

BOTTOM TRAWL SURVEY OF GROUND FISH RESOURCES IN THE ALEUTIAN ISLANDS REGION

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Cruise ID: 2004-01	Vessels: <i>Sea Storm</i>
Cruise Dates: June 1 – August 9, 2004	<i>Gladiator</i>

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Overview

The ninth in a series of comprehensive bottom trawl surveys of groundfish resources in the Aleutian Islands (AI) region was conducted from June 1 through August 9, 2004, by the Resource Assessment and Conservation Engineering (RACE) Division of the Alaska Fisheries Science Center (AFSC), Seattle, Washington. Since 2000 this survey has been conducted biennially; earlier surveys were conducted on a mostly triennial schedule between 1980 and 2000. This report summarizes the sampling operations and preliminary results of the 2004 survey.

The Aleutian Islands region is an extensive archipelago of volcanic origin typified by a relatively narrow continental shelf that is crossed by numerous deep passes. Very strong currents flow through the passes and across the shelf, sometimes making productive fishing operations difficult or impossible.

Commercially valuable species of flatfish (Pacific halibut and Greenland turbot), roundfish (Atka mackerel, Pacific cod, walleye pollock, and sablefish), rockfish (Pacific ocean perch and northern, roughey, and shortraker rockfishes), and invertebrates (golden king crab and scallops) inhabit the area. The rough, rocky bottom conditions provide abundant substrate for many species of bryozoans, hydroids, sponges and corals.

Objectives

The major survey objective is to continue the data time series begun in 1980 to monitor trends in distribution and abundance of important groundfish species and to describe and measure various biological and environmental parameters. Specific objectives of the 2004 survey include:

1. define the distribution and relative abundance of the principal groundfish and commercially important invertebrate species that inhabit the Aleutian archipelago;
2. collect catch and effort data from which to estimate the abundance of the principal groundfish species;
3. collect data to define selected biological parameters, *i.e.* size, sex, age, growth, length-weight relationships, feeding habits, and spawning condition for selected species;
4. monitor and collect trawl performance information; and
5. collect samples and data requested by other researchers or research groups.



Vessels and Gear

The *Sea Storm* and *Gladiator* are both house-forward trawlers with stern ramps, twin net storage reels (mounted forward of the working deck and/or aft over the stern ramp), telescoping deck cranes, propeller nozzles, and paired, controlled-tension hydraulic trawl winches with 1,830 m of 2.54 cm diameter steel cable. Both vessels are 37.8 m in overall length (LOA) and powered by single 1,710 continuous HP main engines. Each vessel is equipped with a full suite of state-of-the-art navigational and fishing electronics including Global Positioning Systems (GPS) with video position plotters, radars, color video fish-finders, and recording depth sounders. Each vessel's crew consisted of the captain, lead fisherman, engineer-fisherman, fisherman, and cook or cook-fisherman. Captains Dan Clark (legs 1 and 3) and Arthur Kuhr (leg 2) skippered the *Gladiator*. Captain Steve Branstiter skippered the *Sea Storm* during the entire cruise.

Stations were sampled with the RACE Division's standardized Poly Nor'Eastern high opening bottom trawls rigged with roller gear. This trawl has a 27.2 m headrope with twenty-one 30 cm diameter floats and a 24.3 m long, 1/2-inch long-link alloy chain fishing line attached to a 24.9 m, 0.95 cm diameter 6×19 galvanized steel wire footrope. The roller gear is 24.2 m long and constructed of 1.9 cm diameter 6×19 galvanized steel wire rope and 36 cm rubber bobbins separated by a solid string of 10 cm rubber disks. In addition, 5.9 m wire rope extensions with 10- and 20 cm rubber disks were used to span each lower flying wing section. The trawls are constructed with 12.7 cm stretched-mesh polyethylene web with a 3.2 cm stretched-mesh nylon liner in the codend. Bridles consist of triple 54.9 m long, 1.6 cm diameter galvanized wire rope. Chain setback extensions to the headrope and side panel attachments are 46 and 23 cm, respectively. Steel 1.83 × 2.74 m V-doors weighing approximately 800 kg each are used to spread the net. Fishing dimensions of the trawls were measured using Scanmar¹ acoustic net mensuration equipment and fishing performance was monitored with electronic bottom contact sensors (BCS) and Seabird SBE-19 micro-bathymographs.

