F/V *Ocean Prowler*
Cruise Report OP-13-01
Longline Survey of the Gulf of Alaska and Eastern Bering Sea
May 26-August 28, 2013

Prepared by

Chris Lunsford and Cara Rodgveller

On August 28, 2013, the Alaska Fisheries Science Center (AFSC) completed the 35th annual longline survey of Alaska sablefish (*Anoplopoma fimbria*) and other groundfish resources of the upper continental slope (Figure 1). This survey was designed to continue the time series (1979-94) of the Gulf of Alaska portion of the Japan-U.S. cooperative longline survey that was discontinued after 1994. The National Marine Fisheries Service (NMFS) has surveyed the Gulf of Alaska annually since 1987, the eastern Aleutian Islands biennially since 1996, and the eastern Bering Sea biennially since 1997. The Gulf of Alaska and eastern Bering Sea were sampled in 2011.

OBJECTIVES

1. Determine the relative abundance and size composition of the most commercially important species: sablefish, shortspine thornyhead (*Sebastolobus alascanus*), Greenland turbot (*Reinhardtius hippoglossoides*), Pacific cod (*Gadus macrocephalus*),and rougheye and shortraker rockfishes (*Sebastes aleutianus* and *S. borealis*).

2. Determine the relative abundance and size composition of other groundfish species caught during the survey: arrowtooth flounder (*Atheresthes stomias*), grenadiers (Macrouridae), skates (Rajadie), and spiny dogfish (*Squalus suckleyi*).

3. Tag and release sablefish, shortspine thornyhead, and Greenland turbot throughout the cruise to determine migration patterns.

4. Collect sablefish otoliths to study the age composition of the population.

VESSEL AND GEAR

Survey operations were conducted using the F/V *Ocean Prowler*, a chartered U.S. longline vessel. The 47 m (155 ft) long vessel carried standard longline hauling gear and was equipped with radios, radars, GPS receivers, a processing line, three sets of plate freezers, and refrigerated holds. Vessel personnel consisted of a captain, an engineer, a

cook, a quality-control technician, two contract biologists, six fishermen and five processors.

Gear configuration is standardized and has been consistent for all survey years since 1988. Units of gear (skates) were 100 m (55 fm) long and contained 45 size 13/0 Mustad[1] circle hooks. Hooks were attached to 38 cm (15 in) gangions that were secured to beckets tied into the groundline at 2 m (6.5 ft) intervals. Five meters (16 ft) of groundline were left bare at each end. Gangions were constructed of medium lay #60 thread nylon, becket material was medium lay #72 thread nylon, and groundline was medium lay 9.5 mm (3/8 in) diameter nylon.

A set of gear consisted of a flag and buoy array at each end followed sequentially by varying lengths by depth of 9.5 mm diameter nylon buoyline, a 92 m (50 fm) section of 9.5 mm polypropylene floating line, a 16 kg (35 lb) piece of chain (to dampen the effect of wave surge on the buoyline), 92 m of 9.5 mm nylon line, a 27 kg (60 lb) halibut anchor, and 366 m (200 fm) of 9.5 mm nylon line. The groundline was weighted with 3.2 kg (7 lb) lead balls at the end of each skate. Hooks were hand baited with chopped squid (*Illex*) at a rate of about 5.7 kg (12.5 lb) per 100 hooks. Squid heads and tentacles were not used for bait.

Total groundline set each day was 16 km (8.6 nmi) long and contained 160 skates and 7,200 hooks except in the eastern Bering Sea where 180 skates with 8,100 hooks were set. Additional effort is placed in this region due to the lower densities of sablefish. Two eighty-skate groundlines laid end to end were set at each station along the upper continental slope. A single groundline of eighty skates was set at each station in the gullies except Amatuli Gully station 87 that consists of 160 skates. Specific information regarding longline survey protocols and details of the survey gear can be found at: http://www.afsc.noaa.gov/ABL/MESA/pdf/LSprotocols.pdf

