Segment Within 3 Days, Chukchi Sale 193

ID	Boundary Segment Name	LA 1	LA 2	LA 3	LA 4	LA 5	LA 6	LA 7	LA 8	LA 9	LA 10	LA 11	LA 12	LA 13	P 1	P 2	P 3	P 4	P 5	P 6	P 7	P 8	P 9	P 10	P 11

Notes- All boundary segments have all values less than 0.5%; therefore the data are not shown and the tables are left blank.

Table A.2-20 Annual Conditional Probabilities (Expressed as Percent Chance) that a Large Oil Spill Starting at a Particular Location Will Contact a Certain Boundary Segment Within 10 Days, Chukchi Sale 193

ID	Boundary Segment Name	LA 1	LA 2	LA 3	LA 4	LA 5	LA 6	LA 7	LA 8	LA 9	LA 10	LA 11	LA 12	LA 13	P 1	P 2	P 3	P 4	P 5	P 6	P 7	P 8	P 9	P 10	P 11

Notes- All boundary segments have all values less than 0.5%; therefore the data are not shown and the tables are left blank.

Table A.2-21 Annual Conditional Probabilities (Expressed as Percent Chance) that a Large Oil Spill Starting at a Particular Location Will Contact a Certain Boundary Segment Within 30 Days, Chukchi Sale 193

ID	Boundary Segment Name	LA 1	LA 2	LA 3	LA 4	LA 5	LA 6	LA 7	LA 8	LA 9	LA 10	LA 11	LA 12	LA 13	P 1	P 2	P 3	P 4	P 5	P 6	P 7	P 8	P 9	P 10	P 11
2	Bering Strait	-	-	-	-	-	-	-	-	1	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-
16	Chukchi Sea	-	1	-	-	-	-	-	-	--		-	-	-	-	-	-	1	-	-	-	-	-	-	-
18	Chukchi Sea	1	2	3	-	1	2	1	-	-	-	1	-	-	-	-	-	1	1	-	3	1	-	1	-
19	Chukchi Sea	1	2	3	-	1	1	2	1	-	-	-	-	-	-	-	-	1	1	-	2	1	-	1	-
20	Chukchi Sea	-	1	2	-	-	1	1	1	-	-	-	-	-	-	-	-	1	-	-	1	-	-	1	-
24	Beaufort Sea	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Notes- ** = Greater than 99.5 percent; - = less than 0.5 percent; LA = Launch Area, P = Pipeline. Rows with all values less than 0.5 percent are not shown.

Table A.2-22 Annual Conditional Probabilities (Expressed as Percent Chance) that a Large Oil Spill Starting at a Particular Location Will Contact a Certain Boundary Segment Within 60 Days, Chukchi Sale 193

ID	Boundary Segment Name	LA 1	LA 2	LA 3	LA 4	LA 5	LA 6	LA 7	LA 8	LA 9	LA 10	LA 11	LA 12	LA 13	P 1	P 2	P 3	P 4	P 5	P 6	P 7	P 8	P 9	P 10	P 11
2	Bering Strait	-	-	-	-	-	-	-	-	1	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-
15	Chukchi Sea	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-
16	Chukchi Sea	1	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	1	-	-	-	-
17	Chukchi Sea	1	1	1	-	-	1	-	-	-	-	-	-	-	-	-	-	1	-	-	1	-	-	-	-
18	Chukchi Sea	3	6	8	1	4	6	5	3	-	2	3	2	2	-	1	-	5	4	2	7	5	1	5	2
19	Chukchi Sea	3	7	8	1	3	6	6	3	-	1	2	2	3	-	1	1	6	3	1	8	3	-	6	2
20	Chukchi Sea	2	4	5	-	2	3	4	4	-	1	1	1	2	-	-	-	3	2	1	4	2	-	4	1
21	Chukchi Sea	-	1	1	-	-	1	1	1	-	-	-	-	1	-	-	-	1	1	-	1	-	-	1	-
22	Chukchi Sea	-	-	1	-	-	-	1	1	-	-	-	-	-	-	-	-	-	-	-	1	-	-	1	-
23	Beaufort Sea	-	-	-	-	-	-	1	1	-	-	-	-	1	-	-	-	-	-	-	-	-	-	1	-
24	Beaufort Sea	-	-	-	-	-	-	-	1	-	-	-	-	1	-	-	-	-	-	-	-	-	-	1	-
25	Beaufort Sea	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
26	Beaufort Sea	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Notes- ** = Greater than 99.5 percent; - = less than 0.5 percent; LA = Launch Area, P = Pipeline. Rows with all values less than 0.5 percent are not shown.

Table A.2-23 Annual Conditional Probabilities (Expressed as Percent Chance) that a Large Oil Spill Starting at a Particular Location Will Contact a Certain Boundary Segment Within 180 Days, Chukchi Sale 193

ID	Boundary Segment Name	LA 1	LA 2	LA 3	LA 4	LA 5	LA 6	LA 7	LA 8	LA 9	LA 10	LA 11	LA 12	LA 13	P 1	P 2	P 3	P 4	P 5	P 6	P 7	P 8	P 9	P 10	P 11
2	Bering Strait	-	-	-	-	-	-	-	-	1	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-
15	Chukchi Sea	1	1	1	-	1	1	1	-	-	-	-	-	-	-	-	-	1	1	-	1	1	-	1	-
16	Chukchi Sea	2	2	1	-	1	1	1	-	-	-	1	1	-	-	-	-	2	1	-	1	1	-	1	1
17	Chukchi Sea	2	2	2	1	1	2	1	1	-	1	1	1	1	-	1	-	2	1	1	2	1	-	1	1
18	Chukchi Sea	5	9	11	2	6	9	9	6	-	4	7	6	5	-	2	1	7	7	5	10	9	3	8	5
19	Chukchi Sea	7	12	14	3	9	12	14	9	-	5	8	9	9	-	2	2	10	9	6	14	10	6	14	8
20	Chukchi Sea	5	9	11	1	7	10	9	8	-	3	5	6	7	-	1	1	8	7	4	10	8	4	9	7
21	Chukchi Sea	1	2	3	-	1	2	2	3	-	-	1	1	2	-	-	-	1	2	1	2	2	1	3	1
22	Chukchi Sea	-	-	1	-	-	1	1	2	-	-	1	1	1	-	-	-	-	-	1	1	1	1	2	1
23	Beaufort Sea	-	1	2	-	-	1	2	2	-	-	-	1	1	-	-	-	-	-	-	1	1	-	2	1
24	Beaufort Sea	-	-	-	-	-	-	1	2	-	-	-	-	1	-	-	-	-	-	-	-	-	-	1	1
25	Beaufort Sea	-	-	-	-	-	1	-	1	-	-	1	1	1	-	-	-	-	-	-	1	1	1	-	1
26	Beaufort Sea	-	-	1	-	-	1	1	1	-	-	-	1	1	-	-	-	-	-	-	1	1	-	1	1
27	Beaufort Sea	-	-	1	-	-	-	1	1	-	-	-	-	1	-	-	-	-	-	-	1	-	-	1	-
28	Beaufort Sea	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
30	Beaufort Sea	-	-	-	-	-	-	-	1	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-

Notes- ** = Greater than 99.5 percent; - = less than 0.5 percent; LA = Launch Area, P = Pipeline. Rows with all values less than 0.5 percent are not shown.

Table A.2-24 Annual Conditional Probabilities (Expressed as Percent Chance) that a Large Oil Spill Starting at a Particular Location Will Contact a Certain Boundary Segment Within 360 Days, Chukchi Sale 193

ID	Boundary Segment Name	LA 1	LA 2	LA 3	LA 4	LA 5	LA 6	LA 7	LA 8	LA 9	LA 10	LA 11	LA 12	LA 13	P 1	P 2	P 3	P 4	P 5	P 6	P 7	P 8	P 9	P 10	P 11
2	Bering Strait	-	-	-	-	-	-	-	-	1	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-
15	Chukchi Sea	1	1	1	-	1	1	1	-	-	-	-	-	-	-	-	-	1	1	-	1	1	-	1	-
16	Chukchi Sea	2	2	1	-	1	1	1	-	-	-	1	1	-	-	-	-	2	1	-	1	1	-	1	1
17	Chukchi Sea	2	2	2	1	1	2	1	1	-	1	1	1	1	-	1	-	2	1	1	2	1	1	1	1
18	Chukchi Sea	5	9	11	2	6	9	9	6	-	4	7	6	5	-	2	1	7	7	5	10	9	4	8	5
19	Chukchi Sea	7	13	14	3	9	13	15	9	-	5	8	10	10	-	2	2	11	9	6	14	11	6	14	9
20	Chukchi Sea	5	9	11	1	7	10	10	8	-	3	6	6	7	-	1	1	8	7	4	11	8	4	10	7
21	Chukchi Sea	1	2	3	-	1	2	3	3	-	1	1	2	2	-	-	-	1	2	1	3	2	1	3	1
22	Chukchi Sea	-	-	1	-	-	1	1	2	-	-	1	1	1	-	-	-	-	-	1	1	1	1	2	1
23	Beaufort Sea	1	1	3	-	1	2	2	3	-	1	1	1	2	-	-	-	1	1	1	2	1	1	2	2
24	Beaufort Sea	-	-	1	-	-	1	1	2	-	-	-	1	2	-	-	-	-	-	-	1	1	-	2	1
25	Beaufort Sea	-	-	-	-	-	1	-	1	-	-	1	1	1	-	-	-	-	-	-	1	1	1	-	1
26	Beaufort Sea	-	1	1	-	-	1	2	2	-	-	-	1	2	-	-	-	-	-	-	1	1	-	2	2
27	Beaufort Sea	-	-	1	-	-	1	1	2	-	-	-	1	1	-	-	-	-	-	-	1	1	-	1	1
28	Beaufort Sea	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
30	Beaufort Sea	-	-	-	-	-	-	-	1	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-
34	Beaufort Sea	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
35	Beaufort Sea	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Notes- ** = Greater than 99.5 percent; - = less than 0.5 percent; LA = Launch Area, P = Pipeline. Rows with all values less than 0.5 percent are not shown.

Table A.2-25 Summer Conditional Probabilities (Expressed as Percent Chance) that a Large Oil Spill Starting at a Particular Location Will Contact a Certain Environmental Resource Area Within 3 Days, Chukchi Sale 193

ID	Environmental Resource Area Name	LA 1	LA 2	LA 3	LA 4	LA 5	LA 6	LA 7	LA 8	LA 9	LA 10	LA 11	LA 12	LA 13	P 1	P 2	P 3	P 4	P 5	P 6	P 7	P 8	P 9	P 10	P 11
—	LAND	-	-	-	-	-	-	-	-	-	-	-	-	1	6	-	1	-	-	7	-	-	3	-	7
1	Kasegaluk Lagoon	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	9	-	-	-	-	-
6	ERA 6	-	-	-	-	-	-	-	-	-	-	-	4	6	-	-	-	-	-	-	-	-	26	-	46
10	Ledyard Bay Spectacled Eider Critical Habitat	-	-	-	-	-	-	-	-	-	12	8	-	-	-	-	24	-	-	62	-	-	-	-	-
14	Cape Thompson Seabird Colony Area	-	-	-	-	-	-	-	-	5	-	-	-	-	36	-	1	-	-	-	-	-	-	-	-
15	Cape Lisburne Seabird Colony Area	-	-	-	-	-	-	-	-	7	3	-	-	-	49	-	28	-	-	-	-	-	-	-	-
18	ERA 18	-	-	-	-	-	-	-	-	3	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-
19	Chukchi Spring Lead 1	-	-	-	-	-	-	-	-	-	-	-	-	-	6	-	-	-	-	-	-	-	-	-	-
20	Chukchi Spring Lead 2	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	4	-	-	1	-	-	-	-	-
21	Chukchi Spring Lead 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7	-	-	-	-	-
22	Chukchi Spring Lead 4	-	-	-	-	-	-	-	-	-	-	1	2	-	-	-	-	-	-	-	-	-	12	-	-
23	Chukchi Spring Lead 5	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	9
35	ERA 35	-	-	-	-	-	-	-	-	-	-	6	38	30	-	-	-	-	-	-	-	14	40	1	42
36	ERA 36	-	-	-	1	6	1	-	-	-	25	34	-	-	-	1	1	-	14	35	-	-	1	-	-
38	Pt. Hope Subsistence Area	-	-	-	-	-	-	-	-	-	-	-	-	-	11	-	2	-	-	-	-	-	-	-	-
39	Point Lay Subsistence Area	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	27	-	-	-	-	-
40	Wainwright Subsistence Area	-	-	-	-	-	-	-	-	-	-	1	2	-	-	-	-	-	-	4	-	-	26	-	3
42	Barrow Subsistence Area 2	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-
45	ERA 45	-	-	-	-	-	-	-	-	5	-	-	-	-	25	-	9	-	-	-	-	-	-	-	-
46	Herald Shoal Polynya	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
47	Ice/Sea Segment 10	2	-	-	11	14	-	-	-	-	-	-	-	-	-	4	-	1	10	-	-	-	-	-	-
48	Ice/Sea Segment 11	-	-	-	-	1	24	1	-	-	-	1	-	-	-	-	-	-	-	-	12	37	-	-	-
49	Hanna's Shoal Polynya	-	1	15	-	-	1	1	-	-	-	-	-	-	-	-	-	-	-	-	5	-	-	-	-
50	Ice/Sea Segment 12	-	-	-	-	-	1	-	-	-	-	3	16	-	-	-	-	-	-	-	-	28	1	-	-
51	Ice/Sea Segment 13	-	-	-	-	-	-	-	-	-	-	-	10	10	-	-	-	-	-	-	-	-	-	-	22
52	Ice/Sea Segment 14	-	-	-	-	-	-	-	9	-	-	-	-	17	-	-	-	-	-	-	-	-	-	-	-
56	ERA 56	-	-	1	-	-	18	12	-	-	-	3	34	2	-	-	-	-	-	-	8	42	4	1	3
64	Peard Bay	-	-	-	-	-	-	-	-	-	-	-	-	3	-	-	-	-	-	-	-	-	-	-	36
70	ERA 70	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-
99	ERA 99	-	-	-	1	10	1	-	-	-	41	56	1	-	-	1	1	-	24	57	-	-	1	-	-

Notes- ** = Greater than 99.5 percent; - = less than 0.5 percent; LA = Launch Area, P = Pipeline. Rows with all values less than 0.5 percent are not shown.

Table A.2-26 Summer Conditional Probabilities (Expressed as Percent Chance) that a Large Oil Spill Starting at a Particular Location Will Contact a Certain Environmental Resource Area Within 10 Days, Chukchi Sale 193

ID	Environmental Resource Area Name	LA 1	LA 2	LA 3	LA 4	LA 5	LA 6	LA 7	LA 8	LA 9	LA 10	LA 11	LA 12	LA 13	P 1	P 2	P 3	P 4	P 5	P 6	P 7	P 8	P 9	P 10	P 11
—	LAND	-	-	-	-	-	-	-	1	3	5	5	5	8	12	-	6	-	-	20	-	-	13	1	18
1	Kasegaluk Lagoon	-	-	-	-	-	-	-	-	-	4	5	1	-	-	-	1	-	-	21	-	-	2	-	-
2	Point Barrow, Plover Islands	-	-	-	-	-	-	-	1	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-
3	ERA 3	-	-	-	-	-	-	-	-	1	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-
6	ERA 6	-	-	-	-	-	-	-	2	-	-	3	13	17	-	-	-	-	-	1	-	1	39	1	54
10	Ledyard Bay Spectacled Eider Critical Habitat	-	-	-	1	1	-	-	-	3	24	14	-	-	4	1	32	-	1	67	-	-	1	-	-
14	Cape Thompson Seabird Colony Area	-	-	-	-	-	-	-	-	11	1	-	-	-	42	-	5	-	-	-	-	-	-	-	-
15	Cape Lisburne Seabird Colony Area	-	-	-	1	-	-	-	-	14	9	1	-	-	54	-	34	-	-	3	-	-	-	-	-
18	ERA 18	-	-	-	3	-	-	-	-	20	3	-	-	-	17	1	5	-	-	-	-	-	-	-	-
19	Chukchi Spring Lead 1	-	-	-	-	-	-	-	-	1	-	-	-	-	7	-	1	-	-	-	-	-	-	-	-
20	Chukchi Spring Lead 2	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	5	-	-	2	-	-	-	-	-
21	Chukchi Spring Lead 3	-	-	-	-	-	-	-	-	-	1	2	-	-	-	-	-	-	-	9	-	-	-	-	-
22	Chukchi Spring Lead 4	-	-	-	-	-	-	-	-	-	-	2	3	-	-	-	-	-	-	1	-	-	13	-	-
23	Chukchi Spring Lead 5	-	-	-	-	-	-	-	-	-	-	-	1	1	-	-	-	-	-	-	-	-	-	-	10
24	Beaufort Spring Lead 6	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-
25	Beaufort Spring Lead 7	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-
29	Ice/Sea Segment 1	-	-	-	-	-	-	-	1	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-
35	ERA 35	-	-	-	-	1	2	2	4	-	-	12	45	37	-	-	-	-	2	1	-	21	46	5	49
36	ERA 36	1	-	-	6	13	3	-	-	1	30	40	4	-	-	6	6	1	22	42	1	4	6	-	
38	Pt. Hope Subsistence Area	-	-	-	-	-	-	-	-	3	1	-	-	-	18	-	5	-	-	-	-	-	-	-	
39	Point Lay Subsistence Area	-	-	-	-	-	-	-	-	-	6	7	-	-	-	-	3	-	-	37	-	-	1	-	-
40	Wainwright Subsistence Area	-	-	-	-	-	-	-	-	-	1	6	8	1	-	-	-	-	1	11	-	-	38	-	7
42	Barrow Subsistence Area 2	-	-	-	-	-	-	-	2	-	-	-	-	4	-	-	-	-	-	-	-	-	-	-	1
45	ERA 45	-	-	-	-	-	-	-	-	15	3	-	-	-	41	-	16	-	-	1	-	-	-	-	-
46	ERA 45	2	-	-	9	2	-	-	-	-	-	-	-	-	-	7	1	-	1	-	-	-	-	-	-
47	Ice/Sea Segment 10	6	1	-	15	22	3	-	-	-	2	3	-	-	-	10	-	5	21	2	-	1	-	-	-
48	Ice/Sea Segment 11	1	4	5	-	6	34	4	-	-	1	6	3	1	-	-	-	3	5	1	21	43	1	1	-
49	Hanna's Shoal Polynya	-	5	29	-	1	6	5	1	-	-	-	-	-	-	-	-	1	-	-	16	1	-	2	-
50	Ice/Sea Segment 12	-	-	-	-	-	4	2	-	-	-	6	25	3	-	-	-	-	-	-	1	37	5	1	6
51	Ice/Sea Segment 13	-	-	-	-	-	-	1	-	-	-	-	17	16	-	-	-	-	-	-	-	2	4	2	35
52	Ice/Sea Segment 14	-	-	-	-	-	-	1	17	-	-	-	-	23	-	-	-	-	-	-	-	-	-	4	2
56	ERA 56	-	2	6	-	2	25	20	1	-	-	8	41	9	-	-	-	2	2	1	15	50	11	7	13
64	Peard Bay	-	-	-	-	-	-	-	1	-	-	-	3	11	-	-	-	-	-	-	-	-	2	1	44
70	ERA 70	4	4	1	-	-	-	-	-	-	-	-	-	-	-	-	-	4	-	-	1	-	-	-	-
99	ERA 99	1	-	-	8	20	5	-	-	1	48	63	5	-	-	8	8	1	36	66	1	5	7	-	-

Notes- ** = Greater than 99.5 percent; - = less than 0.5 percent; LA = Launch Area, P = Pipeline. Rows with all values less than 0.5 percent are not shown.

Table A.2-27 Summer Conditional Probabilities (Expressed as Percent Chance) that a Large Oil Spill Starting at a Particular Location Will Contact a Certain Environmental Resource Area Within 30 Days, Chukchi Sale 193

ID	Environmental Resource Area Name	LA 1	LA 2	LA 3	LA 4	LA 5	LA 6	LA 7	LA 8	LA 9	LA 10	LA 11	LA 12	LA 13	P 1	P 2	P 3	P 4	P 5	P 6	P 7	P 8	P 9	P 10	P 11
—	LAND	1	1	1	7	6	2	3	10	20	21	19	18	23	33	6	22	1	7	36	1	7	32	6	34
1	Kasegaluk Lagoon	-	-	-	2	3	-	-	-	1	11	13	3	-	1	2	6	-	4	31	-	1	7	-	-
2	Point Barrow, Plover Islands	-	-	-	-	-	-	1	5	-	-	-	-	6	-	-	-	-	-	-	-	-	-	2	1
3	ERA 3	-	-	-	2	-	-	-	-	7	2	-	-	-	7	1	4	-	-	-	-	-	-	-	-
4	ERA 4	-	-	-	-	-	-	-	-	3	1	-	-	-	3	-	1	-	-	-	-	-	-	-	-
6	ERA 6	-	-	-	1	3	3	5	9	-	2	12	28	30	-	1	-	1	5	4	1	10	54	9	62
10	Ledyard Bay Spectacled Eider Critical Habitat	-	-	-	6	6	2	-	-	10	36	21	3	-	10	5	41	-	7	71	1	2	5	-	-
11	Wrangel Island 12 nmi Buffer	2	1	1	1	1	-	-	-	-	-	-	-	-	-	1	-	1	1	-	1	-	-	-	-
13	ERA 13	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-
14	Cape Thompson Seabird Colony Area	-	-	-	2	1	-	-	-	16	5	1	-	-	46	1	10	-	-	3	-	-	-	-	-
15	Cape Lisburne Seabird Colony Area	-	-	-	3	2	-	-	-	21	16	3	-	-	58	3	39	-	2	8	-	-	1	-	-
16	ERA 16	-	-	-	1	-	-	-	-	5	1	-	-	-	5	-	2	-	-	-	-	-	-	-	-
18	ERA 18	3	1	-	16	7	1	-	-	42	18	5	-	-	37	12	24	2	5	8	-	1	1	-	-
19	Chukchi Spring Lead 1	-	-	-	-	-	-	-	-	1	-	-	-	-	8	-	1	-	-	-	-	-	-	-	-
20	Chukchi Spring Lead 2	-	-	-	-	-	-	-	-	-	3	1	-	-	-	-	6	-	-	3	-	-	-	-	-
21	Chukchi Spring Lead 3	-	-	-	-	-	-	-	-	-	2	3	-	-	-	-	-	-	1	10	-	-	-	-	-
22	Chukchi Spring Lead 4	-	-	-	-	-	-	-	-	-	-	3	3	-	-	-	-	-	1	1	-	1	14	-	-
23	Chukchi Spring Lead 5	-	-	-	-	-	-	-	-	-	-	-	2	2	-	-	-	-	-	-	-	1	1	-	10
24	Beaufort Spring Lead 6	-	-	-	-	-	-	-	1	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-
25	Beaufort Spring Lead 7	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-
29	Ice/Sea Segment 1	-	-	-	-	-	-	1	3	-	-	-	-	4	-	-	-	-	-	-	-	-	-	1	1
30	Ice/Sea Segment 2	-	-	-	-	-	-	-	1	-	-	-	-	1	-	-	-	-	-	-	-	-	-	1	-
31	Ice/Sea Segment 3	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
35	ERA 35	2	2	2	1	4	10	11	13	-	1	18	54	45	-	1	-	3	6	3	4	31	52	14	54
36	ERA 36	4	2	2	14	22	8	2	-	4	36	46	12	1	2	14	12	4	32	47	3	13	16	1	2
38	Pt. Hope Subsistence Area	-	-	-	1	1	-	-	-	8	4	1	-	-	24	1	9	-	1	3	-	-	-	-	-
39	Point Lay Subsistence Area	-	-	-	2	3	1	-	-	2	15	13	2	-	1	2	8	-	4	45	-	2	3	-	-
40	Wainwright Subsistence Area	-	-	-	2	4	2	1	-	1	6	18	21	4	-	2	2	1	7	19	-	7	53	1	13
42	Barrow Subsistence Area 2	-	-	-	-	-	-	1	8	-	-	-	1	8	-	-	-	-	-	-	-	-	-	2	3
45	ERA 45	-	-	-	3	1	-	-	-	26	11	2	-	-	51	2	24	-	1	6	-	-	-	-	-
46	Herald Shoal Polynya	6	3	1	20	9	2	-	-	3	5	3	-	-	1	18	5	5	8	3	1	1	1	-	-
47	Ice/Sea Segment 10	10	4	2	21	29	7	1	-	1	5	9	3	-	-	16	2	10	31	5	3	5	4	1	1
48	Ice/Sea Segment 11	5	12	14	1	13	43	12	3	-	2	13	9	4	-	2	-	11	14	4	30	51	4	7	3
49	Hanna's Shoal Polynya	4	14	40	-	3	15	16	8	-	1	2	2	3	-	-	-	7	3	1	27	7	-	11	1
50	Ice/Sea Segment 12	1	2	2	-	3	12	8	2	-	1	10	34	9	-	-	-	2	3	1	7	46	11	5	14
51	Ice/Sea Segment 13	-	1	1	-	1	3	5	2	-	-	3	28	22	-	-	-	1	1	-	2	9	16	6	43
52	Ice/Sea Segment 14	-	-	1	-	-	-	4	26	-	-	-	2	27	-	-	-	-	-	-	-	-	1	8	7
53	Ice/Sea Segment 15	-	-	-	-	-	-	-	2	-	-	-	-	1	-	-	-	-	-	-	-	-	-	1	-
54	Ice/Sea Segment 16a	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
56	ERA 56	5	9	15	1	6	34	32	8	-	1	15	49	19	-	1	-	7	6	3	24	58	22	20	23
59	ERA 59	-	-	-	1	-	-	-	-	2	1	-	-	-	2	1	1	-	-	-	-	-	-	-	-
61	ERA 61	-	-	-	-	-	-	-	-	3	1	-	-	-	3	-	1	-	-	-	-	-	-	-	-
63	ERA 63	2	2	1	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-
64	Peard Bay	-	-	-	-	-	1	3	5	-	-	2	10	20	-	-	-	-	1	-	-	4	5	6	51
66	ERA 66	-	-	-	-	-	-	-	2	-	-	-	-	1	-	-	-	-	-	-	-	-	-	1	-
70	ERA 70	8	9	6	-	1	2	1	-	-	-	-	-	-	-	-	-	8	1	-	5	1	-	1	-
82	ERA 82	-	-	-	-	-	-	-	-	1	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-
99	ERA 99	4	3	2	19	33	12	2	-	5	54	69	14	1	2	18	16	6	47	69	4	16	18	1	2

Notes- ** = Greater than 99.5 percent; - = less than 0.5 percent; LA = Launch Area, P = Pipeline. Rows with all values less than 0.5 percent are not shown.

Table A.2-28 Summer Conditional Probabilities (Expressed as Percent Chance) that a Large Oil Spill Starting at a Particular Location Will Contact a Certain Environmental Resource Area Within 60 Days, Chukchi Sale 193

ID	Environmental Resource Area Name	LA 1	LA 2	LA 3	LA 4	LA 5	LA 6	LA 7	LA 8	LA 9	LA 10	LA 11	LA 12	LA 13	P 1	P 2	P 3	P 4	P 5	P 6	P 7	P 8	P 9	P 10	P 11
—	Land	2	2	2	8	10	7	8	18	21	27	27	28	32	34	7	27	2	12	43	3	13	40	13	44
1	Kasegaluk Lagoon	-	-	-	3	4	1	-	-	2	14	16	5	-	1	3	7	-	5	34	-	3	8	-	-
2	Point Barrow, Plover Islands	-	-	-	-	-	-	2	9	-	-	-	-	8	-	-	-	-	-	-	-	-	-	3	3
3	ERA 3	-	-	-	2	-	-	-	-	7	2	-	-	-	7	1	4	-	-	-	-	-	-	-	-
4	ERA 4	-	-	-	-	-	-	-	-	3	1	-	-	-	3	-	1	-	-	-	-	-	-	-	-
6	ERA 6	1	2	2	2	6	8	11	15	-	3	16	35	36	-	2	1	2	9	6	4	16	58	16	66
10	Ledyard Bay Spectacled Eider Critical Habitat	1	-	-	7	8	2	-	-	11	38	22	4	-	11	6	43	-	9	72	1	3	6	-	-
11	Wrangel Island12 nmi Buffer	2	1	1	1	1	1	-	-	-	-	-	-	-	-	2	-	2	1	-	1	-	-	-	-
13	ERA 13	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-
14	Cape Thompson Seabird Colony Area	-	-	-	2	1	-	-	-	16	6	1	-	-	46	1	11	-	-	3	-	-	-	-	-
15	Cape Lisburne Seabird Colony Area	-	-	-	4	3	-	-	-	22	19	4	-	-	58	3	40	-	2	9	-	-	1	-	-
16	ERA 16	-	-	-	1	-	-	-	-	5	1	-	-	-	5	-	2	-	-	-	-	-	-	-	-
18	ERA 18	3	1	-	16	7	1	-	-	42	19	5	1	-	37	12	25	2	5	8	-	1	1	-	-
19	Chukchi Spring Lead 1	-	-	-	-	-	-	-	-	1	-	-	-	-	8	-	1	-	-	-	-	-	-	-	-
20	Chukchi Spring Lead 2	-	-	-	-	-	-	-	-	-	3	1	-	-	-	-	6	-	-	3	-	-	-	-	-
21	Chukchi Spring Lead 3	-	-	-	-	-	-	-	-	-	2	3	-	-	-	-	-	-	1	10	-	-	-	-	-
22	Chukchi Spring Lead 4	-	-	-	-	-	-	-	-	-	-	3	3	-	-	-	-	-	1	1	-	1	14	-	-
23	Chukchi Spring Lead 5	-	-	-	-	-	-	-	-	-	-	-	2	2	-	-	-	-	-	-	-	1	1	-	10
24	Beaufort Spring Lead 6	-	-	-	-	-	-	-	1	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-
25	Beaufort Spring Lead 7	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-
29	Ice/Sea Segment 1	-	-	-	-	-	-	1	5	-	-	-	1	5	-	-	-	-	-	-	-	-	-	2	2
30	Ice/Sea Segment 2	-	-	-	-	-	-	1	2	-	-	-	-	2	-	-	-	-	-	-	-	-	-	2	-
31	Ice/Sea Segment 3	-	-	-	-	-	-	1	2	-	-	-	-	1	-	-	-	-	-	-	-	-	-	1	-
32	Ice/Sea Segment 5	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
35	ERA 35	3	5	7	2	8	16	20	20	-	2	22	60	50	-	2	-	6	10	5	9	38	58	24	59
36	ERA 36	5	4	2	17	26	11	4	1	5	38	51	16	3	2	16	12	6	37	50	4	17	21	2	4
38	Pt. Hope Subsistence Area	-	-	-	1	1	-	-	-	8	6	1	-	-	24	1	10	-	1	3	-	-	-	-	-
39	Point Lay Subsistence Area	-	-	-	3	5	2	-	-	2	18	16	3	-	2	3	10	-	6	48	1	3	5	-	-
40	Wainwright Subsistence Area	1	1	-	3	8	5	2	2	1	9	23	27	7	-	3	4	2	11	23	1	13	59	3	16
42	Barrow Subsistence Area 2	-	-	-	-	-	-	2	12	-	-	-	1	10	-	-	-	-	-	-	-	-	1	3	4
45	ERA 45	-	-	-	3	2	-	-	-	26	13	3	-	-	51	2	25	-	2	8	-	-	-	-	-
46	Herald Shoal Polynya	7	3	1	21	9	3	1	-	3	6	4	1	-	1	19	6	5	8	5	1	2	1	-	-
47	Ice/Sea Segment 10	11	5	2	22	31	9	2	1	1	6	12	5	1	-	17	2	11	33	6	3	6	5	1	1
48	Ice/Sea Segment 11	7	15	18	2	17	47	17	7	-	4	20	15	8	-	3	1	14	18	8	34	56	8	12	8
49	Hanna's Shoal Polynya	7	19	46	1	6	22	24	15	-	2	7	8	9	-	1	-	10	5	4	35	15	3	20	6
50	Ice/Sea Segment 12	2	5	6	1	5	16	13	5	-	1	13	38	13	-	1	-	5	6	3	11	50	16	10	17
51	Ice/Sea Segment 13	1	2	3	-	2	7	10	5	-	-	5	34	26	-	-	-	2	2	1	5	13	25	11	47
52	Ice/Sea Segment 14	-	1	2	-	-	2	7	29	-	-	1	4	29	-	-	-	-	1	-	1	2	2	13	9
53	Ice/Sea Segment 15	-	-	-	-	-	-	2	4	-	-	-	-	3	-	-	-	-	-	-	1	-	-	2	1
54	Ice/Sea Segment 16a	-	-	-	-	-	-	1	3	-	-	-	-	1	-	-	-	-	-	-	-	-	-	1	-
55	Ice/Sea Segment 17	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
56	ERA 56	7	14	22	1	9	40	40	15	-	2	19	56	27	-	2	-	11	9	4	31	65	27	29	31
59	ERA 59	-	-	-	1	-	-	-	-	2	1	-	-	-	2	1	1	-	-	-	-	-	-	-	-
61	ERA 61	-	-	-	-	-	-	-	-	3	1	-	-	-	3	-	1	-	-	-	-	-	-	-	-
63	ERA 63	3	2	1	-	-	-	-	1	-	-	-	-	-	-	-	-	2	-	-	1	-	-	-	-
64	Peard Bay	-	1	2	-	2	4	7	8	-	-	3	15	23	-	-	-	1	2	-	2	7	8	10	55
65	Smith Bay	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
66	ERA 66	-	-	-	-	-	-	-	4	-	-	-	-	2	-	-	-	-	-	-	-	-	-	1	1
70	ERA 70	9	10	7	-	1	3	1	1	-	-	1	1	1	-	1	-	9	1	-	7	2	-	1	-
82	ERA 82	-	-	-	-	-	-	-	-	1	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-
99	ERA 99	5	5	3	21	36	15	4	1	6	54	70	18	3	3	19	16	7	50	69	5	20	22	3	4

Notes- ** = Greater than 99.5 percent; - = less than 0.5 percent; LA = Launch Area, P = Pipeline. Rows with all values less than 0.5 percent are not shown.

Table A.2-29 Summer Conditional Probabilities (Expressed as Percent Chance) that a Large Oil Spill Starting at a Particular Location Will Contact a Certain Environmental Resource Area Within 180 Days, Chukchi Sale 193

ID	Environmental Resource Area Name	LA 1	LA 2	LA 3	LA 4	LA 5	LA 6	LA 7	LA 8	LA 9	LA 10	LA 11	LA 12	LA 13	P 1	P 2	P 3	P 4	P 5	P 6	P 7	P 8	P 9	P 10	P 11
—	LAND	3	2	3	10	12	8	12	23	23	29	28	32	35	36	9	29	3	14	44	4	16	45	18	47
1	Kasegaluk Lagoon	-	-	-	3	4	1	-	-	2	14	16	5	-	1	3	7	-	6	34	-	3	8	-	-
2	Point Barrow, Plover Islands	-	-	1	-	-	-	2	9	-	-	-	1	8	-	-	-	-	-	-	-	-	1	4	3
3	ERA 3	-	-	-	2	-	-	-	-	7	2	-	-	-	7	1	4	-	-	-	-	-	-	-	-
4	ERA 4	-	-	-	-	-	-	-	-	3	1	-	-	-	3	-	1	-	-	-	-	-	-	-	-
6	ERA 6	2	3	4	2	7	10	16	18	-	3	17	38	38	-	2	1	3	10	7	5	18	59	21	67
10	Ledyard Bay Spectacled Eider Critical Habitat	1	-	-	8	8	2	1	1	11	38	22	4	-	11	6	43	-	9	72	1	3	6	-	-
11	Wrangel Island 12nmi Buffer	2	1	1	1	1	1	-	-	-	1	1	-	-	-	2	-	2	1	1	1	-	-	-	-
13	ERA 13	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-
14	Cape Thompson Seabird Colony Area	-	-	-	2	1	-	-	-	16	6	1	-	-	46	1	11	-	-	3	-	-	-	-	-
15	Cape Lisburne Seabird Colony Area	-	-	-	4	3	-	-	-	22	19	4	-	-	58	3	41	-	3	9	-	-	1	-	-
16	ERA 16	-	-	-	1	-	-	-	-	5	1	-	-	-	5	-	2	-	-	-	-	-	-	-	-
18	ERA 18	3	1	-	16	7	1	-	-	42	20	5	1	-	37	12	26	2	5	8	-	1	1	-	-
19	Chukchi Spring Lead 1	-	-	-	-	-	-	-	-	1	-	-	-	-	8	-	1	-	-	-	-	-	-	-	-
20	Chukchi Spring Lead 2	-	-	-	-	-	-	-	-	-	3	1	-	-	-	-	6	-	-	3	-	-	-	-	-
21	Chukchi Spring Lead 3	-	-	-	-	-	-	-	-	-	2	3	-	-	-	-	-	-	1	10	-	-	-	-	-
22	Chukchi Spring Lead 4	-	-	-	-	-	-	-	-	-	-	3	4	-	-	-	-	-	1	1	-	1	14	-	-
23	Chukchi Spring Lead 5	-	-	-	-	-	-	-	-	-	-	-	2	2	-	-	-	-	-	-	-	1	1	-	10
24	Beaufort Spring Lead 6	-	-	-	-	-	-	-	1	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-
25	Beaufort Spring Lead 7	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-
29	Ice/Sea Segment 1	-	-	-	-	-	1	3	6	-	-	-	1	6	-	-	-	-	-	-	1	1	-	3	3
30	Ice/Sea Segment 2	-	-	1	-	-	1	4	4	-	-	-	1	2	-	-	-	-	-	-	1	1	-	3	-
31	Ice/Sea Segment 3	-	-	1	-	-	1	3	3	-	-	-	-	1	-	-	-	-	-	-	1	1	-	2	-
32	Ice/Sea Segment 4	-	-	-	-	-	-	1	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
35	ERA 35	5	7	9	3	10	18	24	23	-	2	23	61	52	-	3	-	7	12	5	11	40	59	27	61
36	ERA 36	5	4	3	18	27	11	4	1	5	39	51	17	3	2	16	12	6	37	50	4	18	22	3	5
38	Pt. Hope Subsistence Area	-	-	-	2	1	-	-	-	8	6	2	-	-	24	1	10	-	1	4	-	-	-	-	-
39	Point Lay Subsistence Area	-	-	-	4	5	2	1	-	2	19	16	3	-	2	3	10	-	6	48	1	3	5	-	-
40	Wainwright Subsistence Area	1	1	1	4	9	6	4	3	1	10	25	29	9	-	4	4	2	12	24	2	14	60	4	18
42	Barrow Subsistence Area 2	-	-	1	-	-	-	3	13	-	-	-	2	11	-	-	-	-	-	-	-	-	1	5	4
45	ERA 45	-	-	-	3	2	-	-	-	26	13	3	-	-	51	2	26	-	2	8	-	-	-	-	-
46	Herald Shoal Polynya	7	3	1	22	10	3	1	-	3	6	4	1	-	1	19	6	5	9	5	1	2	1	1	-
47	Ice/Sea Segment 10	11	5	2	22	31	9	2	1	1	6	12	5	1	-	17	2	11	33	6	4	7	6	1	2
48	Ice/Sea Segment 11	8	17	20	3	18	49	21	10	-	5	22	20	10	-	3	1	15	20	9	36	58	12	16	10
49	Hanna's Shoal Polynya	9	23	49	2	9	28	31	22	-	4	11	19	17	-	2	1	14	8	7	40	22	14	27	14
50	Ice/Sea Segment 12	4	8	9	1	7	19	17	8	-	2	15	41	16	-	2	1	7	7	3	13	52	21	14	20
51	Ice/Sea Segment 13	2	3	5	1	3	9	15	9	-	1	8	38	29	-	1	1	3	3	2	7	17	30	15	49
52	Ice/Sea Segment 14	1	2	4	-	1	4	11	30	-	-	2	6	30	-	-	-	2	1	-	4	4	4	15	9
53	Ice/Sea Segment 15	-	1	2	-	1	2	5	6	-	-	1	1	4	-	-	-	1	1	-	3	2	-	4	1
54	Ice/Sea Segment 16a	-	1	3	-	1	3	5	7	-	-	1	1	4	-	-	-	1	1	-	3	3	-	5	1
55	Ice/Sea Segment 17	-	-	-	-	-	-	1	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-
56	ERA 56	8	16	24	2	10	42	43	16	-	2	20	57	28	-	3	-	13	11	4	33	67	29	31	32
59	ERA 59	-	-	-	1	-	-	-	-	2	1	-	-	-	2	1	1	-	-	-	-	-	-	-	-
61	ERA 61	-	-	-	-	-	-	-	-	3	1	-	-	-	3	-	1	-	-	-	-	-	-	-	-
63	ERA 63	3	2	1	-	-	-	1	2	-	-	-	-	-	-	-	-	2	-	-	1	-	-	1	-
64	Peard Bay	1	2	3	-	2	5	10	10	-	-	4	17	24	-	-	-	2	2	-	3	9	10	13	56
65	Smith Bay	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
66	ERA 66	-	-	-	-	-	-	1	4	-	-	-	-	2	-	-	-	-	-	-	-	-	-	1	1
69	Harrison Bay/Colville Delta	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
70	ERA 70	9	10	8	-	2	3	2	1	-	-	1	1	1	-	1	-	9	1	-	7	2	1	1	-
82	ERA 82	-	-	-	-	-	-	-	-	1	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-
99	ERA 99	5	5	3	21	36	15	4	1	6	54	71	18	3	3	19	16	8	50	69	5	21	23	3	5

Notes- ** = Greater than 99.5 percent; - = less than 0.5 percent; LA = Launch Area, P = Pipeline. Rows with all values less than 0.5 percent are not shown.