¹ Reference to trade names does not imply endorsement by the National Marine Fisheries Service, NOAA.



Itinerary

June 1	First day of charter - Load and setup vessels in Dutch Harbor
June 2	Begin Leg 1 - Measure and mark trawl warps, conduct scope experiment, begin trawl survey sampling operations when preliminary work is completed
June 25	End of Leg 1 in Dutch Harbor - Re provision vessels, exchange personnel
June 26	Begin Leg 2 – Resume survey
July 18	End of Leg 2 in Adak - Re provision vessels, exchange personnel
July 19	Begin Leg 3 - Resume survey
August 8	End of Leg 3 - Arrive Dutch Harbor
August 9	Unload vessels, end of charter

Survey Area

The Aleutian Islands region is an extensive archipelago of volcanic origin typified by a relatively narrow continental shelf that is crossed by numerous deep passes. Very strong currents flow through the passes and across the shelf, sometimes making productive fishing operations difficult or impossible. The survey area extends along the north side of the Aleutian Islands from Akutan Pass (165° W long) to Stalemate Bank (170° E long), west of Attu Island and along the south side of the archipelago from the Islands of the Four Mountains (170° W long) to Stalemate Bank (Figure 1). The survey area includes waters ranging from nearshore to 500 m deep.

Survey Design and Methods

The Aleutian survey region was divided into four major sections based on geographic features and North Pacific Fishery Management Council (NPFMC) regulatory areas. Those sections were further divided into 45 area-depth strata. A Neyman optimum allocation strategy drawing on data from previous surveys and current ex-vessel fish values was used to allocate sampling stations among the



45 strata. Nearly all station locations for this survey are fixed, though we needed to add nine new stations in six strata to satisfy allocation goals.

Tow tracklines and start and end positions were recorded using GPS output. Standard trawl hauls were 15 minutes in estimated on-bottom duration. Actual trawl time on bottom was determined using real-time net configuration data transmitted to the vessel by acoustic net mensuration equipment which were verified and adjusted posteriorly by time and depth recordings from a bathythermograph and a bottom contact sensor (tilt sensor). The acoustic devices continuously measured wingspread and headrope height above the bottom. Efforts were made to maintain constant depth during a tow, but when depths changed, trawl warp length was adjusted accordingly. At most stations, tilt sensors attached to the footrope were used to monitor footrope contact with the bottom.

Catches of fish and many invertebrates were sorted to species or species group, weighed and enumerated according to standard AFSC and RACE Division protocol. Extensive size composition data were collected with barcode based recording devices and downloaded to computer database files after each tow. A variety of biological data including age structures (otoliths), lengths, and weights of individual specimens were collected and entered in the computer database. Special collections included extensive samples of fish stomach contents, rockfish larvae, corals, sponges and other invertebrates. Many whole fish of various species were collected and frozen for studies of the potential impact of parasites on Steller sea lions, and several studies of Steller sea lion prey.

Surface to bottom seawater temperature profiles were recorded at most sampling sites using a headrope-mounted bathythermograph. After each tow, depth profile data were downloaded and stored in computer files, then integrated with net mensuration data to help verify actual fishing time on bottom and net configuration. Sea surface temperature observations were made using bucket thermometers.

Results

Relatively little time was lost to bad weather but during periods of extreme tidal flow, heavy currents sometimes caused work to be postponed or tows to be temporarily aborted. Sampling proceeded from east to west from the Islands of Four Mountains. The two vessels proceeded west together for added safety of operations and to ensure synoptic coverage of the survey area. When satisfactory bottom conditions could not be found at a given station, a pre-selected alternate location or, in some cases, a newly located site within the proper area-depth stratum was sampled.

A total of 472 tows were attempted during this survey. Successful tows of ten minutes or longer duration were achieved at 418 of the 420 assigned stations or alternates. Tows shorter than ten minutes but otherwise successful were made at the other two stations. One special tow was performed to collect deepwater specimens of rare fish. Stations ranged in depth from 26 m to 188 m. Sea surface temperatures were recorded during 471 attempted tows and successful bathythermograph recordings were made during 466 of those tows.



