

Table I.C-1.
Assumptions used to Identify and Analyze the Impacts Associated with Conducting 2D and 3D Seismic Surveys in the Arctic Ocean in 2006.

Planning Parameters	Chukchi Sea	Beaufort Sea
Geographic boundaries	5-Year (2002-2007) Program Area	Leaseholds and 5-Year (2002-2007) Program Area
Working timeframe	June to early November	July to early October
Maximum number of permitted seismic surveys in 2006.	4	4
Maximum number of times a specific oceanographic area would be exposed to a seismic-survey event in 2006.	4	4
Types of G&G seismic-exploration surveys likely to be conducted in 2006.	2D and 3D seismic surveys using streamers.	2D and 3D seismic surveys using streamers. Ocean-bottom cable 2D and 3D seismic surveys. High-resolution surveys.
Number of vessels supporting the seismic-exploration operations vessel(s) in 2006.	1 per seismic exploration operation (in case of an emergency, 1 of the 4 support vessels may be capable of breaking ice).	1 per seismic exploration operation (in case of an emergency, 1 of the 4 support vessels may be capable of breaking ice).

Source:
 USDO, MMS, Alaska OCS Region.

Table II.B-1.
Comparative General Ranking of the Feasibility Characteristics of Each Alternative to be Considered Further.

Alternatives	Effectiveness		Efficiency	Acceptability				Federal Laws
	Obtaining Data	Environmental Soundness	Cost	Implementability				
				T	EV	EC	S	
1 No Action	5	1	5	4.5	3	4.5	1.5	3
3 (120 dB)	4	2	4	4.5	3	4.5	1.5	3
4 (160 db)	2	4	2	2	3	2	3	3
5 (120/160dB)	3	3	3	3	3	3	2	3
6 (180/190dB)	1	5	1	1	3	1	4	3

Notes:
T - Technical feasibility
EV - Environmental feasibility (costs not being a limiting factor)
EC - Economic feasibility
S - Socially feasible as related to subsistence-harvest activities

Table III.B-1.
A Comparison of Most Common Sound Levels from Various Sources¹

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
	Icebreaking ²	193
Dredging		
	Clamshell Dredge	150-162
	<i>Aquarius</i> (cutter suction dredge)	185
	Beaver Mackenzie Dredge	172
Drilling		
	<i>Kulluk</i> (conical drillship) – drilling	185
	Explorer II (drillship) - 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

Source:

¹ Richardson et.al, 1995a.

² Robert Lemeur.

³ Burgess and Green, 1999.

Table III.C-1.

Projected Number of State of Alaska and OCS Seismic Surveys in the Beaufort and Chukchi Seas between 2006 and 2010.

Year	2D/3D Seismic Surveys		High-Resolution, Site-Clearance Surveys		State Water Surveys 2D/3D Seismic Surveys ³	
	Beaufort ¹ Sea	Chukchi ² Sea	Beaufort Sea	Chukchi Sea	Beaufort Sea	Chukchi Sea
2006	4	4	3	0	1	0
2007	3	4	2	0	0	0
2008	3	4	2	0	1	0
2009	2	3	2	1	0	0
2010	2	3	2	1	1	0

Notes:

1. Survey is likely to be a streamer type, but ocean bottom cable surveys could occur also.
2. Because of deeper water, surveys are more likely to be all streamer type.
3. No high-resolution site-clearance surveys are predicted to occur.

Table III.C-2.

Future Lease Sale Activities in Federal and State Waters of the Beaufort and Chukchi Seas, and Vicinity.

Sale Federal	Proposed Sale Date(s)	Area/Description	Resources or Hydrocarbon Potential
MMS Beaufort Sea 202	May 2007	As much as 9.9 million acres from the Canadian border on the east to Barrow on the west in the Beaufort Sea (<i>Federal Register</i> , 2001c).	1.02-1.71 Bbbl Oil (Estimated)
MMS: Beaufort Sea 208	2009*	Approximately the same as Beaufort Sale 202 Area, may be marginally larger depending on Final 5-Year OCS program for 2007-2012.	1.02-1.71 Bbbl Oil (Estimated)
MMS: Beaufort Sea 216	2011*		
MMS: Chukchi Sea 193	November 2007*	As much as 34 million acres from Barrow west to Point Hope and east to the international border.	1.0 Bbbl Oil (Estimated)
MMS: Chukchi Sea 211	2010*	Approximately the same as Chukchi Sale 193 Area, may be marginally larger depending on Final 5-Year OCS program for 2007-2012.	1.0 Bbbl Oil (Estimated)
MMS: Chukchi Sea 221	2011*		
BLM: 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)
BLM: 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)
State of Alaska			
North Slope Areawide	March 2006 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 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. The State of Alaska was scheduled to hold its first area wide sale in the Beaufort Sea on October 13, 1999. This sale was delayed pending the outcome of the British Petroleum-Amoco and ARCO merger and related uncertainties in future lease holdings.	Moderate to High
North Slope Foothills Areawide	May 2006	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