Table A.2-30 Summer Conditional Probabilities (Expressed as Percent Chance) that a Large Oil Spill Starting at a Particular Location Will Contact a Certain Environmental Resource Area Within 360 Days, Chukchi Sale 193

ID	Environmental Resource Area Name	LA 1	LA 2	LA 3	LA 4	LA 5	LA 6	LA 7	LA 8	LA 9	LA 10	LA 11	LA 12	LA 13	P 1	P 2	P 3	P 4	P 5	P 6	P 7	P 8	P 9	P 10	P 11
—	LAND	4	3	6	12	13	10	17	34	28	31	30	34	42	41	10	32	4	15	45	6	18	47	23	50
1	Kasegaluk Lagoon	-	-	-	3	4	1	-	-	2	14	16	5	-	1	3	7	-	6	34	-	3	9	-	-
2	Point Barrow, Plover Islands	-	-	2	-	-	2	6	13	-	-	-	1	10	-	-	-	-	-	-	2	2	1	6	4
3	ERA 3	-	-	-	2	-	-	-	-	7	2	-	-	-	7	1	4	-	-	-	-	-	-	-	-
4	ERA 4	-	-	-	-	-	-	-	-	3	1	-	-	-	3	-	1	-	-	-	-	-	-	-	-
6	ERA 6	2	3	6	2	8	12	20	22	-	3	18	39	40	-	2	1	4	11	7	7	20	60	24	68
10	Ledyard Bay SPEI Crit Hab	1	-	-	8	8	2	1	1	11	38	22	4	-	11	6	43	-	9	72	1	3	6	-	-
11	Wrangel Island 12nmi Buffer	2	1	1	1	1	1	-	-	-	1	1	-	-	-	2	-	2	1	1	1	-	-	-	-
13	ERA 13	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-
14	Cape Thompson Seabird Colony Area	-	-	-	2	1	-	-	-	16	6	1	-	-	46	1	11	-	-	3	-	-	-	-	-
15	Cape Lisburne Seabird Colony Area	-	-	-	4	3	-	-	-	22	19	4	-	-	58	3	41	-	3	9	-	-	1	-	-
16	ERA 16	-	-	-	1	-	-	-	-	7	2	-	-	-	7	1	3	-	-	-	-	-	-	-	-
18	ERA 18	3	1	-	16	7	1	-	-	42	20	5	1	-	37	12	26	2	5	8	-	1	1	-	-
19	Chukchi Spring Lead 1	-	-	-	-	-	-	-	-	1	-	-	-	-	8	-	1	-	-	-	-	-	-	-	-
20	Chukchi Spring Lead 2	-	-	-	-	-	-	-	-	-	3	1	-	-	-	-	6	-	-	3	-	-	-	-	-
21	Chukchi Spring Lead 3	-	-	-	-	-	-	-	-	-	2	3	-	-	-	-	-	-	1	10	-	-	-	-	-
22	Chukchi Spring Lead 4	-	-	-	-	1	-	-	-	-	-	4	4	-	-	-	-	-	1	1	-	1	15	-	-
23	Chukchi Spring Lead 5	-	-	-	-	-	-	-	-	-	-	-	2	2	-	-	-	-	-	-	-	1	1	-	11
24	Beaufort Spring Lead 6	-	1	1	-	-	2	3	3	-	-	1	1	4	-	-	-	1	1	-	1	1	1	3	1
25	Beaufort Spring Lead 7	-	2	4	-	1	4	6	5	-	-	1	2	4	-	-	-	1	1	-	4	4	1	4	1
26	Beaufort Spring Lead 8	-	-	-	-	-	-	1	1	-	-	-	-	1	-	-	-	-	-	-	-	-	-	1	1
27	Beaufort Spring Lead 9	-	-	-	-	-	-	-	1	-	-	-	-	1	-	-	-	-	-	-	-	-	-	1	-
29	Ice/Sea Segment 1	-	-	1	-	-	1	3	6	-	-	-	1	6	-	-	-	-	-	-	1	1	-	4	3
30	Ice/Sea Segment 2	-	-	1	-	-	1	4	4	-	-	1	1	2	-	-	-	-	-	-	1	2	-	3	-
31	Ice/Sea Segment 3	-	-	1	-	-	1	3	3	-	-	-	-	1	-	-	-	-	-	-	1	1	-	2	-
32	Ice/Sea Segment 4	-	-	-	-	-	-	1	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
35	ERA 35	5	7	10	3	10	19	24	23	-	2	24	62	52	-	3	-	7	12	5	12	41	59	27	61
36	ERA 36	5	4	3	18	27	11	4	1	5	39	51	17	3	2	16	12	6	37	50	4	18	22	3	5
38	Pt. Hope Subsistence Area	-	-	-	2	1	-	-	-	8	6	2	-	-	24	1	10	-	1	4	-	-	-	-	-
39	Point Lay Subsistence Area	-	-	-	4	5	2	1	-	2	19	16	3	-	2	3	10	-	6	48	1	3	5	-	-
40	Wainwright Subsistence Area	1	1	1	4	9	6	4	4	1	10	25	29	9	-	4	4	2	12	24	2	14	60	4	18
41	Barrow Subsistence Area 1	-	-	-	-	-	-	-	-	-	-	-	1	1	-	-	-	-	-	-	-	-	-	1	1
42	Barrow Subsistence Area 2	-	-	1	-	-	1	4	14	-	-	1	2	11	-	-	-	-	-	-	1	1	1	5	4
45	ERA 45	-	-	-	3	2	-	-	-	26	13	3	-	-	51	2	26	-	2	8	-	-	-	-	-
46	Herald Shoal Polynya	7	3	1	22	10	3	1	-	3	6	4	1	-	1	19	6	5	9	5	1	2	1	1	-
47	Ice/Sea Segment 10	11	5	2	22	31	9	2	1	1	6	12	5	1	-	17	2	11	33	6	4	7	6	1	2
48	Ice/Sea Segment 11	8	17	20	3	18	49	22	10	-	5	22	20	11	-	3	1	15	20	9	36	58	12	17	11
49	Hanna's Shoal Polynya	10	23	50	2	10	29	34	23	-	4	12	21	19	-	2	1	15	9	7	42	24	15	29	16
50	Ice/Sea Segment 12	4	8	9	1	7	19	17	8	-	2	15	41	16	-	2	1	7	7	3	13	52	21	14	21
51	Ice/Sea Segment 13	2	4	5	1	4	9	15	9	-	1	8	38	29	-	1	1	3	4	2	7	18	30	15	49
52	Ice/Sea Segment 14	1	3	5	-	1	5	11	30	-	-	2	6	30	-	-	-	2	1	-	5	5	4	15	9
53	Ice/Sea Segment 15	-	1	3	-	1	3	5	7	-	-	1	2	4	-	-	-	1	1	-	3	3	1	5	1
54	Ice/Sea Segment 16a	-	1	3	-	1	3	6	8	-	-	1	2	4	-	-	-	1	1	-	3	3	-	5	1
55	Ice/Sea Segment 17	-	-	-	-	-	1	2	2	-	-	-	-	1	-	-	-	-	-	-	1	1	-	1	-
56	ERA 56	8	16	24	2	11	42	43	16	-	2	20	57	28	-	3	-	13	11	4	33	67	29	31	32
58	Ice/Sea Segment 20a	-	-	1	-	-	-	1	5	-	-	-	-	3	-	-	-	-	-	-	-	-	-	2	1
59	ERA 59	-	-	-	1	-	-	-	-	2	1	-	-	-	2	1	1	-	-	-	-	-	-	-	-
60	Ice/Sea Segment 22	-	-	-	-	-	-	-	2	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-
61	ERA 61	-	-	-	-	-	-	-	-	3	1	-	-	-	3	-	1	-	-	-	-	-	-	-	-
62	Ice/Sea Segment 24a	-	-	-	-	-	-	-	1	-	-	-	-	1	-	-	-	-	-	-	-	-	-	1	-
63	ERA 63	3	2	1	-	-	-	1	2	-	-	-	1	1	-	-	-	2	-	-	1	1	1	1	-
64	Peard Bay	1	2	4	-	2	6	13	12	-	-	4	18	25	-	-	-	2	3	-	5	10	10	15	56
65	Smith Bay	-	-	-	-	-	-	1	2	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-
66	ERA 66	-	1	4	-	1	4	6	7	-	-	1	2	3	-	-	-	1	1	-	4	4	1	5	1
67	Herschel Island	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
68	Harrison Bay	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
69	Harrison Bay/Colville Delta	-	-	-	-	-	-	-	1	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-
70	ERA 70	9	10	8	-	2	4	2	1	-	-	1	2	1	-	1	-	9	1	-	7	3	1	1	1
76	ERA 76	-	-	-	-	-	-	-	1	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-
79	ERA 79	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-
82	ERA 82	-	-	-	-	-	-	-	-	1	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-
83	Kaktovik ERA	-	-	-	-	-	-	1	3	-	-	-	-	2	-	-	-	-	-	-	-	-	-	2	1
99	ERA 99	5	5	3	21	36	15	4	1	6	54	71	19	3	3	19	16	8	50	69	5	21	24	3	5

Notes- ** = Greater than 99.5 percent; - = less than 0.5 percent; LA = Launch Area, P = Pipeline. Rows with all values less than 0.5 percent are not shown.

Table A.2-31 Summer Conditional Probabilities (Expressed as Percent Chance) that a Large Oil Spill Starting at a Particular Location Will Contact a Certain Land Segment Within 3 Days, Chukchi Sale 193

ID	Land Segment Name	LA 1	LA 2	LA 3	LA 4	LA 5	LA 6	LA 7	LA 8	LA 9	LA 10	LA 11	LA 12	LA 13	P 1	P 2	P 3	P 4	P 5	P 6	P 7	P 8	P 9	P 10	P 11
64	Kukpuk River, Point Hope	-	-	-	-	-	-	-	-	-	-	-	-	-	4	-	-	-	-	-	-	-	-	-	-
65	Buckland, Cape Lisburne	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	1	-	-	-	-	-	-	-	-
72	Point Lay, Siksrikpak Point	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	-	-	-	-	-
73	Tungaich Point, Tungak Creek	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	-	-	-	-	-
74	Kasegaluk Lagoon, Solivik Isl.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-
79	Point Belcher, Wainwright	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-
81	Peard Bay, Point Franklin	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
82	Skull Cliff	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5
83	Nulavik, Loran Radio Station	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1

Notes- ** = Greater than 99.5 percent; - = less than 0.5 percent; LA = Launch Area, P = Pipeline. Rows with all values less than 0.5 percent are not shown.

Table A.2-32 Summer Conditional Probabilities (Expressed as Percent Chance) that a Large Oil Spill Starting at a Particular Location Will Contact a Certain Land Segment Within 10 Days, Chukchi Sale 193

ID	Land Segment Name	LA 1	LA 2	LA 3	LA 4	LA 5	LA 6	LA 7	LA 8	LA 9	LA 10	LA 11	LA 12	LA 13	P 1	P 2	P 3	P 4	P 5	P 6	P 7	P 8	P 9	P 10	P 11
64	Kukpuk River, Point Hope	-	-	-	-	-	-	-	-	1	-	-	-	-	7	-	-	-	-	-	-	-	-	-	-
65	Buckland, Cape Lisburne	-	-	-	-	-	-	-	-	1	-	-	-	-	4	-	2	-	-	-	-	-	-	-	-
66	Ayugatak Lagoon	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-
71	Kukpowruk River, Sitkok Point	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	1	-	-	-	-	-
72	Point Lay, Siksrikpak Point	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	6	-	-	-	-	-
73	Tungaich Point, Tungak Creek	-	-	-	-	-	-	-	-	-	1	1	-	-	-	-	-	-	-	6	-	-	-	-	-
74	Kasegaluk Lagoon, Solivik Isl.	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	3	-	-	-	-	-
75	Akeonik, Icy Cape	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	2	-	-	-	-	-
76	Avak Inlet, Tunalik River	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-
78	Nivat Point, Nokotlek Point	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	-	-
79	Point Belcher, Wainwright	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	7	-	-
80	Eluksingiak Point, Kugrua Bay	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	3	-	1
81	Peard Bay, Point Franklin	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
82	Skull Cliff	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	8
83	Nulavik, Loran Radio Station	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	3
84	Will Rogers & Wiley Post Mem.	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	3
85	Barrow, Browerville, Elson Lag.	-	-	-	-	-	-	-	1	-	-	-	-	4	-	-	-	-	-	-	-	-	-	-	1

Notes- ** = Greater than 99.5 percent; - = less than 0.5 percent; LA = Launch Area, P = Pipeline. Rows with all values less than 0.5 percent are not shown.

Table A.2-33 Summer Conditional Probabilities (Expressed as Percent Chance) that a Large Oil Spill Starting at a Particular Location Will Contact a Certain Land Segment Within 30 Days, Chukchi Sale 193

ID	Land Segment Name	LA 1	LA 2	LA 3	LA 4	LA 5	LA 6	LA 7	LA 8	LA 9	LA 10	LA 11	LA 12	LA 13	P 1	P 2	P 3	P 4	P 5	P 6	P 7	P 8	P 9	P 10	P 11
27	Laguna Nut, Rigol'	-	-	-	1	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
33	Neskan, Laguna Neskan	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
34	Tepken, Memino	-	-	-	-	-	-	-	-	1	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-
35	Enurmino, Mys Neten	-	-	-	-	-	-	-	-	2	-	-	-	-	2	-	1	-	-	-	-	-	-	-	-
36	Mys Serdtse-Kamen	-	-	-	-	-	-	-	-	2	-	-	-	-	2	-	1	-	-	-	-	-	-	-	-
37	Chegitun, Utkan	-	-	-	-	-	-	-	-	2	-	-	-	-	2	-	1	-	-	-	-	-	-	-	-
38	Enmytagyn, Inchoun, Mitkulen	-	-	-	-	-	-	-	-	1	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-
39	Cape Dezhnev, Naukan, Uelen	-	-	-	-	-	-	-	-	1	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-
63	Asikpak Lag., Cape Seppings,	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-
64	Kukpuk River, Point Hope	-	-	-	-	-	-	-	-	3	1	-	-	-	9	-	2	-	-	1	-	-	-	-	-
65	Buckland, Cape Lisburne	-	-	-	1	-	-	-	-	2	1	-	-	-	7	-	4	-	-	1	-	-	-	-	-
66	Ayugatak Lagoon	-	-	-	-	-	-	-	-	1	1	-	-	-	1	-	2	-	-	1	-	-	-	-	-
67	Cape Sabine, Pitmegea River	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	1	-	-	1	-	-	-	-	-
68	Agiak Lagoon, Punuk Lagoon	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	1	-	-	-	-	-	-	-	-
69	Cape Beaufort, Omalik Lagoon	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	1	-	-	1	-	-	-	-	-
70	Kuchaurak and Kuchiak Creek	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	1	-	-	1	-	-	-	-	-
71	Kukpowruk River, Sitkok Point	-	-	-	-	-	-	-	-	-	2	1	-	-	-	-	2	-	-	3	-	-	-	-	-
72	Point Lay, Siksrikpak Point	-	-	-	-	-	-	-	-	-	2	1	-	-	-	-	1	-	-	7	-	-	-	-	-
73	Tungaich Point, Tungak Creek	-	-	-	-	-	-	-	-	-	2	2	-	-	-	-	1	-	-	9	-	-	-	-	-
74	Kasegaluk Lagoon, Solivik Isl.	-	-	-	1	1	-	-	-	-	2	3	-	-	-	1	1	-	1	5	-	-	1	-	-
75	Akeonik, Icy Cape	-	-	-	-	1	-	-	-	-	1	3	1	-	-	-	-	-	1	4	-	-	1	-	-
76	Avak Inlet, Tunalik River	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	1	-	-	1	-	-
77	Nivat Point, Nokotlek Point	-	-	-	-	-	-	-	-	-	-	1	1	-	-	-	-	-	1	1	-	-	2	-	-
78	Point Collie, Sigeakruk Point	-	-	-	-	-	-	-	-	-	-	2	2	-	-	-	-	-	1	-	-	-	7	-	-
79	Point Belcher, Wainwright	-	-	-	-	-	-	-	-	-	-	2	4	1	-	-	-	-	1	-	-	2	11	-	1
80	Eluksingiak Point, Kugrua Bay	-	-	-	-	-	-	-	-	-	-	1	4	1	-	-	-	-	1	-	-	1	5	-	3
81	Peard Bay, Point Franklin	-	-	-	-	-	-	-	-	-	-	1	2	1	-	-	-	-	-	-	-	1	2	-	3
82	Skull Cliff	-	-	-	-	-	-	-	-	-	-	-	1	2	-	-	-	-	-	-	-	-	1	-	11
83	Nulavik, Loran Radio Station	-	-	-	-	-	-	-	-	-	-	-	1	2	-	-	-	-	-	-	-	-	-	1	5
84	Will Rogers & Wiley Post Mem.	-	-	-	-	-	-	1	1	-	-	-	1	4	-	-	-	-	-	-	-	-	-	1	6
85	Barrow, Browerville, Elson Lag.	-	-	-	-	-	-	1	5	-	-	-	1	9	-	-	-	-	-	-	-	-	-	3	4
86	Dease Inlet, Plover Islands	-	-	-	-	-	-	-	1	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-

Notes- ** = Greater than 99.5 percent; - = less than 0.5 percent; LA = Launch Area, P = Pipeline. Rows with all values less than 0.5 percent are not shown.

Table A.2-34 Summer Conditional Probabilities (Expressed as Percent Chance) that a Large Oil Spill Starting at a Particular Location Will Contact a Certain Land Segment Within 60 Days, Chukchi Sale 193

ID	Land Segment Name	LA 1	LA 2	LA 3	LA 4	LA 5	LA 6	LA 7	LA 8	LA 9	LA 10	LA 11	LA 12	LA 13	P 1	P 2	P 3	P 4	P 5	P 6	P 7	P 8	P 9	P 10	P 11
8	E. Wrangel Island, Skeletov	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-
27	Laguna Nut, Rigol'	-	-	-	1	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
32	Mys Dzhenretlen, Eynenekvyk	-	-	-	-	-	-	-	-	1	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-
33	Neskan, Laguna Neskan	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
34	Tepken, Memino	-	-	-	-	-	-	-	-	1	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-
35	Enurmino, Mys Neten	-	-	-	-	-	-	-	-	2	-	-	-	-	2	-	1	-	-	-	-	-	-	-	-
36	Mys Serdtse-Kamen	-	-	-	-	-	-	-	-	2	-	-	-	-	2	-	1	-	-	-	-	-	-	-	-
37	Chegitun, Utkan	-	-	-	-	-	-	-	-	2	-	-	-	-	2	-	1	-	-	-	-	-	-	-	-
38	Enmytagyn, Inchoun, Mitkulen	-	-	-	-	-	-	-	-	1	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-
39	Cape Dezhnev, Naukan, Uelen	-	-	-	-	-	-	-	-	1	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-
63	Asikpak Lag., Cape Seppings	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-
64	Kukpuk River, Point Hope	-	-	-	-	-	-	-	-	3	2	-	-	-	9	-	2	-	-	1	-	-	-	-	-
65	Buckland, Cape Lisburne	-	-	-	1	-	-	-	-	2	2	1	-	-	7	1	4	-	-	1	-	-	-	-	-
66	Ayugatak Lagoon	-	-	-	-	-	-	-	-	1	1	1	-	-	1	-	2	-	-	1	-	-	-	-	-
67	Cape Sabine, Pitmegea River	-	-	-	-	-	-	-	-	1	1	-	-	-	1	-	1	-	-	1	-	-	-	-	-
68	Agiak Lagoon, Punuk Lagoon	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	1	-	-	-	-	-	-	-	-
69	Cape Beaufort, Omalik Lagoon	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	1	-	-	1	-	-	-	-	-
70	Kuchaurak and Kuchiak Creek	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	1	-	-	1	-	-	-	-	-
71	Kukpowruk River, Sitkok Point	-	-	-	-	-	-	-	-	-	2	1	-	-	-	-	2	-	-	3	-	-	-	-	-
72	Point Lay, Siksrikpak Point	-	-	-	-	-	-	-	-	-	3	1	-	-	-	-	2	-	-	8	-	-	-	-	-
73	Tungaich Point, Tungak Creek	-	-	-	-	1	-	-	-	-	4	2	-	-	-	1	2	-	-	9	-	-	1	-	-
74	Kasegaluk Lagoon, Solivik Isl.	-	-	-	1	1	-	-	-	-	3	4	1	-	-	1	1	-	2	6	-	1	1	-	-
75	Akeonik, Icy Cape	-	-	-	1	1	-	-	-	-	2	4	1	-	-	-	-	-	2	5	-	-	1	-	-
76	Avak Inlet, Tunalik River	-	-	-	-	-	-	-	-	-	-	1	1	-	-	-	-	-	-	1	-	-	1	-	-
77	Nivat Point, Nokotlek Point	-	-	-	-	1	-	-	-	-	1	2	1	-	-	-	-	-	1	1	-	-	2	-	-
78	Point Collie, Sigeakruk Point	-	-	-	-	1	-	-	-	-	-	2	2	-	-	-	-	-	1	1	-	1	8	-	-
79	Point Belcher, Wainwright	-	-	-	-	1	1	1	1	-	-	3	6	1	-	-	-	-	1	1	1	3	13	1	2
80	Eluksingiak Point, Kugrua Bay	-	-	-	-	-	1	-	1	-	-	1	4	2	-	-	-	-	1	-	-	2	6	1	4
81	Peard Bay, Point Franklin	-	-	-	-	1	1	-	-	-	-	1	4	1	-	-	-	-	1	-	-	2	4	1	4
82	Skull Cliff	-	-	-	-	-	-	-	-	-	-	-	2	3	-	-	-	-	-	-	-	1	2	1	13
83	Nulavik, Loran Radio Station	-	-	1	-	-	1	1	1	-	-	-	2	3	-	-	-	-	-	-	1	1	-	1	6
84	Will Rogers & Wiley Post Mem.	-	-	-	-	-	-	2	2	-	-	-	2	6	-	-	-	-	-	-	-	1	-	2	7
85	Barrow, Browerville, Elson Lag.	-	-	-	-	-	-	3	8	-	-	-	1	11	-	-	-	-	-	-	-	-	1	6	5
86	Dease Inlet, Plover Islands	-	-	-	-	-	-	1	2	-	-	-	-	2	-	-	-	-	-	-	-	-	-	1	1
87	Igalik & Kulgurak Island	-	-	-	-	-	-	-	1	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-
88	Cape Simpson, Piasuk River	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
89	Ikpikpuk River, Point Poleakoon	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Notes- ** = Greater than 99.5 percent; - = less than 0.5 percent; LA = Launch Area, P = Pipeline. Rows with all values less than 0.5 percent are not shown.

Table A.2-35 Summer Conditional Probabilities (Expressed as Percent Chance) that a Large Oil Spill Starting at a Particular Location Will Contact a Certain Land Segment Within 180 Days, Chukchi Sale 193

ID	Land Segment Name	LA 1	LA 2	LA 3	LA 4	LA 5	LA 6	LA 7	LA 8	LA 9	LA 10	LA 11	LA 12	LA 13	P 1	P 2	P 3	P 4	P 5	P 6	P 7	P 8	P 9	P 10	P 11
8	E. Wrangel Island, Skeletov	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-
27	Laguna Nut, Rigol'	-	-	-	1	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
30	Nutepynmin, Pyngopil'gyn,	-	-	-	-	-	-	-	-	1	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-
32	Mys Dzhenretlen, Eynenekvyk	-	-	-	-	-	-	-	-	1	-	-	-	-	1	-	1	-	-	-	-	-	-	-	-
33	Neskan, Laguna Neskan	-	-	-	-	-	-	-	-	1	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-
34	Tepken, Memino	-	-	-	-	-	-	-	-	1	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-
35	Enurmino, Mys Neten	-	-	-	-	-	-	-	-	2	-	-	-	-	3	-	1	-	-	-	-	-	-	-	-
36	Mys Serdtse-Kamen	-	-	-	-	-	-	-	-	2	-	-	-	-	2	-	1	-	-	-	-	-	-	-	-
37	Chegitun, Utkan	-	-	-	-	-	-	-	-	2	-	-	-	-	2	-	1	-	-	-	-	-	-	-	-
38	Enmytagyn, Inchoun, Mitkulen	-	-	-	-	-	-	-	-	1	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-
39	Cape Dezhnev, Naukan, Uelen	-	-	-	-	-	-	-	-	1	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-
63	Asikpak Lag., Cape Seppings,	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-
64	Kukpuk River, Point Hope	-	-	-	-	-	-	-	-	3	2	-	-	-	9	-	2	-	-	1	-	-	-	-	-
65	Buckland, Cape Lisburne	-	-	-	1	1	-	-	-	2	2	1	-	-	7	1	4	-	1	2	-	-	-	-	-
66	Ayugatak Lagoon	-	-	-	-	-	-	-	-	1	1	1	-	-	1	-	2	-	-	2	-	-	-	-	-
67	Cape Sabine, Pitmegea River	-	-	-	-	-	-	-	-	1	1	-	-	-	1	-	2	-	-	1	-	-	-	-	-
68	Agiak Lagoon, Punuk Lagoon	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	1	-	-	-	-	-	-	-	-
69	Cape Beaufort, Omalik Lagoon	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	1	-	-	1	-	-	-	-	-
70	Kuchaurak and Kuchiak Creek	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	2	-	-	1	-	-	-	-	-
71	Kukpowruk River, Sitkok Point	-	-	-	-	-	-	-	-	-	2	1	-	-	-	-	2	-	-	3	-	-	-	-	-
72	Point Lay, Siksrikpak Point	-	-	-	-	-	-	-	-	-	3	1	-	-	-	-	2	-	-	8	-	-	-	-	-
73	Tungaich Point, Tungak Creek	-	-	-	1	1	-	-	-	-	4	2	-	-	-	1	2	-	1	9	-	-	1	-	-
74	Kasegaluk Lagoon, Solivik Isl.	-	-	-	1	1	-	-	-	-	3	4	1	-	-	1	2	-	2	6	-	1	1	-	-
75	Akeonik, Icy Cape	-	-	-	1	1	-	-	-	-	2	4	1	-	-	1	-	-	2	6	-	-	1	-	-
76	Avak Inlet, Tunalik River	-	-	-	-	-	-	-	-	-	-	1	1	-	-	-	-	-	1	1	-	-	1	-	-
77	Nivat Point, Nokotlek Point	-	-	-	-	1	-	-	-	-	1	2	1	-	-	-	-	-	1	1	-	-	2	-	-
78	Point Collie, Sigeakruk Point	-	-	-	-	1	-	-	-	-	-	3	3	-	-	-	-	-	2	1	-	1	9	-	1
79	Point Belcher, Wainwright	-	-	-	-	1	1	1	1	-	-	3	6	2	-	-	-	-	2	1	1	3	13	1	2
80	Eluksingiak Point, Kugrua Bay	-	-	-	-	1	1	1	1	-	-	1	5	3	-	-	-	-	1	-	-	3	7	1	5
81	Peard Bay, Point Franklin	-	-	-	-	1	1	1	-	-	-	2	4	2	-	-	-	-	1	-	-	2	4	1	4
82	Skull Cliff	-	-	-	-	-	-	-	-	-	-	1	3	3	-	-	-	-	-	-	-	1	2	1	13
83	Nulavik, Loran Radio Station	-	-	1	-	1	1	1	1	-	-	-	2	3	-	-	-	-	-	-	1	2	-	2	7
84	Will Rogers & Wiley Post Mem.	-	-	-	-	-	1	3	3	-	-	-	2	6	-	-	-	-	-	-	-	1	1	3	8
85	Barrow, Browerville, Elson Lag.	-	-	1	-	-	-	4	9	-	-	-	2	12	-	-	-	-	-	-	1	-	1	7	6
86	Dease Inlet, Plover Islands	-	-	-	-	-	-	1	2	-	-	-	-	2	-	-	-	-	-	-	-	-	-	1	1
87	Igalik & Kulgurak Island	-	-	-	-	-	-	-	1	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-
88	Cape Simpson, Piasuk River	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
89	Ikpikpuk River, Point Poleakoon	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
91	Lonely, Pitt Point, Pogik Bay	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Notes- ** = Greater than 99.5 percent; - = less than 0.5 percent; LA = Launch Area, P = Pipeline. Rows with all values less than 0.5 percent are not shown.

Table A.2-36 Summer Conditional Probabilities (Expressed as Percent Chance) that a Large Oil Spill Starting at a Particular Location Will Contact a Certain Land Segment Within 360 Days, Chukchi Sale 193

ID	Land Segment Name	LA 1	LA 2	LA 3	LA 4	LA 5	LA 6	LA 7	LA 8	LA 9	LA 10	LA 11	LA 12	LA 13	P 1	P 2	P 3	P 4	P 5	P 6	P 7	P 8	P 9	P 10	P 11
8	E. Wrangel Island, Skeletov	-	-	-	-	-	-	-	1	-	-	-	-	1	-	1	-	-	-	-	-	-	-	-	-
26	Ekugvaam, Kepin, Pil'khin	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
27	Laguna Nut, Rigol'	-	-	-	1	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
28	Vankarem,Vankarem Laguna	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
29	Mys Onman, Vel'may	-	-	-	-	-	-	-	-	1	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-
30	Nutepynmin, Pyngopil'gyn	-	-	-	-	-	-	-	-	1	-	-	-	-	1	-	1	-	-	-	-	-	-	-	-
31	Alyatki, Zaliv Tasytkhin	-	-	-	-	-	-	-	-	1	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-
32	Mys Dzhenretlen, Eynenekvyk	-	-	-	-	-	-	-	-	2	-	-	-	-	2	-	1	-	-	-	-	-	-	-	-
33	Neskan, Laguna Neskan	-	-	-	-	-	-	-	-	2	1	-	-	-	1	-	1	-	-	-	-	-	-	-	-
34	Tepken, Memino	-	-	-	-	-	-	-	-	2	-	-	-	-	2	-	1	-	-	-	-	-	-	-	-
35	Enurmino, Mys Neten	-	-	-	-	-	-	-	-	3	1	-	-	-	3	-	1	-	-	-	-	-	-	-	-
36	Mys Serdtse-Kamen	-	-	-	-	-	-	-	-	2	-	-	-	-	2	-	1	-	-	-	-	-	-	-	-
37	Chegitun, Utkan	-	-	-	-	-	-	-	-	2	-	-	-	-	2	-	1	-	-	-	-	-	-	-	-
38	Enmytagyn, Inchoun, Mitkulen	-	-	-	-	-	-	-	-	1	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-
39	Cape Dezhnev, Naukan, Uelen	-	-	-	-	-	-	-	-	1	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-
63	Asikpak Lag., Cape Seppings	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-
64	Kukpuk River, Point Hope	-	-	-	-	-	-	-	-	3	2	-	-	-	9	-	2	-	-	1	-	-	-	-	-
65	Buckland, Cape Lisburne	-	-	-	1	1	-	-	-	2	2	1	-	-	7	1	4	-	1	2	-	-	-	-	-
66	Ayugatak Lagoon	-	-	-	-	-	-	-	-	1	1	1	-	-	1	-	2	-	-	2	-	-	-	-	-
67	Cape Sabine, Pitmegea River	-	-	-	-	-	-	-	-	1	1	-	-	-	1	-	2	-	-	1	-	-	-	-	-
68	Agiak Lagoon, Punuk Lagoon	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	1	-	-	-	-	-	-	-	-
69	Cape Beaufort, Omalik Lagoon	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	1	-	-	1	-	-	-	-	-
70	Kuchaurak and Kuchiak Creek	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	2	-	-	1	-	-	-	-	-
71	Kukpowruk River, Sitkok Point	-	-	-	-	-	-	-	-	-	2	1	-	-	-	-	2	-	-	3	-	-	-	-	-
72	Point Lay, Siksrikpak Point	-	-	-	-	-	-	-	-	-	3	1	-	-	-	-	2	-	-	8	-	-	-	-	-
73	Tungaich Point, Tungak Creek	-	-	-	1	1	-	-	-	-	4	2	-	-	-	1	2	-	1	9	-	-	1	-	-
74	Kasegaluk Lagoon, Solivik Isl.	-	-	-	1	1	-	-	-	-	3	4	1	-	-	1	2	-	2	6	-	1	1	-	-
75	Akeonik, Icy Cape	-	-	-	1	1	-	-	-	-	2	4	1	-	-	1	-	-	2	6	-	-	1	-	-
76	Avak Inlet, Tunalik River	-	-	-	-	-	-	-	-	-	-	1	1	-	-	-	-	-	1	1	-	-	1	-	-
77	Nivat Point, Nokotlek Point	-	-	-	-	1	-	-	-	-	1	2	1	-	-	-	-	-	1	1	-	-	2	-	-
78	Point Collie, Sigeakruk Point	-	-	-	-	1	-	-	-	-	-	3	3	-	-	-	-	-	2	1	-	1	9	-	1
79	Point Belcher, Wainwright	-	-	-	-	1	2	1	1	-	-	3	6	2	-	-	-	-	2	1	1	3	13	1	2
80	Eluksingiak Point, Kugrua Bay	-	-	-	-	1	1	1	1	-	-	2	5	3	-	-	-	-	1	-	-	3	7	1	5
81	Peard Bay, Point Franklin	-	-	-	-	1	1	1	-	-	-	2	4	2	-	-	-	-	1	-	-	2	4	1	4
82	Skull Cliff	-	-	-	-	-	-	-	1	-	-	1	3	3	-	-	-	-	-	-	-	1	2	1	13
83	Nulavik, Loran Radio Station	-	-	1	-	1	1	1	1	-	-	-	2	3	-	-	-	-	-	-	1	2	1	2	7
84	Will Rogers & Wiley Post Mem.	-	1	2	-	-	2	5	5	-	-	1	3	7	-	-	-	-	-	-	2	2	1	6	8
85	Barrow, Browerville, Elson Lag.	-	-	1	-	-	1	5	10	-	-	-	2	13	-	-	-	-	-	-	1	1	2	8	7
86	Dease Inlet, Plover Islands	-	-	-	-	-	-	1	3	-	-	-	-	3	-	-	-	-	-	-	-	-	-	1	1
87	Igalik & Kulgurak Island	-	-	-	-	-	-	-	2	-	-	-	-	1	-	-	-	-	-	-	-	-	-	1	-
88	Cape Simpson, Piasuk River	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
89	Ikpikpuk River Point Poleakoon	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
91	Lonely, Pitt Point, Pogik Bay	-	-	-	-	-	-	-	1	-	-	-	-	1	-	-	-	-	-	-	-	-	-	1	-

Notes- ** = Greater than 99.5 percent; - = less than 0.5 percent; LA = Launch Area, P = Pipeline. Rows with all values less than 0.5 percent are not shown.

Table A.2-37 Summer Conditional Probabilities (Expressed as Percent Chance) that a Large Oil Spill Starting at a Particular Location Will Contact a Certain Group of Land Segments Within 3 Days, Chukchi Sale 193

ID	Land Segment Name	LA 1	LA 2	LA 3	LA 4	LA 5	LA 6	LA 7	LA 8	LA 9	LA 10	LA 11	LA 12	LA 13	P 1	P 2	P 3	P 4	P 5	P 6	P 7	P 8	P 9	P 10	P 11
88	Alaska Maritime National Wildlife Refuge	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	1	-	-	-	-	-	-	-	-
89	National Petroleum Reserve Alaska	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7
96	United States Chukchi Coast	-	-	-	-	-	-	-	-	-	-	-	-	-	6	-	1	-	-	7	-	-	3	-	7

Notes- ** = Greater than 99.5 percent; - = less than 0.5 percent; LA = Launch Area, P = Pipeline. Rows with all values less than 0.5 percent are not shown.