Total catch estimates from successful survey hauls indicate that Atka mackerel was, by far, the dominant species in survey trawl catches in the Aleutian region as a whole (Table 1) and in all survey subareas except the Central Aleutians. Pacific ocean perch (POP), northern rockfish, giant grenadier, and walleye pollock, in that order, were the species with the next highest total catches in the Aleutian region. Only POP was more abundant than Atka mackerel in the Central Aleutian area catches. Atka mackerel also dominated the total catch in the southern Bering Sea area, followed by walleye pollock, POP, and Pacific cod.

Length and individual weight measurements were recorded from almost 9,300 fish (29 species) to monitor and update length-weight relationships (Table 2). Over 8,000 pairs of otolith were collected from eighteen species of fish for age determination (Table 3). These were collected from size-stratified samples from each regulatory area, except for pollock, which were sampled randomly from each tow containing ten or more pollock. Generally, samples were collected from species with high commercial value or those of special scientific interest. Length measurements were the most common biological data collected; 45,666 observations were collected from 52 different species (Table 4).

Several special studies or collections were made as adjunct activities during the survey ranging from studies of feeding habits of groundfish to delineation of stock structure to determining whether lingering effects from nuclear testing at Amchitka might pose any risk to humans or the food chain. Collaborating scientists from other divisions within the AFSC, from three universities in the U.S. and Japan, and from the California Academy of Sciences participated aboard various legs of the survey. Staff from the REFM Division's Resource Ecology and Ecosystem Modeling Program scanned the stomach contents of 1,563 fish of nine species, primarily arrowtooth flounder, walleye pollock, Pacific cod, Atka mackerel, and Pacific halibut. Another 42 stomachs were collected from myctophids for later laboratory analysis. Sightings of shorttailed albatross were documented on a number of occasions and records of those sightings were forwarded to the U.S. Fish and Wildlife Service. Brief seabird censuses were also taken at nearly all sampling stations. Hundreds of individual fish and invertebrates were frozen or preserved for later laboratory identification or other studies at the AFSC or other institutions.

A video drop camera was used for locating Atka mackerel nesting sites and documenting the location, depth, and habitat-type at nesting sites. The work was done concurrent with the 2004 Aleutian Island Groundfish Bottom Trawl Survey aboard the F/V *Sea Storm* and F/V *Gladiator*. There were 40 camera drops made aboard the *Sea Storm* and 36 aboard the *Gladiator* for a total of 76 camera drops. The number of drops per area was: 1 at Stalemate Bank; 10 in the Near Islands; 39 in the Rat Islands; 20 in the Andreanof Islands; and, 6 at Islands of Four Mountains. Real-time video feed and winch control were used to navigate the towed video camera to avoid hanging up while the vessel and camera drifted over the bottom. Video feed was recorded with GPS overlay and a digital video recording device and the drop camera was also equipped to record depth and temperature. Camera drops lasted from 10-80 minutes and ranged from 30-200 m depth.



Scientific Personnel

Sea Storm

Leg 1

Nate Raring^a
 Bill Flerx^b
 Jim Stark
 Ned Laman
 Jay Orr
 Robin Harrison

Leg 2

Bob Lauth^a
 Nate Raring^b
 Jason Conner
 Frank Shaw
 Roger Clark
 Jon Short

Leg 3

Bill Flerx^a
 Paul von Szalay^b
 Ron Payne
 Russ Nelson
 Matt Dick^d
 Vic Smith^e

Gladiator

Leg 1

Alisa Abookire^{a,c}
 Michael Martin^b
 Katherine Pearson^f
 Gary Stauffer
 Andy Whitehouse
 Nancy Roberson

Leg 2

Liz Chilton^{a,c}
 Michael Martin^b
 Greg Jensen^f
 Anne Beaudreau^f
 Megan Lloyd
 Ned Laman

Leg 3

Jason Conner^a
 Bob Lauth^b
 Roger Clark
 Jim Weston^g
 Scott Van Sant^c
 Mei-Sun Yang

Personnel are from AFSC, RACE or REFM Divisions, Seattle, and/or noted as follows:

^a Field Party Chief

^b Deck Boss

^c Personnel from AFSC, RACE Division, Kodiak Laboratory

^d Hokkaido University

^e California Academy of Sciences

^f University of Washington

^g University of Mississippi

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Table 1: Total catch estimates for the most frequently captured fish species, by North Pacific Fisheries Management Council regulatory area and the entire Aleutian region ranked in order of relative abundance.