Notes:

* Pending decisions of the Final 5-Year OCS Program.

Bbbl = billion barrels.

Source:

USDOI, MMS, Alaska OCS Region (2006).

**Table III.D-1
Preliminary Screening of Potential Impacts of Marine Seismic Surveys on Beaufort and Chukchi Seas Resources.**

Resources of Concern	Categories of Marine Seismic Survey-related Disturbances								
	Airgun Noise	Vessel Traffic and Movements	Aircraft Traffic	Seafloor Disturbance ¹	Vessel Operations				
					Air Emissions	Wastewater Discharges	Lights	Noise ²	Petroleum Spills ³
Air Quality	NA	NA	--	NA	O	NA	NA	NA	NA
Archaeological Sites	--	NA	NA	X	NA	NA	NA	NA	NA
Marine Invertebrates*	X	O	NA	X	NA	--	O	--	O
Coastal Wetlands	--	--	NA	NA	NA	--	NA	NA	O
Coastal & Marine Birds	X	X	X	NA	NA	--	X	O	O
Essential Fish Habitat	X	X	NA	X	NA	--	--	X	O
Marine Fish	X	X	NA	X	NA	--	--	X	O
Freshwater Fish	NA	NA	NA	NA	NA	--	NA	NA	--
Commercial Fisheries	X	X	NA	O	NA	--	--	--	O
Geology & Sediments	NA	NA	NA	O	NA	NA	NA	NA	O
Marine Mammals	X	X	X	O	NA	--	NA	X	O
Socio-cultural Environ. and Subsistence	X	X	X	O	NA	--	NA	--	O
Terrestrial Mammals	NA	--	O	NA	NA	--	NA	NA	--
Water Quality	--	NA	NA	O	NA	--	NA	NA	O

Notes:

¹ Seafloor disturbances associated with ocean-bottom cable seismic surveys, anchoring, and cable hang-ups.

² Includes sounds from vessel engines, generators, compressors, machinery, navigation equipment, etc.

³ The assumption is that less than 5 gallons of petroleum would be spilled by each seismic operation each shooting season. No vessel collisions or sinkings are expected to occur.

* Includes benthic infauna and epifauna, and pelagic species.

X-Indicates potential of adverse impact and environmentally analyzed in further detail in the Arctic Ocean OCS draft PEA

O-Indicates negligible impact likely and not environmentally analyzed further in the Arctic Ocean OCS draft PEA indicates no impact likely and not environmentally analyzed further in the Arctic Ocean OCS draft PEA

NA-Not applicable

Table III.D-2.
Example of Seismic Operations Potential to Emit (PTE)¹.

Seismic Vessel Specifications*					Emissions (tons)					
Engine Description	Specifications	Fuel	Rating	Units	PM	NOx	SO2	CO	VOC	CO2
Main Engines	4 x Bergen Diesel KRGB-9 x2065 bhp	Diesel	61.59	KW	2.00	68.42	11.53	15.68	2.01	3,307.10
Emergency & Harbor Generator Engine	1 x Cummings Diesel, NTA -855-G, 250kW.	Diesel	250	KW	0.03	.36	0.03	.08	.03	13.31
				Total	2.02	68.78	11.56	15.76	2.04	3,320.41

*Source:

Vessel Specifications M/V Gilavar—WesternGeco.

Table III.D-2.
Example of Seismic Operations Potential to Emit (PTE)¹. (continued)

Seismic Vessel Specifications*					Emissions (tons)					
Engine Description	Specifications	Fuel	Rating	Units	PM	NOx	SO2	CO	VOC	CO2
Main Engines	2 x GM EMD 20-645- E7	Diesel	5,369	KW	2.17	74.55	12.57	17.09	2.19	3603.38
Auxiliary Engines	2 x CAT D343TA	Diesel	400	KW	.05	.72	.05	.15	.06	26.61
Auxiliary Engine-Bow Thruster	1 x CAT D343	Diesel	200	KW	.03	.36	.02	.08	.03	13.31
				Total	2.25	75.63	12.64	17.32	2.28	3,643.30
				Total Emissions	4.27	144.41	21.19	33.07	4.31	6,963.71

Source:

*Vessel Specifications M/V Alex Gordon.

