

2005 BOTTOM TRAWL SURVEY OF GROUND FISH RESOURCES IN THE GULF OF ALASKA

Prepared by Mark E. Wilkins

Cruise ID:	2005-01	Vessels:	<i>Sea Storm</i>
Cruise Dates:	May 18 – August 6, 2005		<i>Gladiator</i>
			<i>Northwest Explorer</i>

Alaska Fisheries Science Center
7600 Sand Point Way NE
Seattle, WA 98115-6349

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Overview

The ninth in a series of comprehensive bottom trawl surveys of groundfish resources in the Gulf of Alaska (GOA) region was conducted from May 18 through August 6, 2005, by the Resource Assessment and Conservation Engineering (RACE) Division of the Alaska Fisheries Science Center (AFSC), Seattle, Washington. Since 1999 this survey has been conducted biennially; earlier surveys were conducted triennially between 1984 and 1999. This report summarizes the sampling operations and preliminary results of the 2005 survey.

The standard biennial GOA survey area, established in 1999, stretches from the U.S.-Canada border at Dixon Entrance ($54^{\circ} 30'$ N latitude) to the Islands of the Four Mountains at the base of the Aleutian Islands (170° W longitude) including depths from approximately 15 to 1,000 m. The entire standard area was surveyed in 2005, as it was in 1999. Subsets of the standard area were sampled in 2001 (only the area west of 147° W longitude and depths to 500 m were surveyed) and 2003 (only stations shallower than 700 m were surveyed). Each of the earlier triennial surveys (1984-1996) covered the entire continental shelf to 500 m depths, but only the 1984 and 1987 triennial surveys included stations between 500 and 1,000 m.

Commercially valuable species of flatfish, roundfish, rockfish, and invertebrates inhabit the area. In many areas rocky bottom conditions provide abundant substrate for many species of bryozoans, hydroids, sponges and corals. These invertebrate communities, in turn, provide essential habitat for juveniles and adults of many groundfish species.

Objectives

The major survey objective is to continue the time series begun in 1984 to monitor trends in distribution, abundance, and population biology of important groundfish species and to describe and measure various biological and environmental parameters. Specific objectives of the 2005 survey include:

1. define the distribution and relative abundance of the principal groundfish and commercially important invertebrate species that inhabit the Gulf of Alaska;
2. collect catch and effort data from which to estimate the abundance of the principal groundfish species;
3. collect data to define population biology 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 *Gladiator*, *Northwest Explorer*, and *Sea Storm* are all house-forward trawlers with stern ramps, multiple 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 (*Gladiator* and *Sea Storm*) or 2.98 cm (*Northwest Explorer*) diameter steel cable. The *Gladiator* and *Sea Storm* are both 37.8 m in overall length (LOA) and powered by single 1,710 continuous HP main engines. The *Northwest Explorer* is 49.4 m LOA and propelled by twin 1,800 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. The *Gladiator* was operated by Captain Ed French for the first and third legs and by Captain Dan Clark for the second leg. Captain Shawn O'Brien skippered the *Northwest Explorer* for the first three legs, followed by Captain Dan Carney on the final leg. The *Sea Storm* was operated by Captain Steve Branstiter for the first two legs and the final leg and by Captain Jerry Ellefson during the third leg.

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 and Seabird SBE-19 micro-bathythermographs. Among all acceptable performance tows with direct measurements, net width averaged 15.96 m (range 11.78 – 20.75 m) and net height averaged 6.71 m (range 4.12 – 9.96 m).

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



Itinerary

18 May	Charter begins for <i>Sea Storm</i> and <i>Gladiator</i> . Load gear and supplies in Dutch Harbor and set up for sampling.
19 May	Charter begins for <i>Northwest Explorer</i> . Load gear and supplies in Dutch Harbor and set up for sampling.
19-20 May	Vessels depart Dutch Harbor, conduct standardization exercises, and begin sampling for Leg 1.
7 June	End of Leg I for <i>Sea Storm</i> and <i>Northwest Explorer</i> . Crew change at Sand Point, begin Leg II
8 June	End of Leg I for <i>Gladiator</i> . Crew change at Sand Point, begin Leg II
27 June	End of Leg II for <i>Sea Storm</i> and <i>Northwest Explorer</i> , crew change at Kodiak, begin Leg III
29 June	End of Leg II for <i>Gladiator</i> , crew change at Kodiak, begin Leg III
17 July	End of Leg III for <i>Sea Storm</i> and <i>Northwest Explorer</i> , crew change at Seward, begin Leg IV
20 - 21 July	End of charter for <i>Gladiator</i> , off-load gear in Kodiak.
4 - 5 August	End of charter for <i>Sea Storm</i> , off-load gear in Ketchikan.
5 - 6 August	End of charter for <i>Northwest Explorer</i> , off-load gear in Kodiak.