Western Aleutian Area			Central Aleutian Area		
Name	Weight (kg)	Count	Name	Weight (kg)	Count
Atka mackerel	96,064	230,751	Pacific ocean perch	54,140	76,596
Pacific ocean perch	57,385	110,396	Atka mackerel	51,527	113,920
Northern rockfish	38,287	89,800	Northern rockfish	9,021	19,823
Arrowtooth flounder	3,961	3,251	Giant grenadier	8,663	2,176
Pacific cod	2,410	709	Arrowtooth flounder	6,111	3,907
Shortraker rockfish	2,107	744	Pacific cod	5,364	1,560
Whiteblotched skate	1,851	297	Northern rock sole	4,300	11,078
Walleye pollock	1,625	1,562	Kamchatka flounder	3,983	2,213
Shortspine thornyhead	1,596	3,131	Walleye pollock	3,428	2,603
Sponge unident.	1,384		Sponge unident.	2,871	
Northern rock sole	1,359	4,123	Rougheye rockfish	2,466	1,517
Giant grenadier	1,255	311	Shortraker rockfish	1,655	692
Alaska skate	1,096	140	Sablefish	1,093	453
Kamchatka flounder	963	902	Pacific halibut	954	205
Flathead sole	725	3,058	Shortspine thornyhead	637	1,127
Pacific halibut	667	98	Rex sole	606	941
Rex sole	612	1,147	Alaska skate	495	72
Glass sponge unident.	452		Greenland turbot	443	114
Clay pipe sponge	441		Yellow Irish lord	433	659
Aleutian skate	434	40	Aleutian skate	382	34
Magistrate armhook	429	856	Darkfin sculpin	313	2,165
Greenland turbot	303	59	Whiteblotched skate	285	48
Prowfish	249	261	Prowfish	254	69
Cloud sponge	217		Tree sponge	251	
Darkfin sculpin	202	2583	Golden king crab	217	203
Harlequin rockfish	196	439	Dusky rockfish	177	159
Chrysaora jellyfish	177	163	Clay pipe sponge	167	
Kamchatka coral	175	2	<i>Chrysaora melanaster</i>	166	212
Red king crab	146	116	Spud sponge	157	
<i>Chrysaora melanaster</i>	142	143	Chrysaora jellyfish	138	152
Spud sponge	139	27	Ball sponge	127	
Pacific sand lance	137	1,572	Glass sponge unident.	118	
Rougheye rockfish	131	150	Flathead sole	86	172
Basketstar	125	549	Mud skate	85	91



Table 1: Continued.

<i>Eastern Aleutian Area</i>			<i>Total Aleutian Area</i>		
<u>Name</u>	<u>Weight (kg)</u>	<u>Count</u>	<u>Name</u>	<u>Weight (kg)</u>	<u>Count</u>
Atka mackerel	34,084	51,308	Atka mackerel	181,675	395,979
Pacific ocean perch	20,126	34,329	Pacific ocean perch	131,650	221,321
Giant grenadier	16,850	3,939	Northern rockfish	48,550	111,742
Walleye pollock	12,334	7,899	Giant grenadier	26,768	6,426
Pacific cod	8,462	1,868	Walleye pollock	17,387	12,064
Arrowtooth flounder	5,080	6,065	Pacific cod	16,236	4,137
Pacific halibut	2,220	291	Arrowtooth flounder	15,152	13,223
Sponge unident.	2,097	2	Northern rock sole	6,643	17,023
Whiteblotched skate	1,370	269	Sponge unident.	6,352	
Northern rockfish	1,243	2,119	Kamchatka flounder	6,065	4,334
Kamchatka flounder	1,119	1,219	Shortraker rockfish	4,486	1,872
Northern rock sole	984	1,822	Pacific halibut	3,841	594
Shortraker rockfish	723	436	Whiteblotched skate	3,507	614
Rougheye rockfish	492	390	Rougheye rockfish	3,089	2,057
Rex sole	405	649	Shortspine thornyhead	2,337	4,485
Yellow Irish lord	360	492	Alaska skate	1,791	240
Tree sponge	350	36	Rex sole	1,622	2,737
Flathead sole	300	1,529	Sablefish	1,418	610
Aleutian skate	272	24	Flathead sole	1,111	4,759
Giant octopus	264	61	Aleutian skate	1,088	98
Sablefish	252	142	Greenland turbot	998	247
Greenland turbot	251	74	Yellow Irish lord	886	1,395
Darkfin sculpin	246	2,250	Clay pipe sponge	795	
Scapula sponge	225	4	Darkfin sculpin	761	6,998
Alaska skate	200	28	Tree sponge	640	
Clay pipe sponge	187		Glass sponge unident.	571	
Basketstar	173	1093	Prowfish	547	346
Barrel sponge	140		Magistrate armhook squid	530	1,147
Golden king crab	140	131	Golden king crab	432	387
Mud skate	106	176	<i>Chrysaora melanaster</i>	408	498
Shortspine thornyhead	105	227	Giant octopus	384	159
<i>Chrysaora melanaster</i>	99	143	<i>Chrysaora</i> jellyfish	383	377
Pacific sleeper shark	89	1	Basketstar	373	1,872
<i>Chrysaora</i> jellyfish	68	62	Spud sponge	362	