¹ Examples is based upon the operating assumptions and emission factors shown on Table III.D-3.

Table III.D-3

Emission Factors and Operating Assumptions used in the PEA's Air Quality Impact Assessment.

Emission Factors			
Pollutant	< 600 hp	> 600 hp	Units
PM	1.34	0.43	g/kw-hr
NOx	18.85	14.59	g/kw-hr
SO ₂ *	1.25	2.46	g/kw-hr
CO	4.06	3.34	g/kw-hr
VOC	1.50	0.43	g/kw-hr
CO ₂	699.20	705.28	g/kw-hr

*Assumes sulfur concentration of .5% by weight

Operating Assumptions		
Seismic Vessel		
Main Engines	690.5	Hours
Aux. Engines	69.0	Hours
Support Vessel*		
Main Engines	863.1	Hours
Aux. Engines	86.3	Hours

EF Source: AP-42, Tables 3.3.1 & 3.4.1 (1996)

Vessel	Vessel Transit Area (miles)	Vessel Speed (mph)	Elapse Time (hrs)
Seismic Vessel	3452.5	5.0	690.5
Support Vessel	4315.6	5.0	863.1

Support vessel assumed to operate 25% more than seismic vessel to account for back and forth travel to port.

**Table III.D-4.
Prevention of Significant Deterioration (PSD) Standards**

Pollutant	Averaging Period	Maximum Allowable Increase ($\mu\text{g}/\text{m}^3$)
Particulate Matter (PM10)	Annual	30
	24-Hour	
Sulfur Dioxide	Annual	20
	24-Hour	91
	3-Hour	512
Nitrogen Oxides	Annual	25
National Ambient Air Quality Standards		
Pollutant	Averaging Period	Maximum Allowable Increase ($\mu\text{g}/\text{m}^3$)
Carbon Monoxide	8-hour	10,000
	1-hour	40,000
Nitrogen Dioxide	Annual	100
Ozone	1-hour	235
Lead	Quarterly	1.5
Particulate Matter (PM10)	Annual	50
	24-hour	150
Sulfur Dioxide	Annual	80
	24-hour	365
	3-hour	1300
Reduced Sulfur Compounds	30-minute	50
Ammonia	8-hour	2.1

Source:

State of Alaska, Dept. of Environmental Conservation (2002), 18 AAC 50.010, 18 AAC 50.020; 40 , CFR 52.21 (43 *FR* 26388); 40 CFR 50.6 (52 *FR* 24663); 40 CFR 51.166 (53 *FR* 40671).

**Table III.D-5
Potential to Emit for the Liberty Development and Production Facility.**

Pollutant	Amount (tons)
Particulate Matter (PM10)	30.9
Carbon Monoxide	156.4
Nitrogen Dioxide	868.1
Sulfur Dioxide	23.9
Volatile Organic Carbons (VOC)	56.2

Source:

USDOJ, MMS, 2002

**Table III.F-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)	<i>Lampetra tridentata</i>	Pacific lamprey	—	R
		<i>Lampetra camtschatica</i>	Arctic lamprey	W	W
Squaliformes					
	Dalatiidae (sleeper sharks)	<i>Somniosus pacificus</i>	Pacific sleeper shark	?	W
	Squalidae (dogfish sharks)	<i>Squalus acanthias</i>	spiny dogfish	—	R
Clupeoiformes					
	Clupeidae (herrings)	<i>Clupea pallasii</i>	Pacific herring	W	W
Osmeriformes					
	Osmeridae (smelts)	<i>Mallotus villosus</i>	capelin	W	W
		<i>Osmerus mordax</i>	rainbow smelt	W	W
Salmoniformes					
	Salmonidae/Coregoninae (whitefishes)	<i>Stenodus leucichthys</i>	inconnu	R	
		<i>Coregonus sardinella</i>	least cisco	W	W
		<i>Coregonus autumnalis</i>	Arctic cisco	W	
		<i>Coregonus laurettae</i>	Bering cisco	W	W
		<i>Coregonus nasus</i>	broad whitefish	W	W
		<i>Coregonus pidschian</i>	humpback whitefish	W	W
	Salmonidae/Salmoninae (trouts and salmons)	<i>Salvelinus alpinus</i>	Arctic char	W	W
		<i>Salvelinus malma</i>	Dolly Varden	W	W
		<i>Oncorhynchus gorbuscha</i>	pink salmon	W	W
		<i>Oncorhynchus kisutch</i>	coho salmon	R	W
		<i>Oncorhynchus tshawytscha</i>	Chinook salmon	R	W
		<i>Oncorhynchus keta</i>	chum salmon	W	W
		<i>Oncorhynchus nerka</i>	sockeye salmon	R	W