OPERATIONS

The charter began on May 26 at Dutch Harbor, Alaska, and ended on August 28 at Dutch Harbor. The charter period was divided into seven legs (Table 1). During leg 1, the stations along the upper continental slope of the eastern Bering Sea were sampled (Figure 1). During leg 2 stations in the Gulf of Alaska were sampled near the western end of Umnak Island and extending eastward to Sand Point. At the conclusion of Leg 2, the vessel then transited the Gulf of Alaska to southeastern Alaska. Leg 3 began off Dixon Entrance near the U.S.-Canada boundary and continued north and westward to Yakutat. During leg 4, a two-day experiment was conducted in the Yakutat vicinity (See Appendix A). During leg 5, the area between Yakutat and Cordova was sampled, and during leg 6 the area from Cordova to Kodiak was sampled. During leg 7, the area from Kodiak to Sand Point was sampled.

[1] Citation of the above brand name does not constitute U.S. government endorsement.

From 1988 to 1990 the survey period was from June 26 to September 12, which avoided surveying the grounds when a commercial sablefish opener occurred. The survey periods in 1991 through 1994 were 2-1/2 weeks later than in 1988 through 1990. The 1991-1994 surveys were delayed to avoid the commercial trawl fishery that occurred in the Gulf beginning July 1. Starting in 1995, the survey period was moved back to near the 1988-1990 time periods because avoiding the sablefish fishery was impossible due to the extensive increase in length of the fishing season resulting from the implementation of the Individual Fishing Quota (IFQ) system in the sablefish and Pacific halibut longline fisheries. Beginning in 1998 the order in which the stations were sampled was changed to avoid conflicting with an early July rockfish fishery in the central Gulf of Alaska. Instead of continuing to sample in an easterly direction from Sand Point to Dixon Entrance the survey vessel transited to Dixon Entrance during early July and resumed sampling in a westerly direction going from Dixon Entrance to Sand Point. Sampling order has been the same since 1998. From 2009 to present the survey starting and ending dates were several days earlier than previous years. This was done to accommodate the vessel's scheduling needs to finish to the survey as early as possible.

Survey Operations

A total of 16 stations along the upper continental slope of the eastern Bering Sea and 45 stations along the upper continental slope of the Gulf of Alaska were sampled at a rate of one station per day (Figure 1). Surveyed depths ranged from approximately 200 to 1,000 m, although at some stations depths less than 200 m or more than 1,000 m were sampled. In addition, twenty-seven stations were sampled in gullies at the rate of one or two stations per day. The sampled gullies were Shelikof Trough, Amatuli Gully, W-grounds, Yakutat Valley, Spencer Gully, Ommaney Trench, and Dixon Entrance. One station (103) was sampled on the continental shelf off Baranof Island. A list of stations and which management areas they correspond to, what type of habitat type they represent, and whether or not they were used in abundance index calculations is found in Table 2.

The gear was set from shallow to deep and was retrieved in the same order, except on occasions when groundlines parted or sea conditions dictated that it be pulled from the opposite direction. Setting began at approximately 0630 hours Alaska Daylight Time. Retrieval began at approximately 0930 hours and was completed by about 1930 hours.

Data Collection

Catch data were recorded on a hand-held computer. During gear retrieval a scientist stationed at the vessel's rail recorded the species of each hooked fish and the condition of each unoccupied hook (baited or ineffective [i.e., absent, straightened, broken, or tangled]). Time of day was recorded as each hook was tabulated and depth was entered when the first hook of each fifth skate was retrieved or when crossing into a new depth interval (0-100 m, 101-200 m, 201-300 m, 301-400 m, 401-600 m, 601-800 m, 801-1,000 m and 1,001-1,200 m).