Table 1: Continued.

<i>Southern Bering Sea Area</i>		
<u>Name</u>	<u>Weight (kg)</u>	<u>Count</u>
Atka mackerel	48,409	42,667
Walleye pollock	32,195	31,033
Pacific ocean perch	11,952	15,689
Pacific cod	5,931	1,362
Arrowtooth flounder	3,458	5,025
Southern rock sole	1,953	3,544
Pacific halibut	1,822	805
Flathead sole	1,518	4,958
Northern rock sole	1,167	3,045
Rex sole	1,030	1,915
Northern rockfish	835	1,136
Kamchatka flounder	552	232
Greenland turbot	549	166
Harlequin rockfish	547	959
Sablefish	343	141
Sponge unident.	310	
Yellow Irish lord	256	303
Club sponge	223	
Dusky rockfish	195	160
Shortspine thornyhead	195	439
Scapula sponge	177	
Shorthead rockfish	135	57
Big skate	128	7
Rougheye rockfish	123	92
Tanner crab	119	189
Aleutian skate	112	11
Great sculpin	109	34
Tree sponge	93	
Whiteblotched skate	84	24
Prowfish	82	34
Darkfin sculpin	79	967
Butter sole	73	149
Dover sole	53	51
Alaska skate	49	8



Table 2: Length-weight data collected during the 2004 biennial trawl survey of the Aleutian Islands region, by species and North Pacific Fisheries Management Council regulatory area.

<i>Length-Weight Measurements</i>					
<u>Name</u>	<u>Western</u>	<u>Central</u>	<u>Eastern</u>	<u>S Bering</u>	<u>Total / Species</u>
Bering skate	--	9	--	--	9
Mud skate	13	88	152	1	254
Roughtail skate	--	2	--	--	2
Alaska skate	114	82	25	--	221
Aleutian skate	38	35	20	--	93
Whiteblotched skate	284	44	122	6	456
Butterfly skate	--	6	3	--	9
Arrowtooth flounder	223	202	197	143	765
Kamchatka flounder	42	53	--	--	95
Greenland turbot	51	59	44	91	245
Northern rock sole	152	168	166	162	648
Southern rock sole	--	2	25	272	299
Pacific herring	--	--	--	37	37
Giant grenadier	61	53	73	1	188
Yellow Irish lord	--	6	--	47	53
Pacific cod	133	235	191	218	777
Walleye pollock	132	159	90	212	593
Atka mackerel	174	186	165	84	609
Prowfish	30	--	1	0	31
Shortspine thornyhead	317	276	68	157	818
Broadfin thornyhead	1	--	--	--	1
Rougheye rockfish	73	164	134	103	474
Pacific ocean perch	262	263	356	131	1,012
Dark rockfish	54	1	--	2	57
Dusky rockfish	36	99	9	55	199
Northern rockfish	194	156	120	46	516
Harlequin rockfish	51	46	--	86	183
Sharpchin rockfish	--	--	--	6	6
Shortraker rockfish	182	231	167	53	633
Total / Region	1,700	2,625	2,128	1,913	9,283



Table 3: Otolith specimens collected during the 2004 biennial trawl survey of the Aleutian Islands region, by species and North Pacific Fisheries Management Council regulatory area.