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

Fish Species				Distribution by Large Marine Ecosystem	
Order	Family	Species Name	Common Name	Beaufort Sea	Chukchi Sea
Myctophiformes					
	Myctophidae (lanternfishes)	<i>Benthoosema glaciale</i>	glacier lanternfish	R	—
Gadiformes					
	Gadidae (cods)	<i>Boreogadus saida</i>	Arctic cod	W	W
		<i>Arctogadus glacialis</i>	polar cod	R	—
		<i>Arctogadus borisovi</i>	toothed cod	R	—
		<i>Eleginus gracilis</i>	saffron cod	W	W
		<i>Theragra chalcogramma</i>	walleye pollock	—	W
		<i>Gadus ogac</i>	ogac	W	—
Gasterosteiformes					
	Gasterosteidae (sticklebacks)	<i>Gasterosteus aculeatus</i>	threespine stickleback	R	R
		<i>Pungitius pungitius</i>	ninespine stickleback	W	W
Scorpaeniformes					
	Hexagrammidae (greenlings)	<i>Hexagrammos stelleri</i>	whitespotted greenling	U-R	W
	Cottidae (sculpins)	<i>Triglops pingelii</i>	ribbed sculpin	W	W
		<i>Hemilepidotus papilio</i>	butterfly sculpin	—	W
		<i>Hemilepidotus jordani</i>	yellow Irish lord	—	R
		<i>Icelus spatula</i>	spatulate sculpin	W	W
		<i>Icelus bicornis</i>	twohorn sculpin	R	—
		<i>Gymnocanthus tricuspis</i>	Arctic staghorn sculpin	W	W
		<i>Cottus aleuticus</i>	coastrange sculpin	—	LD
		<i>Enophrys diceraus</i>	antlered sculpin	—	W
		<i>Megalocottus platycephalus</i>	belligerent sculpin	—	W
		<i>Myoxocephalus quadricornis</i>	fourhorn sculpin	W	W
		<i>Myoxocephalus scorpius</i>	shorthorn sculpin	W	W
		<i>Myoxocephalus scorpioides</i>	Arctic sculpin	W	W
	<i>Myoxocephalus jaok</i>	plain sculpin	—	W	

Table III.F-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)					
	Cottidae (sculpins) (continued)	<i>Microcottus sellaris</i>	brightbelly sculpin	—	R
		<i>Artediellus gomojunovi</i>	spinyhook sculpin	R	R
		<i>Artediellus scaber</i>	hamecon	W	W
		<i>Artediellus pacificus</i>	hookhorn sculpin	—	R
		<i>Artediellus ochotensis</i>	Okhotsk hookear sculpin	—	R
	Hemitripterae (sailfin sculpins)	<i>Blepsias bilobus</i>	crested sculpin	—	W
		<i>Nautichthys pribilovius</i>	eyeshade sculpin	—	W
	Psychrolutidae (fathead sculpins)	<i>Eurymen gyrinus</i>	smoothcheek sculpin	—	R
		<i>Cottunculus sadko</i>	Sadko sculpin	R	—
	Agonidae (poachers)	<i>Hypsagonus quadricornis</i>	fourhorn poacher	—	R
		<i>Pallasina barbata</i>	tubenose poacher	—	R
		<i>Ocella dodecaedron</i>	Bering poacher	—	R
		<i>Leptagonus decagonus</i>	Atlantic poacher	R	R
		<i>Podothecus veterus</i>	veteran poacher	U-R	R/P
		<i>Ulcina olrikii</i>	Arctic alligatorfish	W	W
		<i>Aspidophoroides monopterygius</i>	alligatorfish	—	LD
		Cyclopteridae (lumpsuckers)	<i>Eumicrotremus derjugini</i>	leatherfin lumpsucker	R/P
	<i>Eumicrotremus andriashevi</i>		pimpled lumpsucker	—	R
	Liparidae (snailfishes)	<i>Liparis gibbus</i>	variegated snailfish	W	W
		<i>Liparis tunicatus</i>	kelp snailfish	W	W
<i>Liparis bristolensis</i>		Bristol snailfish	—	R	
<i>Liparis fabricii</i>		gelatinous seasnail	R/P	—	
<i>Liparis callyodon</i>		spotted snailfish	—	W	
Perciformes					
	Zoarcidae (eelpouts)	<i>Gymnelus hemifasciatus</i>	halfbarred pout	R/P	R/P
		<i>Gymnelus viridis</i>	fish doctor	R/P	R/P
		<i>Lycodes seminudus</i>	longear eelpout	R	—
		<i>Lycodes mucosus</i>	saddled eelpout	R	R
		<i>Lycodes turneri</i>	estuarine eelpout	R	W