Length data were collected with a bar code based measuring board and a bar code reader connected to a ruggedized computer. Length was measured by depth stratum for sablefish, Pacific cod, giant grenadier, arrowtooth flounder, spiny dogfish, multiple rockfish species, and shortspine thornyheads. Lengths of sablefish, giant grenadier, spiny dogfish, and Pacific cod were recorded by sex. Sablefish, shortspine thornyhead, and Greenland turbot were tagged on every 20th skate starting on skate 10 of every set. Pacific halibut were counted and released at the rail without measuring. Catch and length frequency data were transferred to a computer and electronic backup media twice a day. As in the previous surveys, the charter vessel was allowed to retain most of the catch once the scientific data were recorded.

RESULTS

One hundred fifty-two longline hauls were completed in 2013 (Table 3). Several stations were sampled out of order for various reasons including scheduling, weather, and fishing vessel interactions. In 2013, stations 2, 8, 12, and 17 were sampled at the beginning of the survey to help accommodate a late departure by the survey vessel at the start of Leg 1. Giant grenadier was the most frequently caught species, followed by sablefish, shortspine thornyhead, Pacific cod, and arrowtooth flounder (Table 4). The estimated total round weight of sablefish by station ranged from 9 kg (20 lb) to 7,453 kg (16,431 lb) and the overall total round weight of sablefish caught in the survey was 178,198 kg (392,859 lb) (Table 5). The estimated total numbers of major species retained during the survey are presented in Table 6. The estimated total round weights of major species retained during the survey and two-day experiment are presented in Table 7. These estimated numbers and weights include a small number of fish lost at the rail and fish that were tagged and released. The targeted percentage of tagged fish released at the rail is 5% of total catch for those species.

A total of 2,589 sablefish, 1,125 shortspine thornyhead, and 17 Greenland turbot were tagged with external floy tags and released during the 2013 survey. Electronic archival tags were implanted in 36 Greenland turbot. Pop-up satellite tags (PSAT) were implanted in 27 sablefish, 6 spiny dogfish, and 4 lingcod. Length-weight data and otoliths were collected from 1,619 sablefish.

Killer whales depredating on the catch occurred at eleven stations in the Bering Sea, two stations in the western Gulf of Alaska, and two stations in the central Gulf of Alaska (Table 8). Since 1990, portions of the gear affected by killer whale depredation during domestic longline surveys have been excluded from the analysis of the survey data.

Sperm whale observations have been recorded during the longline survey since 1998. Sperm whales were observed during survey operations at 18 stations in 2013 (Table 9). Sperm whales were observed depredating on the gear at two stations in the central Gulf of Alaska, three stations in the West Yakutat region, and seven stations in the East Yakutat/Southeast region (Table 9). Apparent sperm whale depredation is defined as sperm whales being present with the occurrence of damaged fish. Longline survey catch rates and abundance indices are not adjusted for sperm whale depredation.

NMFS has requested the assistance of the fishing fleet to avoid the annual sablefish longline survey since the inception of sablefish IFQ management in 1995. We requested that fishermen stay at least five nautical miles away from each survey station for 7 days before and 3 days after the planned sampling date (3 days allow for survey delays). In 2013 there were five recorded interactions between survey operations and fishing vessels. Interactions occurred at station numbers 71, 74, 82, 79, and 99 by longline vessels. In four cases the vessels were contacted by the survey vessel and were encouraged to avoid survey stations. At station 79 the survey vessel observed buoy and flag arrays close to the station track but was not able to associate a vessel with the gear.

Gear damage and loss occurs during survey operations and may have impacts on catch. In 2013 gear issues occurred at six stations. No gear was lost during the 2013 survey. The gear parted at stations 76, 91, 98, 102, and 107 but all gear was successfully retrieved by hauling the gear in reverse order. At station 104 six extra skates of gear were mistakenly set.

Several special projects were conducted during the 2013 longline survey. Greenland turbot were tagged with archival temperature/depth tags in the Bering Sea and lingcod were tagged in the West Yakutat and central Gulf of Alaska regions. Satellite pop-up tags were deployed on spiny dogfish, sablefish, and lingcod throughout the Gulf of Alaska. Information from these tags will be used to investigate movement patterns within and out of the Gulf of Alaska and potentially help identify spawning areas for sablefish. Additionally, genetic tissue and otoliths of giant grenadier were sampled to see if geographic stock structure exists and to determine if three distinct otoliths shapes identified in previous work correspond to different subspecies or subpopulations. Bubblegum coral genetic and specimen samples were collected to elucidate patterns of genetic connectivity among Paragorgid populations in the Gulf of Alaska. Finally, opportunistic photo identification of both sperm and killer whales were collected for use in whale identification projects.