<i>Otolith Specimens</i>					
<u>Name</u>	<u>Western</u>	<u>Central</u>	<u>Eastern</u>	<u>S Bering</u>	<u>Total / Species</u>
Arrowtooth flounder	223	202	197	143	765
Greenland turbot	51	59	44	91	245
Northern rock sole	157	168	166	162	653
Southern rock sole	--	2	25	272	299
Giant grenadier	61	53	73	1	188
Pacific cod	133	235	191	218	777
Walleye pollock	132	159	90	212	593
Atka mackerel	174	186	165	84	609
Shortspine thornyhead	318	277	68	157	820
Broadfin thornyhead	1	--	--	--	1
Rougheye rockfish	73	165	134	103	475
Pacific ocean perch	282	263	357	131	1,033
Dark rockfish	65	1	--	2	68
Dusky rockfish	36	99	9	55	199
Northern rockfish	194	157	120	46	517
Harlequin rockfish	51	46	--	86	183
Sharpchin rockfish	--	--	--	6	6
Shortraker rockfish	182	231	167	53	633
Total / Region	2,133	2,303	1,806	1,742	8,064



Table 4: Length frequencies collected during the 2004 biennial trawl survey of the Aleutian Islands region, by species and North Pacific Fisheries Management Council regulatory area.

<i>Length Frequencies</i>					
<u>Name</u>	<u>Western</u>	<u>Central</u>	<u>Eastern</u>	<u>S Bering</u>	<u>Total / Species</u>
Pacific sleeper shark	--	--	1	3	4
Big skate	--	--	--	7	7
Bering skate	--	9	--	1	10
Mud skate	13	87	177	10	287
Roughtail skate	--	2	--	--	2
Alaska skate	139	73	28	8	248
Aleutian skate	37	33	24	11	105
Whiteblotched skate	296	46	268	24	634
Butterfly skate	--	5	4	1	10
Whitebrow skate	1	--	--	--	1
Arrowtooth flounder	2,621	2,950	3,238	2,771	11,580
Kamchatka flounder	902	1,307	1,211	234	3,654
Greenland turbot	59	101	94	166	420
Pacific halibut	100	209	295	749	1,353
Flathead sole	2,462	172	775	1,796	5,205
English sole	--	--	--	41	41
Dover sole	78	35	29	51	193
Rex sole	896	921	649	1,066	3,532
Yellowfin sole	--	--	--	19	19
Starry flounder	--	--	--	18	18
Northern rock sole	3,538	6,268	1,724	2,098	13,628
Southern rock sole	--	6	43	2,455	2,504
Butter sole	--	--	--	102	102
Alaska plaice	--	--	--	1	1
Sablefish	17	453	142	142	754
Searcher	--	--	--	2	2
Pacific herring	--	--	--	37	37
Giant grenadier	402	586	561	1	1,550
Popeye grenadier	39	--	--	--	39
Armorhead sculpin	--	2	--	--	2
Yellow Irish lord	244	701	434	300	1,679
Great sculpin	5	7	19	29	60
Bigmouth sculpin	1	4	18	4	27
Pacific cod	707	1,638	1,449	1,280	5,074
Walleye pollock	1,434	2,171	1,595	3,371	8,571
Atka mackerel	8,210	5,848	3,054	1,570	18,682
Kelp greenling	38	12	3	27	80



Table 4: Continued.

<u>Name</u>	<u>Western</u>	<u>Central</u>	<u>Eastern</u>	<u>S Bering</u>	<u>Total / Species</u>
Eulachon	--	--	--	71	71
Capelin	--	--	11	--	11
Chum salmon	14	2	--	--	16
Prowfish	258	67	14	11	350
Ebony eelpout	--	7	--	--	7
Shortspine thornyhead	2,250	1,078	228	308	3,864
Rougheye rockfish	150	875	394	103	1,522
Pacific ocean perch	10,025	8,060	5,343	1,521	24,949
Dark rockfish	89	1	--	2	92
Dusky rockfish	40	160	9	168	377
Northern rockfish	7,397	3,264	1,060	455	12,176
Redbanded rockfish	--	1	--	--	1
Harlequin rockfish	234	193	1	269	697
Sharpchin rockfish	--	--	--	7	7
Shortraker rockfish	334	692	443	57	1,526
Total / Region	20,791	14,400	7,503	2,972	45,666