Survey Area

The survey is designed to assess the groundfish and invertebrate resources of the Gulf of Alaska continental shelf and upper continental slope in the area between the Islands of Four Mountains (170° W longitude) and Dixon Entrance (132°30' W longitude) between nearshore (minimum practical fishing depth about 15 m) and the 1,000 m isobath, as shown in Figure 1. The total area covered by the standard survey is 320,006 km².

Survey Design and Methods

Methods employed during all AFSC RACE Division surveys follow the standards described in Stauffer (2004)², Appendix 1. These protocols serve to standardize the warp measurement and monitoring, use of auto-trawl instrumentation, operations procedures, and gear construction and maintenance.

Similar to previous surveys of the same area, the 2005 GOA survey employed a stratified-random design utilizing 59 strata based on the 100, 200, 300, 500, 700, and 1,000 m isobaths, major geographic features such as banks and gullies, and INPFC regulatory areas. A modified Neyman optimum allocation strategy using data from previous GOA surveys was used to allocate effort among strata. Optimum allocation calculations were made for each of the principal groundfish species in each prior survey year based on that year's survey data and the estimated time to perform a tow in a given stratum as the cost variable (deeper tows take longer to execute and are more likely to require repeated tows to obtain a satisfactory sample; therefore they cost more). The mean of the resulting proportions was then calculated, resulting in an estimate of optimal allocation for each of the principal groundfish species. A weighted mean of these values was then calculated using the product of each species' current ex-vessel value times its biomass (as the weighting variable). This determined the proportion of total survey effort allocated to each stratum which, when multiplied by the estimated available effort (total number of tows), determined the number of tows assigned to each stratum.

As the vessels neared completion of the third leg of the survey, it became apparent that they would be completing the assigned stations well before the end of the charter period. To keep the vessels employed for the entire charter period in the most efficient manner, 109 additional stations were

² Stauffer, Gary (compiler). 2004. NOAA Protocols for Groundfish Bottom Trawl Surveys of the Nation's Fishery Resources. U.S. Dep. Commerce, NOAA Tech. Memo. NMFS-F/SPO-65, 205 p.



selected in strata east of 154° W longitude in the same proportion as the original stations had been allocated. Ultimately, only some of these strata were resampled during the final survey leg of the *Sea Storm* and *Northwest Explorer*.

The target on-bottom duration for a standard trawl haul is 15 minutes. Trawling time on bottom was estimated during the tow using real-time net configuration data (wingspread and headrope height) acoustically transmitted to the vessel. Position data (from GPS) were collected every two seconds throughout the tow. Temperature and depth were recorded every six seconds with a micro-bathymograph attached to the trawl headrope. The bottom contact sensor, a recording tilt sensor attached to the fishing line to detect contact with the bottom, collected data every six seconds. Final tow durations, start and end times, and geographic positions were estimated from all available information collected from each tow.

The operational guidelines for successfully completing a standard survey tow are:

- 15 minutes towing time at a speed of 3 knots, resulting in a distance fished of approximately 1.4 km (0.75 nmi).
- Appropriate length of trawl warp deployed, as specified in the standard survey scope table. The goal of each tow was to not exceed 10 m of depth change over the 15 minute towing period.
- Net mensuration indicates fishing gear operating within normal limits, taking into account that the net width tends to increase and net height decreases as more trawl warp is deployed.
- Survey gear remains in continuous contact with the bottom.
- No significant hang-ups, gear damage or gear conflicts (e.g., crab pots).
- All sampling done during daylight hours (all start and end times fall between 30 minutes after sunrise and 30 minutes before sunset).

Catches were sorted to species, weighed, and counted according to standard protocol. Extensive size composition data were collected with barcode-based recording devices and downloaded to a database after each tow. A variety of biological data including age structures (otoliths), lengths, and weights of individual specimens were collected and entered in the database.

Ancillary data and specimens were collected for researchers within the AFSC Groundfish Program, other AFSC research units, and other affiliated and non-affiliated agencies and educational institutions, including whole specimens, ovaries, fin spines, and acoustic data. Scientists aboard the vessels also collected information on sightings of short-tailed albatross, filed weather observations with the National Weather Service twice daily, and collected continuous echosounder data streams aboard the *Gladiator* and the *Sea Storm*.



Results

Sampling generally proceeded from west to east. After completing its first pass through the survey area during its third survey leg, the *Northwest Explorer* fished the added supplementary stations from east to west, completing their charter in Kodiak. Some of the pre-assigned stations were not sampled due to untrawlable bottom conditions. In these cases, alternate station grid cells were sampled. Of the 905 standard survey tows attempted, 839 were successfully completed, ranging in depth from 22 m to 882 m (Fig. 1).

Arrowtooth flounder was by far the most abundant species survey-wide followed by Pacific ocean perch (POP), giant grenadier, Pacific halibut, and walleye pollock (Table 1). It was also the most abundant species in the Central GOA management area. POP was the most abundant species in the Western and Eastern GOA areas. Other abundant species in the Western GOA area included giant grenadier, arrowtooth flounder, and northern rockfish. The most abundant species in Central GOA area were arrowtooth flounder, POP, giant grenadier, halibut, and pollock. In the Eastern GOA, the most abundant species were POP, arrowtooth flounder, silvergray rockfish, and halibut.