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

Fish Species				Distribution by Large Marine Ecosystem		
Order	Family	Species Name	Common Name	Beaufort Sea	Chukchi Sea	
Perciformes (continued)						
	Zoarcidae (eelpouts) (continued)	<i>Lycodes polaris</i>	polar eelpout	W	W	
		<i>Lycodes raridens</i>	marbled eelpout	—	W	
		<i>Lycodes rossi</i>	threespot eelpout	R	R	
		<i>Lycodes sagittarius</i>	archer eelpout	R	—	
		<i>Lycodes palearis</i>	wattled eelpout	—	W	
		<i>Lycodes pallidus</i>	pale eelpout	R	—	
		<i>Lycodes squamiventer</i>	scalebelly eelpout	R	—	
		<i>Lycodes eudipleurostictus</i>	doubleline eelpout	R	—	
		<i>Lycodes concolor</i>	ebony eelpout	—	R	
	Stichaeidae (pricklebacks)	<i>Eumesogrammus praecisus</i>	fourline snakeblenny	W	W	
		<i>Stichaeus punctatus</i>	Arctic shanny	W	W	
		<i>Chirolophis snyderi</i>	bearded warbonnet	—	R	
		<i>Leptoclinus maculatus</i>	daubed shanny	R	R	
		<i>Anisarchus medius</i>	stout eelblenny	W	W	
		<i>Lumpenus fabricii</i>	slender eelblenny	W	W	
	Pholidae (gunnels)	<i>Pholis fasciata</i>	banded gunnel	—	R	
	Anarhichadidae (wolffishes)	<i>Anarhichas orientalis</i>	Bering wolffish	W	W	
	Ammodytidae (sand lances)	<i>Ammodytes hexapterus</i>	Pacific sand lance	W	W	
	Pleuronectiformes					
		Pleuronectidae (righteye flounders)	<i>Hippoglossus stenolepis</i>	Pacific halibut	—	U-R
			<i>Hippoglossoides robustus</i>	Bering flounder	—	W
<i>Reinhardtius hippoglossoides</i>			Greenland halibut	R	U-P	
<i>Platichthys stellatus</i>			starry flounder	W	W	
<i>Pleuronectes quadrituberculatus</i>			Alaska plaice	—	W	
<i>Pleuronectes glacialis</i>			Arctic flounder	W	W	
<i>Limanda proboscidea</i>			longhead dab	—	W	
<i>Limanda aspera</i>			yellowfin sole	—	W	
<i>Limanda sakhalinensis</i>			Sakhalin sole	—	U-R	

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

Fish Species				Distribution by Large Marine Ecosystem	
Order	Family	Species Name	Common Name	Beaufort Sea	Chukchi Sea

Note

Distribution Keys	
W=widespread;	
LD	=limited distribution relative to available biotope (e.g., continental slope);
R	=rare (<5 records) and disjunct;
R/P	=Rare and patchy;
U-R	=unverified record-rare and disjunct;
U-P	=unverified and patchy.
	Orange cells = rare species known occurring only in one
	Yellow cells = species are rare in one of the two LME's.
	LME. Turquoise cells = rare and endemic species.

Sources:

Mecklenburg, Mecklenburg, and Thorsteinson, 2002; Stevenson et al., 2004.