Table A.2-38 Summer Conditional Probabilities (Expressed as Percent Chance) that a Large Oil Spill Starting at a Particular Location Will Contact a Certain Group of Land Segments Within 10 Days, Chukchi Sale 193

ID	Land Segment Name	LA 1	LA 2	LA 3	LA 4	LA 5	LA 6	LA 7	LA 8	LA 9	LA 10	LA 11	LA 12	LA 13	P 1	P 2	P 3	P 4	P 5	P 6	P 7	P 8	P 9	P 10	P 11
88	Alaska Maritime National Wildlife Refuge	-	-	-	-	-	-	-	-	1	-	-	-	-	4	-	2	-	-	-	-	-	-	-	-
89	National Petroleum Reserve Alaska	-	-	-	-	-	-	-	-	-	-	1	3	2	-	-	-	-	-	-	-	-	4	-	14
90	Kasegaluk Lagoon Special Use Area	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-
95	Russia Chukchi Coast	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-
96	United States Chukchi Coast	-	-	-	-	-	-	-	-	2	5	5	4	3	12	-	6	-	-	20	-	-	13	-	17
97	United States Beaufort Coast	-	-	-	-	-	-	-	1	-	-	-	-	5	-	-	-	-	-	-	-	-	-	-	2

Notes- ** = Greater than 99.5 percent; - = less than 0.5 percent; LA = Launch Area, P = Pipeline. Rows with all values less than 0.5 percent are not shown.

Table A.2-39 Summer Conditional Probabilities (Expressed as Percent Chance) that a Large Oil Spill Starting at a Particular Location Will Contact a Certain Group of Land Segments Within 30 Days, Chukchi Sale 193

ID	Land Segment Name	LA 1	LA 2	LA 3	LA 4	LA 5	LA 6	LA 7	LA 8	LA 9	LA 10	LA 11	LA 12	LA 13	P 1	P 2	P 3	P 4	P 5	P 6	P 7	P 8	P 9	P 10	P 11
84	Wrangel Is Nat Res Natural World Heritage Site	1	1	-	1	1	-	-	-	-	-	-	-	-	-	1	-	1	1	-	-	-	-	-	-
88	Alaska Maritime National Wildlife Refuge	-	-	-	-	-	-	-	-	3	1	-	-	-	8	-	4	-	-	1	-	-	-	-	-
89	National Petroleum Reserve Alaska	-	-	-	-	1	1	1	3	-	1	4	10	8	-	-	-	-	2	2	-	3	11	2	23
90	Kasegaluk Lagoon Special Use Area	-	-	-	-	1	-	-	-	-	1	2	1	-	-	-	-	-	1	2	-	-	3	-	-
95	Russia Chukchi Coast	1	1	-	3	1	-	-	-	11	3	-	-	-	12	3	5	1	1	-	-	-	-	-	-
96	United States Chukchi Coast	-	-	-	3	4	2	2	2	8	18	19	18	11	20	3	18	-	6	35	-	6	32	3	29
97	United States Beaufort Coast	-	-	-	-	-	-	2	7	-	-	-	1	11	-	-	-	-	-	-	-	-	-	3	5

Notes- ** = Greater than 99.5 percent; - = less than 0.5 percent; LA = Launch Area, P = Pipeline. Rows with all values less than 0.5 percent are not shown.

Table A.2-40 Summer Conditional Probabilities (Expressed as Percent Chance) that a Large Oil Spill Starting at a Particular Location Will Contact a Certain Group of Land Segments Within 60 Days, Chukchi Sale 193

ID	Land Segment Name	LA 1	LA 2	LA 3	LA 4	LA 5	LA 6	LA 7	LA 8	LA 9	LA 10	LA 11	LA 12	LA 13	P 1	P 2	P 3	P 4	P 5	P 6	P 7	P 8	P 9	P 10	P 11
84	Wrangel Is Nat Res Natural World Heritage Site	1	1	-	1	1	-	-	-	-	-	-	-	-	-	1	-	1	1	-	-	-	-	-	-
88	Alaska Maritime National Wildlife Refuge	-	-	-	1	-	-	-	-	3	2	1	-	-	8	1	4	-	-	1	-	-	-	-	-
89	National Petroleum Reserve Alaska	-	-	1	-	2	3	2	8	-	1	7	14	13	-	-	-	1	3	3	1	7	15	4	28
90	Kasegaluk Lagoon Special Use Area	-	-	-	-	1	-	-	-	-	1	3	2	-	-	-	-	-	1	2	-	-	4	-	-
91	Teshekpuk Lake Special Use Area	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
95	Russia Chukchi Coast	1	1	-	4	2	-	-	-	12	3	1	-	-	13	3	5	1	1	1	-	-	-	-	-
96	United States Chukchi Coast	1	1	1	5	9	6	4	5	9	24	26	26	17	21	4	21	1	11	42	2	13	40	7	37
97	United States Beaufort Coast	-	-	1	-	-	-	4	14	-	-	-	1	15	-	-	-	-	-	-	-	-	1	7	6

Notes- ** = Greater than 99.5 percent; - = less than 0.5 percent; LA = Launch Area, P = Pipeline. Rows with all values less than 0.5 percent are not shown.

Table A.2-41 Summer Conditional Probabilities (Expressed as Percent Chance) that a Large Oil Spill Starting at a Particular Location Will Contact a Certain Group of Land Segments Within 180 Days, Chukchi Sale 193

ID	Land Segment Name	LA 1	LA 2	LA 3	LA 4	LA 5	LA 6	LA 7	LA 8	LA 9	LA 10	LA 11	LA 12	LA 13	P 1	P 2	P 3	P 4	P 5	P 6	P 7	P 8	P 9	P 10	P 11
84	Wrangel Is Nat Res Natural World Heritage Site	1	1	1	1	1	1	-	1	-	1	1	-	1	-	1	-	1	1	1	1	-	-	1	-
88	Alaska Maritime National Wildlife Refuge	-	-	-	1	1	-	-	-	3	2	1	-	-	8	1	4	-	1	2	-	-	-	-	-
89	National Petroleum Reserve Alaska	-	1	1	1	3	3	4	9	-	1	7	16	14	-	1	-	1	4	3	2	8	17	5	30
90	Kasegaluk Lagoon Special Use Area	-	-	-	-	1	-	-	-	-	1	3	2	-	-	1	-	-	1	2	-	-	4	-	-
91	Teshekpuk Lake Special Use Area	-	-	-	-	-	-	-	2	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-
95	Russia Chukchi Coast	2	1	1	5	2	1	1	1	14	4	1	-	1	14	4	6	1	1	1	1	-	-	1	-
96	United States Chukchi Coast	1	1	2	6	10	7	7	7	9	25	28	29	19	21	5	22	2	13	43	3	15	43	9	40
97	United States Beaufort Coast	-	-	1	-	-	-	5	16	-	-	-	2	17	-	-	-	-	-	-	1	-	2	9	8

Notes- ** = Greater than 99.5 percent; - = less than 0.5 percent; LA = Launch Area, P = Pipeline. Rows with all values less than 0.5 percent are not shown.

Table A.2-42 Summer Conditional Probabilities (Expressed as Percent Chance) that a Large Oil Spill Starting at a Particular Location Will Contact a Certain Group of Land Segments Within 360 Days, Chukchi Sale 193

ID	Land Segment Name	LA 1	LA 2	LA 3	LA 4	LA 5	LA 6	LA 7	LA 8	LA 9	LA 10	LA 11	LA 12	LA 13	P 1	P 2	P 3	P 4	P 5	P 6	P 7	P 8	P 9	P 10	P 11
84	Wrangel Is Nat Res Natural World Heritage Site	1	1	1	1	1	1	1	3	-	1	1	-	2	-	1	-	1	1	1	1	-	-	1	1
88	Alaska Maritime National Wildlife Refuge	-	-	-	1	1	-	-	-	3	2	1	-	-	8	1	4	-	1	2	-	-	-	-	-
89	National Petroleum Reserve Alaska	-	1	2	1	3	4	5	12	-	2	8	17	16	-	1	1	1	4	3	2	9	18	7	32
90	Kasegaluk Lagoon Special Use Area	-	-	-	-	1	-	-	-	-	1	3	2	-	-	1	-	-	1	2	-	-	4	-	-
91	Teshekpuk Lake Special Use Area	-	-	-	-	-	-	1	3	-	-	-	-	1	-	-	-	-	-	-	-	-	-	1	-
95	Russia Chukchi Coast	2	2	1	6	2	1	1	6	19	6	1	1	3	20	5	9	2	1	2	1	-	1	1	1
96	United States Chukchi Coast	1	2	3	6	11	8	9	9	9	25	28	31	20	21	5	23	2	13	44	4	16	44	11	41
97	United States Beaufort Coast	-	-	2	-	-	2	7	20	-	-	-	3	19	-	-	-	-	-	-	1	2	2	12	9

Notes- ** = Greater than 99.5 percent; - = less than 0.5 percent; LA = Launch Area, P = Pipeline. Rows with all values less than 0.5 percent are not shown.

Table A.2-43 Summer Conditional Probabilities (Expressed as Percent Chance) that a Large Oil Spill Starting at a Particular Location Will Contact a Certain Boundary Segment Within 3 Days, Chukchi Sale 193

ID	Boundary Segment Name	LA 1	LA 2	LA 3	LA 4	LA 5	LA 6	LA 7	LA 8	LA 9	LA 10	LA 11	LA 12	LA 13	P 1	P 2	P 3	P 4	P 5	P 6	P 7	P 8	P 9	P 10	P 11

Notes- All boundary segments have all values less than 0.5%; therefore the data are not shown and the tables are left blank.

Table A.2-44 Summer Conditional Probabilities (Expressed as Percent Chance) that a Large Oil Spill Starting at a Particular Location Will Contact a Certain Boundary Segment Within 10 Days, Chukchi Sale 193

ID	Boundary Segment Name	LA 1	LA 2	LA 3	LA 4	LA 5	LA 6	LA 7	LA 8	LA 9	LA 10	LA 11	LA 12	LA 13	P 1	P 2	P 3	P 4	P 5	P 6	P 7	P 8	P 9	P 10	P 11

Notes- All boundary segments have all values less than 0.5%; therefore the data are not shown and the tables are left blank.

Table A.2-45 Summer Conditional Probabilities (Expressed as Percent Chance) that a Large Oil Spill Starting at a Particular Location Will Contact a Certain Boundary Segment Within 30 Days, Chukchi Sale 193

ID	Boundary Segment Name	LA 1	LA 2	LA 3	LA 4	LA 5	LA 6	LA 7	LA 8	LA 9	LA 10	LA 11	LA 12	LA 13	P 1	P 2	P 3	P 4	P 5	P 6	P 7	P 8	P 9	P 10	P 11
2	Bering Strait	-	-	-	-	-	-	-	-	1	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-
16	Chukchi Sea	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-
18	Chukchi Sea	-	1	1	-	-	1	-	-	-	-	-	-	-	-	-	-	1	-	-	1	-	-	-	-
19	Chukchi Sea	-	-	1	-	-	1	1	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	1	-

Notes- ** = Greater than 99.5 percent; - = less than 0.5 percent; LA = Launch Area, P = Pipeline. Rows with all values less than 0.5 percent are not shown.

Table A.2-46 Summer Conditional Probabilities (Expressed as Percent Chance) that a Large Oil Spill Starting at a Particular Location Will Contact a Certain Boundary Segment Within 60 Days, Chukchi Sale 193

ID	Boundary Segment Name	LA 1	LA 2	LA 3	LA 4	LA 5	LA 6	LA 7	LA 8	LA 9	LA 10	LA 11	LA 12	LA 13	P 1	P 2	P 3	P 4	P 5	P 6	P 7	P 8	P 9	P 10	P 11
2	Bering Strait	-	-	-	-	-	-	-	-	1	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-
16	Chukchi Sea	1	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	1	-	-	-	-
17	Chukchi Sea	1	1	1	-	-	1	-	-	-	-	-	-	-	-	-	-	1	-	-	1	-	-	-	-
18	Chukchi Sea	1	3	4	-	2	3	3	2	-	1	2	1	1	-	-	-	2	2	1	4	2	-	3	1
19	Chukchi Sea	1	2	3	-	1	1	3	2	-	-	1	1	1	-	-	-	1	1	-	3	1	-	3	1
20	Chukchi Sea	1	1	1	-	-	-	1	1	-	-	-	-	-	-	-	-	1	-	-	1	-	-	1	-
21	Chukchi Sea	-	-	1	-	-	-	1	1	-	-	-	-	-	-	-	-	-	-	-	1	-	-	1	-
22	Chukchi Sea	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-
23	Beaufort Sea	-	-	-	-	-	-	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
24	Beaufort Sea	-	-	-	-	-	-	-	1	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-
25	Beaufort Sea	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-
26	Beaufort Sea	-	-	-	-	-	-	1	1	-	-	-	-	1	-	-	-	-	-	-	-	-	-	1	-

Notes- ** = Greater than 99.5 percent; - = less than 0.5 percent; LA = Launch Area, P = Pipeline. Rows with all values less than 0.5 percent are not shown.

Table A.2-47 Summer Conditional Probabilities (Expressed as Percent Chance) that a Large Oil Spill Starting at a Particular Location Will Contact a Certain Boundary Segment Within 180 Days, Chukchi Sale 193

ID	Boundary Segment Name	LA 1	LA 2	LA 3	LA 4	LA 5	LA 6	LA 7	LA 8	LA 9	LA 10	LA 11	LA 12	LA 13	P 1	P 2	P 3	P 4	P 5	P 6	P 7	P 8	P 9	P 10	P 11
2	Bering Strait	-	-	-	-	-	-	-	-	1	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-
16	Chukchi Sea	2	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	1	-	-	-	-
17	Chukchi Sea	1	2	2	-	1	2	1	-	-	-	1	-	-	-	-	-	2	1	1	2	1	-	1	-
18	Chukchi Sea	3	5	8	1	5	8	9	6	-	3	7	6	5	-	1	1	4	6	5	8	9	4	8	5
19	Chukchi Sea	3	6	9	1	4	7	12	7	-	3	6	8	7	-	1	1	4	5	5	9	6	7	12	6
20	Chukchi Sea	4	7	8	1	5	7	6	4	-	1	5	6	5	-	1	-	6	5	2	9	7	4	6	7
21	Chukchi Sea	1	1	3	-	-	1	2	3	-	-	1	1	2	-	-	-	1	-	-	3	1	1	2	1
22	Chukchi Sea	-	-	1	-	-	-	1	1	-	-	-	1	1	-	-	-	-	-	-	-	-	-	1	1
23	Beaufort Sea	1	1	3	-	-	1	2	2	-	-	-	1	1	-	-	-	1	-	-	2	1	-	2	1
24	Beaufort Sea	-	-	1	-	-	-	1	1	-	-	-	-	1	-	-	-	-	-	-	1	-	-	2	1
25	Beaufort Sea	-	1	1	-	-	2	1	1	-	-	1	2	1	-	-	-	-	-	-	1	2	3	1	1
26	Beaufort Sea	-	1	2	-	-	1	3	2	-	-	-	1	2	-	-	-	-	-	-	1	1	-	3	2
27	Beaufort Sea	-	-	1	-	-	-	1	2	-	-	-	-	1	-	-	-	-	-	-	1	-	-	2	-
28	Beaufort Sea	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
30	Beaufort Sea	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31	Beaufort Sea	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Notes- ** = Greater than 99.5 percent; - = less than 0.5 percent; LA = Launch Area, P = Pipeline. Rows with all values less than 0.5 percent are not shown.

Table A.2-48 Summer Conditional Probabilities (Expressed as Percent Chance) that a Large Oil Spill Starting at a Particular Location Will Contact a Certain Boundary Segment Within 360 Days, Chukchi Sale 193

ID	Boundary Segment Name	LA 1	LA 2	LA 3	LA 4	LA 5	LA 6	LA 7	LA 8	LA 9	LA 10	LA 11	LA 12	LA 13	P 1	P 2	P 3	P 4	P 5	P 6	P 7	P 8	P 9	P 10	P 11
2	Bering Strait	-	-	-	-	-	-	-	-	1	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-
16	Chukchi Sea	2	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	1	-	-	-	-
17	Chukchi Sea	1	2	3	-	1	2	1	-	-	-	1	-	-	-	-	-	2	1	1	2	1	-	1	-
18	Chukchi Sea	3	5	8	1	5	8	9	6	-	3	7	7	5	-	1	1	5	6	5	8	9	5	8	5
19	Chukchi Sea	3	7	10	1	5	8	12	8	-	3	6	9	8	-	1	1	5	5	5	9	7	8	13	7
20	Chukchi Sea	4	7	8	1	5	8	6	4	-	1	5	6	6	-	1	-	6	5	2	9	7	5	6	8
21	Chukchi Sea	1	1	4	-	-	2	2	3	-	-	1	1	2	-	-	-	1	-	-	3	1	1	2	1
22	Chukchi Sea	-	-	1	-	-	-	1	1	-	-	-	1	1	-	-	-	-	-	-	-	-	-	1	1
23	Beaufort Sea	1	1	3	-	-	1	2	2	-	-	-	1	1	-	-	-	1	-	-	2	1	1	2	1
24	Beaufort Sea	-	-	1	-	-	-	1	1	-	-	-	-	1	-	-	-	-	-	-	1	-	-	2	1
25	Beaufort Sea	-	1	1	-	-	2	1	1	-	-	1	2	1	-	-	-	-	-	-	1	2	3	1	1
26	Beaufort Sea	-	1	2	-	-	1	3	2	-	-	-	1	2	-	-	-	-	-	-	1	1	-	3	2
27	Beaufort Sea	-	-	1	-	-	-	1	2	-	-	-	-	1	-	-	-	-	-	-	1	-	-	2	-
28	Beaufort Sea	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
30	Beaufort Sea	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31	Beaufort Sea	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
34	Beaufort Sea	-	-	-	-	-	-	1	1	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-
35	Beaufort Sea	-	-	-	-	-	-	-	1	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-

Notes- ** = Greater than 99.5 percent; - = less than 0.5 percent; LA = Launch Area, P = Pipeline. Rows with all values less than 0.5 percent are not shown.

Table A.2-49 Winter Conditional Probabilities (Expressed as Percent Chance) that a Large Oil Spill Starting at a Particular Location Will Contact a Certain Environmental Resource Area Within 3 Days, Chukchi Sale 193

ID	Environmental Resource Area Name	LA 1	LA 2	LA 3	LA 4	LA 5	LA 6	LA 7	LA 8	LA 9	LA 10	LA 11	LA 12	LA 13	P 1	P 2	P 3	P 4	P 5	P 6	P 7	P 8	P 9	P 10	P 11
—	LAND	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	5	-	-	1	-	1
1	Kasegaluk Lagoon	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-
6	ERA 6	-	-	-	-	-	-	-	-	-	-	-	1	1	-	-	-	-	-	-	-	-	6	-	10
10	Ledyard Bay Spectacled Eider Critical Habitat	-	-	-	-	-	-	-	-	-	1	1	-	-	-	-	3	-	-	9	-	-	-	-	-
14	Cape Thompson Seabird Colony Area	-	-	-	-	-	-	-	-	-	-	-	-	-	5	-	-	-	-	-	-	-	-	-	-
15	Cape Lisburne Seabird Colony Area	-	-	-	-	-	-	-	-	1	-	-	-	-	7	-	4	-	-	-	-	-	-	-	-
19	Chukchi Spring Lead 1	-	-	-	-	-	-	-	-	-	-	-	-	-	9	-	1	-	-	-	-	-	-	-	-
20	Chukchi Spring Lead 2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6	-	-	1	-	-	-	-	-
21	Chukchi Spring Lead 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	9	-	-	-	-	-
22	Chukchi Spring Lead 4	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	15	-	-
23	Chukchi Spring Lead 5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	10
24	Beaufort Spring Lead 6	-	-	-	-	-	-	-	-	-	-	-	-	1	1	-	-	-	-	5	-	-	1	-	1
38	Pt. Hope Subsistence Area	-	-	-	-	-	-	-	-	-	-	-	-	-	6	-	2	-	-	-	-	-	-	-	-
39	Point Lay Subsistence Area	-	-	-	-	-	-	-	-	-	1	1	-	-	-	-	-	-	-	25	-	-	-	-	-
40	Wainwright Subsistence Area	-	-	-	-	-	-	-	-	-	-	-	-		-	-	-	-	-	3	-	-	22	-	1
41	Barrow Subsistence Area 1	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	4
45	ERA 45	-	-	-	-	-	-	-	-	2	-	-	-	-	7	-	3	-	-	-	-	-	-	-	-
46	Herald Shoal Polynya	-	-	-	2	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-
47	Ice/Sea Segment 10	1	-	-	9	12	-	-	-	-	-	-	-	-	-	2	-	-	4	-	-	-	-	-	-
48	Ice/Sea Segment 11	-	-	-	-	2	26	-	-	-	-	3	1	-	-	-	-	-	2	-	6	40	-	-	-
49	Hanna's Shoal Polynya	-	1	27	-	-	2	2	-	-	-	-	-	-	-	-	-	-	-	-	11	-	-	-	-
50	Ice/Sea Segment 12	-	-	-	-	-	-	-	-	-	-	2	17	-	-	-	-	-	-	-	-	27	1	-	-
51	Ice/Sea Segment 13	-	-	-	-	-	-	-	-	-	-	-	10	10	-	-	-	-	-	-	-	-	-	-	28
52	Ice/Sea Segment 14	-	-	-	-	-	-	-	7	-	-	-	-	17	-	-	-	-	-	-	-	-	-	-	-
99	ERA 99	-	-	-	-	1	-	-	-	-	6	8	-	-	-	-	-	-	3	9	-	-	-	-	-

Notes- ** = Greater than 99.5 percent; - = less than 0.5 percent; LA = Launch Area, P = Pipeline. Rows with all values less than 0.5 percent are not shown.

Table A.2-50 Winter Conditional Probabilities (Expressed as Percent Chance) that a Large Oil Spill Starting at a Particular Location Will Contact a Certain Environmental Resource Area Within 10 Days, Chukchi Sale 193

ID	Environmental Resource Area Name	LA 1	LA 2	LA 3	LA 4	LA 5	LA 6	LA 7	LA 8	LA 9	LA 10	LA 11	LA 12	LA 13	P 1	P 2	P 3	P 4	P 5	P 6	P 7	P 8	P 9	P 10	P 11
—	LAND	-	-	-	-	-	-	-	-	1	3	2	1	2	3	-	2	-	-	14	-	-	3	-	4
1	Kasegaluk Lagoon	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-
6	ERA 6	-	-	-	-	-	-	-	-	-	-	-	2	3	-	-	-	-	-	-	-	-	9	-	12
10	Ledyard Bay Spectacled Eider Critical Habitat	-	-	-	-	-	-	-	-	-	3	2	-	-	-	-	4	-	-	11	-	-	-	-	-
14	Cape Thompson Seabird Colony Area	-	-	-	-	-	-	-	-	1	-	-	-	-	6	-	1	-	-	-	-	-	-	-	-
15	Cape Lisburne Seabird Colony Area	-	-	-	-	-	-	-	-	1	1	-	-	-	7	-	5	-	-	-	-	-	-	-	-
19	Chukchi Spring Lead 1	-	-	-	-	-	-	-	-	-	-	-	-	-	9	-	1	-	-	-	-	-	-	-	-
20	Chukchi Spring Lead 2	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	7	-	-	2	-	-	-	-	-
21	Chukchi Spring Lead 3	-	-	-	-	-	-	-	-	-	1	2	-	-	-	-	-	-	-	12	-	-	-	-	-
22	Chukchi Spring Lead 4	-	-	-	-	-	-	-	-	-	-	2	3	-	-	-	-	-	-	1	-	-	18	-	-
23	Chukchi Spring Lead 5	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	11
24	Beaufort Spring Lead 6	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-
25	Beaufort Spring Lead 7	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-
38	Pt. Hope Subsistence Area	-	-	-	-	-	-	-	-	1	-	-	-	-	9	-	3	-	-	-	-	-	-	-	-
39	Point Lay Subsistence Area	-	-	-	-	-	-	-	-	-	6	3	-	-	-	-	3	-	-	31	-	-	-	-	-
40	Wainwright Subsistence Area	-	-	-	-	-	-	-	-	-	2	2	2	-	-	-	1	-	-	10	-	-	27	-	2
41	Barrow Subsistence Area 1	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	6
45	ERA 45	-	-	-	-	-	-	-	-	4	-	-	-	-	12	-	4	-	-	-	-	-	-	-	-
46	Herald Shoal Polynya	3	-	-	10	-	-	-	-	1	-	-	-	-	-	11	1	-	-	-	-	-	-	-	-
47	Ice/Sea Segment 10	3	-	-	12	17	1	-	-	-	2	1	-	-	-	4	-	1	10	1	-	-	-	-	-
48	Ice/Sea Segment 11	1	4	3	-	10	37	2	-	-	3	16	5	-	-	-	-	4	15	4	12	51	2	-	1
49	Hanna's Shoal Polynya	1	8	47	-	2	16	13	3	-	-	1	1	1	-	-	-	3	2	-	31	6	-	7	-
50	Ice/Sea Segment 12	-	-	-	-	-	2	1	-	-	-	5	25	3	-	-	-	-	1	-	-	33	4	-	7
51	Ice/Sea Segment 13	-	-	-	-	-	-	-	-	-	-	-	15	13	-	-	-	-	-	-	-	-	5	-	40
52	Ice/Sea Segment 14	-	-	-	-	-	-	-	12	-	-	-	-	24	-	-	-	-	-	-	-	-	-	1	3
99	ERA 99	-	-	-	-	3	-	-	-	-	8	10	-	-	-	-	-	-	5	12	-	-	-	-	-

Notes- ** = Greater than 99.5 percent; - = less than 0.5 percent; LA = Launch Area, P = Pipeline. Rows with all values less than 0.5 percent are not shown.

Table A.2-51 Winter Conditional Probabilities (Expressed as Percent Chance) that a Large Oil Spill Starting at a Particular Location Will Contact a Certain Environmental Resource Area Within 30 Days, Chukchi Sale 193

ID	Environmental Resource Area Name	LA 1	LA 2	LA 3	LA 4	LA 5	LA 6	LA 7	LA 8	LA 9	LA 10	LA 11	LA 12	LA 13	P 1	P 2	P 3	P 4	P 5	P 6	P 7	P 8	P 9	P 10	P 11
—	LAND	1	-	-	2	1	-	-	1	5	12	6	3	4	9	3	11	-	1	21	-	1	9	-	7
1	Kasegaluk Lagoon	-	-	-	-	1	-	-	-	-	3	2	-	-	-	-	1	-	1	5	-	-	-	-	-
4	ERA 4	-	-	-	-	-	-	-	-	5	-	-	-	-	8	-	1	-	-	-	-	-	-	-	-
6	ERA 6	-	-	-	-	-	-	-	1	-	-	1	5	5	-	-	-	-	1	1	-	1	16	-	18
10	Ledyard Bay Spectacled Eider Critical Habitat	-	-	-	-	1	-	-	-	1	7	4	-	-	1	1	8	-	1	13	-	-	-	-	-
11	Wrangel Island	3	-	-	1	-	-	-	-	-	-	-	-	-	-	2	-	1	-	-	-	-	-	-	-
14	Cape Thompson Seabird Colony Area	-	-	-	-	-	-	-	-	2	-	-	-	-	8	-	1	-	-	-	-	-	-	-	-
15	Cape Lisburne Seabird Colony Area	-	-	-	-	-	-	-	-	2	2	-	-	-	9	-	7	-	-	-	-	-	-	-	-
16	ERA 16	-	-	-	-	-	-	-	-	1	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-
19	Chukchi Spring Lead 1	-	-	-	-	-	-	-	-	1	-	-	-	-	11	-	2	-	-	-	-	-	-	-	-
20	Chukchi Spring Lead 2	-	-	-	-	-	-	-	-	1	5	1	-	-	1	-	10	-	-	3	-	-	-	-	-
21	Chukchi Spring Lead 3	-	-	-	-	1	-	-	-	-	6	4	-	-	-	1	2	-	1	15	-	-	-	-	-
22	Chukchi Spring Lead 4	-	-	-	-	2	1	-	-	-	2	5	6	-	-	-	-	-	2	5	-	2	25	-	-
23	Chukchi Spring Lead 5	-	-	-	-	-	-	-	-	-	-	-	1	2	-	-	-	-	-	-	-	-	2	-	14
24	Beaufort Spring Lead 6	-	-	-	-	-	-	-	1	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-
25	Beaufort Spring Lead 7	-	-	-	-	-	-	-	1	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-
38	Pt. Hope Subsistence Area	-	-	-	-	-	-	-	-	2	-	-	-	-	12	-	4	-	-	-	-	-	-	-	-
39	Point Lay Subsistence Area	-	-	-	1	2	-	-	-	1	15	7	-	-	-	2	12	-	1	36	-	-	-	-	-
40	Wainwright Subsistence Area	-	-	-	1	2	-	-	-	-	7	7	7	-	-	1	4	-	1	17	-	1	38	-	4
41	Barrow Subsistence Area 1	-	-	-	-	-	-	-	1	-	-	-	1	4	-	-	-	-	-	-	-	-	1	-	9
45	ERA 45	-	-	-	-	-	-	-	-	6	1	-	-	-	16	-	7	-	-	-	-	-	-	-	-
46	Herald Shoal Polynya	7	-	-	17	1	-	-	-	4	1	-	-	-	2	20	3	1	-	-	-	-	-	-	-
47	Ice/Sea Segment 10	5	1	-	16	23	2	-	-	1	7	4	1	-	1	7	1	4	15	5	1	2	1	-	-
48	Ice/Sea Segment 11	4	10	7	5	24	45	9	1	1	13	35	14	5	-	4	4	11	31	19	18	63	6	6	5
49	Hanna's Shoal Polynya	6	20	59	2	13	35	33	15	-	4	11	9	12	-	1	1	13	14	6	47	24	2	26	9
50	Ice/Sea Segment 12	-	1	1	-	3	5	3	-	-	2	10	34	8	-	-	-	1	4	3	2	38	12	2	17
51	Ice/Sea Segment 13	-	-	-	-	-	-	1	1	-	-	1	22	16	-	-	-	-	-	-	-	3	17	1	46
52	Ice/Sea Segment 14	-	-	-	-	-	-	1	15	-	-	-	2	28	-	-	-	-	-	-	-	-	1	3	7
53	Ice/Sea Segment 15	-	-	-	-	-	-	-	1	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-
59	ERA 59	-	-	-	-	-	-	-	-	1	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-
61	ERA 61	-	-	-	-	-	-	-	-	2	-	-	-	-	4	-	1	-	-	-	-	-	-	-	-
99	ERA 99	-	-	-	3	8	2	-	-	-	12	15	2	-	-	2	3	1	10	17	-	3	3	-	-

Notes- ** = Greater than 99.5 percent; - = less than 0.5 percent; LA = Launch Area, P = Pipeline. Rows with all values less than 0.5 percent are not shown.

Table A.2-52 Winter Conditional Probabilities (Expressed as Percent Chance) that a Large Oil Spill Starting at a Particular Location Will Contact a Certain Environmental Resource Area Within 60 Days, Chukchi Sale 193

ID	Environmental Resource Area Name	LA 1	LA 2	LA 3	LA 4	LA 5	LA 6	LA 7	LA 8	LA 9	LA 10	LA 11	LA 12	LA 13	P 1	P 2	P 3	P 4	P 5	P 6	P 7	P 8	P 9	P 10	P 11
—	LAND	2	1	-	6	4	1	1	2	10	18	10	8	6	15	6	18	1	4	27	-	3	17	1	11
1	Kasegaluk Lagoon	-	-	-	1	2	1	-	-	-	5	4	1	-	-	1	3	-	2	8	-	1	1	-	-
4	ERA 4	-	-	-	-	-	-	-	-	5	-	-	-	-	8	-	2	-	-	-	-	-	-	-	-
6	ERA 6	-	1	1	1	2	2	1	3	-	1	5	11	8	-	-	-	1	3	3	1	4	25	2	22
10	Ledyard Bay Spectacled Eider Critical Habitat	-	-	-	2	3	1	-	-	2	11	6	1	-	1	2	11	-	3	15	-	1	1	-	-
11	Wrangel Island	3	1	-	1	1	-	-	-	-	-	-	-	-	-	2	-	2	-	-	-	-	-	-	-
14	Cape Thompson Seabird Colony Area	-	-	-	-	-	-	-	-	2	1	-	-	-	9	-	3	-	-	-	-	-	-	-	-
15	Cape Lisburne Seabird Colony Area	-	-	-	-	1	-	-	-	3	4	1	-	-	10	-	9	-	1	1	-	-	-	-	-
16	ERA 16	-	-	-	-	-	-	-	-	3	-	-	-	-	3	-	1	-	-	-	-	-	-	-	-
19	Chukchi Spring Lead 1	-	-	-	-	-	-	-	-	1	1	-	-	-	12	-	3	-	-	-	-	-	-	-	-
20	Chukchi Spring Lead 2	-	-	-	-	1	-	-	-	1	7	2	1	-	1	-	12	-	1	5	-	1	-	-	-
21	Chukchi Spring Lead 3	-	-	-	2	2	-	-	-	1	8	5	1	-	-	2	5	-	2	17	-	-	1	-	-
22	Chukchi Spring Lead 4	-	-	-	2	3	1	-	-	-	4	9	10	-	-	1	1	-	4	8	-	4	29	-	2
23	Chukchi Spring Lead 5	-	-	-	-	-	-	1	-	-	-	1	3	3	-	-	-	-	-	-	1	1	5	1	16
24	Beaufort Spring Lead 6	-	-	-	-	-	-	-	2	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	1
25	Beaufort Spring Lead 7	-	-	-	-	-	-	-	2	-	-	-	-	2	-	-	-	-	-	-	-	-	-	1	1
26	Beaufort Spring Lead 8	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
38	P.t Hope Subsistence Area	-	-	-	-	-	-	-	-	2	1	-	-	-	13	-	5	-	-	-	-	-	-	-	-
39	Point Lay Subsistence Area	-	-	-	3	4	1	-	-	1	20	9	1	-	1	3	16	-	3	39	-	1	1	-	-
40	Wainwright Subsistence Area	-	-	-	3	4	1	-	-	-	11	11	14	1	-	2	7	-	4	21	-	4	49	-	7
41	Barrow Subsistence Area 1	-	-	-	-	-	-	-	1	-	-	-	1	5	-	-	-	-	-	-	-	-	2	-	11
45	ERA 45	-	-	-	-	-	-	-	-	7	2	1	-	-	17	-	9	-	1	1	-	-	-	-	-
46	Herald Shoal Polynya	8	1	-	18	1	-	-	-	4	2	-	-	-	2	21	4	1	1	-	-	-	-	-	-
47	Ice/Sea Segment 10	6	3	1	17	25	4	1	-	1	10	7	2	-	1	8	3	5	18	7	2	3	2	-	-
48	Ice/Sea Segment 11	7	13	12	10	31	49	16	5	2	22	44	22	11	1	8	9	15	38	28	22	68	12	13	12
49	Hanna's Shoal Polynya	10	26	64	6	21	43	45	25	1	11	22	19	25	-	5	4	19	22	14	54	35	7	38	21
50	Ice/Sea Segment 12	1	3	2	1	5	8	6	2	-	4	14	40	13	-	1	1	3	7	5	4	41	22	5	24
51	Ice/Sea Segment 13	-	1	1	-	1	2	2	2	-	1	4	29	18	-	-	-	1	2	1	1	6	31	3	49
52	Ice/Sea Segment 14	-	-	-	-	-	-	1	17	-	-	-	3	29	-	-	-	-	-	-	-	1	2	3	9
53	Ice/Sea Segment 15	-	-	-	-	-	-	-	2	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-
59	ERA 59	-	-	-	1	-	-	-	-	2	-	-	-	-	1	-	1	-	-	-	-	-	-	-	-
61	ERA 61	-	-	-	-	-	-	-	-	3	-	-	-	-	6	-	1	-	-	-	-	-	-	-	-
64	Peard Bay	-	-	-	-	-	1	1	1	-	-	1	1	2	-	-	-	-	1	-	1	1	1	1	3
70	ERA 70	-	1	1	-	-	1	1	-	-	-	-	-	-	-	-	-	-	-	-	1	1	-	1	-
99	ERA 99	2	1	-	7	13	4	1	-	1	15	19	5	1	-	5	5	2	15	21	1	6	6	-	1

Notes- ** = Greater than 99.5 percent; - = less than 0.5 percent; LA = Launch Area, P = Pipeline. Rows with all values less than 0.5 percent are not shown.