Throughout the survey, biological data were collected from many species with length measurements being the most common. Nearly 292,000 fish representing 91 species were measured for length, including approximately 65,400 arrowtooth flounder, 27,000 pollock, 26,700 Pacific ocean perch, 23,500 flathead sole, 21,000 shortspine thornyheads, and 20,000 rock sole (northern and southern combined) (Table 2). Approximately 12,000 otoliths were collected from 20 species, along with 13,347 length-weight observations representing 51 species (Tables 3 and 4). In addition, a total of 676 fish and invertebrate specimens were collected and vouchered for systematics analysis and identification.

Size composition estimates for the entire GOA are presented in Figure 2 for six of the most abundant groundfish species.

For further information, contact Mr. Russ Nelson, Director, Resource Assessment and Conservation Engineering Division, Alaska Fisheries Science Center, National Marine Fisheries Service, 7600 Sand Point Way NE, Seattle, WA 98115-6349. Telephone (206) 526-4103.



Scientific Personnel

<i>Northwest Explorer</i>					
Leg 1	Leg 2	Leg 3	Leg 4		
Jason Conner ^a	Bill Flerx ^a	Michael Martin ^a	Bob Lauth ^a		
Frank Shaw	Chris Rooper	Duane Stevenson	Jay Orr		
Ron Erickson	Jim Stark	Chris Gburski	Bill Flerx		
Andy Whitehouse	Roger Clark	Katie Dodd	Mei-Sun Yang		
Roger Clark	Mei-Sun Yang	Amie Olson	Stan Kotwicki		
Dan Foy	Hsuan-ching Ho ^b	Buck Stockhausen	Gary McMurrin		
<i>Sea Storm</i>					
Leg 1	Leg 2	Leg 3	Leg 4		
Liz Chilton ^a	Alisa Abookire ^a	Bill Flerx ^a	Liz Chilton ^a		
Robin Harrison	Kim Rand ^d	Paul von Szalay	Michael Martin		
Ned Laman	Wyatt Fournier ^d	Dennis Benjamin	Jim Stark		
Cynthia Yeung	Jared Guthridge ^e	Heather Kenney	Dennis Benjamin		
Nancy Roberson	Laura Gosnell ^f	Jon Short	Alison Vijgen		
Hilary Emberton ^c	Hilary Emberton ^c	Hilary Emberton ^c	Hilary Emberton ^c		
<i>Gladiator</i>					
Leg 1	Leg 2	Leg 3			
Nate Raring ^a	Ned Laman ^a	Frank Shaw ^a			
Paul von Szalay	Katherine Pearson	Mark Zimmermann			
Ron Payne	Vanessa Lowe	Ingrid Spies			
Joanna Miles	Lyndsey Lefevre	Yvonne Hong ^j			
Dan Cooper	Brian Van Winkle ^h	Lewis Barnett ⁱ			
Vic Smith ^g	Diane Haas ⁱ	Abrar Ahmed ^k			
<p>^a Field Party Chief</p> <p>Personnel are AFSC staff from Seattle, Kodiak, or Auke Bay (ABL, Juneau) unless noted as follows:</p> <table border="0"> <tr> <td> <p>^b Visiting scientist through the University of Washington SAFS Fish Collection</p> <p>^c International Pacific Halibut Commission, Seattle, WA</p> <p>^d Contractor, AFSC ABL</p> <p>^e Alaska Sea Life Center, Seward, AK - volunteer</p> <p>^f Intern - University of Washington</p> </td> <td> <p>^g California Academy of Sciences, San Francisco, CA</p> <p>^h Intern – AFSC ABL</p> <p>ⁱ Moss Landing Marine Lab, Moss Landing, CA</p> <p>^j Oak Ridge Inst. for Science and Education (ORISE) intern</p> <p>^k Volunteer</p> </td> </tr> </table>				<p>^b Visiting scientist through the University of Washington SAFS Fish Collection</p> <p>^c International Pacific Halibut Commission, Seattle, WA</p> <p>^d Contractor, AFSC ABL</p> <p>^e Alaska Sea Life Center, Seward, AK - volunteer</p> <p>^f Intern - University of Washington</p>	<p>^g California Academy of Sciences, San Francisco, CA</p> <p>^h Intern – AFSC ABL</p> <p>ⁱ Moss Landing Marine Lab, Moss Landing, CA</p> <p>^j Oak Ridge Inst. for Science and Education (ORISE) intern</p> <p>^k Volunteer</p>
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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 Gulf of Alaska ranked in order of relative abundance.