For further information contact

Dr. Phil Mundy, Director, Auke Bay Laboratories, National Marine Fisheries Service, 17109 Pt. Lena Loop Road, Juneau, AK 99801 Telephone (907) 789-6001

Table 1. Leg numbers, dates, and personnel for the 2013 NMFS longline survey.

Leg	Dates	Personnel	Affiliation
1	May 26 - June 14	Pete Hulson	ABL
		Daniel Michrowski	UAF
		Jason Wright	Contract Biologist
		Johanna Marsters	Contract Biologist
2	June 14 - July 3	Dave Csepp	ABL
		Jason Wright	Contract Biologist
		Johanna Marsters	Contract Biologist
3	July 5 - July 19	Cindy Tribuzio	ABL
		Megan Stachura	Contractor
		Jason Wright	Contract Biologist
		Johanna Marsters	Contract Biologist
4*	July 20 - July 22	Cindy Tribuzio	ABL
		Megan Stachura	Contractor
		Johanna Marsters	Contract Biologist
5	July 23 - August 2	Chris Lunsford	ABL
		Thomas Farrugia	UAF
		Jason Wright	Contract Biologist
		Johanna Marsters	Contract Biologist
6	August 4 - August 15	Katy Echave	ABL
		Kari Fenske	UAF
		Jason Wright	Contract Biologist
		Johanna Marsters	Contract Biologist
7	August 16- August 29	Pat Malecha	ABL
		Karson Coutre	UAF
		Jason Wright	Contract Biologist
		Johanna Marsters	Contract Biologist

ABL - Auke Bay Laboratories, Alaska Fisheries Science Center
UAF – University of Alaska Fairbanks
* Two-day experiment

Table 2. Stations fished in 2013 NMFS longline survey. Sablefish management area refers to the North Pacific Fisheries Management Council areas, station type refers to station habitat type, and abundance calculations indicates whether or not station catches were used in abundance index calculations.

Station Number	Sablefish Management Area	Station Type	Abundance Calculations
1	Bering Sea	Slope	Yes
2	Bering Sea	Slope	Yes
4	Bering Sea	Slope	Yes
6	Bering Sea	Slope	Yes
8	Bering Sea	Slope	Yes
10	Bering Sea	Slope	Yes
12	Bering Sea	Slope	Yes
13	Bering Sea	Slope	Yes
15	Bering Sea	Slope	Yes
17	Bering Sea	Slope	Yes
18	Bering Sea	Slope	Yes
20	Bering Sea	Slope	Yes
22	Bering Sea	Slope	Yes
32	Bering Sea	Slope	Yes
33	Bering Sea	Slope	Yes
34	Bering Sea	Slope	Yes
62	Western Gulf of Alaska	Slope	Yes
63	Western Gulf of Alaska	Slope	Yes
64	Western Gulf of Alaska	Slope	Yes
65	Western Gulf of Alaska	Slope	Yes
66	Western Gulf of Alaska	Slope	Yes
67	Western Gulf of Alaska	Slope	Yes
68	Western Gulf of Alaska	Slope	Yes
69	Western Gulf of Alaska	Slope	Yes
70	Western Gulf of Alaska	Slope	Yes
71	Western Gulf of Alaska	Slope	Yes
72	Central Gulf of Alaska	Slope	Yes
73	Central Gulf of Alaska	Slope	Yes
74	Central Gulf of Alaska	Slope	Yes
75	Central Gulf of Alaska	Slope	Yes
76	Central Gulf of Alaska	Slope	Yes
77	Central Gulf of Alaska	Slope	Yes
78	Central Gulf of Alaska	Slope	Yes
79	Central Gulf of Alaska	Slope	Yes
80	Central Gulf of Alaska	Slope	Yes
81	Central Gulf of Alaska	Slope	Yes
82	Central Gulf of Alaska	Slope	Yes
83	Central Gulf of Alaska	Slope	Yes