Table A.2-53 Winter Conditional Probabilities (Expressed as Percent Chance) that a Large Oil Spill Starting at a Particular Location Will Contact a Certain Environmental Resource Area Within 180 Days, Chukchi Sale 193

ID	Environmental Resource Area Name	LA 1	LA 2	LA 3	LA 4	LA 5	LA 6	LA 7	LA 8	LA 9	LA 10	LA 11	LA 12	LA 13	P 1	P 2	P 3	P 4	P 5	P 6	P 7	P 8	P 9	P 10	P 11
—	LAND	7	5	4	16	13	7	7	10	30	30	21	23	17	37	16	33	6	12	38	5	11	38	8	27
1	Kasegaluk Lagoon	-	-	-	5	6	1	-	-	1	11	8	3	-	1	4	6	1	5	13	-	2	3	-	-
2	Point Barrow, Plover Islands	1	2	2	-	1	2	3	5	-	-	1	2	4	-	-	-	1	1	-	2	2	2	3	3
4	ERA 4	-	-	-	-	-	-	-	-	5	-	-	-	-	9	-	2	-	-	-	-	-	-	-	-
6	ERA 6	1	2	2	4	8	5	6	9	1	7	13	22	16	1	2	3	2	9	11	3	10	36	7	32
10	Ledyard Bay Spectacled Eider Critical Habitat	-	-	-	5	7	1	-	-	3	16	10	2	-	2	5	15	1	6	19	-	3	3	-	-
11	Wrangel Island	4	2	-	1	1	-	-	-	-	-	-	-	-	-	3	-	2	1	-	-	-	-	-	-
14	Cape Thompson Seabird Colony Area	-	-	-	-	-	-	-	-	2	1	-	-	-	11	-	4	-	-	-	-	-	-	-	-
15	Cape Lisburne Seabird Colony Area	-	-	-	1	1	-	-	-	4	5	1	1	-	12	-	11	-	1	2	-	1	1	-	-
16	ERA 16	-	-	-	1	-	-	-	-	10	2	-	-	-	10	1	4	-	-	-	-	-	-	-	-
18	ERA 18	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-
19	Chukchi Spring Lead 1	-	-	-	-	-	-	-	-	2	1	-	-	-	13	-	3	-	-	-	-	-	-	-	-
20	Chukchi Spring Lead 2	-	-	-	1	1	-	-	-	1	8	3	1	-	1	1	13	-	2	6	-	1	1	-	-
21	Chukchi Spring Lead 3	-	-	-	3	4	1	-	-	1	10	7	1	-	1	3	6	-	4	18	-	1	1	-	-
22	Chukchi Spring Lead 4	1	-	-	4	6	2	-	-	1	7	12	14	1	1	3	4	1	7	11	-	5	34	-	3
23	Chukchi Spring Lead 5	-	-	-	-	-	1	1	1	-	-	2	6	5	-	-	-	-	1	1	1	2	9	1	20
24	Beaufort Spring Lead 6	-	-	-	-	-	-	1	4	-	-	-	2	5	-	-	-	-	-	-	-	1	1	1	3
25	Beaufort Spring Lead 7	-	-	-	-	-	-	1	4	-	-	-	1	4	-	-	-	-	-	-	-	1	1	1	3
26	Beaufort Spring Lead 8	-	-	-	-	-	-	-	1	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-
27	Beaufort Spring Lead 9	-	-	-	-	-	-	-	1	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-
30	Ice/Sea Segment 2	-	1	1	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	-	-	-
31	Ice/Sea Segment 3	-	1	1	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	-	-	-
32	Ice/Sea Segment 4	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-
35	ERA 35	2	4	4	1	4	5	4	4	-	1	4	6	5	-	1	-	4	5	2	4	5	6	5	7
36	ERA 36	1	2	1	2	3	2	1	-	-	1	3	3	1	-	1	-	2	4	2	2	2	4	-	3
38	Pt Hope Subsistence Area	-	-	-	-	-	-	-	-	2	1	-	-	-	14	-	6	-	-	1	-	-	-	-	-
39	Point Lay Subsistence Area	1	-	-	6	7	1	-	-	2	25	13	3	-	1	6	20	1	6	42	-	2	3	-	-
40	Wainwright Subsistence Area	1	1	1	7	10	3	1	1	1	18	19	20	3	1	6	11	2	10	29	1	7	56	1	11
41	Barrow Subsistence Area 1	-	-	-	-	-	-	1	2	-	-	1	3	6	-	-	-	-	-	1	-	1	4	1	15
42	Barrow Subsistence Area 2	1	2	2	-	1	2	3	2	-	-	-	2	2	-	-	-	2	1	-	2	2	2	2	2
45	ERA 45	-	-	-	-	1	-	-	-	7	3	1	1	-	19	-	10	-	1	2	-	1	1	-	-
46	Herald Shoal Polynya	8	1	-	19	2	-	-	-	4	2	1	-	-	2	22	4	1	1	1	-	-	-	-	-
47	Ice/Sea Segment 10	7	4	2	19	28	6	1	-	2	13	10	5	1	1	9	5	7	21	10	4	7	6	-	2
48	Ice/Sea Segment 11	11	19	18	13	37	53	24	13	3	27	50	34	21	2	10	12	20	44	34	28	73	24	21	24
49	Hanna's Shoal Polynya	15	33	68	9	29	51	54	37	2	18	33	33	37	1	8	9	26	30	23	59	44	17	48	34
50	Ice/Sea Segment 12	4	6	5	3	11	12	9	4	1	8	20	46	16	1	2	3	7	14	10	8	44	30	8	28
51	Ice/Sea Segment 13	1	2	2	1	5	5	5	5	-	4	10	36	22	-	1	2	3	7	6	3	11	42	6	54
52	Ice/Sea Segment 14	1	3	4	-	1	4	6	20	-	-	2	6	32	-	-	-	2	1	-	4	4	4	7	12
53	Ice/Sea Segment 15	-	1	1	-	-	1	1	2	-	-	-	1	2	-	-	-	-	-	-	1	1	1	1	1
54	Ice/Sea Segment 16a	-	1	1	-	-	1	-	1	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-
56	ERA 56	4	7	9	1	4	8	10	8	-	2	4	6	8	-	1	1	6	5	2	9	6	5	9	8
59	ERA 59	-	-	-	2	-	-	-	-	3	1	-	-	-	2	1	2	-	-	-	-	-	-	-	-
61	ERA 61	-	-	-	-	-	-	-	-	4	-	-	-	-	7	-	1	-	-	-	-	-	-	-	-
63	ERA 63	1	2	1	-	-	1	-	1	-	-	1	-	-	-	-	-	1	1	-	1	1	-	-	-
64	Peard Bay	1	1	2	1	3	3	4	4	-	1	4	8	7	-	1	1	1	3	2	2	5	6	5	12
66	ERA 66	-	1	1	-	-	-	-	2	-	-	-	1	1	-	-	-	-	-	-	-	-	1	-	1
70	ERA 70	1	2	2	-	2	2	3	2	-	1	2	2	2	-	-	-	2	2	2	3	2	1	2	2
99	ERA 99	4	5	3	11	20	10	4	2	2	21	26	13	4	2	9	9	7	22	26	5	13	17	3	7

Notes- ** = Greater than 99.5 percent; - = less than 0.5 percent; LA = Launch Area, P = Pipeline. Rows with all values less than 0.5 percent are not shown.

Table A.2-54 Winter Conditional Probabilities (Expressed as Percent Chance) that a Large Oil Spill Starting at a Particular Location Will Contact a Certain Environmental Resource Area Within 360 Days, Chukchi Sale 193

ID	Environmental Resource Area Name	LA 1	LA 2	LA 3	LA 4	LA 5	LA 6	LA 7	LA 8	LA 9	LA 10	LA 11	LA 12	LA 13	P 1	P 2	P 3	P 4	P 5	P 6	P 7	P 8	P 9	P 10	P 11
—	LAND	9	7	6	21	16	9	9	13	36	35	24	26	20	43	20	38	8	15	42	7	14	42	10	30
1	Kasegaluk Lagoon	-	-	-	5	6	1	-	-	1	11	8	3	-	1	4	6	1	5	13	-	2	3	-	-
2	Point Barrow, Plover Islands	2	3	4	1	2	3	4	6	-	1	2	3	5	-	1	1	3	2	2	4	3	3	4	3
4	ERA 4	-	-	-	-	-	-	-	-	5	-	-	-	-	9	-	2	-	-	-	-	-	-	-	-
6	ERA 6	1	2	2	4	8	5	6	9	1	7	13	23	17	1	2	3	3	9	11	3	10	36	7	33
10	Ledyard Bay Spectacled Eider Critical Habitat	-	-	-	5	7	1	-	-	3	16	10	2	-	2	5	15	1	6	19	-	3	3	-	1
11	Wrangel Island	4	2	-	1	1	-	-	-	-	-	-	-	-	-	3	-	2	1	-	-	-	-	-	-
14	Cape Thompson Seabird Colony Area	-	-	-	-	-	-	-	-	2	1	-	-	-	11	-	4	-	-	-	-	-	-	-	-
15	Cape Lisburne Seabird Colony Area	-	-	-	1	1	-	-	-	4	5	1	1	-	12	-	11	-	1	2	-	1	1	-	-
16	ERA 16	-	-	-	2	-	-	-	-	12	2	-	-	-	12	1	5	-	-	-	-	-	-	-	-
18	ERA 18	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-
19	Chukchi Spring Lead 1	-	-	-	-	-	-	-	-	2	1	-	-	-	13	-	3	-	-	-	-	-	-	-	-
20	Chukchi Spring Lead 2	-	-	-	1	1	-	-	-	1	8	3	1	-	1	1	13	-	2	6	-	1	1	-	-
21	Chukchi Spring Lead 3	-	-	-	3	4	1	-	-	1	10	7	1	-	1	3	6	-	4	18	-	1	1	-	-
22	Chukchi Spring Lead 4	1	-	-	4	6	2	-	-	1	7	12	14	1	1	3	4	1	7	11	-	5	34	-	3
23	Chukchi Spring Lead 5	-	-	-	-	-	1	1	1	-	-	2	6	5	-	-	-	-	1	1	1	2	9	1	20
24	Beaufort Spring Lead 6	-	-	-	-	-	-	1	4	-	-	-	2	5	-	-	-	-	-	-	-	1	1	2	3
25	Beaufort Spring Lead 7	-	1	1	-	-	1	1	4	-	-	-	2	5	-	-	-	-	-	-	-	1	1	1	3
26	Beaufort Spring Lead 8	-	-	-	-	-	-	-	1	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	1
27	Beaufort Spring Lead 9	-	-	-	-	-	-	-	1	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-
28	Beaufort Spring Lead 10	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
29	Ice/Sea Segment 1	-	-	-	-	-	1	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-
30	Ice/Sea Segment 2	-	1	1	-	-	1	1	1	-	-	-	-	1	-	-	-	-	-	-	1	1	-	1	-
31	Ice/Sea Segment 3	-	1	1	-	-	1	1	1	-	-	-	-	1	-	-	-	-	-	-	1	1	-	1	-
32	Ice/Sea Segment 4	-	-	1	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	-	-	-
35	ERA 35	2	4	4	1	5	6	5	5	-	2	5	7	6	-	1	1	4	5	3	5	6	7	5	8
36	ERA 36	1	2	1	2	3	2	1	-	-	2	3	3	1	-	1	1	2	4	2	2	2	5	-	3
38	Pt. Hope Subsistence Area	-	-	-	-	-	-	-	-	2	1	-	-	-	14	-	6	-	-	1	-	-	-	-	-
39	Point Lay Subsistence Area	1	-	-	6	7	1	-	-	2	25	13	3	-	1	6	20	1	6	42	-	2	3	-	-
40	Wainwright Subsistence Area	1	1	1	7	10	3	1	1	1	18	19	20	3	1	6	11	2	10	29	1	7	56	1	12
41	Barrow Subsistence Area 1	-	-	-	-	-	-	1	2	-	-	1	3	6	-	-	-	-	-	1	-	1	4	1	15
42	Barrow Subsistence Area 2	2	3	3	1	3	3	3	3	-	1	2	3	3	-	1	1	3	2	2	3	3	2	3	2
45	ERA 45	-	-	-	-	1	-	-	-	7	3	1	1	-	19	-	10	-	1	2	-	1	1	-	-
46	Herald Shoal Polynya	8	1	-	19	2	-	-	-	4	2	1	-	-	2	22	4	1	1	2	-	-	-	-	-
47	Ice/Sea Segment 10	7	4	2	19	28	6	1	-	2	13	11	5	1	1	9	5	7	21	11	4	7	7	-	2
48	Ice/Sea Segment 11	11	20	18	13	37	54	24	14	3	28	50	35	23	2	10	12	21	44	34	28	73	25	22	25
49	Hanna's Shoal Polynya	15	33	68	10	29	51	54	38	2	19	33	33	38	1	8	9	26	31	23	60	45	18	48	34
50	Ice/Sea Segment 12	4	6	5	3	11	12	10	4	1	8	20	46	17	1	2	3	7	14	11	8	45	31	8	29
51	Ice/Sea Segment 13	2	2	2	2	6	5	5	5	-	4	10	37	22	-	1	2	3	7	7	3	12	42	6	55
52	Ice/Sea Segment 14	2	4	5	1	3	5	6	21	-	2	3	7	32	-	1	1	3	3	2	5	5	4	8	13
53	Ice/Sea Segment 15	-	1	2	-	1	2	2	4	-	1	1	1	3	-	-	-	1	1	1	2	1	1	2	2
54	Ice/Sea Segment 16a	-	1	2	-	1	1	1	2	-	-	-	-	1	-	-	-	1	1	-	2	1	-	1	1
55	Ice/Sea Segment 17	-	1	1	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-
56	ERA 56	4	8	10	2	6	9	11	9	-	3	5	8	10	-	1	1	7	6	4	10	8	7	11	11
58	Ice/Sea Segment 20a	-	-	-	-	-	-	1	1	-	-	-	-	1	-	-	-	-	-	-	-	-	-	1	-
59	ERA 59	-	-	-	2	-	-	-	-	3	1	-	-	-	2	1	2	-	-	-	-	-	-	-	-
61	ERA 61	-	-	-	-	-	-	-	-	4	-	-	-	-	7	-	1	-	-	-	-	-	-	-	-
63	ERA 63	1	2	1	-	1	1	1	1	-	-	1	1	1	-	-	-	2	1	1	1	1	1	1	2
64	ERA 64	1	1	2	1	3	3	4	4	-	2	4	8	7	-	1	1	1	4	3	2	5	7	5	14
66	ERA 66	1	2	2	1	1	1	1	2	-	1	1	1	2	-	1	-	1	1	1	2	1	2	1	1
69	ERA 69	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-
70	ERA 70	1	2	2	-	2	3	3	2	-	1	3	2	3	-	-	1	2	2	2	3	3	1	2	2
99	ERA 99	4	5	3	11	20	10	4	2	2	21	27	14	4	2	9	9	7	23	27	5	13	19	3	7

Notes- ** = Greater than 99.5 percent; - = less than 0.5 percent; LA = Launch Area, P = Pipeline. Rows with all values less than 0.5 percent are not shown.

Table A.2-55 Winter Conditional Probabilities (Expressed as Percent Chance) that a Large Oil Spill Starting at a Particular Location Will Contact a Certain Land Segment Within 3 Days, Chukchi Sale 193

ID	Land Segment Name	LA 1	LA 2	LA 3	LA 4	LA 5	LA 6	LA 7	LA 8	LA 9	LA 10	LA 11	LA 12	LA 13	P 1	P 2	P 3	P 4	P 5	P 6	P 7	P 8	P 9	P 10	P 11
64	Kukpuk River, Point Hope	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-
65	Buckland, Cape Lisburne	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-
72	Point Lay, Siksrikpak Point	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-
73	Tungaich Point, Tungak Creek	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	-	-	-	-	-
74	Kasegaluk Lagoon, Solivik Isl.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-
82	Skull Cliff	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1

Notes- ** = Greater than 99.5 percent; - = less than 0.5 percent; LA = Launch Area, P = Pipeline. Rows with all values less than 0.5 percent are not shown.

Table A.2-56 Winter Conditional Probabilities (Expressed as Percent Chance) that a Large Oil Spill Starting at a Particular Location Will Contact a Certain Land Segment Within 10 Days, Chukchi Sale 193

ID	Land Segment Name	LA 1	LA 2	LA 3	LA 4	LA 5	LA 6	LA 7	LA 8	LA 9	LA 10	LA 11	LA 12	LA 13	P 1	P 2	P 3	P 4	P 5	P 6	P 7	P 8	P 9	P 10	P 11
64	Kukpuk River, Point Hope	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-
65	Buckland, Cape Lisburne	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-
72	Point Lay, Siksrikpak Point	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	3	-	-	-	-	-
73	Tungaich Point, Tungak Creek	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	6	-	-	-	-	-
74	Kasegaluk Lagoon, Solivik Isl.	-	-	-	-	-	-	-	-	-	1	1	-	-	-	-	-	-	-	4	-	-	-	-	-
75	Akeonik, Icy Cape	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	1	-	-	-	-	-
79	Point Belcher, Wainwright	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-
80	Eluksingiak Point, Kugrua Bay	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-
82	Skull Cliff	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
84	Will Rogers & Wiley Post Mem.	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	1
85	Barrow, Browerville, Elson Lag.	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	1

Notes- ** = Greater than 99.5 percent; - = less than 0.5 percent; LA = Launch Area, P = Pipeline. Rows with all values less than 0.5 percent are not shown.

Table A.2-57 Winter Conditional Probabilities (Expressed as Percent Chance) that a Large Oil Spill Starting at a Particular Location Will Contact a Certain Land Segment Within 30 Days, Chukchi Sale 193

ID	Land Segment Name	LA 1	LA 2	LA 3	LA 4	LA 5	LA 6	LA 7	LA 8	LA 9	LA 10	LA 11	LA 12	LA 13	P 1	P 2	P 3	P 4	P 5	P 6	P 7	P 8	P 9	P 10	P 11
27	Laguna Nut, Rigol'	-	-	-	1	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-
35	Enurmino, Mys Neten	-	-	-	-	-	-	-	-	1	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-
36	Mys Serdtse-Kamen	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-
39	Cape Dezhnev, Naukan, Uelen	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-
64	Kukpuk River, Point Hope	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-
65	Buckland, Cape Lisburne	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	1	-	-	-	-	-	-	-	-
70	Kuchaurak and Kuchiak Creek	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-
71	Kukpowruk River, Sitkok Point	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	2	-	-	1	-	-	-	-	-
72	Point Lay, Siksrikpak Point	-	-	-	-	-	-	-	-	-	3	1	-	-	-	-	2	-	-	4	-	-	-	-	-
73	Tungaich Point, Tungak Creek	-	-	-	-	-	-	-	-	-	3	1	-	-	-	-	2	-	-	7	-	-	-	-	-
74	Kasegaluk Lagoon, Solivik Isl.	-	-	-	-	-	-	-	-	-	2	1	-	-	-	-	1	-	-	6	-	-	-	-	-
75	Akeonik, Icy Cape	-	-	-	-	-	-	-	-	-	1	1	-	-	-	-	1	-	-	3	-	-	-	-	-
78	Point Collie, Sigeakruk Point	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-
79	Point Belcher, Wainwright	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	3	-	-
80	Eluksingiak Point, Kugrua Bay	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	3	-	-
82	Skull Cliff	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
83	Nulavik, Loran Radio Station	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
84	Will Rogers & Wiley Post Mem.	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	2
85	Barrow, Browerville, Elson Lag.	-	-	-	-	-	-	-	1	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	2

Notes- ** = Greater than 99.5 percent; - = less than 0.5 percent; LA = Launch Area, P = Pipeline. Rows with all values less than 0.5 percent are not shown.

Table A.2-58 Winter Conditional Probabilities (Expressed as Percent Chance) that a Large Oil Spill Starting at a Particular Location Will Contact a Certain Land Segment Within 60 Days, Chukchi Sale 193

ID	Land Segment Name	LA 1	LA 2	LA 3	LA 4	LA 5	LA 6	LA 7	LA 8	LA 9	LA 10	LA 11	LA 12	LA 13	P 1	P 2	P 3	P 4	P 5	P 6	P 7	P 8	P 9	P 10	P 11
8	E. Wrangel Island, Skeletov	1	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-
27	Laguna Nut, Rigol'	-	-	-	1	-	-	-	-	1	-	-	-	-	1	1	-	-	-	-	-	-	-	-	-
30	Nutepynmin, Pyngopil'gyn	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
32	Mys Dzhenretlen, Eynenekvyk	-	-	-	-	-	-	-	-	1	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-
33	Neskan, Laguna Neskan	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-
34	Tepken, Memino	-	-	-	-	-	-	-	-	1	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-
35	Enurmino, Mys Neten	-	-	-	-	-	-	-	-	2	-	-	-	-	2	-	1	-	-	-	-	-	-	-	-
36	Mys Serdtse-Kamen	-	-	-	-	-	-	-	-	1	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-
37	Chegitun, Utkan	-	-	-	-	-	-	-	-	1	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-
38	Enmytagyn, Inchoun, Mitkulen	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-
39	Cape Dezhnev, Naukan, Uelen	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-
64	Kukpuk River, Point Hope	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-
65	Buckland, Cape Lisburne	-	-	-	-	-	-	-	-	1	-	-	-	-	3	-	1	-	-	-	-	-	-	-	-
70	Kuchaurak and Kuchiak Creek	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	1	-	-	-	-	-	-	-	-
71	Kukpowruk River, Sitkok Point	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	2	-	-	1	-	-	-	-	-
72	Point Lay, Siksrikpak Point	-	-	-	-	-	-	-	-	-	3	1	-	-	-	-	3	-	-	4	-	-	-	-	-
73	Tungaich Point, Tungak Creek	-	-	-	-	1	-	-	-	-	4	1	-	-	-	1	3	-	-	8	-	-	-	-	-
74	Kasegaluk Lagoon, Solivik Isl.	-	-	-	1	1	-	-	-	-	3	2	-	-	-	1	2	-	1	7	-	-	-	-	-
75	Akeonik, Icy Cape	-	-	-	1	1	-	-	-	-	2	2	-	-	-	1	1	-	1	4	-	-	1	-	-
76	Avak Inlet, Tunalik River	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-
78	Point Collie, Sigeakruk Point	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	1	-	-	4	-	-
79	Point Belcher, Wainwright	-	-	-	-	-	-	-	-	-	-	1	2	-	-	-	-	-	-	-	-	-	6	-	-
80	Eluksingiak Point, Kugrua Bay	-	-	-	-	-	-	-	-	-	-	1	2	-	-	-	-	-	-	-	-	1	5	-	1
81	Peard Bay, Point Franklin	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
82	Skull Cliff	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	2
83	Nulavik, Loran Radio Station	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
84	Will Rogers & Wiley Post Mem.	-	-	-	-	-	-	-	-	-	-	-	1	2	-	-	-	-	-	-	-	-	-	-	3
85	Barrow, Browerville, Elson Lag.	-	-	-	-	-	-	-	1	-	-	-	-	3	-	-	-	-	-	-	-	-	-	-	2

Notes- ** = Greater than 99.5 percent; - = less than 0.5 percent; LA = Launch Area, P = Pipeline. Rows with all values less than 0.5 percent are not shown.

Table A.2-59 Winter Conditional Probabilities (Expressed as Percent Chance) that a Large Oil Spill Starting at a Particular Location Will Contact a Certain Land Segment Within 180 Days, Chukchi Sale 193

ID	Land Segment Name	LA 1	LA 2	LA 3	LA 4	LA 5	LA 6	LA 7	LA 8	LA 9	LA 10	LA 11	LA 12	LA 13	P 1	P 2	P 3	P 4	P 5	P 6	P 7	P 8	P 9	P 10	P 11
7	E. Wrangel Island	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
8	E. Wrangel Island, Skeleton	1	1	-	-	-	-	-	-	-	-	-	-	-	-	1	-	1	-	-	-	-	-	-	-
24		-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-
25	Ostrov Leny, Yulinu	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-
26	Ekugvaam ,Kepin, Pil'khin	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-
27	Laguna Nut, Rigol'	1	-	-	1	-	-	-	-	1	-	-	-	-	1	1	-	-	-	-	-	-	-	-	-
28	Vankarem,Vankarem Laguna	-	-	-	1	-	-	-	-	1	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-
29	Mys Onman, Vel'may	-	-	-	1	-	-	-	-	1	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-
30	Nutepynmin, Pyngopil'gyn	-	-	-	1	-	-	-	-	1	-	-	-	-	1	1	1	-	-	-	-	-	-	-	-
31	Alyatki, Zaliv Tasytkhin	-	-	-	1	-	-	-	-	1	-	-	-	-	1	-	1	-	-	-	-	-	-	-	-
32	Mys Dzhenretlen, Eynenekvyk	-	-	-	1	-	-	-	-	2	-	-	-	-	2	-	1	-	-	-	-	-	-	-	-
33	Neskan, Laguna Neskan	-	-	-	-	-	-	-	-	2	-	-	-	-	2	-	1	-	-	-	-	-	-	-	-
34	Tepken, Memino	-	-	-	-	-	-	-	-	3	-	-	-	-	3	-	1	-	-	-	-	-	-	-	-
35	Enurmino, Mys Neten	-	-	-	-	-	-	-	-	5	1	-	-	-	5	-	2	-	-	-	-	-	-	-	-
36	Mys Serdtse-Kamen	-	-	-	-	-	-	-	-	3	-	-	-	-	5	-	1	-	-	-	-	-	-	-	-
37	Chegitun, Utkan	-	-	-	-	-	-	-	-	3	-	-	-	-	4	-	1	-	-	-	-	-	-	-	-
38	Enmytagyn, Inchoun, Mitkulen	-	-	-	-	-	-	-	-	1	-	-	-	-	3	-	-	-	-	-	-	-	-	-	-
39	Cape Dezhnev, Naukan, Uelen	-	-	-	-	-	-	-	-	1	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-
64	Kukpuk River, Point Hope	-	-	-	-	-	-	-	-	1	-	-	-	-	3	-	1	-	-	-	-	-	-	-	-
65	Buckland, Cape Lisburne	-	-	-	-	-	-	-	-	1	-	-	-	-	4	-	2	-	-	-	-	-	-	-	-
67	Cape Sabine, Pitmegea River	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-
70	Kuchaurak Creek, Kuchiak Creek	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	2	-	-	-	-	-	-	-	-
71	Kukpowruk River, Sitkok Point	-	-	-	-	-	-	-	-	-	3	1	-	-	-	-	3	-	-	2	-	-	-	-	-
72	Point Lay, Siksrikpak Point	-	-	-	1	1	-	-	-	-	4	1	-	-	-	1	4	-	1	5	-	-	-	-	-
73	Tungaich Point, Tungak Creek	-	-	-	1	1	-	-	-	1	5	2	-	-	-	1	4	-	1	9	-	-	-	-	-
74	Kasegaluk Lagoon, Solivik Isl.	-	-	-	2	2	-	-	-	-	4	3	1	-	-	2	3	-	2	8	-	-	1	-	-
75	Akeonik, Icy Cape	-	-	-	2	2	-	-	-	-	3	3	1	-	-	2	2	-	1	5	-	-	1	-	-
76	Avak Inlet, Tunalik River	-	-	-	-	1	-	-	-	-	1	1	-	-	-	-	-	-	1	1	-	1	1	-	-
77	Nivat Point, Nokotlek Point	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-
78	Point Collie, Sigeakruk Point	-	-	-	-	1	-	-	-	-	1	2	3	-	-	-	1	-	1	2	-	1	7	-	1
79	Point Belcher, Wainwright	-	-	-	-	1	-	-	-	-	1	2	3	-	-	-	1	-	1	2	-	1	9	-	1
80	Eluksingiak Point, Kugrua Bay	-	-	-	-	1	-	-	-	-	1	1	4	1	-	-	-	-	1	1	-	2	9	-	3
81	Peard Bay, Point Franklin	-	-	-	-	1	1	-	-	-	1	1	1	-	-	-	-	1	1	1	-	1	2	-	2
82	Skull Cliff	-	-	-	-	-	1	1	-	-	-	1	2	1	-	-	-	-	1	1	-	1	4	-	5
83	Nulavik, Loran Radio Station	-	-	-	-	1	1	1	1	-	-	1	2	2	-	-	-	-	1	-	1	1	1	1	4
84	Will Rogers & Wiley Post Mem.	-	-	-	-	-	-	1	1	-	-	-	2	3	-	-	-	-	-	-	-	-	1	1	5
85	Barrow, Browerville, Elson Lag.	-	-	-	-	-	-	2	5	-	-	-	3	7	-	-	-	-	-	-	-	1	2	3	6
86	Dease Inlet, Plover Islands	-	-	-	-	-	-	1	1	-	-	-	1	1	-	-	-	-	-	-	-	-	1	1	1
87	Igalik & Kulgurak Island	1	1	1	-	1	1	1	1	-	-	-	-	-	-	-	-	1	-	-	1	1	-	1	-

Notes- ** = Greater than 99.5 percent; - = less than 0.5 percent; LA = Launch Area, P = Pipeline. Rows with all values less than 0.5 percent are not shown.

Table A.2-60 Winter Conditional Probabilities (Expressed as Percent Chance) that a Large Oil Spill Starting at a Particular Location Will Contact a Certain Land Segment Within 360 Days, Chukchi Sale 193

ID	Land Segment Name	LA 1	LA 2	LA 3	LA 4	LA 5	LA 6	LA 7	LA 8	LA 9	LA 10	LA 11	LA 12	LA 13	P 1	P 2	P 3	P 4	P 5	P 6	P 7	P 8	P 9	P 10	P 11
7	E. Wrangel Island	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
8	E. Wrangel Island, Skeletov	1	1	-	-	-	-	-	-	-	-	-	-	-	-	1	-	1	-	-	-	-	-	-	-
24		-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-
25	Ostrov Leny, Yulinu	-	-	-	1	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-
26	Ekugvaam, Kepin, Pil'khin	-	-	-	1	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-
27	Laguna Nut, Rigol'	1	-	-	1	-	-	-	-	1	-	-	-	-	1	1	-	-	-	-	-	-	-	-	-
28	Vankarem,Vankarem Laguna	-	-	-	1	-	-	-	-	1	-	-	-	-	1	1	-	-	-	-	-	-	-	-	-
29	Mys Onman, Vel'may	-	-	-	1	-	-	-	-	1	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-
30	Nutepynmin, Pyngopil'gyn	-	-	-	2	-	-	-	-	2	-	-	-	-	1	1	1	-	-	-	-	-	-	-	-
31	Alyatki, Zaliv Tasytkhin	-	-	-	1	-	-	-	-	2	-	-	-	-	1	1	1	-	-	-	-	-	-	-	-
32	Mys Dzhenretlen, Eynenekvyk	-	-	-	1	-	-	-	-	3	-	-	-	-	2	-	1	-	-	-	-	-	-	-	-
33	Neskan, Laguna Neskan	-	-	-	1	-	-	-	-	3	-	-	-	-	2	1	1	-	-	-	-	-	-	-	-
34	Tepken, Memino	-	-	-	-	-	-	-	-	4	1	-	-	-	4	-	1	-	-	-	-	-	-	-	-
35	Enurmino, Mys Neten	-	-	-	1	-	-	-	-	5	1	-	-	-	6	-	2	-	-	-	-	-	-	-	-
36	Mys Serdtse-Kamen	-	-	-	-	-	-	-	-	4	-	-	-	-	5	-	2	-	-	-	-	-	-	-	-
37	Chegitun, Utkan	-	-	-	-	-	-	-	-	3	-	-	-	-	5	-	1	-	-	-	-	-	-	-	-
38	Enmytagyn, Inchoun, Mitkulen	-	-	-	-	-	-	-	-	2	-	-	-	-	3	-	1	-	-	-	-	-	-	-	-
39	Cape Dezhnev, Naukan, Uelen	-	-	-	-	-	-	-	-	1	-	-	-	-	3	-	1	-	-	-	-	-	-	-	-
64	Kukpuk River, Point Hope	-	-	-	-	-	-	-	-	1	-	-	-	-	3	-	1	-	-	-	-	-	-	-	-
65	Buckland, Cape Lisburne	-	-	-	-	-	-	-	-	1	-	-	-	-	4	-	2	-	-	-	-	-	-	-	-
67	Cape Sabine, Pitmegea River	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-
70	Kuchaurak and Kuchiak Creek	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	2	-	-	-	-	-	-	-	-
71	Kukpowruk River, Sitkok Point	-	-	-	-	-	-	-	-	-	3	1	-	-	-	-	3	-	-	2	-	-	-	-	-
72	Point Lay, Siksrikpak Point	-	-	-	1	1	-	-	-	-	4	1	-	-	-	1	4	-	1	5	-	-	-	-	-
73	Tungaich Point, Tungak Creek	-	-	-	1	1	-	-	-	1	5	2	-	-	-	1	4	-	1	9	-	-	-	-	-
74	Kasegaluk Lagoon, Solivik Isl.	-	-	-	2	2	-	-	-	-	4	3	1	-	-	2	3	-	2	8	-	-	1	-	-
75	Akeonik, Icy Cape	-	-	-	2	2	-	-	-	-	3	3	1	-	-	2	2	-	1	5	-	-	1	-	-
76	Avak Inlet, Tunalik River	-	-	-	-	1	-	-	-	-	1	1	-	-	-	-	-	-	1	1	-	1	1	-	-
77	Nivat Point, Nokotlek Point	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-
78	Point Collie, Sigeakruk Point	-	-	-	1	1	-	-	-	-	2	2	3	-	-	-	1	-	1	2	-	1	7	-	1
79	Point Belcher, Wainwright	-	-	-	-	1	-	-	-	-	1	2	3	-	-	-	1	-	1	2	-	1	9	-	1
80	Eluksingiak Point, Kugrua Bay	-	-	-	-	1	-	-	-	-	1	1	4	1	-	-	-	-	1	1	-	2	10	-	3
81	Peard Bay, Point Franklin	-	-	-	-	1	1	-	-	-	1	1	1	-	-	-	-	1	1	1	-	1	2	-	2
82	Skull Cliff	-	-	-	-	-	1	1	-	-	-	1	2	1	-	-	-	-	1	1	-	1	4	-	6
83	Nulavik, Loran Radio Station	-	-	-	-	1	1	1	1	-	-	1	2	2	-	-	-	-	1	-	1	1	1	1	4
84	Will Rogers & Wiley Post Mem.	-	-	-	-	-	-	1	1	-	-	-	2	3	-	-	-	-	-	-	-	-	1	1	5
85	Barrow, Browerville, Elson Lag.	-	-	-	-	-	-	2	5	-	-	1	4	7	-	-	-	-	-	-	-	1	3	3	6
86	Dease Inlet, Plover Islands	-	-	-	-	-	-	1	1	-	-	-	1	1	-	-	-	-	-	-	-	1	1	1	1
87	Igalik & Kulgurak Island	2	2	2	1	1	2	1	1	-	1	1	1	1	-	1	-	2	1	1	2	2	-	1	1
88	Cape Simpson, Piasuk River	1	1	1	-	1	1	-	1	-	-	-	-	-	-	-	-	1	-	1	1	-	-	-	-

Notes- ** = Greater than 99.5 percent; - = less than 0.5 percent; LA = Launch Area, P = Pipeline. Rows with all values less than 0.5 percent are not shown.

Table A.2-61 Winter Conditional Probabilities (Expressed as Percent Chance) that a Large Oil Spill Starting at a Particular Location Will Contact a Certain Group of Land Segments Within 3 Days, Chukchi Sale 193

ID	Land Segment Name	LA 1	LA 2	LA 3	LA 4	LA 5	LA 6	LA 7	LA 8	LA 9	LA 10	LA 11	LA 12	LA 13	P 1	P 2	P 3	P 4	P 5	P 6	P 7	P 8	P 9	P 10	P 11
88	Alaska Maritime National Wildlife Refuge	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-
89	National Petroleum Reserve Alaska	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
96	United States Chukchi Coast	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	5	-	-	1	-	1

Notes- ** = Greater than 99.5 percent; - = less than 0.5 percent; LA = Launch Area, P = Pipeline. Rows with all values less than 0.5 percent are not shown.

Table A.2-62 Winter Conditional Probabilities (Expressed as Percent Chance) that a Large Oil Spill Starting at a Particular Location Will Contact a Certain Group of Land Segments Within 10 Days, Chukchi Sale 193

ID	Land Segment Name	LA 1	LA 2	LA 3	LA 4	LA 5	LA 6	LA 7	LA 8	LA 9	LA 10	LA 11	LA 12	LA 13	P 1	P 2	P 3	P 4	P 5	P 6	P 7	P 8	P 9	P 10	P 11
88	Alaska Maritime National Wildlife Refuge	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-
89	National Petroleum Reserve Alaska	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	2
96	United States Chukchi Coast	-	-	-	-	-	-	-	-	-	3	2	1	1	3	-	2	-	-	14	-	-	3	-	3
97	United States Beaufort Coast	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	1

Notes- ** = Greater than 99.5 percent; - = less than 0.5 percent; LA = Launch Area, P = Pipeline. Rows with all values less than 0.5 percent are not shown.

Table A.2-63 Winter Conditional Probabilities (Expressed as Percent Chance) that a Large Oil Spill Starting at a Particular Location Will Contact a Certain Group of Land Segment Within 30 Days, Chukchi Sale 193

ID	Land Segment Name	LA 1	LA 2	LA 3	LA 4	LA 5	LA 6	LA 7	LA 8	LA 9	LA 10	LA 11	LA 12	LA 13	P 1	P 2	P 3	P 4	P 5	P 6	P 7	P 8	P 9	P 10	P 11
84	Wrangel Is Nat Res Natural World Heritage Site	1	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-
88	Alaska Maritime National Wildlife Refuge	-	-	-	-	-	-	-	-	1	-	-	-	-	2	-	1	-	-	-	-	-	-	-	-
89	National Petroleum Reserve Alaska	-	-	-	-	-	-	-	-	-	-	1	1	-	-	-	-	-	-	1	-	-	4	-	3
90	Kasegaluk Lagoon Special Use Area	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-
95	Russia Chukchi Coast	1	-	-	1	-	-	-	-	3	-	-	-	-	5	2	1	-	-	-	-	-	-	-	-
96	United States Chukchi Coast	-	-	-	1	1	-	-	-	1	11	6	3	2	4	1	10	-	1	21	-	1	9	-	5
97	United States Beaufort Coast	-	-	-	-	-	-	-	1	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	2

Notes- ** = Greater than 99.5 percent; - = less than 0.5 percent; LA = Launch Area, P = Pipeline. Rows with all values less than 0.5 percent are not shown.

Table A.2-64 Winter Conditional Probabilities (Expressed as Percent Chance) that a Large Oil Spill Starting at a Particular Location Will Contact a Certain Group of Land Segments Within 60 Days, Chukchi Sale 193

ID	Land Segment Name	LA 1	LA 2	LA 3	LA 4	LA 5	LA 6	LA 7	LA 8	LA 9	LA 10	LA 11	LA 12	LA 13	P 1	P 2	P 3	P 4	P 5	P 6	P 7	P 8	P 9	P 10	P 11
84	Wrangel Is Nat Res Natural World Heritage Site	1	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	1	-	-	-	-	-	-	-
88	Alaska Maritime National Wildlife Refuge	-	-	-	-	-	-	-	-	1	-	-	-	-	3	-	1	-	-	-	-	-	-	-	-
89	National Petroleum Reserve Alaska	-	-	-	-	1	1	-	-	-	1	2	3	1	-	-	-	-	1	1	-	2	7	-	5
90	Kasegaluk Lagoon Special Use Area	-	-	-	-	-	-	-	-	-	1	1	-	-	-	-	-	-	-	1	-	-	1	-	-
95	Russia Chukchi Coast	2	1	-	3	-	-	-	-	8	1	-	-	-	9	3	3	1	-	-	-	-	-	-	-
96	United States Chukchi Coast	-	-	-	3	4	1	-	1	2	17	9	7	3	5	3	16	-	4	27	-	3	17	1	8
97	United States Beaufort Coast	-	-	-	-	-	-	-	1	-	-	-	-	3	-	-	-	-	-	-	-	-	-	-	2

Notes- ** = Greater than 99.5 percent; - = less than 0.5 percent; LA = Launch Area, P = Pipeline. Rows with all values less than 0.5 percent are not shown.