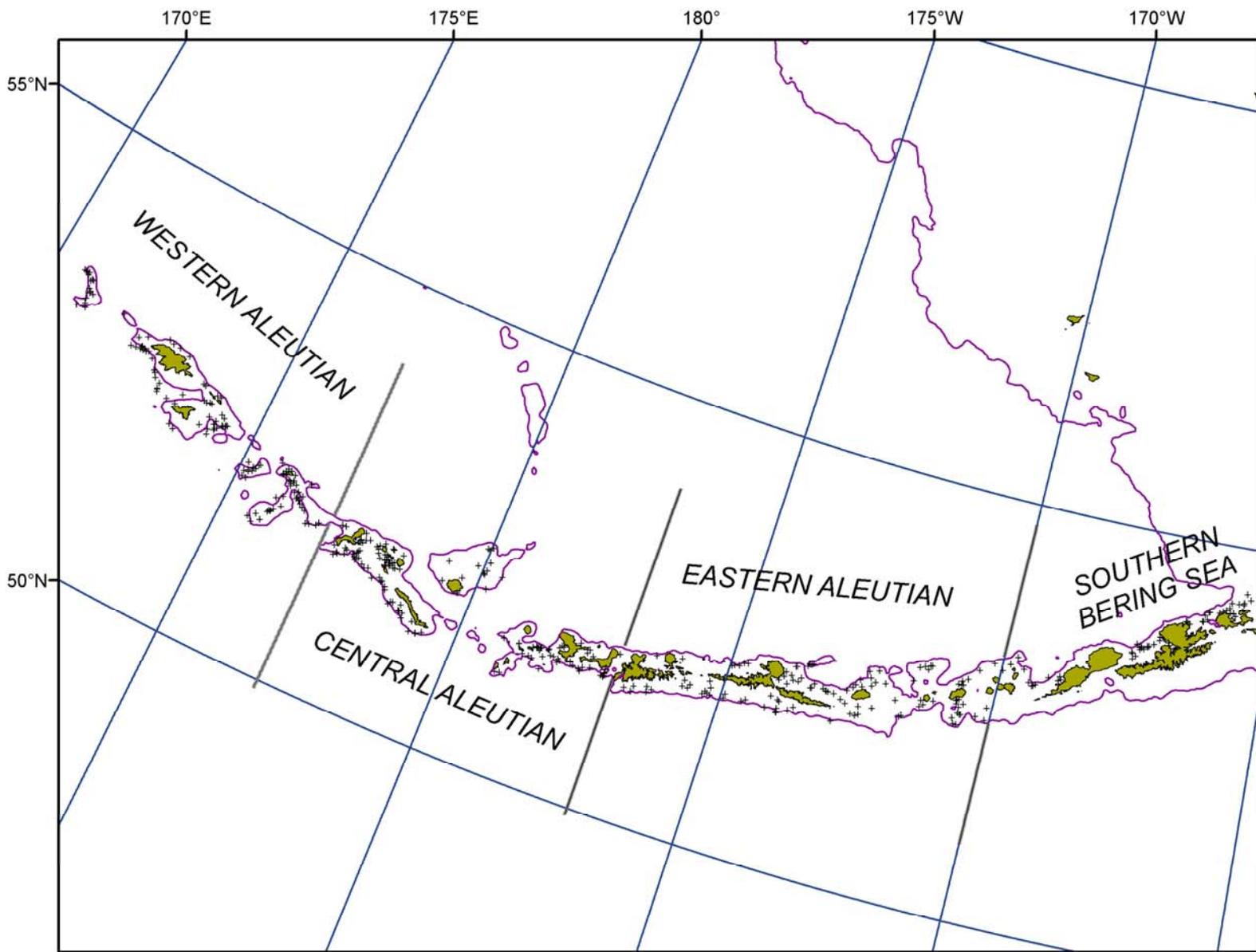


Figure 1.-- Locations of successful tows made during the 2004 Bottom Trawl Survey of Groundfish in the Aleutian Islands Region. Management subareas and the 500 m depth contour are shown.