<i>Western Gulf of Alaska</i>			<i>Central Gulf of Alaska</i>		
<u>Name</u>	<u>Weight (kg)</u>	<u>Count</u>	<u>Name</u>	<u>Weight (kg)</u>	<u>Count</u>
Pacific ocean perch	24,933.8	42,375	Arrowtooth flounder	95,935.8	133,102
Giant grenadier	17,606.0	6,407	Pacific ocean perch	38,169.6	56,686
Arrowtooth flounder	15,639.8	25,928	Giant grenadier	27,194.8	10,237
Northern rockfish	14,190.9	14,636	Pacific halibut	25,970.5	7,935
Pacific cod	8,773.3	3,191	Walleye pollock	18,118.6	32,328
Walleye pollock	8,742.9	11,379	Sablefish	13,778.6	5,173
Pacific halibut	7,543.5	3,294	Northern rockfish	12,963.1	17,151
Atka mackerel	6,878.6	6,661	Pacific cod	11,169.1	5,778
Flathead sole	4,389.6	17,211	Flathead sole	10,785.1	34,756
Dusky rockfish	4,114.3	3,516	Dusky rockfish	9,083.9	5,662
Southern rock sole	4,009.1	6,261	Southern rock sole	5,352.7	8,469
Northern rock sole	3,908.6	10,644	Rex sole	5,017.3	12,909
Yellowfin sole	2,219.9	6,688	Shortspine thornyhead	3,638.5	13,855
Sablefish	2,053.1	887	Dover sole	3,090.9	3,573
Shortspine thornyhead	1,871.6	8,536	Rougheye rockfish unid.	2,889.6	2,862
Harlequin rockfish	1,635.1	2,588	Northern rock sole	2,707.8	4,139
Gigantic anemone	1,619.4	4,058	Eulachon	2,329.0	82,197
Sponge unident.	1,367.3	--	Longnose skate	2,005.5	219
Dark rockfish	1,303.5	988	Shortraker rockfish	1,903.6	541
Starry flounder	1,133.5	648	Yellowfin sole	1,797.4	4,622
Black rockfish	1,131.6	700	Pacific sleeper shark	1,605.9	14
Yellow Irish lord	1,029.7	1,662	Big skate	1,525.7	97
Pacific sleeper shark	920.1	14	Aleutian skate	1,232.0	159
Rex sole	833.3	2,317	Butter sole	1,211.9	3,693
Shortraker rockfish	618.8	228	Spiny dogfish	1,035.9	452
Rougheye rockfish	607.9	511	Sharpchin rockfish	1,024.3	3,732
Big skate	595.2	30	Lingcod	799.3	114
Prowfish	373.6	130	Gigantic anemone	765.0	2,401
Scapula sponge	349.1	--	Popeye grenadier	656.4	4,765
Butter sole	339.2	588	Starry flounder	511.1	229
Mussels	331.8	6,091	Green sea urchin	474.9	9,429
Great sculpin	271.7	137	Redstripe rockfish	449.1	906
Alaska plaice	231.8	209	Jellyfish unident.	433.3	694
Popeye grenadier	231.6	1,574	Yellow Irish lord	406.3	754



Table 1: Continued.

<i>Eastern Gulf of Alaska</i>			<i>Total Survey Area</i>		
<u>Name</u>	<u>Weight (Kg)</u>	<u>Count</u>	<u>Name</u>	<u>Weight (Kg)</u>	<u>Count</u>
Pacific ocean perch	21,299.8	42,736	Arrowtooth flounder	124,579.0	178,996
Arrowtooth flounder	13,003.4	19,966	Pacific ocean perch	84,403.1	141,797
Silvergray rockfish	4,721.6	2,420	Giant grenadier	48,235.6	18,210
Pacific halibut	3,637.6	954	Pacific halibut	37,151.5	12,183
Giant grenadier	3,434.8	1,566	Walleye pollock	30,204.0	52,528
Sablefish	3,384.9	1,433	Northern rockfish	27,175.9	31,827
Walleye pollock	3,342.4	8,821	Pacific cod	21,077.8	9,633
Dover sole	3,003.4	4,436	Sablefish	19,216.6	7,493
Shortspine thornyhead	2,962.7	13,248	Flathead sole	15,576.4	53,834
Pacific hake	2,052.1	2,655	Dusky rockfish	13,426.3	9,332
Rex sole	1,930.2	9,113	Southern rock sole	9,638.1	15,350
Shortraker rockfish	1,894.3	423	Shortspine thornyhead	8,472.8	35,639
Pacific herring	1,314.3	17,813	Rex sole	7,780.8	24,339
Sharpchin rockfish	1,245.9	4,437	Atka mackerel	7,210.9	6,953
Pacific cod	1,135.4	664	Northern rock sole	6,616.4	14,783
Lingcod	1,087.2	206	Dover sole	6,307.8	8,269
Spiny dogfish	1,077.2	520	Silvergray rockfish	4,788.8	2,472
Roughey rockfish	1,038.5	1,217	Roughey rockfish unid.	4,536.0	4,590
Spotted ratfish	1,019.3	2,630	Shortraker rockfish	4,416.8	1,192
<i>Chrysaora melanaster</i>	714.9	3,556	Yellowfin sole	4,017.2	11,310
Redstripe rockfish	640.7	1,356	Eulachon	2,968.0	105,746
Eulachon	630.0	23,008	Longnose skate	2,728.3	321
Longnose skate	597.6	87	Pacific sleeper shark	2,650.0	30
Redbanded rockfish	449.6	549	Gigantic anemone	2,390.4	6,473
Red tree coral	422.7	--	Sharpchin rockfish	2,289.5	8,211
Flathead sole	401.7	1,867	Big skate	2,249.0	138
English sole	336.4	715	Spiny dogfish	2,114.8	973
Southern rock sole	276.3	620	Pacific hake	2,053.0	2,656
Dusky rockfish	228.1	154	Harlequin rockfish	1,980.4	4,877
Longspine thornyhead	160.1	1,531	Lingcod	1,886.5	320
Heart urchin	158.4	4,567	Starry flounder	1,651.1	879
Harlequin rockfish	141.3	1,725	Butter sole	1,551.7	4,283
Popeye grenadier	137.4	842	Dark rockfish	1,506.3	1,188
Big skate	128.1	11	Sponge unident.	1,493.3	--