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

Species Binomen	Common Name	Page No.	Freshwater			Brackish			Marine									Behavioral Stratification							
			Principle Environment	Fluvial	Lacustrine	Nearshore			Neritic			Oceanic			Demersal (D)	Bathymersal (BD)	Bentho-Pelagic (BP)	1-200m (epipelagic) (EP)		>1000m (bathypelagic)	cryopelagic (CP)				
						Estuarine	Intertidal	0-2m (Infralittoral Fringe)	1-50m	51-100m	101-200m	201-300m	301-500m	501-700m				701-1000m	1001-3000m			>3000m	(MP)		
<i>Lampetra tridentata</i>	Pacific lamprey	61	A	X	X	X	X	X	X	X	X	X	X	-	-	-	-	-	X	-	-	-	-	-	-
<i>Lampetra camtschatica</i>	Arctic lamprey	62	A	X	X	X	X	X	X	X	X	-	-	-	-	-	-	-	X	-	-	-	-	-	-
<i>Somniosus pacificus</i>	Pacific sleeper shark	86	M	-	-	-	-	X	X	X	X	X	X	X	X	X	X	-	X	-	-	-	-	-	-
<i>Squalus acanthias</i>	spiny dogfish	88	M	-	-	-	-	X	X	X	X	X	X	X	X	X	X	-	X	-	-	-	-	-	-
<i>Clupea pallasii</i>	Pacific herring	134	M	-	-	-	X	X	X	X	X	X	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Mallotus villosus</i>	capelin	171	M	-	-	-	X	X	X	X	X	X	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Osmerus mordax</i>	rainbow smelt	174	A	X	-	-	X	X	X	X	X	X	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Stenodus leucichthys</i>	inconnu	181	FW/A	X	X	X	X	X	X	X	-	-	-	-	-	-	-	X	-	-	-	-	-	-	-
<i>Coregonus sardinella</i>	least cisco	182	A	X	X	X	X	X	X	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Coregonus autumnalis</i>	Arctic cisco	183	A	X	X	X	X	X	X	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Coregonus laurettae</i>	Bering cisco	184	A	X	-	-	X	X	X	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Coregonus nasus</i>	broad whitefish	185	FW/A	X	X	X	X	X	X	-	-	-	-	-	-	-	-	X	-	-	-	-	-	-	-
<i>Coregonus pidschian</i>	humpback whitefish	188	A	X	-	-	X	X	X	-	-	-	-	-	-	-	-	X	-	-	-	-	-	-	-
<i>Salvelinus alpinus</i>	Arctic char	199	A/FW	X	X	X	X	X	X	X	-	-	-	-	-	-	-	-	X	-	-	-	-	-	-
<i>Salvelinus malma</i>	Dolly Varden	200	A	X	X	X	X	X	X	X	X	X	-	-	-	-	-	-	X	-	-	-	-	-	-
<i>Oncorhynchus gorbuscha</i>	pink salmon	205	A	X	-	-	X	X	X	X	X	X	X	-	-	-	-	-	X	-	-	-	-	-	-
<i>Oncorhynchus kisutch</i>	coho salmon	206	A	X	-	-	X	X	X	X	X	X	X	-	-	-	-	-	X	-	-	-	-	-	-
<i>Oncorhynchus tshawytscha</i>	Chinook salmon	207	A	X	-	-	X	X	X	X	X	X	X	-	-	-	-	-	X	-	-	-	-	-	-
<i>Oncorhynchus keta</i>	chum salmon	208	A	X	-	-	X	X	X	X	X	-	-	-	-	-	-	-	X	-	-	-	-	-	-
<i>Oncorhynchus nerka</i>	sockeye salmon	209	A	X	X	X	X	X	X	X	X	X	X	-	-	-	-	-	X	-	-	-	-	-	-
<i>Bentho-sema glaciale</i>	glacier lanternfish	249	M	-	-	-	-	-	-	-	-	-	X	X	X	X	X	-	-	-	-	-	-	-	-
<i>Boreogadus saida</i>	Arctic cod	290	M	-	-	-	X	-	-	X	X	X	X	X	X	X	-	-	X	-	-	-	-	-	X
<i>Arctogadus glacialis</i>	polar cod	291	M	-	-	-	-	-	-	X	X	X	X	X	X	X	-	-	X	-	-	-	-	-	X
<i>Arctogadus borisovi</i>	toothed cod	292	B/M	-	-	-	-	-	-	X	X	X	-	-	-	-	-	-	X	-	-	-	-	-	-
<i>Eleginus gracilis</i>	saffron cod	293	M	X	-	-	X	X	X	X	X	-	-	-	-	-	-	X	-	-	-	-	-	-	-
<i>Theragra chalcogramma</i>	walleye pollock	295	M	-	-	-	-	-	-	-	X	X	X	X	X	X	X	X	X	X	-	-	-	-	-
<i>Gadus ogac</i>	ogac	297	M	-	-	-	-	-	X	X	X	X	-	-	-	-	-	X	X	-	-	-	-	-	-
<i>Gasterosteus aculeatus</i>	threespine stickleback	333	A/FW	X	X	X	X	X	X	X	X	X	X	X	X	X	-	X	X	-	-	-	-	-	-
<i>Pungitius pungitius</i>	ninespine stickleback	334	A/FW	X	X	X	X	X	X	X	X	-	-	-	-	-	-	X	-	X	-	-	-	-	-
<i>Hexagrammos stelleri</i>	whitespotted greenling	392	M	-	-	-	X	X	X	X	X	X	-	-	-	-	-	X	-	-	-	-	-	-	-