Table A.2-65 Winter Conditional Probabilities (Expressed as Percent Chance) that a Large Oil Spill Starting at a Particular Location Will Contact a Certain Group of Land Segments Within 180 Days, Chukchi Sale 193

ID	Land Segment Name	LA 1	LA 2	LA 3	LA 4	LA 5	LA 6	LA 7	LA 8	LA 9	LA 10	LA 11	LA 12	LA 13	P 1	P 2	P 3	P 4	P 5	P 6	P 7	P 8	P 9	P 10	P 11
84	Wrangel Is Nat Res Natural World Heritage Site	2	1	-	-	-	-	-	-	-	-	-	-	-	-	1	-	2	-	-	-	-	-	-	-
88	Alaska Maritime National Wildlife Refuge	-	-	-	-	-	-	-	-	1	-	-	-	-	4	-	2	-	-	-	-	-	-	-	-
89	National Petroleum Reserve Alaska	2	3	3	2	5	4	4	3	-	3	6	11	6	-	1	1	3	5	5	4	7	17	4	14
90	Kasegaluk Lagoon Special Use Area	-	-	-	1	1	-	-	-	-	1	1	1	-	-	-	-	-	1	2	-	1	1	-	-
95	Russia Chukchi Coast	5	2	-	8	1	1	-	-	26	3	1	-	-	29	8	10	3	1	-	-	1	-	-	-
96	United States Chukchi Coast	1	1	1	8	11	4	3	3	4	27	20	19	8	8	8	24	2	11	37	2	9	35	3	20
97	United States Beaufort Coast	1	2	2	-	1	2	4	7	-	-	1	4	8	-	-	-	1	1	-	2	2	3	5	7

Notes- ** = Greater than 99.5 percent; - = less than 0.5 percent; LA = Launch Area, P = Pipeline. Rows with all values less than 0.5 percent are not shown.

Table A.2-66 Winter Conditional Probabilities (Expressed as Percent Chance) that a Large Oil Spill Starting at a Particular Location Will Contact a Certain Group of Land Segments Within 360 Days, Chukchi Sale 193

ID	Land Segment Name	LA 1	LA 2	LA 3	LA 4	LA 5	LA 6	LA 7	LA 8	LA 9	LA 10	LA 11	LA 12	LA 13	P 1	P 2	P 3	P 4	P 5	P 6	P 7	P 8	P 9	P 10	P 11
84	Wrangel Is Nat Res Nat World Heritage Site	2	1	-	1	1	-	-	1	-	-	-	1	-	-	1	-	2	1	-	-	-	1	-	-
88	Alaska Maritime National Wildlife Refuge	-	-	-	-	-	-	-	-	1	-	-	-	-	4	-	2	-	-	-	-	-	-	-	-
89	National Petroleum Reserve Alaska	3	4	4	3	7	6	5	5	-	5	9	13	7	-	2	2	4	8	7	5	9	20	5	16
90	Kasegaluk Lagoon Special Use Area	-	-	-	1	1	-	-	-	-	1	1	1	-	-	-	-	-	1	2	-	1	1	-	-
91	Teshekpuk Lake Special Use Area	-	-	-	-	1	-	-	1	-	-	-	-	1	-	-	-	-	1	-	-	-	-	1	-
95	Russia Chukchi Coast	6	2	-	12	2	1	-	1	32	5	1	1	1	34	11	13	3	1	1	1	1	1	-	-
96	United States Chukchi Coast	1	1	1	8	12	5	3	3	4	28	21	20	9	8	8	24	2	11	39	2	9	37	3	21
97	United States Beaufort Coast	2	3	4	1	3	4	6	9	-	2	3	6	10	-	1	1	3	3	2	4	4	5	6	9

Notes- ** = Greater than 99.5 percent; - = less than 0.5 percent; LA = Launch Area, P = Pipeline. Rows with all values less than 0.5 percent are not shown.

Table A.2-67 Winter Conditional Probabilities (Expressed as Percent Chance) that a Large Oil Spill Starting at a Particular Location Will Contact a Certain Boundary Segment Within 3 Days, Chukchi Sale 193

ID	Boundary Segment Name	LA 1	LA 2	LA 3	LA 4	LA 5	LA 6	LA 7	LA 8	LA 9	LA 10	LA 11	LA 12	LA 13	P 1	P 2	P 3	P 4	P 5	P 6	P 7	P 8	P 9	P 10	P 11

Notes- All boundary segments have all values less than 0.5%; therefore the data are not shown and the tables are left blank.

Table A.2-68 Winter Conditional Probabilities (Expressed as Percent Chance) that a Large Oil Spill Starting at a Particular Location Will Contact a Certain Boundary Segment Within 10 Days, Chukchi Sale 193

ID	Boundary Segment Name	LA 1	LA 2	LA 3	LA 4	LA 5	LA 6	LA 7	LA 8	LA 9	LA 10	LA 11	LA 12	LA 13	P 1	P 2	P 3	P 4	P 5	P 6	P 7	P 8	P 9	P 10	P 11

Notes- All boundary segments have all values less than 0.5%; therefore the data are not shown and the tables are left blank.

Table A.2-69 Winter Conditional Probabilities (Expressed as Percent Chance) that a Large Oil Spill Starting at a Particular Location Will Contact a Certain Boundary Segment Within 30 Days, Chukchi Sale 193

ID	Boundary Segment Name	LA 1	LA 2	LA 3	LA 4	LA 5	LA 6	LA 7	LA 8	LA 9	LA 10	LA 11	LA 12	LA 13	P 1	P 2	P 3	P 4	P 5	P 6	P 7	P 8	P 9	P 10	P 11
2	Bering Strait	-	-	-	-	-	-	-	-	1	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-
16	Chukchi Sea	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-
18	Chukchi Sea	1	3	4	-	1	2	2	1	-	-	1	-	-	-	-	-	2	2	-	4	1	-	1	-
19	Chukchi Sea	1	3	4	-	1	2	2	2	-	-	1	-	1	-	-	-	2	1	-	3	1	-	2	-
20	Chukchi Sea	1	2	3	-	1	1	1	1	-	-	-	-	-	-	-	-	1	1	-	2	-	-	1	-
21	Chukchi Sea	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
22	Chukchi Sea	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
23	Beaufort Sea	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
24	Beaufort Sea	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
25	Beaufort Sea	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Notes- ** = Greater than 99.5 percent; - = less than 0.5 percent; LA = Launch Area, P = Pipeline. Rows with all values less than 0.5 percent are not shown.

Table A.2-70 Winter Conditional Probabilities (Expressed as Percent Chance) that a Large Oil Spill Starting at a Particular Location Will Contact a Certain Boundary Segment Within 60 Days, Chukchi Sale 193

ID	Boundary Segment Name	LA 1	LA 2	LA 3	LA 4	LA 5	LA 6	LA 7	LA 8	LA 9	LA 10	LA 11	LA 12	LA 13	P 1	P 2	P 3	P 4	P 5	P 6	P 7	P 8	P 9	P 10	P 11
2	Bering Strait	-	-	-	-	-	-	-	-	1	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-
15	Chukchi Sea	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-
16	Chukchi Sea	1	1	-	-	1	1	-	-	-	-	-	-	-	-	-	-	2	1	-	1	-	-	-	-
17	Chukchi Sea	1	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	1	-	-	1	-
18	Chukchi Sea	5	9	10	1	5	8	7	4	-	2	5	3	3	-	1	-	6	5	3	10	6	1	6	3
19	Chukchi Sea	5	11	12	1	5	9	9	5	-	2	3	3	5	-	1	1	9	5	2	11	5	-	7	3
20	Chukchi Sea	2	5	7	-	4	5	6	6	-	1	2	2	3	-	-	-	4	4	1	6	4	-	6	2
21	Chukchi Sea	-	1	2	-	1	1	2	2	-	-	-	-	1	-	-	-	1	1	-	2	1	-	2	-
22	Chukchi Sea	-	-	1	-	-	1	1	2	-	-	-	-	1	-	-	-	-	-	-	1	-	-	1	-
23	Beaufort Sea	-	-	-	-	-	-	1	1	-	-	-	-	1	-	-	-	-	-	-	-	-	-	1	1
24	Beaufort Sea	-	-	-	-	-	-	1	1	-	-	-	-	1	-	-	-	-	-	-	-	-	-	1	-
25	Beaufort Sea	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
26	Beaufort Sea	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Notes- ** = Greater than 99.5 percent; - = less than 0.5 percent; LA = Launch Area, P = Pipeline. Rows with all values less than 0.5 percent are not shown.

Table A.2-71 Winter Conditional Probabilities (Expressed as Percent Chance) that a Large Oil Spill Starting at a Particular Location Will Contact a Certain Boundary Segment Within 180 Days, Chukchi Sale 193

ID	Boundary Segment Name	LA 1	LA 2	LA 3	LA 4	LA 5	LA 6	LA 7	LA 8	LA 9	LA 10	LA 11	LA 12	LA 13	P 1	P 2	P 3	P 4	P 5	P 6	P 7	P 8	P 9	P 10	P 11
2	Bering Strait	-	-	-	-	-	-	-	-	1	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-
15	Chukchi Sea	2	2	2	-	1	1	1	-	-	-	1	-	1	-	-	-	2	1	-	2	1	-	1	1
16	Chukchi Sea	2	3	1	-	2	2	1	-	-	1	1	1	1	-	-	1	3	1	1	1	1	-	1	1
17	Chukchi Sea	2	2	2	1	1	1	1	1	-	1	1	1	1	-	1	1	2	1	1	2	1	1	1	1
18	Chukchi Sea	7	11	13	2	7	10	9	6	-	5	7	5	5	-	2	2	9	8	5	12	9	3	8	5
19	Chukchi Sea	10	16	17	4	12	16	16	10	-	7	10	9	11	-	3	3	14	12	6	17	13	5	15	9
20	Chukchi Sea	5	10	13	1	8	11	12	11	-	4	6	6	8	-	1	1	9	8	5	12	9	3	12	7
21	Chukchi Sea	1	2	2	-	2	2	3	3	-	1	1	2	2	-	-	-	1	2	1	2	2	1	3	1
22	Chukchi Sea	-	-	1	-	-	1	1	3	-	-	1	1	1	-	-	-	-	1	1	1	1	2	2	-
23	Beaufort Sea	-	-	1	-	-	1	1	2	-	-	-	-	1	-	-	-	-	-	-	1	1	-	1	1
24	Beaufort Sea	-	-	-	-	-	-	1	2	-	-	-	1	1	-	-	-	-	-	-	-	-	-	1	1
25	Beaufort Sea	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
26	Beaufort Sea	-	-	-	-	-	-	-	1	-	-	-	-	1	-	-	-	-	-	-	-	1	-	-	-
27	Beaufort Sea	-	-	1	-	-	-	1	1	-	-	-	-	1	-	-	-	-	-	-	1	-	-	1	1
28	Beaufort Sea	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
30	Beaufort Sea	-	-	-	-	-	-	-	1	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-

Notes- ** = Greater than 99.5 percent; - = less than 0.5 percent; LA = Launch Area, P = Pipeline. Rows with all values less than 0.5 percent are not shown.

Table A.2-72 Winter Conditional Probabilities (Expressed as Percent Chance) that a Large Oil Spill Starting at a Particular Location Will Contact a Certain Boundary Segment Within 360 Days, Chukchi Sale 193

ID	Boundary Segment Name	LA 1	LA 2	LA 3	LA 4	LA 5	LA 6	LA 7	LA 8	LA 9	LA 10	LA 11	LA 12	LA 13	P 1	P 2	P 3	P 4	P 5	P 6	P 7	P 8	P 9	P 10	P 11
2	Bering Strait	-	-	-	-	-	-	-	-	1	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-
15	Chukchi Sea	2	2	2	-	1	1	1	-	-	-	1	-	1	-	-	-	2	1	-	2	1	-	1	1
16	Chukchi Sea	2	3	1	-	2	2	1	-	-	1	1	1	1	-	-	1	3	1	1	1	1	-	1	1
17	Chukchi Sea	2	2	2	1	1	1	1	1	-	1	1	1	1	-	1	1	2	1	1	2	1	1	1	1
18	Chukchi Sea	7	12	13	2	7	10	9	6	-	5	8	6	6	-	2	2	9	8	5	12	9	4	8	6
19	Chukchi Sea	10	17	18	4	12	16	17	10	-	7	10	10	11	-	3	3	15	12	6	18	14	5	16	10
20	Chukchi Sea	5	10	13	1	9	11	12	11	-	4	6	6	8	-	1	1	9	9	5	12	9	3	12	7
21	Chukchi Sea	1	2	3	-	2	2	3	4	-	1	2	2	2	-	-	-	2	3	1	2	2	1	3	1
22	Chukchi Sea	-	-	1	-	-	1	2	3	-	-	1	1	2	-	-	-	-	1	1	1	1	2	2	1
23	Beaufort Sea	1	1	2	1	1	2	3	4	-	1	1	1	3	-	-	-	1	2	1	2	2	1	3	2
24	Beaufort Sea	-	1	1	-	1	1	2	3	-	-	1	1	2	-	-	-	1	1	1	1	1	1	2	1
25	Beaufort Sea	-	-	-	-	-	-	-	2	-	-	1	-	1	-	-	-	-	1	-	-	-	-	-	-
26	Beaufort Sea	-	1	1	-	1	1	1	2	-	-	1	1	1	-	-	-	-	1	-	1	1	1	1	1
27	Beaufort Sea	-	-	1	-	-	1	2	2	-	-	-	1	2	-	-	-	-	-	-	1	1	1	1	1
28	Beaufort Sea	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
29	Beaufort Sea	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
30	Beaufort Sea	-	-	-	-	-	-	-	1	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-

Notes- ** = Greater than 99.5 percent; - = less than 0.5 percent; LA = Launch Area, P = Pipeline. Rows with all values less than 0.5 percent are not shown.

Table A.2-73 Combined Probabilities (Expressed as Percent Chance) of One or More Spills Greater than or Equal to 1,000 Barrels, and the Estimated Number of Spills (Mean), Occurring and Contacting a Certain Environmental Resource over the assumed Production Life of the Lease Area Within 3 Days, Chukchi Sale 193

ID	Environmental Resource Area Name	Alternative I Proposal		Alternative III Corridor I		Alternative IV Corridor II	
		Percent	Mean	Percent	Mean	Percent	Mean
	Land	1	0.01	-	-	-	-
6	ERA 6	1	0.01	1	0.01	1	0.1
10	Ledyard Bay Spectacled Eider Critical Habitat	4	0.04	2	0.02	3	0.3
14	Cape Thompson Seabird Colony Area	1	0.01	-	-	-	-
15	Cape Lisburne Seabird Colony Area	2	0.02	1	0.01	1	0.01
20	Chukchi Spring Lead 2	1	0.01	-	-	-	-
21	Chukchi Spring Lead 3	1	0.01	-	-	1	0.01
35	ERA 35	1	0.01	1	0.01	1	0.01
36	ERA 36	3	0.03	2	0.02	2	0.02
39	Point Lay Subsistence Area	2	0.02	1	0.01	2	0.02
40	Wainwright Subsistence Area	1	0.01	1	0.01	1	0.01
45	ERA 45	1	0.01	-	-	1	0.01
47	Ice/Sea Segment 10	1	0.01	1	0.01	1	0.01
48	Ice/Sea Segment 11	1	0.01	1	0.01	1	0.01
50	Ice/Sea Segment 12	1	0.01	1	0.01	1	0.01
51	Ice/Sea Segment 13	1	0.01	-	-	-	-
56	ERA 56	1	0.01	1	0.01	1	0.01

Notes- ** = Greater than 99.5 percent; - = less than 0.5 percent. Rows with all values less than 0.5 percent are not shown.

Table A.2-74 Combined Probabilities (Expressed as Percent Chance) of One or Spills Greater than or Equal to 1,000 Barrels, and the Estimated Number of Spills (Mean), Occurring and Contacting a Certain Environmental Resource over the assumed Production Life of the Lease Area Within 10 Days, Chukchi Sale 193

ID	Environmental Resource Area Name	Alternative I Proposal		Alternative III Corridor I		Alternative IV Corridor II	
		Percent	Mean	Percent	Mean	Percent	Mean
	Land	3	0.03	1	0.01	2	0.02
1	Kasegaluk Lagoon	1	0.01	1	0.01	1	0.01
6	ERA 6	1	0.01	1	0.01	1	0.01
10	Ledyard Bay Spectacled Eider Critical Habitat	5	0.05	3	0.03	4	0.04
14	Cape Thompson Seabird Colony Area	1	0.01	-	-	-	-
15	Cape Lisburne Seabird Colony Area	2	0.02	1	0.01	2	0.02
18	ERA 18	1	0.01	-	-	-	-
20	Chukchi Spring Lead 2	1	0.01	-	-	1	0.01
21	Chukchi Spring Lead 3	1	0.01	1	0.01	1	0.01
22	Chukchi Spring Lead 4	1	0.01	-	-	1	0.01
35	ERA 35	2	0.02	1	0.01	1	0.01
36	ERA 36	3	0.03	2	0.02	3	0.03
38	Point Hope Subsistence Area	1	0.01	-	-	-	-
39	Point Lay Subsistence Area	3	0.03	2	0.02	3	0.03
40	Wainwright Subsistence Area	2	0.02	1	0.01	2	0.02
45	ERA 45	1	0.01	1	0.01	1	0.01
47	Ice/Sea Segment 10	1	0.02	1	0.01	1	0.01
48	Ice/Sea Segment 11	3	0.03	3	0.03	3	0.03
49	Hanna's Shoal Polynya	1	0.01	1	0.01	1	0.01
50	Ice/Sea Segment 12	1	0.01	1	0.01	1	0.01
51	Ice/Sea Segment 13	1	0.01	1	0.01	1	0.01
56	ERA 56	1	0.01	1	0.01	1	0.01

Notes- ** = Greater than 99.5 percent; - = less than 0.5 percent. Rows with all values less than 0.5 percent are not shown.

Table A.2-75 Combined Probabilities (Expressed as Percent Chance) of One or More Large Spills Greater than or Equal to 1,000 Barrels, and the Estimated Number of Spills (Mean), Occurring and Contacting a Certain Environmental Resource over the assumed Production Life of the Lease Area Within 30 Days, Chukchi Sale 193

ID	Environmental Resource Area Name	Alternative I Proposal		Alternative III Corridor I		Alternative IV Corridor II	
		Percent	Mean	Percent	Mean	Percent	Mean
	Land	7	0.07	3	0.03	5	0.05
1	Kasegaluk Lagoon	2	0.02	1	0.01	2	0.02
6	ERA 6	3	0.03	2	0.02	2	0.02
10	Ledyard Bay Spectacled Eider Critical Habitat	7	0.07	3	0.03	5	0.05
14	Cape Thompson Seabird Colony Area	1	0.01	-	-	1	0.01
15	Cape Lisburne Seabird Colony Area	3	0.03	1	0.01	2	0.02
18	ERA 18	2	0.02	1	0.01	2	0.02
20	Chukchi Spring Lead 2	1	0.01	1	0.01	1	0.01
21	Chukchi Spring Lead 3	2	0.02	1	0.01	1	0.01
22	Chukchi Spring Lead 4	1	0.01	1	0.01	1	0.01
35	ERA 35	2	0.02	1	0.01	2	0.02
36	ERA 36	5	0.05	3	0.03	4	0.04
38	Point Hope Subsistence Area	1	0.01	-	-	1	0.01
39	Point Lay Subsistence Area	5	0.05	3	0.03	4	0.04
40	Wainwright Subsistence Area	4	0.04	3	0.03	4	0.04
45	ERA 45	3	0.03	1	0.01	2	0.02
46	Herald Shoal Polynya	1	0.01	1	0.01	1	0.01
47	Ice/Sea Segment 10	3	0.03	2	0.02	3	0.03
48	Ice/Sea Segment 11	6	0.06	5	0.06	6	0.06
49	Hanna's Shoal Polynya	3	0.03	3	0.03	3	0.03
50	Ice/Sea Segment 12	3	0.03	2	0.02	3	0.03
51	Ice/Sea Segment 13	2	0.02	1	0.01	2	0.02
52	Ice/Sea Segment 14	1	0.01	-	-	-	-
56	ERA 56	2	0.02	2	0.02	2	0.02
64	Peard Bay	1	0.01	-	-	1	0.01

Notes- ** = Greater than 99.5 percent; - = less than 0.5 percent. Rows with all values less than 0.5 percent are not shown.

Table A.2-76 Combined Probabilities (Expressed as Percent Chance) of One or More Large Spills Greater than or Equal to 1,000 Barrels, and the Estimated Number of Spills (Mean), Occurring and Contacting a Certain Environmental Resource over the assumed Production Life of the Lease Area Within 60 Days, Chukchi Sale 193

ID	Environmental Resource Area Name	Alternative I Proposal		Alternative III Corridor I		Alternative IV Corridor II	
		Percent	Mean	Percent	Mean	Percent	Mean
	Land	9	0.1	5	0.05	7	0.08
1	Kasegaluk Lagoon	3	0.03	2	0.02	3	0.03
6	ERA 6	4	0.04	2	0.02	3	0.03
10	Ledyard Bay Spectacled Eider Critical Habitat	8	0.08	4	0.04	6	0.06
14	Cape Thompson Seabird Colony Area	1	0.01	1	0.01	1	0.01
15	Cape Lisburne Seabird Colony Area	4	0.04	2	0.02	3	0.03
18	ERA 18	3	0.03	1	0.01	2	0.02
20	Chukchi Spring Lead 2	2	0.02	1	0.01	1	0.01
21	Chukchi Spring Lead 3	2	0.02	1	0.01	2	0.02
22	Chukchi Spring Lead 4	2	0.02	1	0.01	2	0.02
35	ERA 35	3	0.03	2	0.02	3	0.03
36	ERA 36	5	0.05	3	0.03	5	0.05
38	Point Hope Subsistence Area	1	0.01	1	0.01	1	0.01
39	Point Lay Subsistence Area	6	0.07	4	0.04	5	0.05
40	Wainwright Subsistence Area	6	0.06	4	0.04	5	0.05
45	ERA 45	3	0.03	1	0.01	2	0.02
46	Herald Shoal Polynya	2	0.02	1	0.01	1	0.01
47	Ice/Sea Segment 10	4	0.04	3	0.03	3	0.04
48	Ice/Sea Segment 11	8	0.09	7	0.07	8	0.08
49	Hanna's Shoal Polynya	6	0.06	4	0.05	5	0.05
50	Ice/Sea Segment 12	4	0.04	3	0.03	4	0.04
51	Ice/Sea Segment 13	3	0.03	2	0.02	2	0.03
52	Ice/Sea Segment 14	1	0.01	-	0.00	1	0.01
56	ERA 56	3	0.03	2	0.02	2	0.03
64	Peard Bay	1	0.01	1	0.01	1	0.01

Notes- ** = Greater than 99.5 percent; - = less than 0.5 percent. Rows with all values less than 0.5 percent are not shown.

Table A.2-77 Combined Probabilities (Expressed as Percent Chance) of One or More Large Spills Greater than or Equal to 1,000 Barrels, and the Estimated Number of Spills (Mean), Occurring and Contacting a Certain Environmental Resource over the assumed Production Life of the Lease Area Within 180 Days, Chukchi Sale 193

ID	Environmental Resource Area Name	Alternative I Proposal		Alternative III Corridor I		Alternative IV Corridor II	
		Percent	Mean	Percent	Mean	Percent	Mean
	Land	13	0.14	7	0.07	10	0.11
1	Kasegaluk Lagoon	4	0.04	2	0.02	3	0.03
6	ERA 6	5	0.06	4	0.04	5	0.05
10	Ledyard Bay Spectacled Eider Critical Habitat	8	0.09	5	0.05	7	0.07
14	Cape Thompson Seabird Colony Area	1	0.02	1	0.01	1	0.01
15	Cape Lisburne Seabird Colony Area	4	0.04	2	0.02	3	0.03
16	ERA 16	1	0.01	1	0.01	2	0.02
18	ERA 18	3	0.03	1	0.01	1	0.01
20	Chukchi Spring Lead 2	2	0.02	1	0.01	2	0.02
21	Chukchi Spring Lead 3	2	0.02	2	0.02	2	0.02
22	Chukchi Spring Lead 4	3	0.03	1	0.01	2	0.02
23	Chukchi Spring Lead 5	1	0.01	-	0.00	1	0.01
35	ERA 35	4	0.04	3	0.03	4	0.04
36	ERA 36	6	0.06	4	0.04	5	0.05
38	Point Hope Subsistence Area	1	0.01	1	0.01	1	0.01
39	Point Lay Subsistence Area	7	0.08	4	0.04	6	0.06
40	Wainwright Subsistence Area	7	0.08	5	0.05	6	0.07
45	ERA 45	3	0.03	1	0.01	2	0.02
46	Herald Shoal Polynya	2	0.02	1	0.01	2	0.02
47	Ice/Sea Segment 10	4	0.04	3	0.03	4	0.04
48	Ice/Sea Segment 11	10	0.11	8	0.08	10	0.10
49	Hanna's Shoal Polynya	8	0.09	6	0.07	8	0.08
50	Ice/Sea Segment 12	5	0.05	4	0.04	5	0.05
51	Ice/Sea Segment 13	4	0.04	3	0.03	4	0.04
52	Ice/Sea Segment 14	1	0.01	1	0.01	1	0.01
56	ERA 56	4	0.04	3	0.03	4	0.04
64	Peard Bay	2	0.02	1	0.01	2	0.02
70	ERA 70	1	0.01	-	0.00	1	0.01

Notes- ** = Greater than 99.5 percent; - = less than 0.5 percent. Rows with all values less than 0.5 percent are not shown.

Table A.2-78 Combined Probabilities (Expressed as Percent Chance) of One or More Large Spills Greater than or Equal to 1,000 Barrels, and the Estimated Number of Spills (Mean), Occurring and Contacting a Certain Environmental Resource over the assumed Production Life of the Lease Area Within 360 Days, Chukchi Sale 193

ID	Environmental Resource Area Name	Alternative I Proposal		Alternative III Corridor I		Alternative IV Corridor II	
		Percent	Mean	Percent	Mean	Percent	Mean
	Land	14	0.15	8	0.08	11	0.12
1	Kasegaluk Lagoon	4	0.04	2	0.02	3	0.03
	Barrow Plover Islands	1	0.01	1	0.01	1	0.01
6	ERA 6	6	0.06	4	0.04	5	0.05
10	Ledyard Bay Spectacled Eider Critical Habitat	8	0.09	5	0.05	7	0.07
14	Cape Thompson Seabird Colony Area	1	0.02	1	0.01	1	0.01
15	Cape Lisburne Seabird Colony Area	4	0.04	2	0.02	3	0.03
16	ERA 16	1	0.01	-	0.00	1	0.01
18	ERA 18	3	0.03	1	0.01	2	0.02
20	Chukchi Spring Lead 2	2	0.02	1	0.01	1	0.01
21	Chukchi Spring Lead 3	2	0.02	1	0.01	2	0.02
22	Chukchi Spring Lead 4	3	0.03	2	0.02	2	0.02
23	Chukchi Spring Lead 5	1	0.01	-	0.00	1	0.01
35	ERA 35	4	0.04	3	0.03	4	0
36	ERA 36	6	0.06	4	0.04	5	0.05
38	Point Hope Subsistence Area	1	0.01	1	0.01	1	0.01
39	Point Lay Subsistence Area	7	0.08	4	0.04	6	0.06
40	Wainwright Subsistence Area	8	0.08	5	0.05	6	0.07
42	Barrow Subsistence Area 2	1	0.01	1	0.01	1	0.01
45	ERA 45	3	0.03	1	0.01	2	0.02
46	Herald Shoal Polynya	2	0.02	1	0.01	2	0.02
47	Ice/Sea Segment 10	4	0.05	3	0.03	4	0.04
48	Ice/Sea Segment 11	10	0.11	8	0.08	10	0.1
49	Hanna's Shoal Polynya	9	0.09	7	0.07	8	0.08
50	Ice/Sea Segment 12	5	0.06	4	0.04	5	0.05
51	Ice/Sea Segment 13	4	0.05	3	0.03	4	0.04
52	Ice/Sea Segment 14	2	0.02	1	0.01	1	0.01
56	ERA 56	4	0.04	3	0.03	4	0.04
64	Peard Bay	2	0.02	1	0.01	2	0.02
70	ERA 70	1	0.01	1	0.00	1	0.01

Notes- ** = Greater than 99.5 percent; - = less than 0.5 percent. Rows with all values less than 0.5 percent are not shown.

Table A.2-79 Combined Probabilities (Expressed as Percent Chance) of One or More Large Spills Greater than or Equal to 1,000 Barrels, and the Estimated Number of Spills (Mean), Occurring and Contacting a Certain Land Segment over the Assumed Production Life of the Lease Area Within 3 Days, Chukchi Sale 193

ID	Land Segment Name	Alternative I Proposal		Alternative III Corridor I		Alternative IV Corridor II	
		Percent	Mean	Percent	Mean	Percent	Mean

Notes- All land segments have all values less than 0.5%; therefore the data are not shown and the tables are left blank.

Table A.2-80 Combined Probabilities (Expressed as Percent Chance) of One or More Large Spills Greater than or Equal to 1,000 Barrels, and the Estimated Number of Spills (Mean), Occurring and Contacting a Certain Land Segment over the Assumed Production Life of the Lease Area Within 10 Days, Chukchi Sale 193

ID	Land Segment Name	Alternative I Proposal		Alternative III Corridor I		Alternative IV Corridor II	
		Percent	Mean	Percent	Mean	Percent	Mean
73	Tungaich Point, Tungak Creek	1	0.01	-	0.00	-	0.00

Notes- ** = Greater than 99.5 percent; - = less than 0.5 percent. Rows with all values less than 0.5 percent are not shown.

Table A.2-81 Combined Probabilities (Expressed as Percent Chance) of One or More Large Spills Greater than or Equal to 1,000 Barrels, and the Estimated Number of Spills (Mean), Occurring and Contacting a Certain Land Segment over the Assumed Production Life of the Lease Area Within 30 Days, Chukchi Sale 193

ID	Land Segment Name	Alternative I Proposal		Alternative III Corridor I		Alternative IV Corridor II	
		Percent	Mean	Percent	Mean	Percent	Mean
72	Point Lay, Siksrikpak Point	1	0.01	-	0.00	1	0.01
73	Tungaich Point, Tungak Creek	1	0.01	1	0.01	1	0.01
74	Kasegaluk Lagoon, Solivik Isl.	1	0.01	-	0.00	1	0.01
75	Akeonik, Icy Cape	1	0.01	-	0.00	-	0.00

Notes- ** = Greater than 99.5 percent; - = less than 0.5 percent. Rows with all values less than 0.5 percent are not shown.

Table A.2-82 Combined Probabilities (Expressed as Percent Chance) of One or More Large Spills Greater than or Equal to 1,000 Barrels, and the Estimated Number of Spills (Mean), Occurring and Contacting a Certain Land Segment over the Assumed Production Life of the Lease Area Within 60 Days, Chukchi Sale 193

ID	Land Segment Name	Alternative I Proposal		Alternative III Corridor I		Alternative IV Corridor II	
		Percent	Mean	Percent	Mean	Percent	Mean
71	Kukpowruk River, Sitkok Point	1	0.01	-	0.00	-	0.00
72	Point Lay, Siksrikpak Point	1	0.01	1	0.01	1	0.01
73	Tungaich Point, Tungak Creek	1	0.01	1	0.01	1	0.01
74	Kasegaluk Lagoon, Solivik Isl.	1	0.01	-	0.00	1	0.01
75	Akeonik, Icy Cape	1	0.01	-	0.00	-	0.00

Notes- ** = Greater than 99.5 percent; - = less than 0.5 percent. Rows with all values less than 0.5 percent are not shown.

Table A.2-83 Combined Probabilities (Expressed as Percent Chance) of One or More Large Spills Greater than or Equal to 1,000 Barrels, and the Estimated Number of Spills (Mean), Occurring and Contacting a Certain Land Segment over the Assumed Production Life of the Lease Area Within 180 Days, Chukchi Sale 193

ID	Land Segment Name	Alternative I Proposal		Alternative III Corridor I		Alternative IV Corridor II	
		Percent	Mean	Percent	Mean	Percent	Mean
65	Buckland, Cape Lisburne	1	0.01	-	0.00	-	0.00
71	Kukpowruk River, Sitkok Point	1	0.01	-	0.00	-	0.00
72	Point Lay, Siksrikpak Point	1	0.01	1	0.01	1	0.01
73	Tungaich Point, Tungak Creek	1	0.01	1	0.01	1	0.01
74	Kasegaluk Lagoon, Solivik Isl.	1	0.01	1	0.01	1	0.01
75	Akeonik, Icy Cape	1	0.01	1	0.01	1	0.01
78	Point Collie, Sigeakruk Point	1	0.01	-	0.00	1	0.01
79	Point Belcher, Wainwright	1	0.01	1	0.01	1	0.01
80	Eluksingiak Point, Kugrua Bay	1	0.01	-	0.00	1	0.01

Notes- ** = Greater than 99.5 percent; - = less than 0.5 percent. Rows with all values less than 0.5 percent are not shown.

Table A.2-84 Combined Probabilities (Expressed as Percent Chance) of One or More Large Spills Greater than or Equal to 1,000 Barrels, and the Estimated Number of Spills (Mean), Occurring and Contacting a Certain Land Segment over the Assumed Production Life of the Lease Area Within 360 Days, Chukchi Sale 193

ID	Land Segment Name	Alternative I Proposal		Alternative III Corridor I		Alternative IV Corridor II	
		Percent	Mean	Percent	Mean	Percent	Mean
65	Buckland, Cape Lisburne	1	0.01	-	0.00	-	0.00
71	Kukpowruk River, Sitkok Point	1	0.01	-	0.00	-	0.00
72	Point Lay, Siksrikpak Point	1	0.01	1	0.01	1	0.01
73	Tungaich Point, Tungak Creek	1	0.01	1	0.01	1	0.01
74	Kasegaluk Lagoon, Solivik Isl.	1	0.01	1	0.01	1	0.01
75	Akeonik, Icy Cape	1	0.01	1	0.01	1	0.01
78	Point Collie, Sigeakruk Point	1	0.01	-	0.00	1	0.01
79	Point Belcher, Wainwright	1	0.01	1	0.01	1	0.01
80	Eluksingiak Point, Kugrua Bay	1	0.01	-	0	1	0.01

Notes- ** = Greater than 99.5 percent; - = less than 0.5 percent. Rows with all values less than 0.5 percent are not shown.

Table A.2-85 Combined Probabilities (Expressed as Percent Chance) of One or More Large Spills Greater than or Equal to 1,000 Barrels, and the Estimated Number of Spills (Mean), Occurring and Contacting a Certain Group of Land Segments over the Assumed Production Life of the Lease Area Within 3 Days, Chukchi Sale 193

ID	Land Segment Name	Alternative I Proposal		Alternative III Corridor I		Alternative IV Corridor II	
		Percent	Mean	Percent	Mean	Percent	Mean
96	United States Chukchi Coast	1	0.01	-	-	1	0.01

Notes- ** = Greater than 99.5 percent; - = less than 0.5 percent. Rows with all values less than 0.5 percent are not shown.

Table A.2-86 Combined Probabilities (Expressed as Percent Chance) of One or More Large Spills Greater than or Equal to 1,000 Barrels, and the Estimated Number of Spills (Mean), Occurring and Contacting a Certain Group of Land Segments over the Assumed Production Life of the Lease Area Within 10 Days, Chukchi Sale 193

ID	Land Segment Name	Alternative I Proposal		Alternative III Corridor I		Alternative IV Corridor II	
		Percent	Mean	Percent	Mean	Percent	Mean
96	United States Chukchi Coast	2	0.02	1	0.01	2	0.02

Notes- ** = Greater than 99.5 percent; - = less than 0.5 percent. Rows with all values less than 0.5 percent are not shown.

Table A.2-87 Combined Probabilities (Expressed as Percent Chance) of One or More Large Spills Greater than or Equal to 1,000 Barrels, and the Estimated Number of Spills (Mean), Occurring and Contacting a Certain Group of Land Segments over the Assumed Production Life of the Lease Area Within 30 Days, Chukchi Sale 193

ID	Land Segment Name	Alternative I Proposal		Alternative III Corridor I		Alternative IV Corridor II	
		Percent	Mean	Percent	Mean	Percent	Mean
89	National Petroleum Reserve Alaska	1	0.01	-	-	1	0.01
95	Russia Chukchi Coast	1	0.01	-	-	-	-
96	United States Chukchi Coast	6	0.06	3	0.03	5	0.05

Notes- ** = Greater than 99.5 percent; - = less than 0.5 percent. Rows with all values less than 0.5 percent are not shown.

Table A.2-88 Combined Probabilities (Expressed as Percent Chance) of One or More Large Spills Greater than or Equal to 1,000 Barrels, and the Estimated Number of Spills (Mean), Occurring and Contacting a Certain Group of Land Segments over the Assumed Production Life of the Lease Area Within 60 Days, Chukchi Sale 193

ID	Land Segment Name	Alternative I Proposal		Alternative III Corridor I		Alternative IV Corridor II	
		Percent	Mean	Percent	Mean	Percent	Mean
89	National Petroleum Reserve Alaska	1	0.01	1	0.01	1	0.01
95	Russia Chukchi Coast	1	0.01	-	-	1	0.01
96	United States Chukchi Coast	8	0.08	4	0.04	6	0.06

Notes- ** = Greater than 99.5 percent; - = less than 0.5 percent. Rows with all values less than 0.5 percent are not shown.

Table A.2-89 Combined Probabilities (Expressed as Percent Chance) of One or More Large Spills Greater than or Equal to 1,000 Barrels, and the Estimated Number of Spills (Mean), Occurring and Contacting a Certain Group of Land Segments over the Assumed Production Life of the Lease Area Within 180 Days, Chukchi Sale 193

ID	Land Segment Name	Alternative I Proposal		Alternative III Corridor I		Alternative IV Corridor II	
		Percent	Mean	Percent	Mean	Percent	Mean
88	Alaska Maritime NWR	1	0.01	-	-	-	-
89	National Petroleum Reserve Alaska	2	0.02	2	0.02	2	0.02
95	Russia Chukchi Coast	2	0.02	1	0.01	1	0.01
96	United States Chukchi Coast	11	0.11	6	0.06	9	0.09
97	United States Beaufort Coast	1	0.01	-	-	1	0.01

Notes- ** = Greater than 99.5 percent; - = less than 0.5 percent. Rows with all values less than 0.5 percent are not shown.