Table 2: Summary of length collections during the 2005 biennial trawl survey of the Gulf of Alaska, 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>Total / Species</u>
Salmon shark	--	1	--	1
Spiny dogfish	1	314	517	832
Pacific sleeper shark	13	8	1	22
Big skate	27	95	9	131
Bering skate	4	126	14	144
Longnose skate	13	214	81	308
Roughtail skate	--	1	--	1
Alaska skate	4	10	--	14
Aleutian skate	17	155	4	176
Whiteblotched skate	6	--	--	6
Butterfly skate	1	--	--	1
Spotted ratfish	--	--	305	305
Pacific sanddab	--	--	144	144
Arrowtooth flounder	11,002	43,227	11,124	65,353
Pacific halibut	3,243	7,935	953	12,131
Flathead sole	6,589	15,616	1,331	23,536
Slender sole	--	20	487	507
Petrale sole	--	--	100	100
English sole	54	351	663	1,068
Dover sole	229	3,268	3,775	7,272
Deepsea sole	--	15	10	25
Rex sole	2,002	9,774	7,461	19,237
Yellowfin sole	1,428	1,604	--	3,032
Starry flounder	552	225	2	779
Sand sole	10	198	--	208
Northern rock sole	5,344	3,239	--	8,583
Southern rock sole	4,267	6,323	620	11,210
Butter sole	364	2,455	2	2,821
Curlfin sole	--	--	1	1
Alaska plaice	194	287	--	481
Wolf-eel	--	--	3	3
Sablefish	804	4,146	1,325	6,275
Searcher	14	26	--	40
Pacific pomfret	--	--	6	6
Pacific herring	--	360	638	998
Pacific sardine	--	--	2	2
Pacific grenadier	15	146	107	268



Table 2: Continued.

Length Frequencies

<u>Name</u>	<u>Western</u>	<u>Central</u>	<u>Eastern</u>	<u>Total / Species</u>
Giant grenadier	1,528	2,612	871	5,011
Popeye grenadier	572	1,202	641	2,415
Armorhead sculpin	--	1	--	1
Yellow Irish lord	1,044	590	--	1,634
Great sculpin	100	114	--	214
Plain sculpin	31	172	--	203
Spinyhead sculpin	--	28	6	34
Bigmouth sculpin	9	50	2	61
Pacific sandfish	--	--	3	3
Pacific tomcod	--	90	204	294
Pacific cod	2,281	3,911	652	6,844
Pacific flatnose	2	34	58	94
Saffron cod	--	13	--	13
Walleye pollock	4,723	16,405	6,004	27,132
Lingcod	--	111	194	305
Atka mackerel	1,192	260	--	1,452
Kelp greenling	109	63	7	179
Ragfish	--	--	1	1
Pacific hake	--	1	2,133	2,134
Eulachon	47	3,042	1,182	4,271
Capelin	17	246	398	661
Chinook salmon	14	32	24	70
Coho salmon	--	17	2	19
Pink salmon	--	5	11	16
Chum salmon	10	76	15	101
Sockeye salmon	--	12	--	12
Prowfish	109	81	6	196
Wattled eelpout	--	1	--	1
Shortspine thornyhead	3,107	9,586	8,171	20,864
Longspine thornyhead	--	284	947	1,231
Rougheye rockfish	299	2,614	1,179	4,092
Pacific ocean perch	3,653	11,440	11,584	26,677
Silvergray rockfish	2	49	1,275	1,326
Dark rockfish	179	198	--	377
Dusky rockfish	1,176	2,284	146	3,606
Darkblotched rockfish	--	--	19	19
Splitnose rockfish	--	--	37	37
Greenstriped rockfish	--	--	161	161
Puget Sound rockfish	--	--	3	3
Widow rockfish	--	5	6	11



Table 2: Continued.