Table III.F.2

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

			Brackish					Marine										Behavioral Stratification						
			Freshwater		Nearshore			Neritic							Oceanic									
Species Binomen	Common Name	Page No.	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 (D)	Bathymersal (BD)	Benthic-Pelagic (BP)	1-200m (epipelagic) (EP)	201-1000m (mesopelagic) (MP)	>1000m (bathypelagic)	cryopelagic (CP)
<i>Liparis fabricii</i>	gelatinous seasnail	592	M	-	-	-	-	-	X	X	X	X	X	X	X	X	-	X	X	-	-	-	-	-
<i>Liparis callyodon</i>	spotted snailfish	601	M	-	-	-	X	X	X	-	-	-	-	-	-	-	-	X	-	-	-	-	-	-
<i>Gymnelus hemifasciatus</i>	halfbarred pout	689	M	-	-	-	X	X	X	X	-	-	-	-	-	-	-	X	-	-	-	-	-	-
<i>Gymnelus viridis</i>	fish doctor	690	M	-	-	-	X	X	X	X	X	-	-	-	-	-	-	X	-	-	-	-	-	-
<i>Lycodes seminudus</i>	longear eelpout	707	M	-	-	-	-	-	-	-	X	X	X	X	-	-	-	X	-	-	-	-	-	-
<i>Lycodes mucosus</i>	saddled eelpout	708	M	-	-	-	-	-	X	X	-	-	-	-	-	-	-	X	-	-	-	-	-	-
<i>Lycodes turneri</i>	estuarine eelpout	709	M	-	-	-	-	-	X	X	X	-	-	-	-	-	-	X	-	-	-	-	-	-
<i>Lycodes polaris</i>	polar eelpout	710	M	-	-	-	-	-	X	X	X	-	-	-	-	-	-	X	-	-	-	-	-	-
<i>Lycodes raridens</i>	marbled eelpout	711	M	-	-	-	-	-	X	X	X	-	-	-	-	-	-	X	-	-	-	-	-	-
<i>Lycodes rossii</i>	threespot eelpout	713	M	-	-	-	-	-	X	X	X	X	X	-	-	-	-	X	-	-	-	-	-	-
<i>Lycodes sagittarius</i>	archer eelpout	717	M	-	-	-	-	-	-	-	-	-	X	X	-	-	-	X	-	-	-	-	-	-
<i>Lycodes palearis</i>	wattled eelpout	719	M	-	-	-	-	-	X	X	X	-	-	-	-	-	-	X	-	-	-	-	-	-
<i>Lycodes pallidus</i>	pale eelpout	721	M	-	-	-	-	-	X	X	X	X	X	X	X	X	-	X	X	-	-	-	-	-
<i>Lycodes squamiventer</i>	scaleshell eelpout	722	M	-	-	-	-	-	-	-	-	-	X	X	X	X	-	X	X	-	-	-	-	-
<i>Lycodes eudipleurostictus</i>	doubleline eelpout	723	M	-	-	-	-	-	X	X	X	X	-	-	-	-	-	X	-	-	-	-	-	-
<i>Lycodes concolor</i>	ebony eelpout	725	M	-	-	-	-	-	X	X	X	X	X	X	X	X	-	X	X	-	-	-	-	-
<i>Eumesogrammus praecisus</i>	fourline snakeblenny	746	M	-	-	-	-	-	X	X	X	X	X	-	-	-	-	X	-	-	-	-	-	-
<i>Stichaeus punctatus</i>	Arctic shanny	747	M	-	-	-	-	-	X	X	-	-	-	-	-	-	-	X	-	-	-	-	-	-
<i>Chirolophis snyderi</i>	bearded warbonnet	752	M	-	-	-	-	-	X	X	-	-	-	-	-	-	-	X	-	-	-	-	-	-
<i>Leptoclinius maculatus</i>	daubed shanny	756	M	-	-	-	-	-	X	X	X	X	X	-	-	-	-	X	-	-	-	-	-	-
<i>Anisarchus medius</i>	stout eelblenny	758	M	-	-	-	-	-	X	X	X	-	-	-	-	-	-	X	-	-	-	-	-	-
<i>Lumpenus fabricii</i>	slender eelblenny	759	M	-	-	-	X	X	X	X	-	-	-	-	-	-	-	-	X	-	X	-	-	-
<i>Pholis fasciata</i>	banded gunnel	777	M	-	-	-	-	-	X	-	-	-	-	-	-	-	-	X	-	-	-	-	-	-
<i>Anarhichas orientalis</i>	Bering wolffish	783	M	-	-	-	-	-	X	-	-	-	-	-	-	-	-	X	-	-	-	-	-	-
<i>Ammodytes hexapterus</i>	Pacific sand lance	795	M	-	-	-	X	X	X	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Hippoglossus stenolepis</i>	Pacific halibut	823	M	-	-	-	-	-	X	X	X	X	X	X	X	X	-	X	-	-	-	-	-	-
<i>Hippoglossoides robustus</i>	Bering flounder	829	M	-	-	-	-	-	X	X	X	X	X	-	-	-	-	X	-	-	-	-	-	-
<i>Reinhardtius hippoglossoides</i>	Greenland halibut	830	M	-	-	-	-	-	X	X	X	X	X	X	X	X	-	X	-	-	-	-	-	-
<i>Platichthys stellatus</i>	starry flounder	833	M/B	X	-	X	X	X	X	X	X	X	X	-	-	-	-	X	-	-	-	-	-	-
<i>Pleuronectes quadrituberculatus</i>	Alaska plaice	835	M	-	-	-	-	-	X	X	X	X	X	-	-	-	-	X	-	-	-	-	-	-
<i>Pleuronectes glacialis</i>	Arctic flounder	836	B/M	X	-	X	-	X	X	-	-	-	-	-	-	-	-	X	-	-	-	-	-	-
<i>Limanda proboscidea</i>	longhead dab	843	M	X	-	X	-	X	X	-	-	-	-	-	-	-	-	X	-	-	-	-	-	-
<i>Limanda aspera</i>	yellowfin sole	844	M	X	-	X	-	X	X	X	X	X	X	X	-	-	-	X	-	-	-	-	-	-
<i>Limanda sakhalinensis</i>	Sakhalin sole	845	M	X	-	X	-	X	X	X	X	-	X	-	X	-	-	X	-	-	-	-	-	-