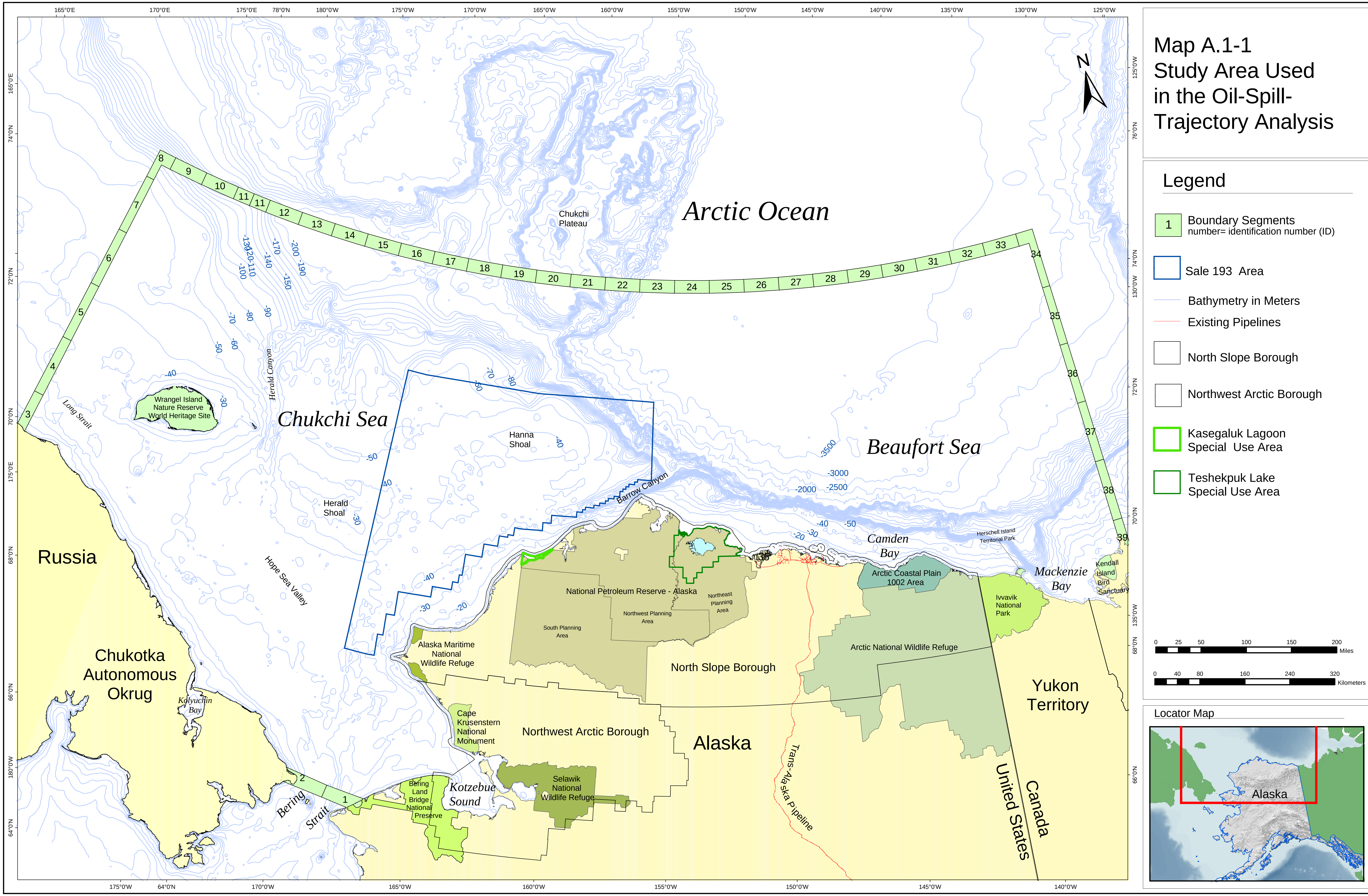
Table A.2-90 Combined Probabilities (Expressed as Percent Chance) of One or More Large Spills Greater than or Equal to 1,000 Barrels, and the Estimated Number of Spills (Mean), Occurring and Contacting a Certain Group of Land Segments over the Assumed Production Life of the Lease Area Within 360 Days, Chukchi Sale 193

ID	Land Segment Name	Alternative I Proposal		Alternative III Corridor I		Alternative IV Corridor II	
		Percent	Mean	Percent	Mean	Percent	Mean
88	Alaska Maritime NWR	1	0.01	-	0.00	-	0.00
89	National Petroleum Reserve Alaska	3	0.03	2	0.02	3	0.03
95	Russia Chukchi Coast	3	0.03	1	0.01	2	0.02
96	United States Chukchi Coast	11	0.11	6	0.06	9	0.09
97	United States Beaufort Sea Coast	1	0.01	1	0.01	1	0.01

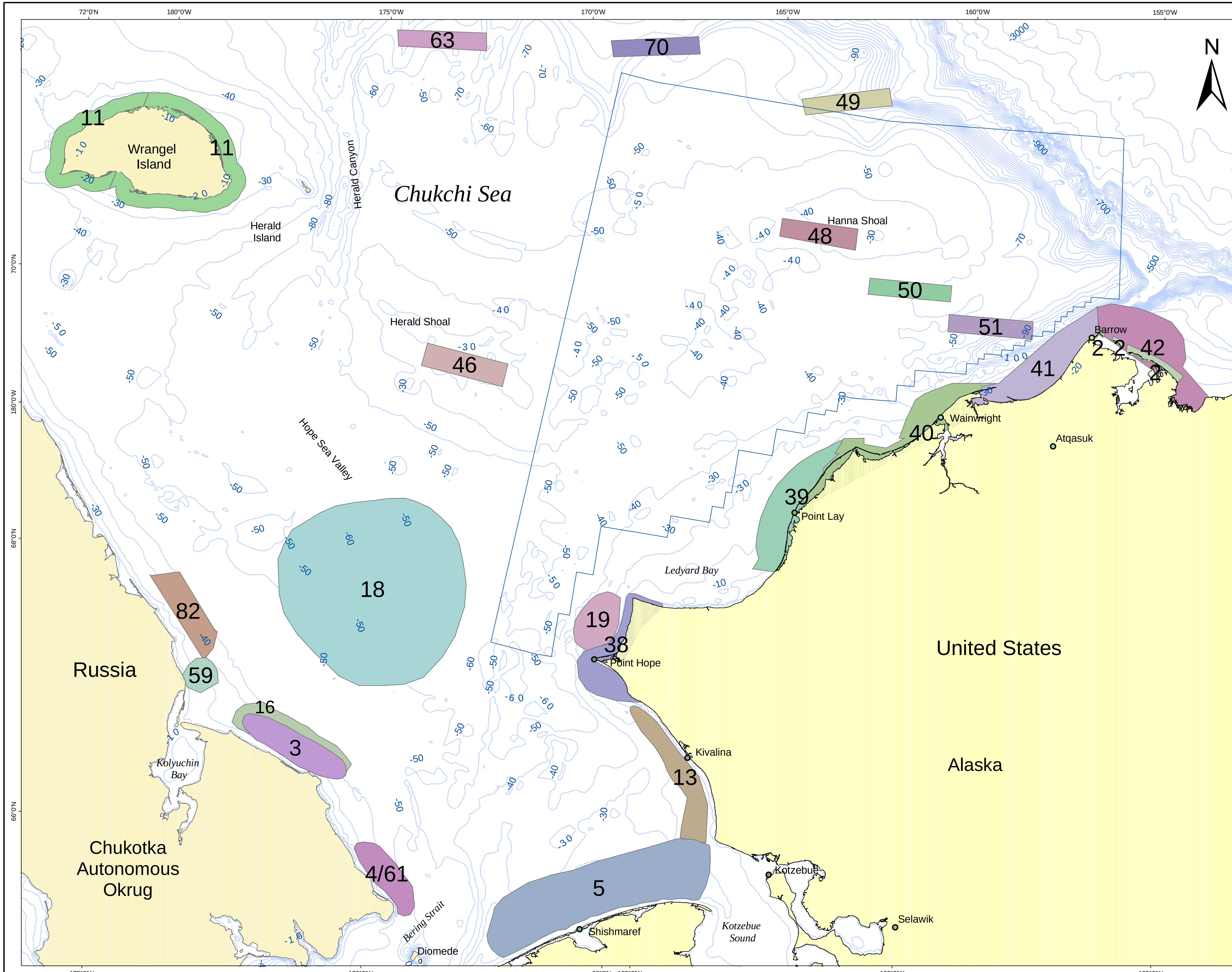
Notes- ** = Greater than 99.5 percent; - = less than 0.5 percent. Rows with all values less than 0.5 percent are not shown.

Table A.2-91 Range of Annual Conditional Probabilities (Expressed as Percent Chance) that a Large Oil Spill Starting at a Particular Location Will Contact Russian Waters Within 3, 10, 30, 60, 180 and 360 Days, Chukchi Sale 193

Days	LA 1	LA 2	LA 3	LA 4	LA 5	LA 6	LA 7	LA 8	LA 9	LA 10	LA 11	LA 12	LA 13
3	<0.5-3	<0.5-3	<0.50	<0.5-4	<0.5-1	<0.5	<0.5	<0.5	<0.5-4	<0.5	<0.5	<0.5	<0.5-0
10	<0.5-6	<0.5-2	<0.5-1	<0.5-8	<0.5-1	<0.5-1	<0.5-0	<0.5-0	<0.5-9	<0.5-1	<0.5	<0.5	<0.5
30	<0.5-8	<0.5-4	<0.5-1	<0.5-11	<0.5-2	<0.5-1	<0.5-1	<0.5-0	<0.5-12	<0.5-3	<0.5-1	<0.5-1	<0.5
60	<0.5-9	<0.5-5	<0.5-2	<0.5-11	<0.5-3	<0.5-2	<0.5-1	<0.5-1	<0.5-12	<0.5-4	<0.5-1	<0.5-1	<0.5-1
180	<0.5-10	<0.5-6	<0.5-3	<0.5-12	<0.5-3	<0.5-3	<0.5-2	<0.5-1	<0.5-12	<0.5-4	<0.5-2	<0.5-2	<0.5-2
360	<0.5-10	<0.5-6	<0.5-4	<0.5-12	<0.5-3	<0.5-3	<0.5-4	<0.5-2	<0.5-12	<0.5-4	<0.5-2	<0.5-2	<0.5-2



Map A.1-1 Study Area Used in the Oil-Spill-Trajectory Analysis



Map A.1-2a Environmental Resource Areas Used in the Oil-Spill-Trajectory Analysis

Legend

Environmental Resource Areas

ID.	Name
2.	Point Barrow, Plover Islands
3.	ERA 3
4.	ERA 4/ERA 61
5.	ERA 5
11.	Wrangel Island 12 nautical mile buffer
13.	ERA 13
16.	ERA 16
18.	ERA 18
19.	Chukchi Spring Lead 1
36.	ERA 36
38.	Point Hope Subsistence Area
39.	Point Lay Subsistence Area
40.	Wainwright Subsistence Area
41.	Barrow Subsistence Area 1
42.	Barrow Subsistence Area 2
46.	Herald Shoal Polynya
47.	Ice/Sea Segment 10
48.	Ice/Sea Segment 11
49.	Hanna's Shoal Polynya
50.	Ice/Sea Segment 12
51.	Ice/Sea Segment 13
52.	Ice/Sea Segment 14
59.	ERA 59
61.	ERA 61
63.	ERA 63
65.	Smith Bay
70.	ERA 70
82.	ERA 82

Sale 193 Area

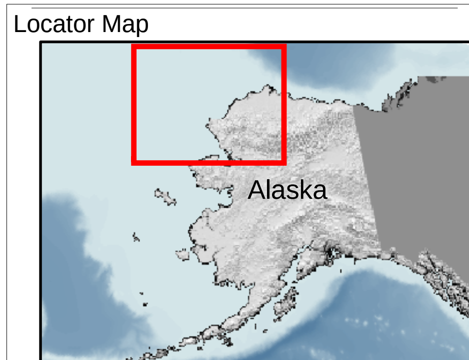
Bathymetry in Meters

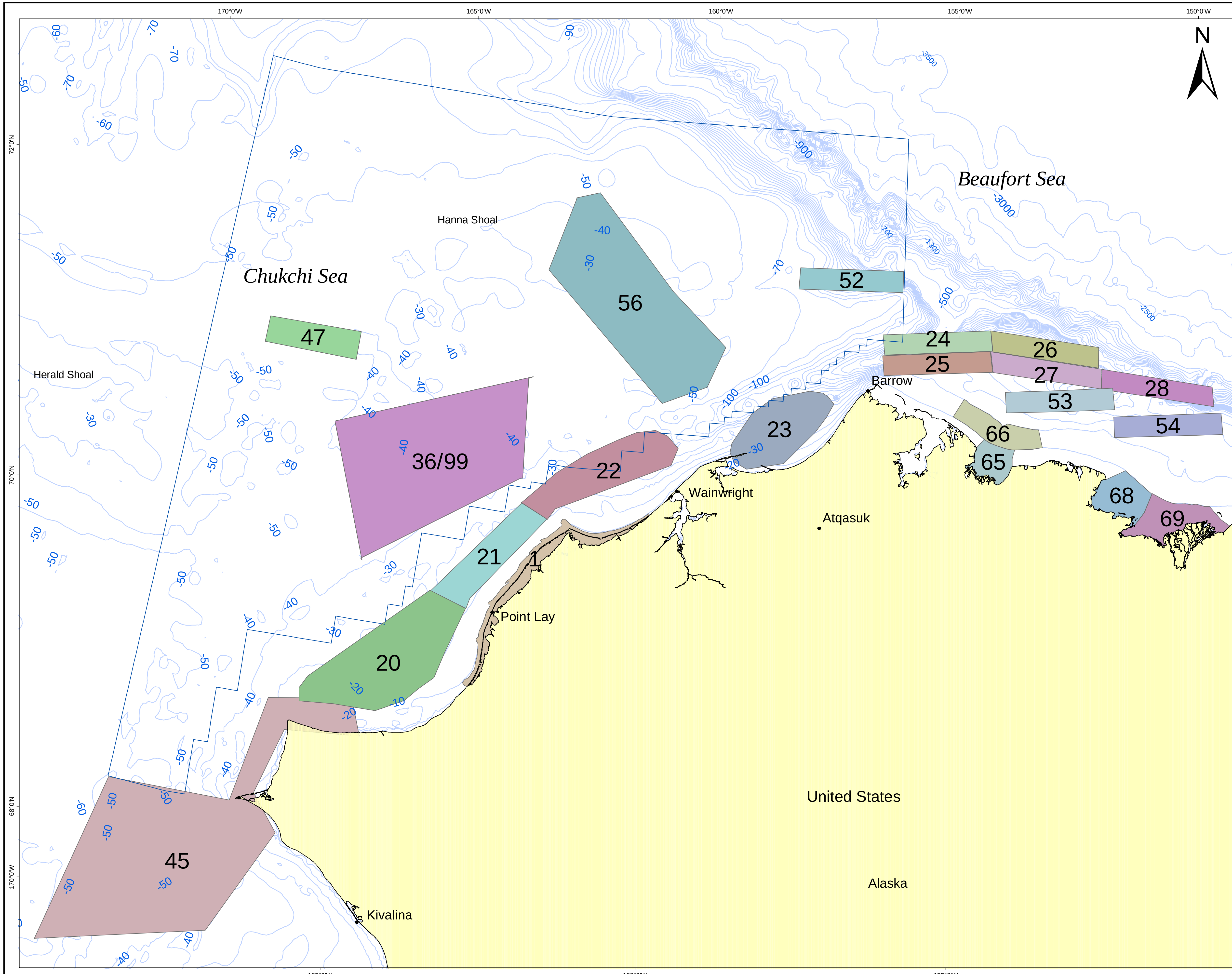
See Appendix A, Tables A.1-12 - A.1-15a for ERA information.

0 12.5 25 50 75 100 Miles

0 20 40 80 120 160 Kilometers

Locator Map





Map A.1-2b Environmental Resource Areas Used in the Oil-Spill-Trajectory Analysis

Legend

Environmental Resource Areas

ID	Name
1.	Kasegaluk Lagoon
20.	Chukchi Spring Lead 2
21.	Chukchi Spring Lead 3
22.	Chukchi Spring Lead 4
23.	Chukchi Spring Lead 5
24.	Beaufort Spring Lead 6
25.	Beaufort Spring Lead 7
26.	Beaufort Spring Lead 8
27.	Beaufort Spring Lead 9
28.	Beaufort Spring Lead 10
36/99.	ERA 36/ERA 99
45.	ERA 45
47.	Ice/Sea Segment 10
52.	Ice/Sea Segment 14
53.	Ice/Sea Segment 15
54.	Ice/Sea Segment 16a
56.	ERA 56
65.	Smith Bay
66.	ERA 66
68.	Harrison Bay
69.	Harrison Bay/Colville Delta

Bathymetry in Meters

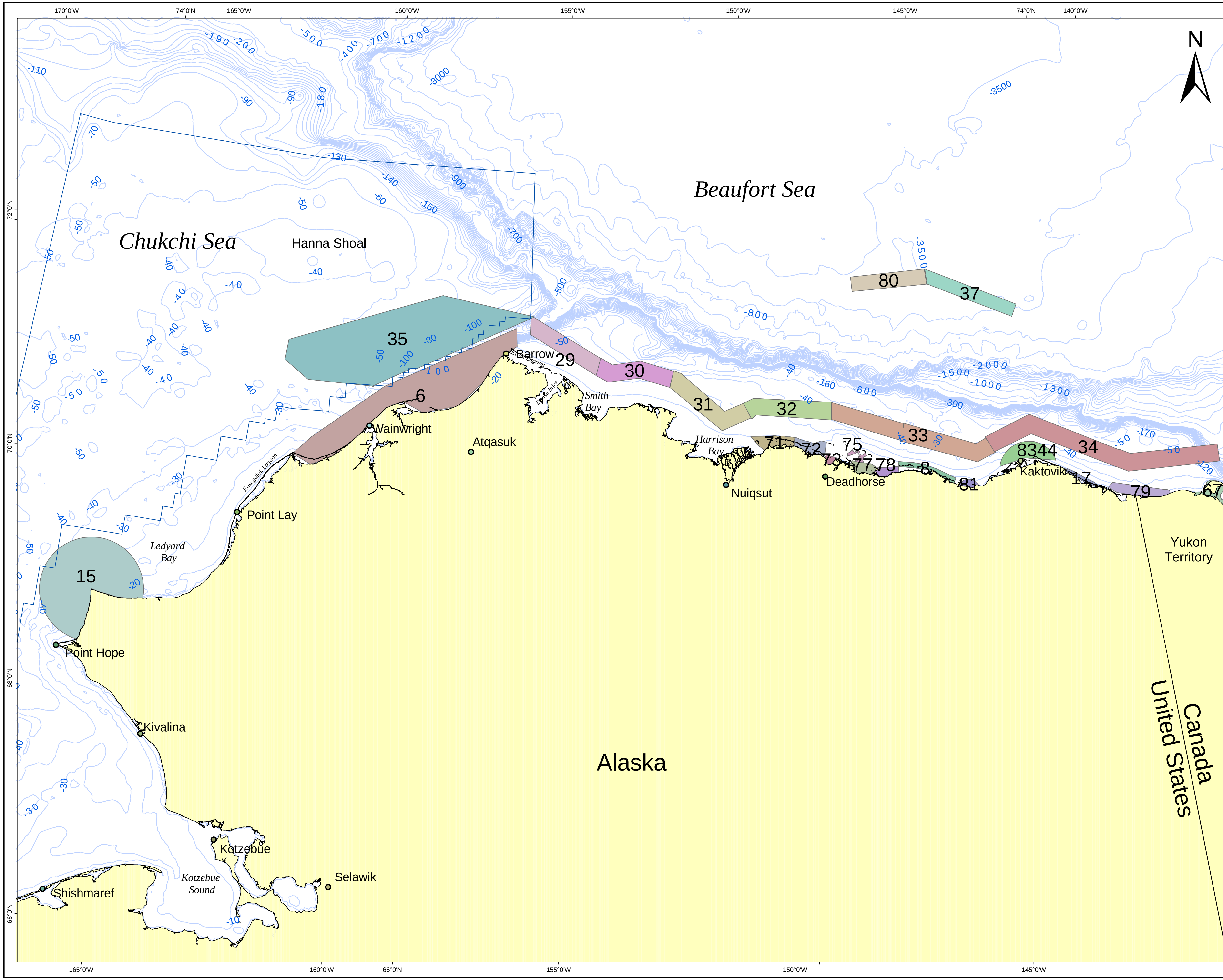
See Appendix A, Tables A.1-12 - A.1-15a for ERA information.

0 12.5 25 50 75 Miles

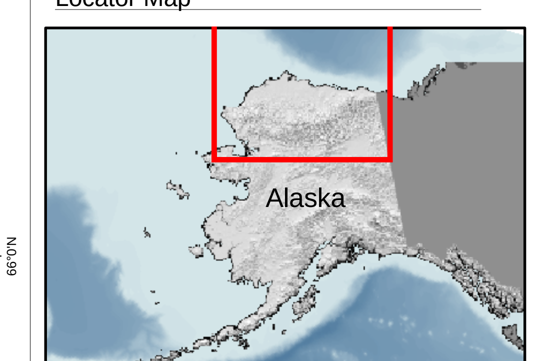
0 20 40 80 120 Kilometers

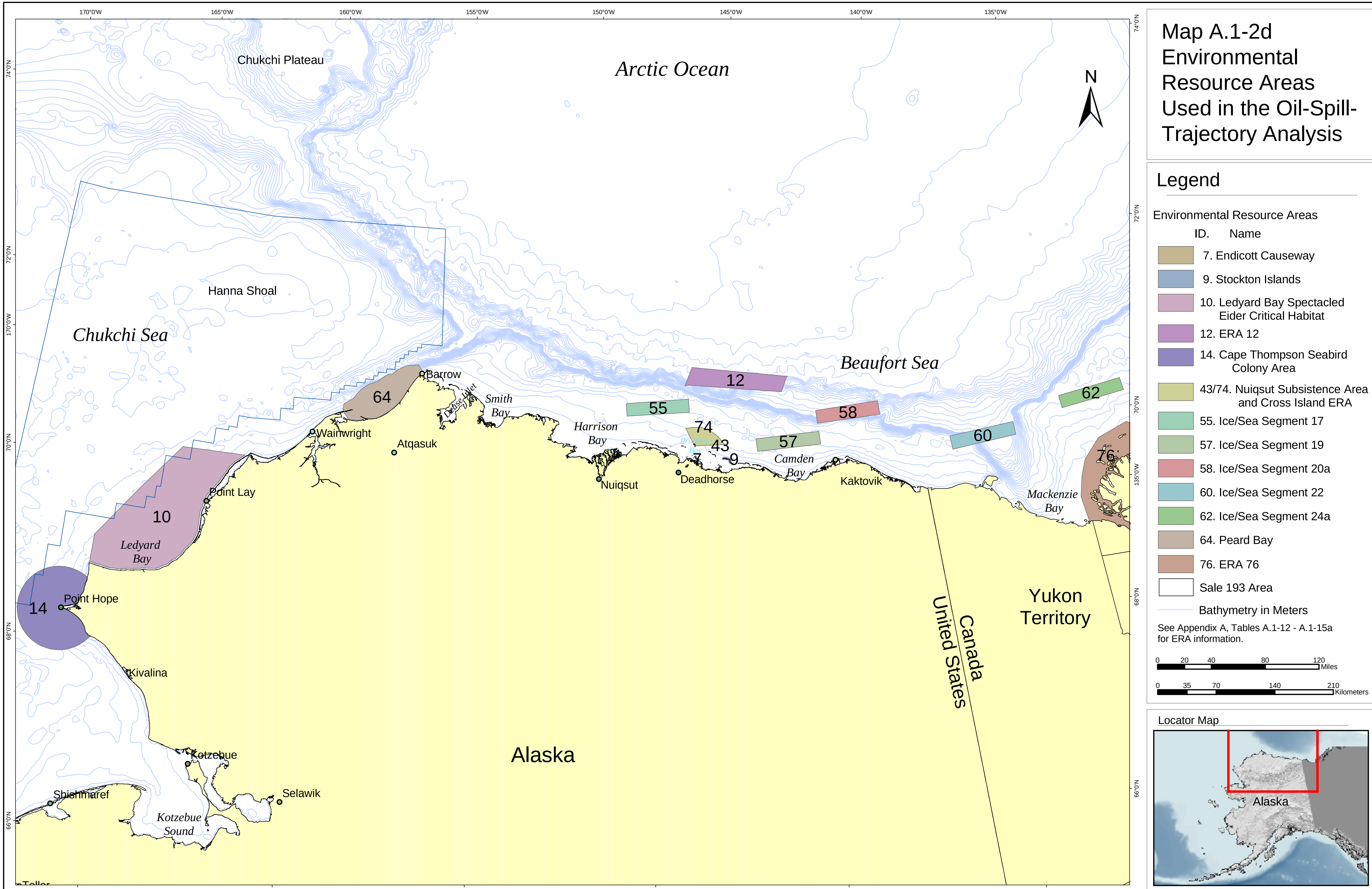
Locator Map

Map A.1-2c Environmental Resource Areas Used in the Oil-Spill-Trajectory Analysis

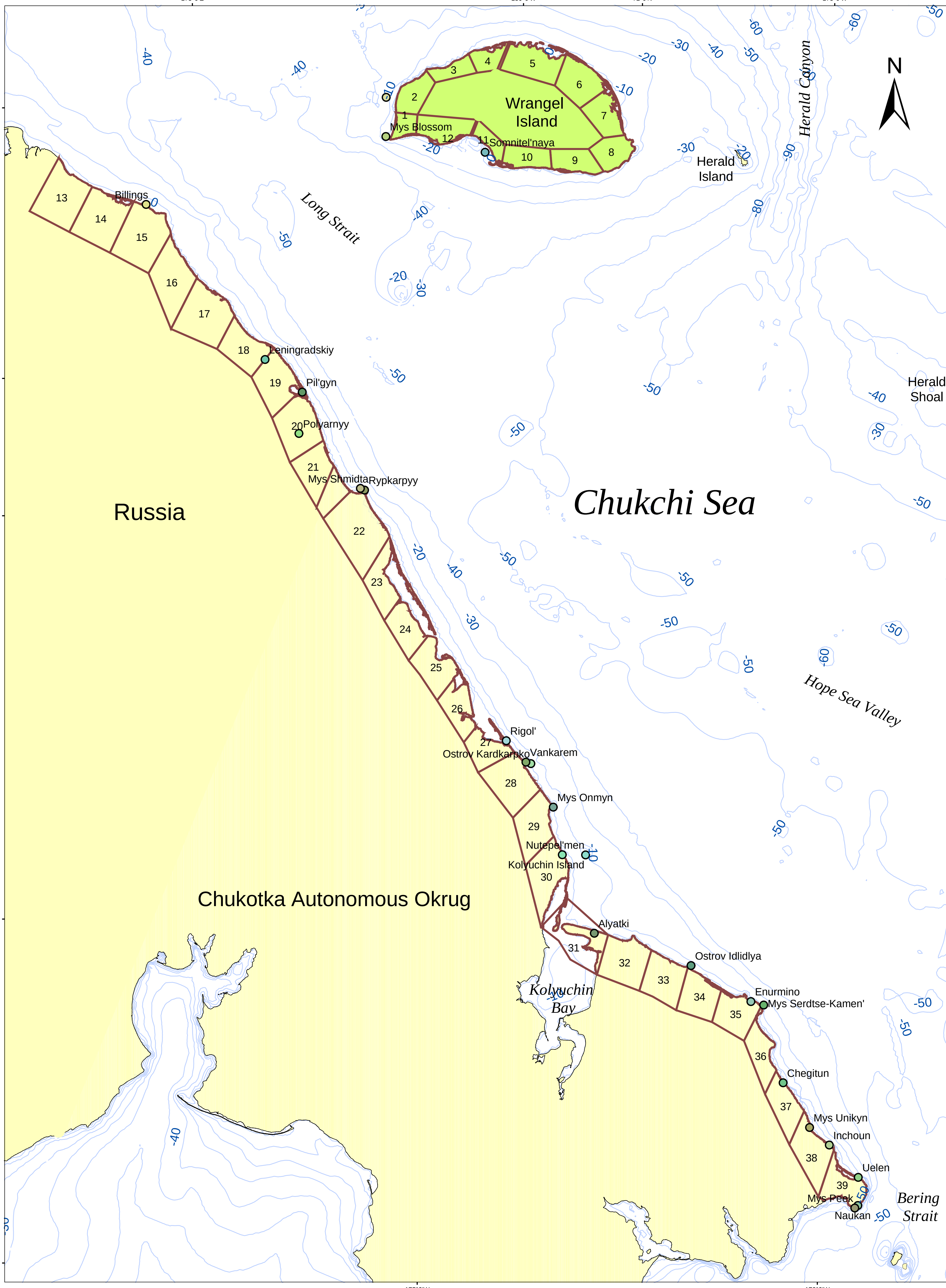


Locator Map





Map A.1-2d Environmental Resource Areas Used in the Oil-Spill-Trajectory Analysis
Legend
Environmental Resource Areas
ID. Name
7. Endicott Causeway
9. Stockton Islands
10. Ledyard Bay Spectacled Eider Critical Habitat
12. ERA 12
14. Cape Thompson Seabird Colony Area
43/74. Nuiqsut Subsistence Area and Cross Island ERA
55. Ice/Sea Segment 17
57. Ice/Sea Segment 19
58. Ice/Sea Segment 20a
60. Ice/Sea Segment 22
62. Ice/Sea Segment 24a
64. Peard Bay
76. ERA 76
Sale 193 Area
Bathymetry in Meters
See Appendix A, Tables A.1-12 - A.1-15a for ERA information.
0 20 40 80 120 Miles
0 35 70 140 210 Kilometers
Locator Map
Alaska
Arctic Ocean
Chukchi Plateau
Hanna Shoal
Chukchi Sea
Beaufort Sea
N
Barrow
Smith Bay
Wainwright
Atqasuk
Harrison Bay
Nuiqsut
Deadhorse
Camden Bay
Kaktovik
Mackenzie Bay
Point Lay
Ledyard Bay
Point Hope
Kivalina
Kotzebue
Selawik
Shishmaref
Kotzebue Sound
Alaska
Yukon Territory
Canada
United States
12
55
74
43
7
9
57
58
60
62
64
76
10
14
170°0'W
165°0'W
160°0'W
155°0'W
150°0'W
145°0'W
140°0'W
135°0'W
74°0'N
72°0'N
70°0'N
68°0'N
66°0'N



Map A.1-3a
Land Segments
(1-39) Used
In the Oil-Spill-
Trajectory Analysis

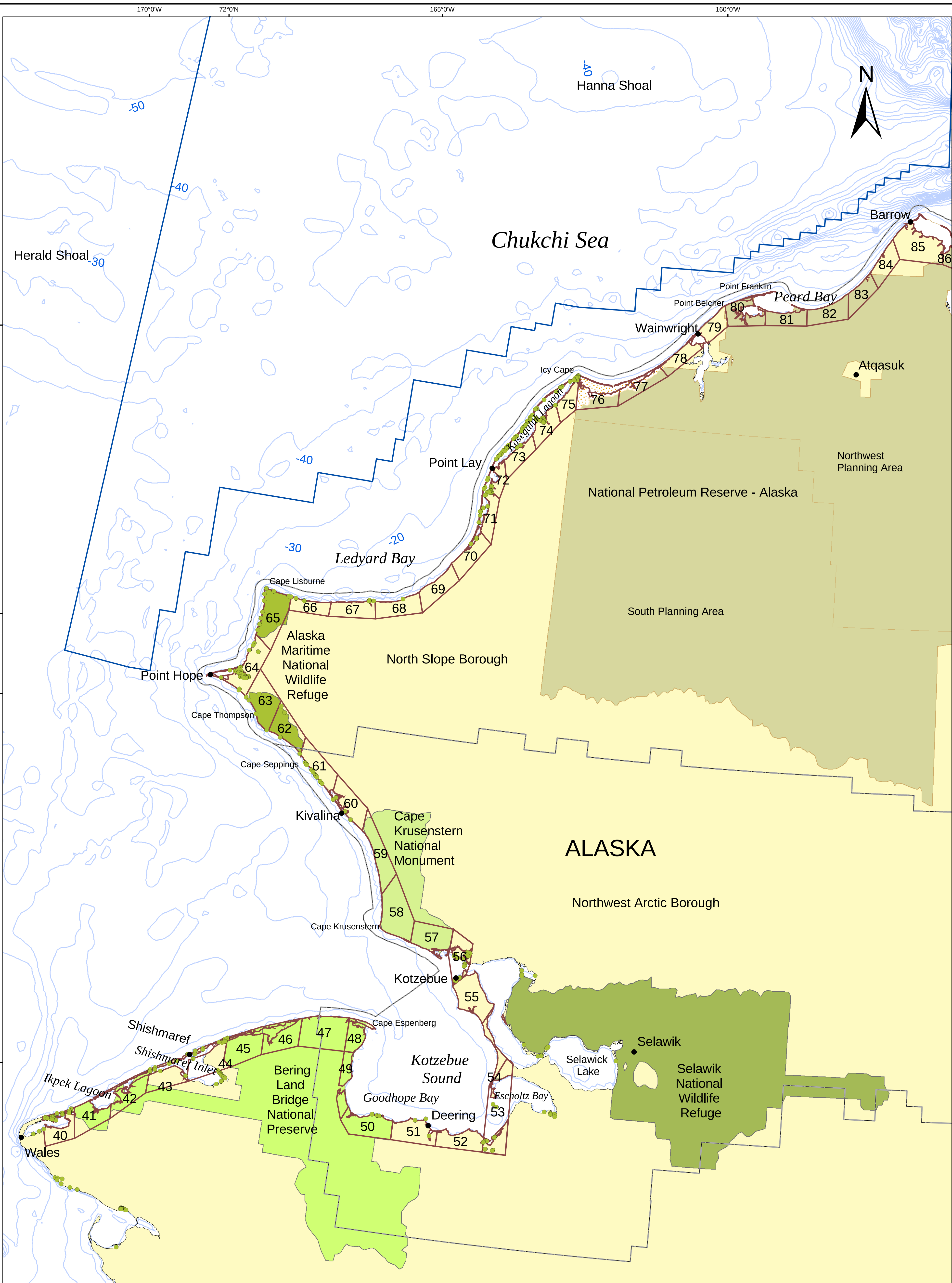
Legend

- 1 — Land Segments, number = identification number (ID)
- Wrangel Island Nature World Heritage Site
- Chukotka Autonomous Okrug, Russia
- Bathymetry in Meters

0 5 10 20 30 Miles

0 10 20 40 60 Kilometers

Locator Map



Map A.1-3b
Land Segments (40-85) Used In the Oil-Spill-Trajectory Analysis

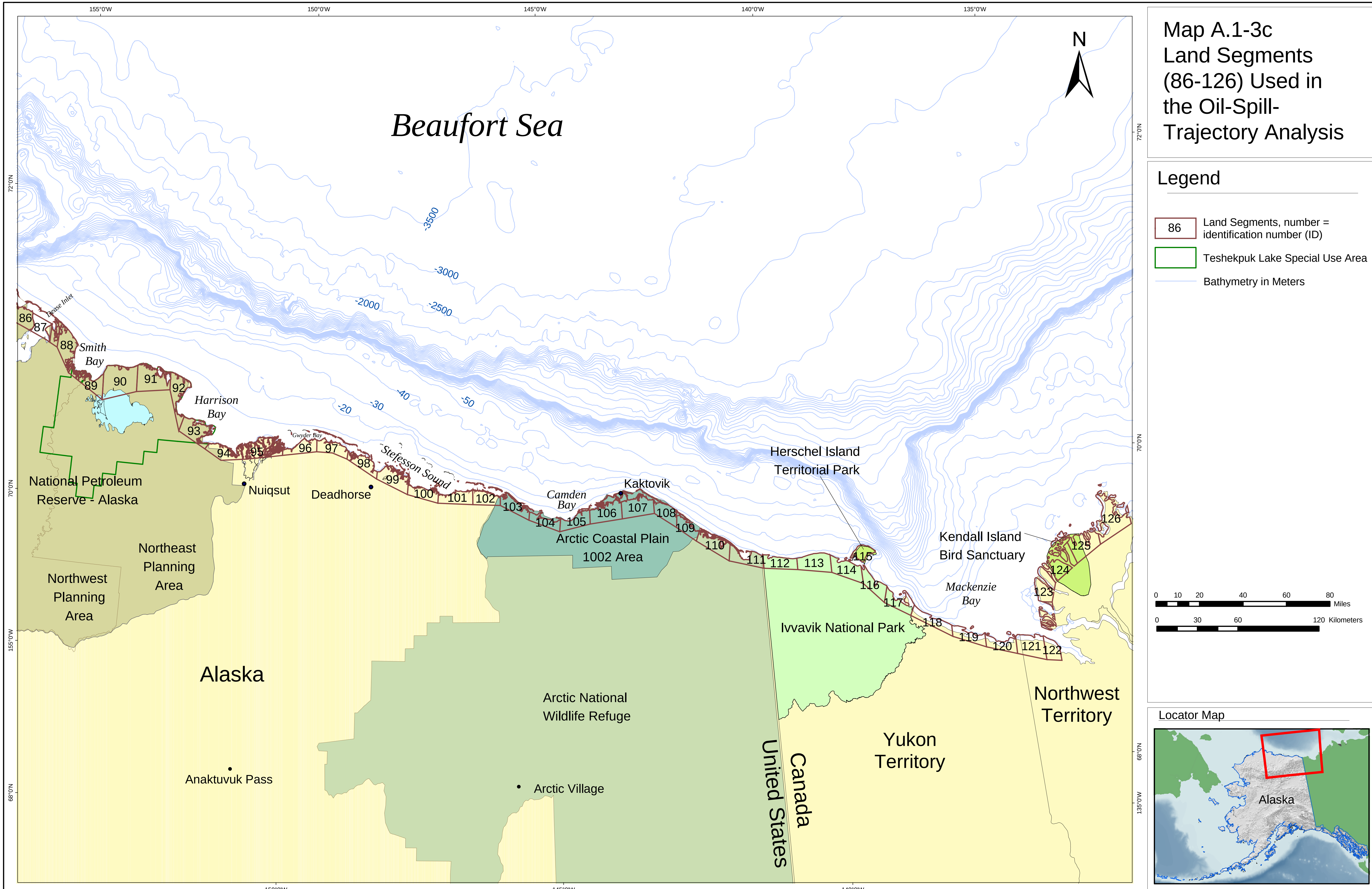
Legend

- 40 — Land Segments, number = identification number (ID)
- Kasegaluk Lagoon Special Use Area
- Alaska Maritime National Wildlife Refuge
- Bathymetry in Meters
- Boroughs
- Sale 193 Area