<i>Length Frequencies</i>				
<u>Name</u>	<u>Western</u>	<u>Central</u>	<u>Eastern</u>	<u>Total / Species</u>
Yellowtail rockfish	--	--	37	37
Rosethorn rockfish	2	1	507	510
Quillback rockfish	--	--	12	12
Black rockfish	339	--	3	342
Bocaccio	--	--	1	1
Canary rockfish	--	--	43	43
Northern rockfish	1,921	2,918	29	4,868
Redstripe rockfish	201	293	943	1,437
yelloweye rockfish	19	30	18	67
Redbanded rockfish	8	147	541	696
Harlequin rockfish	439	415	348	1,202
Pygmy rockfish	--	1	92	93
Sharpchin rockfish	42	1,141	2,464	3,647
Shortraker rockfish	195	522	391	1,108
Total / Region	59,567	161,236	71,056	291,859



Table 3: Length-weight data collected during the 2005 biennial trawl survey of the Gulf of Alaska, by species and North Pacific Fisheries Management Council regulatory area.

Length-Weight Measurements

<u>Name</u>	<u>Western</u>	<u>Central</u>	<u>Eastern</u>	<u>Total / Species</u>
Spiny dogfish	1	151	47	199
Pacific sleeper shark	5	5		10
Big skate	9	32	4	45
Bering skate	1	29	8	38
Longnose skate	3	68	44	115
Alaska skate	3	3	1	6
Aleutian skate	4	46	--	51
Butterfly skate	1	--	--	1
Spotted ratfish	--	--	157	157
Arrowtooth flounder	201	532	382	1,115
Flathead sole	153	347	60	560
Petrale sole	--	--	18	18
English sole	--	10	--	10
Dover sole	48	231	250	529
Rex sole	67	317	216	600
Northern rock sole	276	111		387
Southern rock sole	174	201	45	420
Wolf-eel	--	--	2	2
Sablefish	49	522	271	842
Pacific herring	--	56	7	63
Giant grenadier	61	149	81	291
Yellow Irish lord	90	28	--	118
Great sculpin	4	2	--	6
Bigmouth sculpin	--	5	--	5
Pacific tomcod	--	53	--	53
Pacific cod	200	210	135	545
Walleye pollock	276	525	738	1,539
Lingcod	--	28	103	131
Atka mackerel	228	88	--	316
Eulachon	--	69	41	110
Capelin	--	10	57	67
Chinook salmon	--	14	--	14
Coho salmon	--	2	--	2
Pink salmon	--	3	--	3
Chum salmon	1	24	--	25
Sockeye salmon	--	1	--	1
Prowfish	--	10	--	10



Table 3: Continued.

Length-Weight Measurements

<u>Name</u>	<u>Western</u>	<u>Central</u>	<u>Eastern</u>	<u>Total / Species</u>
Shortspine thornyhead	240	308	208	756
Rougeye rockfish	153	276	224	653
Pacific ocean perch	194	766	546	1,506
Silvergray rockfish	--	10	70	80
Dusky rockfish	298	348	58	704
Splitnose rockfish	--	--	1	1
Widow rockfish	--	--	3	3
Canary rockfish	--	--	40	40
Northern rockfish	215	210	--	425
Redstripe rockfish	--	--	90	90
Yelloweye rockfish	--	--	6	6
Harlequin rockfish	35	28	44	107
Sharpchin rockfish	2	65	89	156
Shortraker rockfish	72	186	158	416
Total / Region	3,064	6,079	4,204	13,347

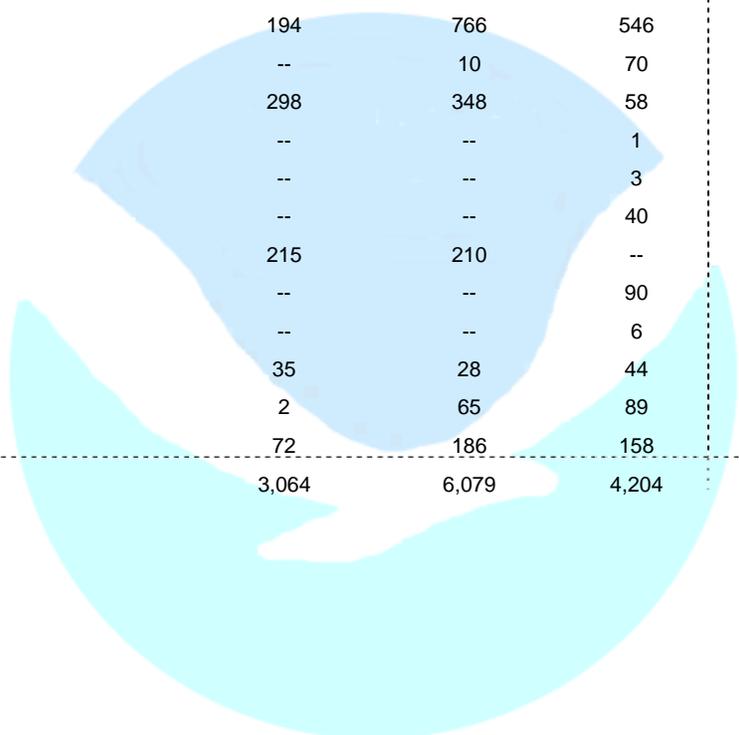




Table 4: Otolith specimens collected during the 2005 biennial trawl survey of the Gulf of Alaska, by species and North Pacific Fisheries Management Council regulatory area.