Station Number	Sablefish Management Area	Station Type	Abundance Calculations
84	Central Gulf of Alaska	Slope	Yes
85	Central Gulf of Alaska	Slope	Yes
86	Central Gulf of Alaska	Slope	Yes
87	Central Gulf of Alaska	Gully	No
88	Central Gulf of Alaska	Slope	Yes
89	West Yakutat	Slope	Yes
90	West Yakutat	Slope	Yes
91	West Yakutat	Slope	Yes
92	West Yakutat	Slope	Yes
93	West Yakutat	Slope	Yes
94	West Yakutat	Slope	Yes
95	West Yakutat	Slope	Yes
96	West Yakutat	Slope	Yes
97	East Yakutat/Southeast	Slope	Yes
98	East Yakutat/Southeast	Slope	Yes
99	East Yakutat/Southeast	Slope	Yes
100	East Yakutat/Southeast	Slope	Yes
101	East Yakutat/Southeast	Slope	Yes
102	East Yakutat/Southeast	Slope	Yes
103	East Yakutat/Southeast	Shelf	No
104	East Yakutat/Southeast	Slope	Yes
105	East Yakutat/Southeast	Slope	Yes
106	East Yakutat/Southeast	Slope	Yes
107	East Yakutat/Southeast	Slope	Yes
108	East Yakutat/Southeast	Slope	Yes
120	Central Gulf of Alaska	Gully	No
121	Central Gulf of Alaska	Gully	No
122	Central Gulf of Alaska	Gully	No
123	Central Gulf of Alaska	Gully	No
124	Central Gulf of Alaska	Gully	No
125	Central Gulf of Alaska	Gully	No
126	Central Gulf of Alaska	Gully	No
127	Central Gulf of Alaska	Gully	No
128	Central Gulf of Alaska	Gully	No
129	Central Gulf of Alaska	Gully	No
130	Central Gulf of Alaska	Gully	No
131	Central Gulf of Alaska	Gully	No
132	Central Gulf of Alaska	Gully	No
133	Central Gulf of Alaska	Gully	No
134	Central Gulf of Alaska	Gully	No
135	Central Gulf of Alaska	Gully	No
136	West Yakutat	Gully	No
137	West Yakutat	Gully	No
138	West Yakutat	Gully	No

Station Number	Sablefish Management Area	Station Type	Abundance Calculations
139	West Yakutat	Gully	No
142	East Yakutat/Southeast	Deep Gully	Yes
143	East Yakutat/Southeast	Deep Gully	Yes
144	East Yakutat/Southeast	Deep Gully	Yes
145	East Yakutat/Southeast	Deep Gully	Yes
148	East Yakutat/Southeast	Deep Gully	Yes
149	East Yakutat/Southeast	Deep Gully	Yes

Table 3. Set information by set and haul for the 2013 NMFS longline survey. Positions are in decimal degree (DD) format.