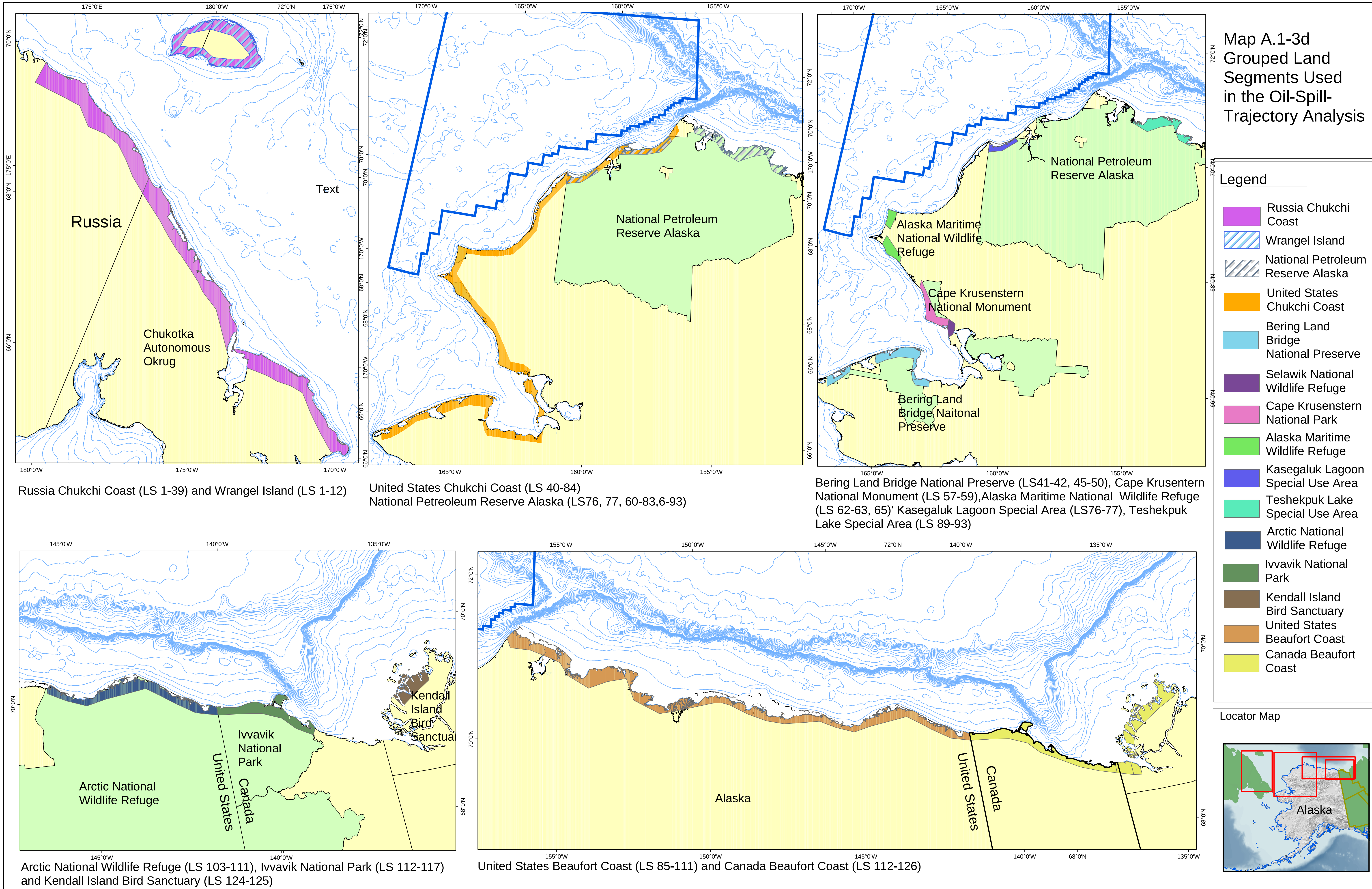
0 15 30 60 Miles

0 25 50 100 Miles

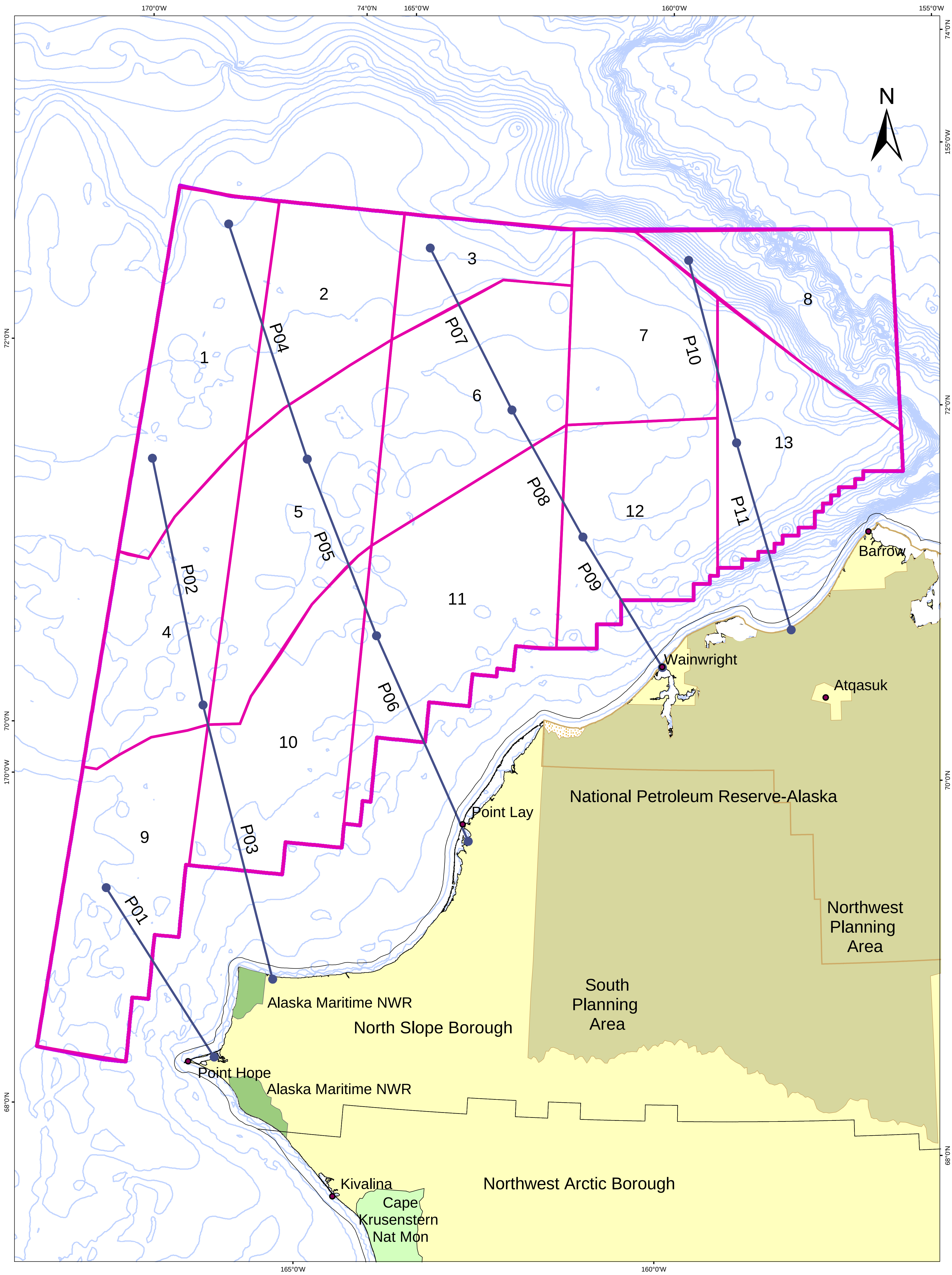
Locator Map



Map A.1-3c Land Segments (86-126) Used in the Oil-Spill-Trajectory Analysis



Map A.1-3d Grouped Land Segments Used in the Oil-Spill-Trajectory Analysis
Legend
Russia Chukchi Coast
Wrangel Island
National Petroleum Reserve Alaska
United States Chukchi Coast
Bering Land Bridge National Preserve
Selawik National Wildlife Refuge
Cape Krusenstern National Park
Alaska Maritime Wildlife Refuge
Kasegaluk Lagoon Special Use Area
Teshekpuk Lake Special Use Area
Arctic National Wildlife Refuge
Ivvavik National Park
Kendall Island Bird Sanctuary
United States Beaufort Coast
Canada Beaufort Coast
Locator Map
Alaska
Russia
Text
Chukotka Autonomous Okrug
Russia Chukchi Coast (LS 1-39) and Wrangel Island (LS 1-12)
National Petroleum Reserve Alaska
United States Chukchi Coast (LS 40-84)
National Petreoleum Reserve Alaska (LS76, 77, 60-83,6-93)
National Petroleum Reserve Alaska
Alaska Maritime National Wildlife Refuge
Cape Krusenstern National Monument
Bering Land Bridge Naitonal Preserve
Bering Land Bridge National Preserve (LS41-42, 45-50), Cape Krusentern National Monument (LS 57-59),Alaska Maritime National Wildlife Refuge (LS 62-63, 65)' Kasegaluk Lagoon Special Area (LS76-77), Teshekpuk Lake Special Area (LS 89-93)
Kendall Island Bird Sanctuai
Ivvavik National Park
Arctic National Wildlife Refuge
United States
Canada
Arctic National Wildlife Refuge (LS 103-111), Ivvavik National Park (LS 112-117) and Kendall Island Bird Sanctuary (LS 124-125)
Alaska
United States
Canada
United States Beaufort Coast (LS 85-111) and Canada Beaufort Coast (LS 112-126)



Map A.1-4a Hypothetical Launch Areas And Pipelines Used in the Oil-Spill-Trajectory Analysis for Alternative I

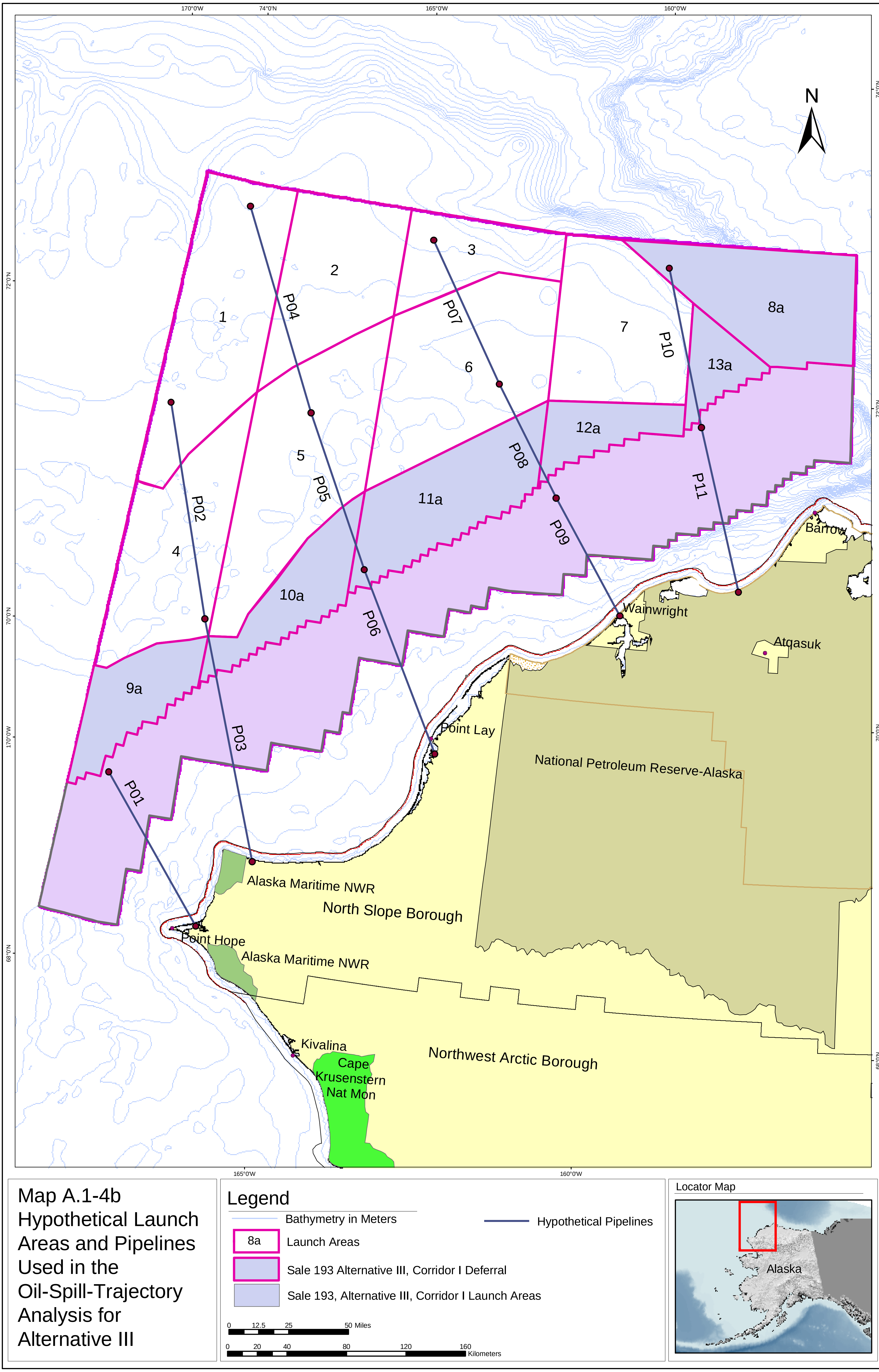
Legend

- 9 Launch Area
- Hypothetical Pipelines
- Kasegaluk Lagoon Special Use Area
- Bathymetry in Meters
- Boroughs

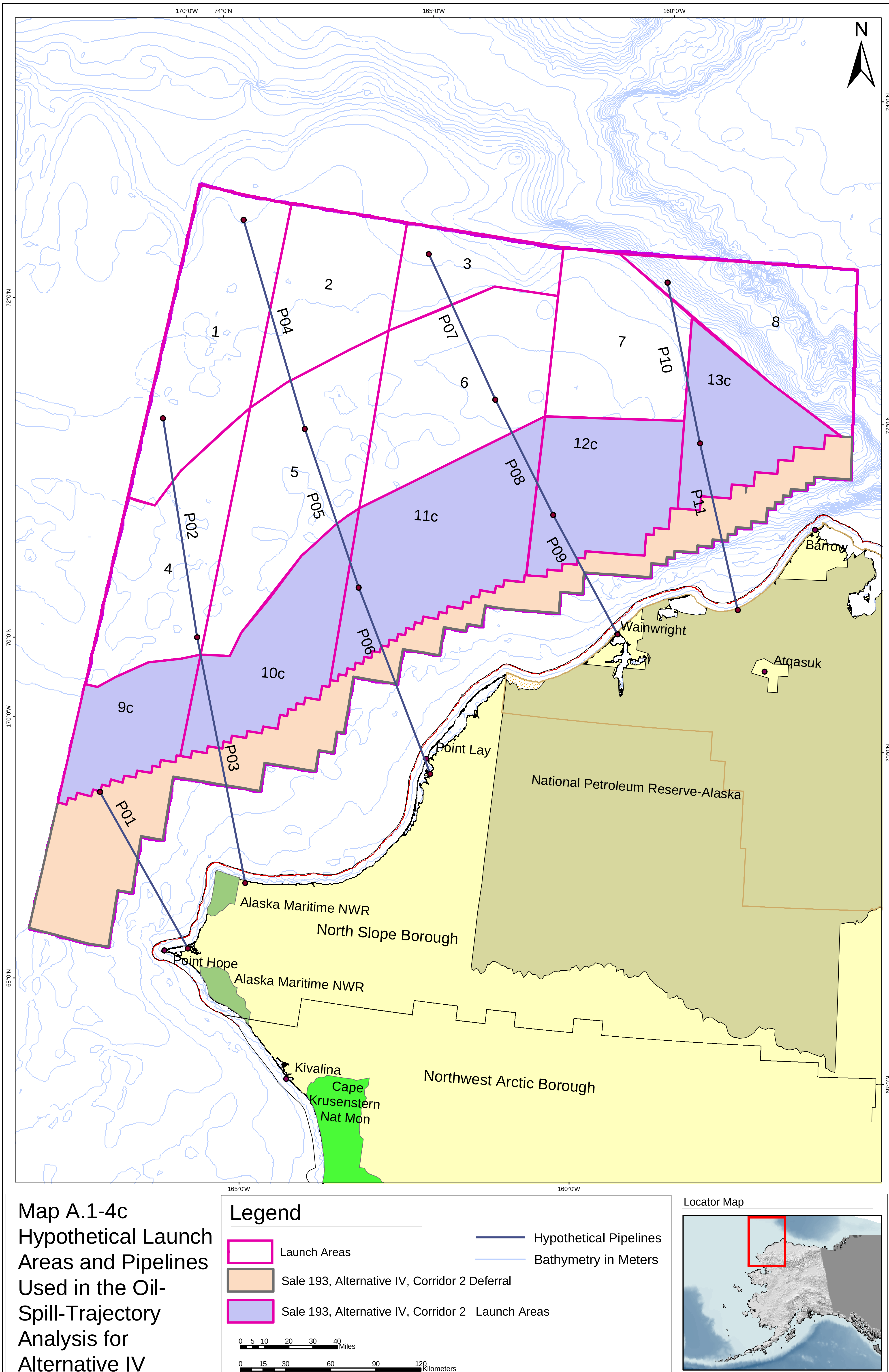
0 15 30 60 90 120 Miles

60 30 0 60 Miles

Locator Map



Map A.1-4b Hypothetical Launch Areas and Pipelines Used in the Oil-Spill-Trajectory Analysis for Alternative III



Map A.1-4c Hypothetical Launch Areas and Pipelines Used in the Oil-Spill-Trajectory Analysis for Alternative IV

APPENDIX B

NMFS
Endangered Species Act,
Section 7
Consultation
And Coordination

United States Department of the Interior

MINERALS MANAGEMENT SERVICE
Alaska Outer Continental Shelf Region
3801 Centerpoint Drive, Suite 500
Anchorage, Alaska 99503-5823

AUG 12 2005

James W. Balsiger, Ph.D.
Regional Administrator, Alaska Region
National Marine Fisheries Service
P.O. Box 21668
Juneau, Alaska 99802-1668

Dear Dr. Balsiger:

The Minerals Management Service (MMS) proposes to reinitiate consultation under Section 7 of the Endangered Species Act (ESA) on oil and gas leasing and exploration activities on two Outer Continental Shelf (OCS) Planning Areas in the arctic. Specifically, we propose to reinitiate following the Arctic Regional Biological Opinion (ARBO) approach used in the past, so that the geographic area considered in the consultation is expanded to again include potential activities that could occur within the entire Beaufort Sea Planning Area and within the Chukchi Sea OCS Program Area, as delineated in the Attachment which is reproduced from the Final EIS for our current 5-Year OCS Leasing Program. Note that the current 5-Year Leasing Program excludes the nearshore Polynya area from leasing consideration in the Chukchi Sea. Below we briefly summarize relevant background.

In November 1988, the National Marine Fisheries Service (NMFS) prepared the Arctic Regional Biological Opinion (ARBO) which concerned leasing and exploration activities in the Arctic Region (Beaufort Sea, Chukchi Sea, and Hope Basin OCS Planning Areas). Because of the removal of the gray whale from the list of threatened and endangered species, the availability of new information on the potential impacts of oil and gas-related noise on bowhead whales, the use of new seismic survey technology in the Arctic, and trends in OCS activities in the Arctic Region, MMS proposed to reinitiate consultation with NMFS on November 2, 1999. Because of lack of industry interest in the Chukchi Sea and Hope Basin Planning Areas at that time, MMS proposed, and NMFS agreed, to limit the reinitiated consultation to leasing and exploration activities only in the Beaufort Sea Planning Area. Thus, in the resultant, and most current, Biological Opinion of May 25, 2001, NMFS concluded that

> "Present and foreseeable future oil and gas exploration activities on the Alaskan OCS are likely to occur only in the Beaufort Sea."

Because of this assumption, which was based on the best information available at the time, the action area for the May 2001 biological opinion was defined as the Alaskan Beaufort Sea OCS Planning Area, extending from the Canadian border to the Barrow area.

Due to industry response to our recent Beaufort Sea lease sales and call for information and nominations in the Chukchi Sea, and based on discussions with industry, the aforementioned assumption is no longer valid. Therefore, we would like to reinitiate consultation with your agency on leasing and exploration activities in areas of both the Beaufort Sea and the Chukchi Sea, as specified above.

In accordance with the Endangered Species Act Section 7 regulations governing interagency cooperation, MMS intends to prepare a biological evaluation in which we describe the actions and specific areas being considered in the consultation, describe the listed species and critical habitats that may be affected by those actions, evaluate potential effects and cumulative effects on listed species and critical habitats, and provide other relevant information necessary for NMFS to prepare their biological opinion.

By this letter, we are notifying you of the listed species and critical habitat that we, with your concurrence, expect to include in our biological evaluation. Based on previous correspondence with NMFS on this issue and based on our review of available information, MMS is aware of only one listed species, the endangered bowhead whale, that commonly occurs in these two planning areas. However, based on NMFS' November 1988 Biological Opinion, and, in some cases, other information suggesting the possible occurrence of other listed species in areas within or near these two planning areas, MMS currently intends to review and consider the following listed species in our biological evaluation:

Common Name	Scientific Name	ESA Status
Bowhead whale	*Balaena mysticetus*	Endangered
Fin whale	*Balaenoptera physalus*	Endangered
Humpback whale	*Megaptera novaeangliae*	Endangered
Right whale	*Eubalaena glacialis*	Endangered
Sei whale	*Balaenoptera borealis*	Endangered

We have included right and sei whales on this species list because, in your biological opinion of November 1988 (page 3), NMFS stated that these species were among "...six species of endangered whales that inhabit Arctic Region waters of Alaska." On page 4 of the 1988 ARBO, NMFS stated that "The right and sei whales are rare in Arctic waters. They are represented by isolated records in the Chukchi Sea, probably of stray individuals well outside the normal ranges of their populations." We believe that information available since that opinion supports this conclusion.

MMS is not aware of any designated or proposed critical habitat for any species that is under the jurisdiction of NMFS and that occurs within, near, or that could potentially be affected by leasing or exploration activities within, the Beaufort Sea or Chukchi Sea.

Please notify us of your concurrence with, or necessary revisions to, the above list of species and add any critical habitats which you believe need to be considered in our biological evaluation. In addition, we ask that you specify whether we should include Eastern North Pacific gray whales (*Eschrichtius robustus*) in our evaluation. While this population of gray whales was removed from the list of threatened and endangered species in 1994, NMFS's Biological Opinion on Oil and Gas Lease Sales 191 and 199 in the Cook Inlet OCS Planning Area included a "...general assessment of the effects of the action on gray whales as part of NMFS' continuing responsibility to monitor the status of the species." Lastly, we ask that you reaffirm NMFS's conclusion in recent consultations (e.g., the consultation on the Beaufort Sea Lease Sales 186, 195, and 202) that MMS does not need to consult on species along the transportation corridor from Valdez to ports along the Pacific coast and to the Far East.

To facilitate consideration of our request for concurrence, we are sending copies of this letter to your Anchorage Field Office. Upon receipt of your reply within 30 days, we will begin preparation of our biological evaluation reviewing potential effects of Federal oil and gas leasing and exploration by MMS within the Alaskan Beaufort Sea and the Chukchi Sea.

If you have any questions on the issues raised in this letter or require additional information, please contact Dr. Lisa Rotterman, Minerals Management Service, Mail Stop 8303, 3801 Centerpoint Drive, Suite 500, Anchorage Alaska 99503-5823 (commercial and FTS telephone: 907-334-5245)

Sincerely,

John Goll
Regional Director

Enclosure

cc: (w/enclosure)

Mr. Brad Smith
Anchorage Field Office
National Marine Fisheries Service
Federal Building
22 West 7th Avenue, Box 43
Anchorage Alaska 99513-7577

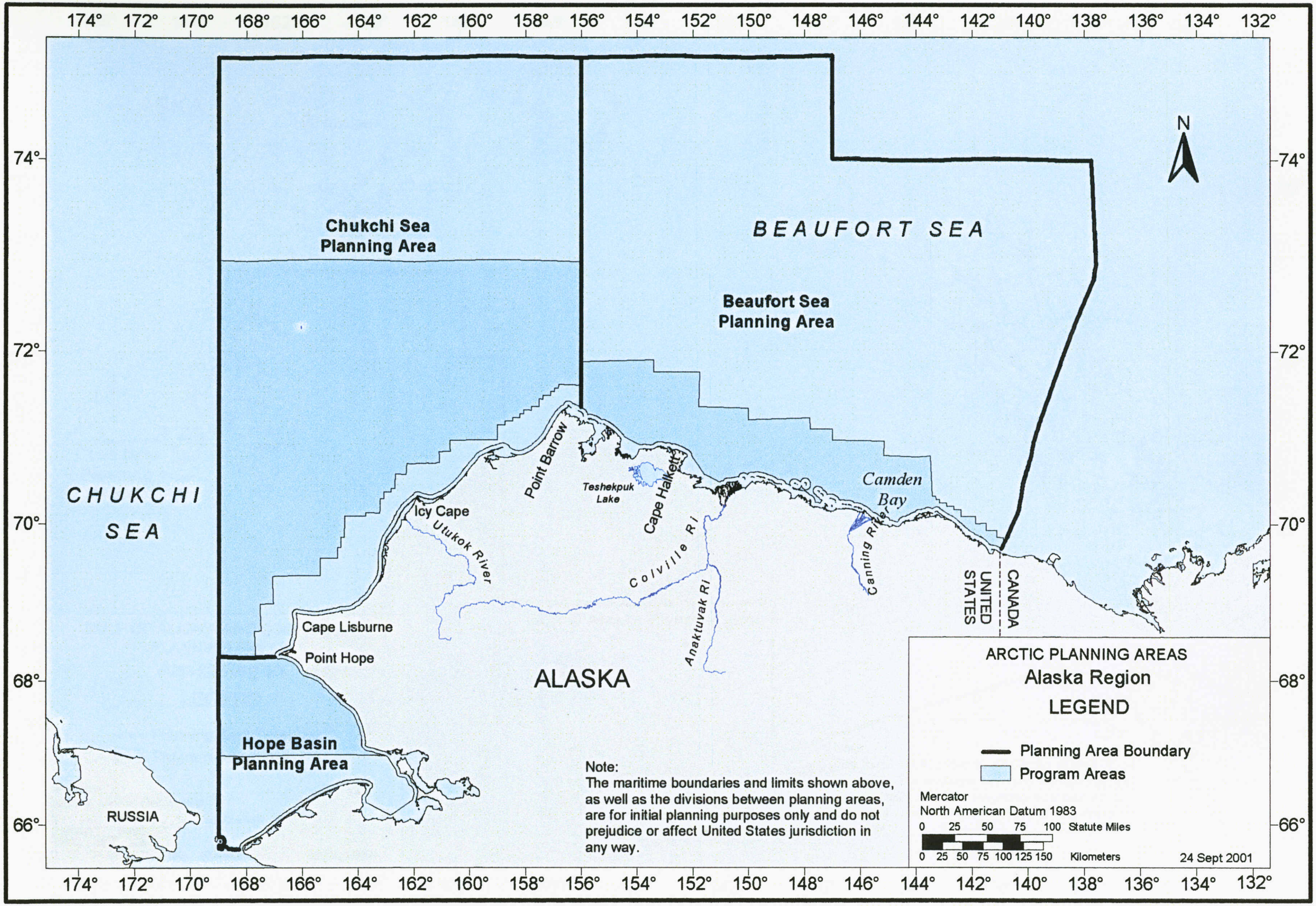


Figure 2-3. Beaufort Sea, Chukchi Sea, and Hope Basin Planning Areas - Alaska Region

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
National Marine Fisheries Service
P.O. Box 21668
Juneau, Alaska 99802-1668

September 30, 2005

John Goll
Regional Director
Minerals Management Service
Alaska Outer Continental Shelf Region
3801 Centerpoint Drive, Suite 500
Anchorage, AK. 99503-5823

Dear Mr. Goll:

The National Marine Fisheries Service (NMFS) has received your letter requesting information on the presence of threatened or endangered species and their designated critical habitat which occur in the Alaska Beaufort Sea and Chukchi Sea planning areas.

The following species is listed under the Federal Endangered Species Act and is found in these areas:

Bowhead Whale (Balaena mysticetus).....................Endangered

Critical habitat has not been designated for the bowhead whale.

Additionally, the endangered humpback (Megaptera novaeangliae) and fin whale (Balaenoptera physalus) are found in waters of the Chukchi Sea and Bering Sea outside of the subject planning areas. These animals could be impacted secondarily by OCS activities. NMFS recommends their inclusion in your evaluation. NMFS also recommends the evaluation provide a comprehensive assessment of OCS activities on threatened and endangered species, and, to accomplish this, include all deferrals within these planning areas.

We hope this information will be useful in your section 7 determinations. Please direct any questions to Brad Smith in our Anchorage office, (907) 271-3023.

Sincerely,

Kaja Brix
Assistant Regional Administrator
for Protected Resources

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
National Marine Fisheries Service
P.O. Box 21668
Juneau, Alaska 99802-1668

June 16, 2006

John Goll
Director, Alaska Outer Continental Shelf Region
Minerals Management Service
3801 Centerpoint Drive, Suite 500
Anchorage, Alaska 99503-5823

Dear Mr. Goll:

This document transmits the National Marine Fisheries Service's (NMFS) Biological Opinion for Federal oil and gas leasing and exploration by the Minerals Management Service (MMS) within the Alaskan Beaufort and Chukchi Seas, and its effects on the endangered bowhead whale in accordance with section 7 of the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 et seq.). Your March 3, 2006 letter to NMFS requested re-initiation of consultation in this matter. The MMS has provided a Biological Evaluation of leasing and exploration actions in the Beaufort and Chukchi Seas, which was received on March 15, 2006. We acknowledged receipt of this information in our letter dated April 5, 2006.

This Biological Opinion is based on information provided in the March 2006 Biological Evaluation and other sources of information. A complete administrative record of this consultation is on file at the NMFS offices in Anchorage.

NMFS concludes that leasing and exploration are not likely to jeopardize the continued existence of the bowhead whale. In formulating this opinion, NMFS used the best available information, including information provided by MMS, recent research on the effects of oil and gas activities on the bowhead whale, and the traditional knowledge of Native hunters and the Inupiat along Alaska's north slope. Although we conclude that foreseeable exploration activities are not likely to jeopardize the continued existence of the bowhead whale, we remain concerned about the potential additive effects of oil and gas activities associated with exploration, production, and transportation throughout the Beaufort and Chukchi Seas. Conservation recommendations are provided with the opinion which are intended to improve our understanding of the impacts of oil and gas activities on the bowhead whale, as well as to minimize or mitigate adverse effects.

Sincerely,

Robert D. Mecum
Acting Administrator, Alaska Region

APPENDIX C

USFWS
Endangered Species Act,
Section 7
Consultation
And Coordination

United States Department of the Interior

MINERALS MANAGEMENT SERVICE
Alaska Outer Continental Shelf Region
3801 Centerpoint Drive, Suite 500
Anchorage, Alaska 99503-5823

SEP 21 2006

Memorandum

To: Regional Director, FWS, Region 7

From: Regional Director

Subject: Chukchi Sea Lease Sale 193: Endangered Species Act Section 7 Consultation

The Minerals Management Service (MMS) is completing a draft Environmental Impact Statement (DEIS) for the proposed Chukchi Sea Lease Sale 193. The Steller's and spectacled eider, both threatened species, and the Kittlitz's murrelet, a candidate species, occur in the proposed lease sale area. We have worked closely with the Fairbanks Endangered Species Branch in preparing the attached biological evaluation to evaluate the potential effects this lease sale could have on threatened and candidate birds.

We sent a previous draft of this biological evaluation to the Fairbanks Fish and Wildlife Field Office on July 17, 2006. We recently received some comments on the draft biological evaluation when Fish and Wildlife Services (FWS) personnel met with us on September 7, 2006. Those comments pertained to the need to calculate the anticipated incidental take from onshore developments should production occur following the lease sale. We were requested to address the potential for the Steller's eiders to be affected if an oil spill were to occur when they were concentrated in the spring-lead system and to more fully explain the most likely development scenario in terms of the potential for locating a commercially developable field. Our explanation of the oil spill risk analysis modeling was expanded to include combined probabilities. We revised the draft biological evaluation to address the FWS' comments and concerns.

We consider the attached biological evaluation a complete document for your review. We believe the biological evaluation satisfies the information requirements specified in 50 CFR 402.12 and 402.14. If you still require additional information or analysis, please contact us quickly as we anticipate including a copy of the biological evaluation in our DEIS, which is scheduled to go to the printer on October 3, 2006.

Our biological evaluation determined that the proposed Chukchi Sea Lease Sale 193 would likely have the following level of effects on Steller's and spectacled eiders and Kittlitz's murrelets:

- Listed and Candidate Species
  - Lease Sale 193 could present new sources of disturbance, collision hazards, and oil/toxic pollution that could result in the taking of Steller's and spectacled eiders. Without comprehensive mitigation measures to avoid or minimize potential impacts, these activities *are likely to adversely affect* Steller's and spectacled eiders.

  - Lease Sale 193 could present new sources of disturbance and oil/toxic pollution that could result in the taking of Kittlitz's murrelet. Without comprehensive mitigation measures to avoid or minimize potential impacts, these activities *may affect* the Kittlitz's murrelet.

- Ledyard Bay Critical Habitat Area
  - Lease Sale 193 could present new activities that could result in the physical modification of seafloor habitats and decrease use of the Ledyard Bay Critical Habitat Area by molting spectacled eiders. Without comprehensive mitigation measures to avoid or minimize potential impacts, these activities are *likely to adversely modify* the Ledyard Bay Critical Habitat Area.

We request your opinion on these findings. If you determine a jeopardy situation may exist for all or any part of the proposed action, we ask that you respond to this memorandum in as timely a manner as possible, according to 50 CFR 402 14(g)(5), to allow the MMS and FWS staff time to jointly discuss the findings. We believe that such discussions will facilitate the consultation and ensure protection of listed species. These discussions will also ensure that any proposed alternatives are within our authority to control and implement, and are feasible, prudent, and effective. To facilitate completion of this consultation, we are sending a copy of this memorandum to the Fairbanks Fish and Wildlife Field Office in Fairbanks, Alaska.

If you have any questions on this consultation or require additional information, please contact Mr. Mark Schroeder at (907) 334-5247.

Attachment

cc: Field Office Supervisor
U.S. Fish and Wildlife Service
Fairbanks Fish and Wildlife Field Office
101 12th Avenue, Room 110
Fairbanks, Alaska 99701

United States Department of the Interior

FISH AND WILDLIFE SERVICE
1011 E. Tudor Rd.
Anchorage, Alaska 99503-6199

IN REPLY REFER TO:

AFES

OCT 27 2006

Memorandum

To: Regional Director, Minerals Management Service – Alaska Outer Continental Shelf Region

From: Regional Director – Region 7 Thomas O. Melius

Subject: Chukchi Sea Lease Sale 193: Endangered Species Act Section 7 Consultation

We acknowledged receipt on September 25, 2006, of your Biological Evaluation and memorandum requesting initiation of Section 7 consultation under the Endangered Species Act for activities associated with Lease Sale 193 in the Chukchi Sea. The consultation concerns the possible effects of the proposed action on threatened Steller's eiders (*Polysticta stelleri*), spectacled eiders (*Somateria fischeri*), and the candidate species Kittlitz's murrelet (*Brachyramphus brevirostris*).

After reviewing the BE we have determined that the proposed action may adversely impact listed species and will therefore require formal consultation. All the information required to initiate formal consultation was either included in the BE or is otherwise accessible for our consideration and reference. However, it is likely that we will identify additional information needs, or require clarification on aspects of the proposed action as consultation progresses.

As a reminder, Section 7 allows the Fish and Wildlife Service 90 calendar days to conclude formal consultation with your agency and an additional 45 calendar days to prepare our biological opinion (unless we mutually agree upon an extension). Therefore, we will provide you with our final biological opinion on or before February 7, 2007.

This consultation will be conducted by the Endangered Species Branch of the Fairbanks Field Office. In order to expedite communication please address future documents or requests concerning this consultation to Ted Swem, Branch Chief, Fairbanks Fish and Wildlife Field Office, 101 12th Avenue, Room 110, Fairbanks, Alaska 99701.

United States Department of the Interior

FISH AND WILDLIFE SERVICE
1011 E. Tudor Rd.
Anchorage, Alaska 99503-6199

IN REPLY REFER TO:

FWS/AFES/FFWFO

MAR 2 8 2007

Memorandum

To: Regional Director – Minerals Management Service

From: Regional Director – Region 7 Thomas O. Melius

Subject: Chukchi Sea Lease Sale 193: Endangered Species Act Section 7 Consultation

This document transmits the U.S. Fish and Wildlife Service's (Service) Biological Opinion (BO) in accordance with Section 7 of the Endangered Species Act of 1973, as amended (Act), on the effects of the Mineral Management Service's proposed Chukchi Sea Lease Sale 193 to listed and candidate species (attached). The BO evaluates effects of the action on the threatened spectacled eider (*Somateria fischeri*), threatened Steller's eider (*Polysticta stelleri*), and the Ledyard Bay Critical Habitat Unit designated for spectacled eiders. At your request, we have also evaluated potential effects on the candidate species Kittlitz's murrelet (*Brachyramphus brevirostris*) to aid in planning in the event that it is listed under the Act during this project's life, but the current document does not represent a formal BO for the Kittlitz's murrelet.

Lease Sale 193 would authorize the sale of oil and gas leases in 34 million acres of Federal waters in the Chukchi Sea, and may ultimately result in development and production of oil and gas in this area. The MMS has statutory authority to complete its OCS energy development actions as incremental step consultations under the Act. In accordance with this authority and the applicable regulations, this BO includes analyses and conclusions as to whether: 1) the incremental step of leasing and exploration (including seismic surveys and exploratory drilling) would violate Section 7(a)(2) of the Act (i.e., whether these steps would likely jeopardize listed species or cause destruction or adverse modification of critical habitat); and 2) there is a reasonable likelihood that the entire action of leasing, exploration, development, and production that may result from Lease Sale 193 would violate Section 7(a)(2) of the Act. Additionally, for the first incremental step, we have estimated and authorized incidental take, and provided reasonable and prudent measures, and associated terms and conditions intended to reduce take.

Based on the available information, it is the Service's BO that it is unlikely that leasing and exploration activities will violate Section 7(a)(2) of the Act. Incidental take of a small number of Steller's and spectacled eiders is anticipated from collisions during exploratory drilling; this incidental take and potential impacts from spills are mitigated through the reasonable and prudent measures, and terms and conditions, which are mandatory for the MMS to implement. It is also our BO that the entire action, which may also include development and production, would not jeopardize the continued existence of the spectacled or Steller's eider, or destroy or adversely modify designated critical habitat. This conclusion is based upon the fact that population-level impacts, although possible depending upon what is proposed at a later date, are not reasonably expected to occur based on the information available at this time.

We caution, however, that consultation at future incremental steps in this phased oil and gas process is crucial in order to fully evaluate project specific information about particular development and production plans, and whether or not they are likely to jeopardize listed species or destroy or adversely modify critical habitat. We wish to provide clear notification that consultation on subsequent incremental steps may reach different conclusions depending on the scope, location, and nature of what is proposed. Based on our analyses, we believe that some potential development proposals, while not reasonably likely at this time, could ensue from Lease Sale 193 that would jeopardize listed species or cause destruction or adverse modification of critical habitat. Therefore, consultation on subsequent incremental steps will require careful consideration of all information available at that time, including up-to-date evaluations of listed species status, the environmental baseline, and project-specific considerations such as spill risk assessments and spill trajectory models to evaluate risk to listed species. To this end, we have provided guidance on ways to minimize the likelihood of conflict between listed species and proposed development, and we have identified information needs that will provide for well-informed consultation on subsequent incremental steps.