Sources:

Moulton & George (2000); Mecklenburg et al. (2002), Froese, R. and D. Pauly. Editors. 2003. FishBase.

Table III.F-3.

Reduction in Fish Catch Rates as a Result of Seismic Survey Activity.

Species	Gear Type	Sound Pressure Level of Airgun Emissions (in decibels)	Catch Reduction	Source
Atlantic cod (<i>Gadus morhua</i>)	Trawl	250 dB	46-69% Lasting at least 5 days	Engas et al., 1993
	Longline	250 dB	17-45% Lasting at least 5 days	Engas et al., 1993
		Undetermined, 9.32 miles from the source	55-79% Lasting at least 24 hours	Løkkeborg and Soldal, 1993
Haddock (<i>Melanogrammus aeglefinus</i>)	Trawl	250 dB	49-72% Lasting at least 5 days	Engas et al., 1993
	Longline	250 dB	49-73% Lasting at least 5 days	Engas et al., 1993
Rockfish (<i>Sebastes</i> spp.)	Longline	223 dB	52% - Effect period not determined	Skalski et al., 1992

Table III.G-1.

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
Diomedede	146	92.5
Shismaref	562	93.2
Wales	152	83.6

Source:

USDOC, Bureau of the Census, 2000.

Table III.G-2.**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)
Diomedes	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.