Station	Haul	Date	# Skates Retrieved	Start Latitude	Start Longitude	End Latitude	End Longitude	Start Depth (m)	End Depth (m)
17	1	30-May	90	56.04	-169.62	55.99	-169.73	189	406
17	2	30-May	90	55.99	-169.74	55.98	-169.89	422	873
12	3	31-May	90	56.63	-172.36	56.57	-172.44	191	592
12	4	31-May	90	56.57	-172.44	56.50	-172.51	586	689
8	5	1-Jun	90	57.63	-174.16	57.70	-174.24	136	452
8	6	1-Jun	90	57.70	-174.24	57.78	-174.30	377	839
2	7	2-Jun	90	58.62	-176.64	58.58	-176.76	148	504
2	8	2-Jun	90	58.58	-176.77	58.55	-176.91	531	941
1	9	3-Jun	90	58.78	-177.58	58.81	-177.71	153	411
1	10	3-Jun	90	58.82	-177.72	58.86	-177.84	445	684
4	11	4-Jun	90	58.50	-175.65	58.48	-175.79	220	440
4	12	4-Jun	90	58.48	-175.79	58.50	-175.92	448	739
6	13	5-Jun	90	58.33	-174.31	58.40	-174.37	167	493
6	14	5-Jun	90	58.41	-174.38	58.38	-174.49	413	646
10	15	6-Jun	90	56.83	-173.38	56.90	-173.41	206	487
10	16	6-Jun	90	56.91	-173.41	56.97	-173.46	391	609
13	17	7-Jun	90	56.49	-171.45	56.47	-171.57	169	409
13	18	7-Jun	90	56.47	-171.57	56.46	-171.70	392	632
15	19	8-Jun	90	56.16	-170.67	56.13	-170.77	139	409
15	20	8-Jun	90	56.13	-170.78	56.16	-170.91	436	821
18	21	9-Jun	90	56.24	-169.18	56.18	-169.28	175	655
18	22	9-Jun	90	56.18	-169.28	56.13	-169.38	663	851
20	23	10-Jun	90	55.81	-168.80	55.85	-168.93	202	623
20	24	10-Jun	88	55.85	-168.94	55.93	-169.00	500	709
22	25	11-Jun	90	55.46	-168.01	55.43	-168.14	157	269
22	26	11-Jun	90	55.42	-168.14	55.39	-168.28	283	590
34	27	12-Jun	90	53.35	-168.98	53.30	-168.89	629	802
34	28	12-Jun	90	53.29	-168.89	53.28	-168.81	529	761
33	29	13-Jun	91	53.59	-168.33	53.61	-168.20	118	823
33	30	13-Jun	90	53.61	-168.19	53.62	-168.06	118	781
32	31	14-Jun	90	53.77	-167.33	53.72	-167.38	117	436
32	32	14-Jun	90	53.71	-167.39	53.69	-167.46	314	582
64	33	16-Jun	80	53.19	-166.85	53.12	-166.89	214	314
64	34	16-Jun	80	53.12	-166.89	53.06	-166.95	322	802
62	35	17-Jun	80	52.66	-168.99	52.62	-169.08	134	568
62	36	17-Jun	80	52.62	-169.09	52.57	-169.17	418	763
63	37	18-Jun	80	52.97	-168.14	52.91	-168.21	109	432
63	38	18-Jun	80	52.91	-168.21	52.85	-168.24	355	420