We commend you for taking a proactive approach to Kittlitz's murrelet conservation, and we also appreciate the considerable efforts made by your staff to provide all the information necessary for our consultation. We look forward to working with you to implement the terms and conditions of the BO, address our shared information needs, and assess future phases of the project.

As you are aware, the Service published a 12-month finding and proposed rule in the Federal Register on January 9, 2007, that found listing of the polar bear as threatened under the Endangered Species Act (Act) to be warranted. For proposed species, such as the polar bear, the Act requires action agencies to *conference* with the Service. Conference is a process of early interagency cooperation designed to identify potential conflicts between an action and species conservation, and to minimize or avoid adverse effects to proposed species or proposed critical habitat. Several key distinctions between the consultation and conference processes are important to identify. First, the "trigger" for consultation and conference is different. While agencies are required to consult with the Service when their actions "may affect" the continued existence of listed species or critical habitat, action agencies are only required to confer with the Service for those actions "likely to jeopardize" the continued existence of the proposed species or result in the "destruction or adverse modification" of proposed critical habitat. Based on our experience to date with agency consultations in northern Alaska, including those related to oil and gas development, and given that Alaska comprises only a small portion of the circumpolar range inhabited by the species proposed for listing, we believe that conference will technically be required in few if any instances in the coming months. As we have discussed, we look forward to working with your staff in the near future on this issue.

A complete administrative record of this consultation is on file at the Fairbanks Fish and Wildlife Field Office, 101 12th Ave., Room 110, Fairbanks, Alaska 99701. A chronology of the consultation history is provided in Appendix 1. If you have any questions, please call Ted Swem at (907) 456-0441.

Attachment

Appendix D

Summary:
Analysis of Seismic Survey Mitigation Alternatives

Appendix D. Summary: Analysis of Seismic Survey Mitigation Alternatives.

The following mitigation alternatives related to conducting seismic surveys were analyzed as part of the "*Final Programmatic Environmental Assessment (PEA), Arctic Ocean Outer Continental Shelf Seismic Surveys – 2006*," dated June 2006 (OCS EIS/EA MMS 2006-038):

> **Alternative 1.** No seismic-survey permits issued for geophysical exploration activities (No Action). *(Referenced in Chukchi 193 DEIS as Seismic Survey Mitigation Alternative 1)*
>
> **Alternative 2.** Seismic surveys for geophysical-exploration activities would be permitted with existing Alaska OCS G&G exploration stipulations and guidelines. *(Referenced in Chukchi 193 DEIS as Seismic Survey Mitigation Alternative 2)*
>
> **Alternative 3.** Seismic surveys for geophysical exploration activities would be permitted incorporating existing Alaska OCS G&G exploration stipulations and guidelines and additional protective measures for marine mammals, including a 120-decibel-(dB)-specified exclusion zone. *(Referenced in Chukchi 193 DEIS as Seismic Survey Mitigation Alternative 3)*
>
> **Alternative 4.** Seismic surveys for geophysical-exploration activities would be permitted incorporating existing Alaska OCS G&G exploration stipulations and guidelines and additional protective measures for marine mammals, including a 160-dB-specified exclusion zone. *(Referenced in Chukchi 193 DEIS as Seismic Survey Mitigation Alternative 4)*
>
> **Alternative 5.** Seismic surveys for geophysical-exploration activities would be permitted incorporating existing Alaska OCS G&G exploration stipulations and guidelines and additional protective measures for marine mammals, including 160-dB- and 120-dB-specified exclusion zones. *(Referenced in Chukchi 193 DEIS as Seismic Survey Mitigation Alternative 5)*
>
> **Alternative 6.** Seismic surveys for geophysical-exploration activities would be permitted incorporating existing Alaska OCS G&G exploration stipulations and guidelines and additional protective measures for marine mammals, including a 180/190-dB-specified exclusion zone. *(Referenced in Chukchi 193 DEIS as Seismic Survey Mitigation Alternative 6)*

The sections that follow are summarizing excerpts from the PEA which described the potential impacts of Alternatives 1, 3, 4, 5, and 6. Alternative 2 was dropped from detailed analysis in the PEA because of its potential to cause unavoidable significant impacts. See the PEA for a more detailed and thorough description and discussion of the potential impacts of conducting seismic surveys and the mitigation measures proposed to protect the biological resources of the Arctic Ocean.

Fish/Fishery Resources and Essential Fish Habitat (EFH)

Alternative 1 (No Action) poses no adverse impacts to fish/fishery resources or EFH.

Alternatives 3 through 6 would have adverse but not significant impacts on fish/fishery resources and EFH. The analysis in the final PEA notes specific issues that were afforded additional assessment given their importance to fish survival and reproduction and human uses, including impacts to migration and spawning, rare species, subsistence fishing, and operation of coincidental multiple seismic surveys. However, based on the above assessment, MMS concludes that the potential for impacts to these issues (e.g., migration, spawning, rare species, and subsistence fishing) also is adverse but not significant.

Alternatives 3 through 6 all equally employ mitigation measures to avoid or limit the potential for impacts to fish resources and EFH. As these measures apply across Alternatives 3 through 6, there remains little difference across the various alternatives as to the degree of impacts for this species group and related issues. In theory, the alternatives with the more restrictive exclusion zones for marine mammals

(Alternatives 3 and 5) would provide more protection for marine fish and invertebrate species if seismic survey shutdown were to occur, but again this would be considered only incrementally more protective for fish, invertebrates and related issues.

The following mitigation measures are specifically designed to limit potential impacts to migration, spawning, rare species, subsistence fishing, and operation of multiple seismic surveys:

- Seismic cables and airgun arrays shall not be towed in the vicinity of fragile biocenoses, unless MMS determines the proposed operations can be conducted without damage to the fragile biocenoses.

- Based on the information provided by MMS on the known locations of fragile biocenoses in the Chukchi and Beaufort seas, the applicant shall clearly explain to what distance their operations will avoid fragile biocenoses and how they will avoid damaging fragile biocenoses.

- Permittees shall report to MMS if damage to fragile biocenoses occurs as a result of their operations. Additionally, Permittees shall notify MMS if they detect any fragile biocenoses otherwise not documented in their permit application.

- Vessels shall not anchor in the vicinity of any documented fragile biocenoses (e.g., the Boulder Patch, natural gardens of coral/sponge or macroalgae [e.g., kelp beds]), unless an emergency situation involving human safety specifically exists and there are no other feasible sites to anchor at the time.

Threatened and Endangered (T&E) Species

T&E Marine Birds.

Alternative 1 (No Action) would mean that spectacled and Steller’s eiders and Kittlitz’s murrelets in the Beaufort and Chukchi seas would not be exposed to disturbance and noise from seismic vessels and associated seismic activities.

The most likely effects of Alternatives 3, 4, 5, and 6 involve disturbance and bird/vessel collisions. Eiders will either dive or fly in response to a disturbance. All the alternatives implement monitoring a marine mammal-exclusion zone. Mitigation measures for marine mammals likely necessitate the use of high-intensity lights at night and during inclement weather to search for marine mammals in the vessel path. Seismic surveys would cease when the marine mammal-exclusion zone could not be effectively monitored, but the high-intensity lights could remain on to search for marine mammals. The zone is monitored using observers that are onboard and/or in aircraft, and would need the use of high-intensity lighting to maintain vigilance for marine mammals when the surveys are being conducted during periods of darkness or poor visibility (e.g., during rain or fog). Use of high-intensity lighting would be independent of the size of the exclusion zone, as these lights would be useful only in areas closest to the seismic-survey vessel.

In the Chukchi Sea, spectacled eiders molt in Ledyard Bay, an area designated as critical habitat. Males and/or females are present in this area from early July through the middle of October or possibly later. As day-length decreases during the late summer, eiders migrating to the molting area in darkness would be more likely to encounter vessels using high-intensity lights. Spectacled eiders often migrate at night and flying at night they can become disoriented by high-intensity work lights and strike vessels. Eiders flying during low-visibility conditions of rain or fog can also strike vessels.

The risk of collisions with spectacled eiders is lowest beyond 60 km offshore, because females tend to travel within 60 km and males travel within 35 km. Within these distances from shore, the risk of collisions might increase, especially during poor visibility. The greatest risk of a vessel strike would exist if the seismic-survey vessel was using high-intensity lighting while transiting through areas of high spectacled eider density at night during fog or rain.

The most likely effects of seismic surveys to Steller's eiders in the Beaufort and Chukchi seas involve the same type of disturbances and collisions associated with spectacled eiders. Due to the extent of sea ice, it is unlikely that seismic surveys would begin in the Beaufort Sea when males are passing through, so impacts to Steller's eiders are unlikely. Males could be encountered in the Chukchi Sea in the summer and fall, and females might be encountered in both the Beaufort and Chukchi seas during the seismic-survey period. Limited data exist on breeding Kittlitz's murrelets. Breeding pairs in the Chukchi Sea are solitary and nested well inland on the tundra. They forage at sea during nesting and chick rearing, but their foraging distances during this period in the Chukchi Sea are unknown. In glaciated areas in Alaska, they typically forage within a few hundred meters of shore. An estimated 15,000 Kittlitz's murrelets have been observed in the pelagic waters of the Chukchi Sea beginning in late August, but their presence is sporadic, suggesting there are additional factors that influence their distribution and that there is large interannual variation in abundance. Accordingly, the potential for disturbance from or collision with seismic-survey vessels or aircraft is small. It is possible, during the course of normal feeding or escape behavior that a murrelet could be near enough to an airgun to be injured by a pulse. A mitigation measure to "ramp up" airgun noise when seismic surveys begin can help disperse birds before harm occurs. During ongoing surveys, murrelets also are likely to hear the advance of the slow-moving survey vessel and associated airgun operations and move away.

T&E Marine Mammals

Alternative 1 (No Action) would not expose T&E marine mammals (bow head, fin, and humpback whales) in the project area to noise associated with seismic surveys and their associated support vessels (air and sea)..

Alternatives 3 through 6 are similar but have varying levels of protection for T&E marine mammals. This variation in protection primarily is in the noise level set as the shut-down criteria and monitoring that is required to effectively monitor that noise-level radii, or shut-down/exclusion zone.

While all alternatives other than the Alternative 1 (No-Action) meet the objectives of this environmental assessment, they also potentially could adversely affect bowhead whales and other marine mammals, principally through incidental harassment due to exposure to seismic survey noise. Possible harassment likely would be most pronounced if large feeding aggregations of whales, or cow/calf pairs of bowhead whales, are affected. Alternatives 3 through 6 have the potential for causing adverse but not significant impacts.

Alternatives 3 through 6 would prohibit seismic surveys around bowheads in the spring lead system and thereby reduce the potential for adverse effects of seismic surveys on bowhead calving, cow/calf pairs, and newborn calves. The effect of seismic surveys on these components of the population is very uncertain, and avoidance of their exposure is the most effective way to reduce the potential for an adverse effect on these bowheads. Even at a 120-dB isopleth shut-down zone (included in Alternatives 3 and 5), bowhead whales might still detect seismic survey airgun sounds, icebreaker sound, or vessels associated with seismic surveys.

Variability in the size and configuration of the airgun arrays, water depth, and bottom properties all can influence these noise-level radii, which is expected to vary from one location to another and between different seismic operations. Therefore, field verification is included as a mitigation measure to verify the actual noise-level radii. Shut-down or safety zones may be as large as 30 km for the 120-dB zones and as small as 100 m for the 190-dB zones, depending on the size and energy output of the airgun array and environmental conditions. It is likely that monitoring will be required using one or more of these: aerial surveys; passive acoustic monitoring; and boat-based surveys. If these methods of monitoring are not effective, then additional mitigation measures may be set in place (i.e., adaptive management schemes where specific areas of higher marine mammal concentrations are avoided on a temporal or spatial basis).

Alternatives 3 through 6 provide monitoring requirements meant for observers to visually monitor the exclusion zone, regardless of size, and be able to call for a shut down if marine mammals enter the exclusion zone. The ability of observers to effectively monitor the exclusion zone, and be able to call for a shut down if bowheads enter the zone, is critical to the success of the protective measures described in Alternatives 3 through 6, although it is generally not possible to observe all bowheads within the exclusion zone, especially during foggy weather or at night. Additional monitoring techniques, such as aerial surveys, vessel-based systems, or passive acoustics, could enhance the ability to detect bowhead whales and other marine mammals in larger exclusion zones.

Evidence shows that bowhead whales and other cetaceans can react behaviorally in the presence of aircraft. The mitigations imposed under Alternatives 3 through 6 all would require that aircraft be flown no lower than 1,000 ft, a level that limits the potential for reactions from marine mammals. Therefore, the use of aerial over flights in monitoring would not be expected to add additional impacts to bowhead whales. The same is true for passive acoustic monitoring where observers simply "listen" for evidence of whale noise. Vessel-based monitoring may impose a degree of additional disturbance, but it would be considered less than what would occur for seismic activity should whales not be monitored but present in the exclusion zone.

Each exclusion zone in Alternatives 3 through 6 would require boat-based visual monitoring (i.e., all observers are scanning areas from the vessel as far as visually possible with appropriate equipment). The additional monitoring techniques (e.g. aerial or vessel-based surveys, acoustic monitoring) that may be necessary for Alternatives 3 and 5 could be costly to implement because the larger exclusion zone associated with the 120-dB isopleth, in theory, would provide a much larger and more difficult area to monitor then the smaller exclusion zones (160-dB isopleth and 180/190-dB isopleth). Smaller exclusion zones are less effective in limiting impacts to cetaceans than larger exclusion zones because larger exclusion zones associated with Alternatives 3 and 5 would by definition require further distance of operating seismic survey vessels from cetaceans than Alternatives 4 and 6. Additional mitigation measures would be set in place (i.e., adaptive management schemes where specific areas of higher marine mammal concentrations are avoided on a temporal or spatial basis) should monitoring measures prove ineffective. Therefore, the varying degrees of impact among the alternatives, as discussed in the paragraphs above, remains the same with the greatest to least level of protection from behavioral disturbance being Alternatives 3, 5, 4, and 6 respectively.

Non-T&E Marine Birds.

Murres. The chance of murres colliding with seismic-survey vessels is relatively low, because most murres should be out of the action area during the male molt and at-sea rearing period. The primary risk of collision occurs during the brief period when murres migrate south to the Bering Sea. Based on telemetry data, most murres would not migrate through the action area.

Puffins. Seismic-survey vessels would remain at least 3 mi from shore, so there is little chance for disturbance of breeding colonies. Most puffins are located near Cape Lisburne in September, but this area represents only a small portion of the action area, and it is possible that this area already might be surveyed prior to September. If surveys were completed prior to September, there would be minimal risk of puffins colliding with the seismic-survey vessel.

Black-legged Kittiwake. Disturbance and risk of collision should be minimal to kittiwakes, as they are mobile (i.e., not molting) and wide ranging throughout the Chukchi Sea. There are no discernable areas of concentration that may increase the impact of disturbance or risk of collision. Most kittiwakes are out of the Chukchi Sea by late September.

Northern Fulmar. If distribution trends are similar to the 1980's, most fulmars would be south of the action area. Furthermore, most fulmars are present in the Chukchi Sea for only a few weeks at the end of summer; it is possible that all survey vessels would be working on survey areas farther north during that time to take advantage of the period of maximum ice retreat in the Beaufort Sea. Both of these factors make the chance of large scale disturbance or collision minimal.

Short-tailed Shearwaters and Auklets. These species are considered together, because they occur in similar numbers and both forage on patchily distributed zooplankton in pelagic waters. The chance of disturbance is low, because their distribution is patchy and the disturbance is of short duration. A disturbance might lead to a temporary halt in feeding in one area or a switch to a new and possibly less-productive area.

The risk of collisions is a more relevant issue, as shearwaters and auklets are present in the Chukchi Sea until late September or early October. There are about 12 hours of darkness during this period, and seismic surveys could occur 24 hours a day. Large collisions involving crested auklets and lights on commercial-fishing vessels have been documented. Collisions are not documented for shearwaters, but these types of events typically are poorly documented. It appears most likely that large collisions occur when a combination of darkness, fog, rain, or snow exist and high-intensity lights are used on commercial vessels near large aggregations of certain species of seabirds. While there is no certainty that collisions would occur, the chance seems to be the greatest for auklets and, perhaps to a lesser extent, shearwaters in the Chukchi Sea during seismic surveys.

Black Guillemot. These birds usually are closely associated with the ice edge, and the likelihood of disturbance or collisions is limited to a small portion of the action area. Seismic-survey vessels need to follow a specific course during the survey and, therefore, minimize surveys near the ice edge due to the presence of large sections of ice that could cause the vessel to alter course or damage seismic instruments. Accordingly, operations in areas likely to be inhabited by black guillemots are limited, and the chance for disturbance and collisions is minimal.

Gulls and Terns. The likelihood of impacts from disturbance or collisions to Ross' gulls, ivory gulls, arctic terns, and glaucous gulls is minimal. Ross's gulls and ivory gulls are associated with ice and breed well outside the action area. They are present in the action area for a short period before migrating through the Chukchi Sea to overwintering locations. Arctic terns breed near the coast of both seas, but seismic vessels will be operating beyond 3 mi from shore; therefore, disturbance is unlikely. Terns migrate through the Chukchi Sea but are rarely observed in pelagic waters. Similarly, glaucous gulls typically are most abundant within 70 km of shore, thereby reducing the likelihood of disturbance and collisions.

Phalaropes. Both species of phalaropes may be encountered in the Beaufort and Chukchi seas, especially during the postnesting period in late summer and fall. Phalaropes use habitat within a few meters of shore and also pelagic areas; their distribution is generally tied to patchy concentrations of zooplankton. Because seismic-survey vessels would remain at least 3 mi offshore, disturbance to or a collision with phalaropes nearshore is unlikely. In pelagic waters, disturbances may occur but their impact is likely to be minimal, due to the patchy distribution of prey and the transient and short-term nature of seismic surveys. Disturbed phalaropes might move to another prey patch or return to the same area after the disturbance passes. Collisions may occur, especially during inclement weather, but the likelihood of collisions is unknown. Red-necked phalaropes were attracted to lights on a ship in the Gulf of Guinea and reacted most strongly at night in inclement weather. There does not appear to be any other documented cases of collisions involving phalaropes, so the incidence of collisions may either be low or unreported.

Jaegers. The chance of impacts to jaegers by disturbance or collision is minimal. Although they are present throughout the Chukchi Sea in the fall when there are several hours of darkness and frequent inclement weather, jaegers are not known to occur in high concentrations in any area.

Loons. In the Beaufort and Chukchi seas, loons typically migrate close to shore until they are south of Cape Lisburne, when they travel over pelagic waters on their migration to wintering areas. Impacts from disturbances or collisions are unlikely, because loons migrate nearshore in most of the action area, and seismic-survey vessels would remain 3 mi offshore.

Long-Tailed Ducks. Impacts from disturbances or collisions are unlikely, because long-tailed ducks molt in lagoons on the coast of the Beaufort Sea. Seismic-survey vessels would remain 3 mi offshore during surveys. After molting, these birds move south following the Chukchi Sea coast and typically remain 45 km offshore along the 20-m isobath. Observations farther offshore are uncommon. The chance of disturbance is small due to the small portion of the action area within 45 km from the coast. Collisions are possible, especially in inclement weather.

Common Eider. Impacts to common eiders likely would be similar to those described for spectacled eiders, although the implications of potential impacts probably are less significant. Common eiders molt near several locations along the Alaska Chukchi Sea coast including Point Lay, Icy Cape, and Cape Lisburne. Like spectacled eiders, their molt locations probably coincide with areas of high-density prey items. Disturbance at molt locations could impose additional stress during this energetically demanding period; the degree of stress would depend on the magnitude and frequency of disturbance. Collisions are possible, especially during nighttime when there is inclement weather. Most common eiders follow the 20-m isobath, which is ~45 km from shore in the Chukchi Sea and 13-16 km in the Beaufort Sea. Because most of the action area lies well beyond these distances form shore, eiders are at risk of collisions for a small portion of the surveys. Implementation of mitigation measures would reduce the likelihood of collisions.

King Eider. Impacts would be similar to common eiders in both the Beaufort and Chukchi seas, except that king eiders molt at locations in the Bering Sea. Migration distances from shore are similar, so the collision impacts are likely similar to common eiders.

Non-T&E Marine Mammals.

The most likely effects on marine mammals from seismic activity and the proposed alternatives include disturbance reactions to seismic vessels and associated aircraft traffic, and altered prey availability. Responses, such as fright, avoidance, and changes in behavior and vocalization patterns have been observed in marine mammals at ranges of tens to hundreds of kilometers from a sound source. Sound could also affect marine mammals indirectly by changing the accessibility of their prey species. Populations could be adversely affected if feeding, orientation, hazard avoidance, migration, or social behaviors are altered. Serious long-term consequences could also result from chronic exposure. Baleen whales (bowhead, fin, humpback, gray, and minke whales) are the most sensitive marine mammal species to anthropogenic noise in the action area.

The No Action alternative (Alternative 1) would not expose marine mammals in the project area to noise associated with seismic surveys and their associated support vessels (air and sea). Other methods to collect geophysical and geological data (as yet undetermined) may disturb animals in the project area in unknown, but possibly similar ways.

Alternatives 3 through 6 are essentially the same with varying levels of protection for marine mammals depending on the size of an exclusion zone and related monitoring. They all are environmentally sound, as they all contain protective measures to mitigate possible impacts on marine mammals. Theoretically, when effectively monitored, alternatives with the lowest dB isopleth exclusion zone (e.g., Alternative 3 at 120-dB) provide a greater level of protection for marine mammals from harm and harassment than those alternatives having a higher dB isopleth exclusion zone (e.g. Alternative 6 at 180/190-dB). In addition, Alternatives 3 through 6 would prohibit seismic surveys around marine mammals in the spring lead system.

Field verification of the exclusion zone would be required under these alternatives, and the appropriate size of the exclusion zone would be based on these results. It is likely that the exclusion zone for these bigger arrays would be larger than what has been previously used, and this may result in an increased area where marine mammals may be harassed. In addition, as the safety zone increases in size (from 190/180-dB to 120 dB; Alternatives 3 through 6), the ability of vessel-based visual observers to effectively monitor the exclusion zone decreases. Therefore, additional monitoring techniques (i.e., aerial surveys and acoustic monitoring) or mitigation measures would be required for the alternatives with larger exclusion zones.

Pinnipeds (Ringed, Spotted, Ribbon, and Bearded Seal and Pacific Walrus). The NMFS' current Level A harassment threshold for pinnipeds (excluding the pacific walrus) is 190 dB. Pacific walrus are managed by the FWS, and they recently implemented a 180-dB exclusion zone for walrus.

Alternatives 3 through 6 all provide exclusion zones capable of providing protection for pinnipeds in the project area. The exclusion zone would be the smallest for Alternative 6 (180/190 dB) and could be monitored visually by vessel-based observers. Conversely, Alternative 3 would provide the largest exclusion zone (120 dB). Increased disturbance from vessel and aircraft activity could consequently cause pinnipeds to leave haul-out locations and enter the water, though the response is highly variable. This could have a greater impact if flushing of haul out sites occurs when pups are present, as they can be more easily injured and separated from their mothers. Use of the 160 dB exclusion zone in Alternative 4 and in Alternative 5 would provide an intermediate-sized safety zone. Alternatives 3-5, when properly monitored, would provide exclusion zones which are sufficient for pinnipeds.

The MMS believes the potential for any injuries to pinnipeds from the proposed activity and Alternatives 3 through 6 is very limited, with Alternative 6 providing a slightly greater potential for Level A Harassment as its specified exclusion zone of 190 dB most closely approaches the lower limits of levels set by NMFS for Level A Harassment.

Alternatives 3 through 6 require trained observers to visually monitor the exclusion zone, regardless of its size, and to be able to call for a shut-down if pinnipeds enter the exclusion zone. The ability of observers to effectively monitor the exclusion zone, and be able to call for a shut-down if pinnipeds enter the zone is critical to the success of the protective measures described in Alternatives 3 through 6, though it is often difficult to observe all pinnipeds within the exclusion zone.

Pinnipeds are not likely to be exposed to sound levels which could cause injury, as they would have to swim within extremely close proximity to the seismic array in order to be vulnerable, and there is no specific evidence that exposure to pulses of airgun sound can cause direct injury to pinnipeds. The most likely potential impacts to pinnipeds from seismic surveys and associated activities would be disturbance and possible impacts to food resources.

Alternatives 3 through 6 would require overflights at or above 1,000 ft in order to minimize the potential for behavioral impacts to marine mammals. Therefore, the use of aerial surveys is not expected to significantly increase the potential for harassment of pinnipeds. Therefore, the varying degrees of impact between the alternatives remains the same with the greatest to least level of protection from behavioral disturbance and injury being Alternatives 3, 5, 4, and 6 respectively.

Cetaceans (Beluga Whale, Killer Whale, Harbor Porpoise, Minke Whale, and Gray Whale). NMFS' current threshold for Level A Harassment (potential to injure) of cetaceans is 180 dB. The mitigation measures outlined in Section IV, and which apply to Alternatives 3 through 6, are set to avoid any takes of marine mammals by Level A Harassment. In addition, the MMPA authorization required under Alternatives 3 through 6 would not authorize any Level A takes of marine mammals. Based on the above, the fact that no injuries to marine mammals have been documented from seismic survey activities, MMS believes the potential for any injuries to cetaceans from the proposed activity and Alternatives 3 through 6 is very limited, with Alternative 6 providing a slightly greater potential for Level A Harassment as its specified exclusion zone of 180 dB most closely approaches the lower limits of levels set by NMFS for Level A Harassment.

The NMFS' current threshold for Level B Harassment (potential to disturb) for cetaceans is 160 dB. No studies have shown that toothed whales have reacted behaviorally to seismic sound below the 160 dB received sound level. Studies on most baleen whales, except for the bowhead and gray whale, have also not demonstrated behavioral reaction at a received sound level of less than 160 dB. However, data exists showing that gray and bowhead whales may react behaviorally at received sound levels lower than 160 dB. In comparing Alternatives 3 through 6, looking purely at the size of the exclusion zone and assuming the monitoring requirements will be effective, there are differences in the level of potential behavioral impact across these alternatives. The most protective (i.e., resulting in the least potential for takes by Level B Harassment and avoidance of Level A Harassment) would be Alternative 3 as this provides the largest exclusion zone (120 dB) and would apply for all marine mammals. Given the bowhead whale is the only cetacean in the Proposed Action area to show avoidance near the 120 dB received sound levels from impulse sounds and all other cetaceans in the Proposed Action area have generally demonstrated avoidance at higher received sound levels (i.e., 160 to 180 dB), Alternative 3 would result in the least impact to cetaceans and other marine mammals in the Proposed Action area.

After Alternative 3, Alternative 5 would provide the next most protective level for cetaceans. In this alternative, the exclusion zone would be set at 160 dB unless a certain number of bowhead whales (individuals, reproductive-age females, calves) were present, as determined by MMS and NMFS, where the exclusion zone would be changed to 120 dB. The combination of the two exclusion zones under this alternative would provide all cetaceans with additional protective measures but still would provide an exclusion zone at 160 dB (the level set by NMFS beyond which Level B Harassment is more likely to occur) at all remaining times. Therefore, Alternative 5 provides the next most protective alternative for marine mammals.

Alternative 4 follows Alternatives 3 and 5, respectively, in the degree of potential impacts to cetaceans. This alternative sets the exclusion zone at 160 dB at all times, the level set by NMFS beyond which Level B Harassment is more likely to occur. Therefore, the greatest potential for Level B Harassment exists for Alternative 6 where the exclusion zone for cetaceans is set at 180 dB, which exceeds NMFS' 160 dB determination for Level B Harassment (disturbance) and most closely approaches the NMFS determination for Level A Harassment (injury).

While the additional techniques required for Alternatives 3 and 5 would be costly and a larger exclusion zone in theory would provide a much larger, and possibly more difficult, area to monitor, this does not necessarily mean these larger exclusion zones are less effective in limiting impacts to cetaceans for the following reasons: (1) each exclusion zone in Alternatives 3 through 6 would require boat-based visual monitoring (i.e., all observers are scanning areas from the vessel as far as visually possible with appropriate equipment); (2) larger exclusion zones in Alternatives 3 and 5 would by definition require further distance of operating seismic vessels from cetaceans than Alternatives 4 and 6 with smaller exclusion zones; (3) the aerial survey and acoustic monitoring required in Alternatives 3 and 5 (and not in Alternatives 4 and 6) would provide additional coverage further away from the seismic source; and (4) additional mitigation measures would be set in place (i.e., adaptive management schemes where specific areas of higher marine mammal concentrations are avoided on a temporal or spatial basis) should monitoring measures prove ineffective. Therefore, the varying degrees of impact between the alternatives, as discussed in the paragraphs above, remains the same with the greatest to least level of protection from behavioral disturbance being Alternatives 3, 5, 4, and 6 respectively.

Marine Fissipeds (Polar Bear). Polar bears are managed by the FWS, and they recently implemented a safety radius for polar bears of 190 dB (USDOI, FWS, 2005). Because any polar bears encountered will most likely be on the ice, air gun effects on them are expected to be minor. If polar bears are encountered in the water, received sound levels would be substantially reduced due to the pressure release effects near the water surface (Richardson et al. 1995a). The most likely impacts to polar bears from seismic surveys and associated activities would be disturbance and possible impacts to bears' food resources. Any impacts of seismic activity to polar bear food resources will probably be minor, local and brief in nature. Bearded and ringed seals are the primary prey of polar bears in the action area, and abundance and availability of these seals are not expected to be significantly altered by the proposed seismic surveys and associated activities.

Alternative 6 provides the smallest exclusion zone (180/190 dB) and could be visually monitored by vessel-based observers. As the exclusion zones grow in size, it becomes less likely that the zone can be effectively monitored by vessel-based observers and aircraft-based observers will need to be added (i.e., when 120-dB level is used in Alternatives 3 and 5). Vessel activity should cause only a brief disturbance, with bears resuming normal activities after the vessel passes. Aircraft activity may be more problematic as polar bears often run away from aircraft passing at low altitude (e.g., altitude < 200 m and lateral distance < 400 m). The inclusion of aircraft-based observers has the potential to disturb more polar bears than vessel-based observers alone if the aerial observations are flown at a sufficiently low altitude. Use of the 160-dB exclusion zone in Alternative 4 and in Alternative 5 will provide an intermediate-sized safety zone. For the Chukchi Sea, Alternatives 4 and 5 are essentially identical. The ability of observers to effectively monitor the exclusion zone, and be able to call for a shut-down if polar bears enter the safety zone is critical to the success of the protective measures described in Alternatives 3 through 6.

Subsistence-Harvest Patterns

Because no seismic activity would occur under Alternative 1, no impacts to subsistence resources and practices would be expected.

Alternatives 3, 4, 5, and 6 all would have similar impacts on subsistence harvests. Seismic surveys for prelease geophysical exploration activities would be permitted with existing Alaska OCS exploration stipulations and guidelines and additional specific protective measures for marine mammals, including an isopleth-specified exclusion zone. These alternatives would permit seismic surveys in the Beaufort and Chukchi seas and incorporate standard G&G-permit stipulations and additional protective measures to ensure that fish, wildlife, and subsistence-harvest resources and practices are not adversely impacted. An inability to effectively perform mitigation measures would result in the suspension of a G&G permit until such time that the protective measures can be successfully performed and demonstrated. Theoretically, the larger the exclusion zone coupled with shut-down procedures, the greater protection of marine mammals from potential harassment and injury. Therefore, the 120-dB isopleth-exclusion zone would afford more protection from harassment and injury for marine mammals than the 180/190-dB isopleth-exclusion zone. The more marine mammals are protected, the more subsistence-harvest activities are protected.

An operator could propose to conduct seismic-survey activity in an area critical to whaling during the whaling season; however, if this condition did occur, potential conflict could be mitigated by the cessation of activities during the whale migration. Because fall ice conditions are not predictable events, user conflicts between vessels and whalers due to bad ice conditions might be more difficult to mitigate. Presently, individual companies are coordinating with the whalers through the auspices of the AEWC. Such coordination was a requirement under MMS leases for Beaufort and Chukchi Sea Sales 97,109, 144, 170, 186, and 195. The working protocol is for the company to submit a plan of cooperation as a part of their exploration plan. Seismic surveying requires submission of a letter stating that cooperation will occur.

Required mitigation similar to the lease-specific Stipulations No. 4 - Industry Site-Specific Bowhead Whale-Monitoring Program and Stipulation No. 5 - Conflict Avoidance Mechanisms to Protect Subsistence Whaling and Other Subsistence Activities and conflict avoidance measures defined in an IHA would specify any noise-monitoring program for marine mammals required for ongoing seismic operations in the Chukchi Sea and would be considered through the Peer Review Workshop meetings. Because permittees usually seek a Letter of Authorization (LOA) or IHA for incidental take from the NMFS, the monitoring program and review process required under the LOA or IHA generally will satisfy the requirements of Stipulations 4 and 5. Any potential monitoring program would be designed to: (1) assess when bowhead and beluga whales, walrus, and bearded seals are present in the vicinity of potential operations and the extent of behavioral effects on these species due to operations; (2) consider the potential scope and extent of impacts that the particular type of operation could have on these species; and (3) address local subsistence hunters' concerns and integrate Inupiat traditional knowledge.

Stipulations and required mitigation and conflict avoidance measures under MMP authorization as defined by NMFS and FWS should be followed in locations where the subsistence hunt is affected. The MMPA authorization obligates operators to demonstrate no unmitigable adverse impacts on subsistence practices. Conflict avoidance agreements between Permittees and the AEWC work toward avoiding unreasonable conflicts and disturbances to hunters and bowhead whales. Similar avoidance measures could be required for the subsistence beluga whale hunt by the Alaska Beluga Whale Committee (ABWC), for the subsistence walrus hunt by the Alaska Eskimo Walrus Commission (EWC), and for the subsistence polar bear harvest by the Nanuk Commission (NC). Such conflict avoidance agreements likely would follow protocols similar to those reached annually between Permittees and the AEWC for the subsistence bowhead hunt and address industry seismic-vessel activities under provisions of the MMPA. The AEWC prefers to negotiate a conflict avoidance agreement with industry on an annual basis using a regional rather than a project-specific approach, so as to address potential impacts from all ongoing projects. With the use of the conflict avoidance agreement methodology, Native subsistence-whale hunters generally have been successful in reaching their annual whale "take" quotas.

For MMS-permitted seismic surveys, NMFS- and FWS-sanctioned observers, usually local Alaskan Natives and biologists employed by the monitoring contractor, are onboard survey vessels. These observers stop seismic operations when they observe marine mammals within the safety radius designated by the NMFS. Shut down of the airguns occurs if marine mammals are within this radius because of concern about possible effects on marine mammal hearing sensitivity (USDOI, MMS, 2003a).

Sociocultural Environment

Because no seismic-survey activity would occur (Alternative 1), no impacts to subsistence resources and practices and consequent impacts on sociocultural systems would be expected. However, if other nonseismic field techniques are proposed to be used, they would require additional environmental analysis.

Seismic surveys for geophysical exploration activities covered in Alternatives 3, 4, 5, and 6 would be permitted with existing Alaska OCS exploration stipulations and guidelines and additional specific protective measures, including a specified isopleth-exclusion zone (either 120 dB, 160 dB, 120 dB and 160 dB, or 180/190 dB). Additional protective measures (beyond the existing Alaska OCS exploration stipulations and guidelines) would be identified and incorporated into these alternatives to ensure that fish, wildlife, and subsistence-harvest resources and practices are not adversely impacted. An inability to effectively perform mitigation measures will result in the suspension of a G&G permit until such time that the protective measures can be successfully performed and demonstrated.

Avoidance planning, stipulations and required mitigation, and conflict avoidance measures under MMPA authorization are defined by NMFS and FWS and made a part of each alternative would serve collectively to mitigate disturbance effects on Native lifestyles and subsistence practices and would likely mitigate any consequent impacts on sociocultural systems.

To ensure compliance with the MMPA, MMS also is requiring seismic-survey operators to obtain from NMFS and FWS an Incidental Take Authorization (ITA), which could be in the form of an IHA or LOA, before commencing MMS-permitted seismic-survey activities. The ITA's mitigation and monitoring requirements would further ensure that impacts to marine mammals will be negligible and that there will be no unmitigable adverse impact on subsistence uses of marine mammals.

To achieve this standard, the seismic operators usually negotiate a Conflict Avoidance Agreement (CAA) with the Alaska Eskimo Whaling Commission and the affected villages' Whaling Captains Association. The CAA likely will include a prohibition on conducting seismic surveys during the bowhead whale-hunting season in the Beaufort Sea, describe a dispute-resolution process, and provide emergency assistance to whalers at sea. Implementation of the CAA further ensures that there will not be significant social or economic impacts on the coastal inhabitants of the Beaufort and Chukchi seas by avoiding an adverse impact on subsistence marine mammal-harvest activities.

Archaeological Resources

Alternatives 3 through 6 include potential use of ocean bottom cable (OBC) surveys to gather seismic data. The OBC surveys might occur in the Beaufort Sea but are not anticipated to occur in the Chukchi OCS because of its great water depths and the greater efficiency of streamer operations in deep water.

The OBC seismic surveys potentially could impact both prehistoric and historic archaeological resources in waters inshore of the 20-m isobath or in deeper water, if cables are laid from shallow to deep water. Assuming compliance with existing Federal, State, and local archaeological regulations and policies and the application of MMS' G&G Permit Stipulation 6 (regarding the discovery of archaeological resources) and CFR 251.6 (a)(5) regarding G&G Explorations of the Outer Continental Shelf to not "disturb archaeological resources," most impacts to archaeological resources in shallow offshore waters would be avoided.

Environmental Justice

Because no seismic survey activity would occur under Alternative 1 (No Action), no environmental justice impacts would be expected.

Inupiat Natives could be disproportionately affected by any alternative that allows seismic because of their reliance on subsistence foods; and actions under these alternatives could affect subsistence resources and harvest practices. Avoidance planning, stipulations and required mitigation, and conflict avoidance measures under IHA requirements as defined by NMFS and FWS and made a part of each alternative would serve collectively to mitigate disturbance effects on environmental justice. Mitigating measures likely would incorporate traditional knowledge and the cooperative efforts between MMS, the State, the people of the North Slope, and tribal and local governments. With required mitigation and conflict avoidance measures in place, significant impacts to subsistence resources and hunts would not occur as a result of this action, thereby avoiding significant impacts on sociocultural systems and disproportionately high adverse impacts on low income and minority populations in the region.

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Oil and Gas Lease Sale 193 and Seismic Surveying Activities
Final Environmental Impact Statement VOLUME III

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