<i>Otolith Specimens</i>				
<u>Name</u>	<u>Western</u>	<u>Central</u>	<u>Eastern</u>	<u>Total / Species</u>
Arrowtooth flounder	201	532	382	1,115
Flathead sole	153	347	60	560
Dover sole	48	232	250	530
Rex sole	67	317	216	600
Northern rock sole	276	111	--	387
Southern rock sole	174	201	45	420
Sablefish	49	522	271	842
Giant grenadier	61	149	81	291
Pacific cod	200	210	135	545
Walleye pollock	276	525	738	1,539
Atka mackerel	228	87	--	315
Shortspine thornyhead	240	309	208	757
Rougheye rockfish	153	276	224	653
Pacific ocean perch	194	800	546	1,540
Silvergray rockfish	--	10	64	74
Dusky rockfish	298	360	58	716
Northern rockfish	215	210	--	425
Harlequin rockfish	35	28	44	107
Sharpchin rockfish	2	65	89	156
Shortraker rockfish	72	186	158	416
Total / Region	2,942	5,477	3,569	11,988

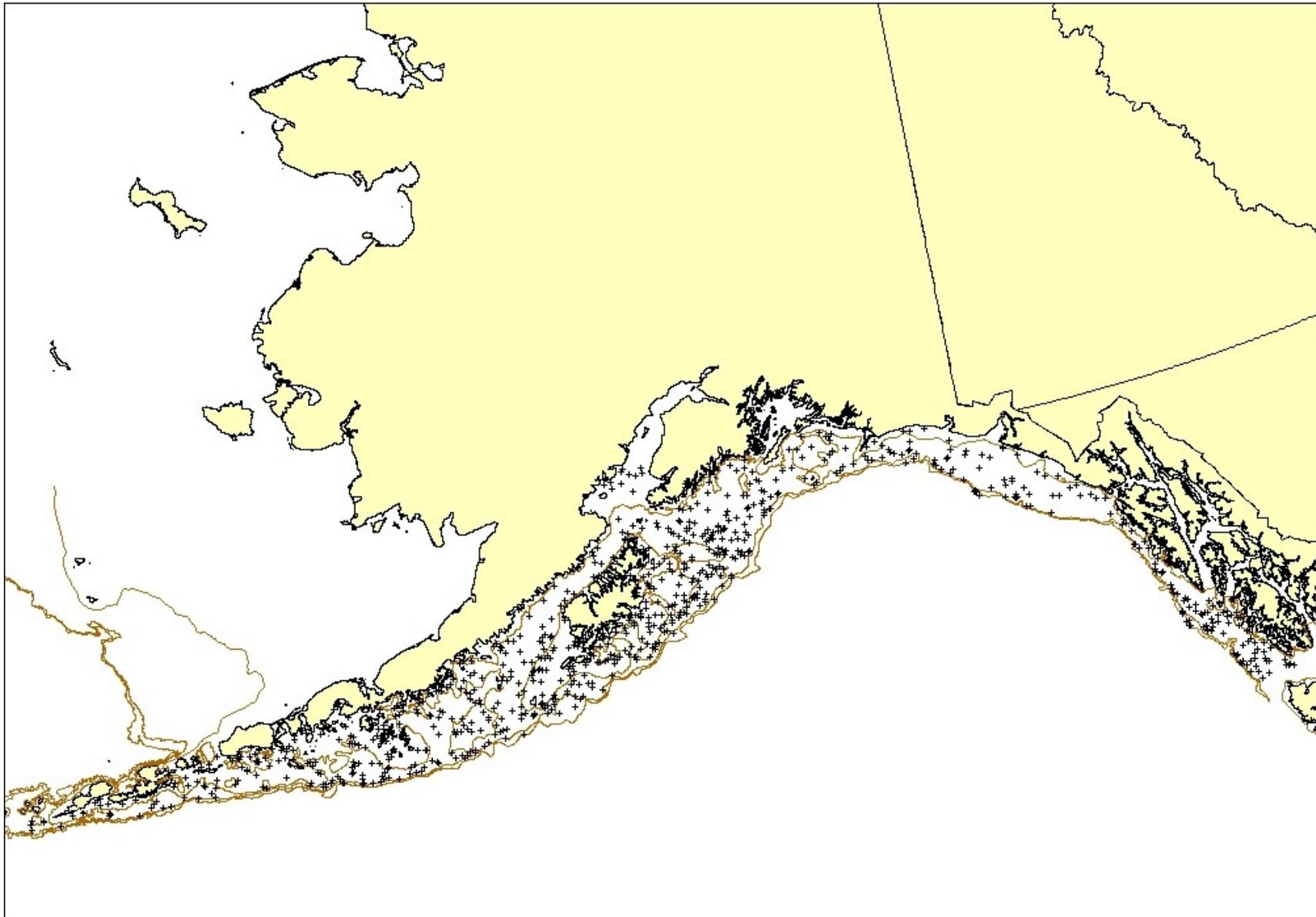


Figure 1: Locations of the 839 successful hauls made during the 2005 Gulf of Alaska Biennial Bottom Trawl Survey. The 100, 500, and 1,000 m isobaths are shown.

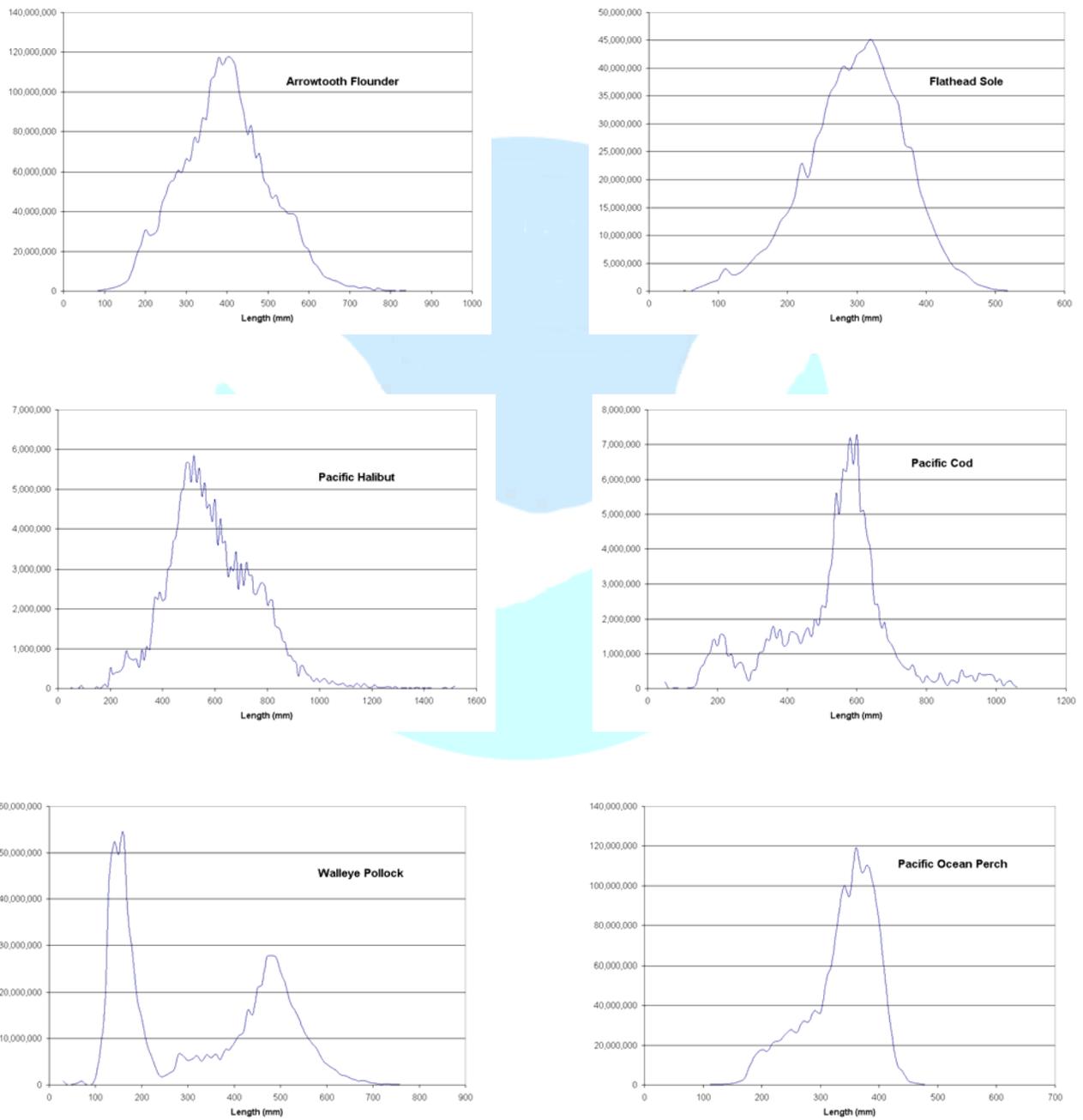


Figure 2: Estimated size composition (population number at length) for six major groundfish species assessed during the 2005 bottom trawl survey of Gulf of Alaska groundfish and invertebrate resources.