Station	Haul	Date	# Skates Retrieved	Start Latitude	Start Longitude	End Latitude	End Longitude	Start Depth (m)	End Depth (m)
65	39	19-Jun	80	53.58	-165.69	53.51	-165.73	355	420
65	40	19-Jun	80	53.51	-165.73	53.44	-165.78	124	300
66	41	20-Jun	80	53.74	-164.47	53.68	-164.55	315	491
66	42	20-Jun	80	53.68	-164.54	53.63	-164.64	137	278
67	43	21-Jun	80	53.97	-163.26	53.91	-163.32	283	575
67	44	21-Jun	80	53.91	-163.33	53.87	-163.43	116	358
68	45	22-Jun	80	54.13	-161.63	54.09	-161.71	323	652
68	46	22-Jun	80	54.09	-161.72	54.07	-161.82	137	357
69	47	23-Jun	80	54.31	-161.06	54.26	-161.15	269	753
69	48	23-Jun	80	54.26	-161.16	54.21	-161.23	176	375
70	49	24-Jun	80	54.37	-160.25	54.30	-160.29	384	792
70	50	24-Jun	80	54.30	-160.29	54.23	-160.31	149	285
71	51	25-Jun	80	54.50	-159.26	54.44	-159.32	313	596
71	52	25-Jun	80	54.43	-159.32	54.38	-159.40	148	271
72	53	26-Jun	80	54.63	-158.57	54.57	-158.61	292	708
72	54	26-Jun	80	54.57	-158.65	54.50	-158.70	137	362
73	55	27-Jun	80	54.85	-157.74	54.79	-157.81	367	878
73	56	27-Jun	80	54.79	-157.81	54.73	-157.85	193	368
74	57	28-Jun	80	55.24	-156.67	55.18	-156.74	354	625
74	58	28-Jun	80	55.17	-156.74	55.10	-156.76	185	335
75	59	29-Jun	80	55.64	-155.85	55.57	-155.86	311	705
75	60	29-Jun	80	55.56	-155.86	55.49	-155.83	143	211
148	61	5-Jul	80	54.65	-132.84	54.60	-132.94	214	228
149	62	5-Jul	80	54.60	-133.02	54.60	-133.15	145	378
108	63	6-Jul	80	54.46	-133.92	54.49	-134.01	410	417
108	64	6-Jul	80	54.50	-134.01	54.55	-134.07	255	668
107	65	7-Jul	80	54.90	-134.29	54.96	-134.35	443	878
107	66	7-Jul	80	54.96	-134.35	55.01	-134.43	221	623
106	67	8-Jul	80	55.35	-134.73	55.40	-134.83	456	738
106	68	8-Jul	80	55.40	-134.84	55.39	-134.95	380	626
105	69	9-Jul	80	55.56	-134.97	55.58	-135.06	514	825
105	70	9-Jul	80	55.59	-135.06	55.63	-135.15	215	607
144	71	10-Jul	80	55.93	-134.90	56.01	-134.91	539	926
145	72	10-Jul	80	56.03	-134.93	56.08	-135.01	201	362
104	73	11-Jul	80	55.99	-135.45	56.03	-135.54	353	384
104	74	11-Jul	80	56.03	-135.54	56.09	-135.61	369	639
103	75	12-Jul	80	56.38	-135.35	56.38	-135.48	566	786
103	76	12-Jul	80	56.38	-135.49	56.37	-135.62	145	186
102	77	13-Jul	80	56.86	-136.00	56.90	-136.09	188	246
102	78	13-Jul	80	56.90	-136.09	56.96	-136.12	283	846

Station	Haul	Date	# Skates Retrieved	Start Latitude	Start Longitude	End Latitude	End Longitude	Start Depth (m)	End Depth (m)
101	79	14-Jul	80	57.19	-136.24	57.22	-136.34	241	727
101	80	14-Jul	80	57.22	-136.34	57.28	-136.37	650	921
100	81	15-Jul	80	57.62	-136.54	57.62	-136.67	273	712
100	82	15-Jul	80	57.62	-136.68	57.67	-136.77	662	926
142	83	16-Jul	80	57.92	-137.01	57.92	-137.14	394	446
143	84	16-Jul	80	57.97	-137.07	57.97	-137.20	263	422
99	85	17-Jul	80	57.88	-137.38	57.89	-137.49	212	729
99	86	17-Jul	80	57.89	-137.50	57.88	-137.62	546	847
98	87	18-Jul	80	58.14	-138.73	58.16	-138.86	231	819
98	88	18-Jul	80	58.16	-138.86	58.18	-138.98	500	809
97	89	19-Jul	80	58.47	-139.47	58.46	-139.61	189	552
97	90	19-Jul	80	58.46	-139.61	58.42	-139.70	509	781
96	95	24-Jul	80	58.68	-140.64	58.69	-140.79	273	634
96	96	24-Jul	80	58.70	-140.79	58.74	-140.90	469	764
95	97	25-Jul	80	59.06	-141.34	59.05	-141.48	291	509
95	98	25-Jul	80	59.05	-141.49	59.05	-141.63	532	844
138	99	26-Jul	80	59.42	-140.92	59.43	-141.08	201	294
139	100	26-Jul	80	59.41	-141.17	59.35	-141.26	321	329
94	101	27-Jul	80	59.39	-142.18	59.42	-142.30	245	558
94	102	27-Jul	80	59.43	-142.31	59.47	-142.40	539	946
93	103	28-Jul	80	59.55	-142.57	59.59	-142.69	129	609
93	104	28-Jul	80	59.59	-142.69	59.57	-142.80	580	643
136	105	29-Jul	80	59.68	-143.38	59.72	-143.49	297	313
137	106	29-Jul	80	59.75	-143.59	59.76	-143.71	159	299
92	107	30-Jul	80	59.56	-143.66	59.56	-143.80	207	798
92	108	30-Jul	80	59.57	-143.81	59.59	-143.93	563	701
91	109	31-Jul	80	59.52	-144.72	59.48	-144.85	184	472
91	110	31-Jul	80	59.48	-144.85	59.45	-144.98	484	839
90	111	1-Aug	80	59.50	-145.54	59.53	-145.68	160	803
90	112	1-Aug	80	59.53	-145.69	59.52	-145.81	536	741
89	113	2-Aug	80	59.26	-146.86	59.22	-146.97	196	615
89	114	2-Aug	80	59.21	-146.98	59.17	-147.07	623	910
134	115	5-Aug	80	59.51	-146.97	59.56	-147.07	209	215
135	116	5-Aug	80	59.52	-147.15	59.44	-147.15	209	218
88	117	6-Aug	80	59.16	-147.60	59.10	-147.62	247	495
88	118	6-Aug	80	59.08	-147.62	59.01	-147.63	522	890
87	119	7-Aug	80	59.13	-148.65	59.06	-148.65	154	192
87	120	7-Aug	80	59.05	-148.65	58.98	-148.65	199	240
132	121	8-Aug	80	59.08	-149.40	59.04	-149.51	182	227
133	122	8-Aug	80	58.95	-149.51	58.92	-149.63	238	244

Station	Haul	Date	# Skates Retrieved	Start Latitude	Start Longitude	End Latitude	End Longitude	Start Depth (m)	End Depth (m)
130	123	9-Aug	80	58.73	-149.19	58.77	-149.08	177	216
131	124	9-Aug	80	58.80	-149.04	58.84	-148.92	236	253
86	125	10-Aug	80	58.69	-148.33	58.62	-148.33	285	461
86	126	10-Aug	80	58.62	-148.33	58.56	-148.34	464	818
85	127	11-Aug	80	58.29	-148.62	58.22	-148.66	245	523
85	128	11-Aug	80	58.22	-148.66	58.14	-148.70	545	847
84	129	12-Aug	80	57.97	-149.17	57.91	-149.26	173	496
84	130	12-Aug	80	57.91	-149.26	57.85	-149.34	517	958
128	131	13-Aug	80	57.98	-149.97	58.00	-149.83	220	264
129	132	13-Aug	80	58.08	-149.91	58.07	-150.03	295	307
83	133	14-Aug	80	57.63	-149.92	57.57	-149.95	390	547
83	134	14-Aug	80	57.56	-149.95	57.50	-149.98	557	839
82	135	15-Aug	80	57.40	-150.58	57.33	-150.59	217	490
82	136	15-Aug	80	57.34	-150.49	57.28	-150.57	535	717
81	137	17-Aug	80	57.12	-151.21	57.05	-151.27	251	528
81	138	17-Aug	80	57.05	-151.28	56.97	-151.28	564	837
80	139	18-Aug	80	56.48	-152.21	56.42	-152.30	160	495
80	140	18-Aug	80	56.42	-152.31	56.34	-152.36	450	612
79	141	19-Aug	80	56.30	-153.08	56.26	-153.20	246	586
79	142	19-Aug	80	56.26	-153.21	56.21	-153.29	571	854
78	143	20-Aug	80	55.99	-154.02	55.92	-154.02	239	484
78	144	20-Aug	80	55.92	-154.02	55.85	-154.05	520	870
77	145	21-Aug	80	56.05	-154.58	55.98	-154.58	227	507
77	146	21-Aug	80	55.97	-154.58	55.90	-154.58	546	884
76	147	22-Aug	80	55.76	-155.14	55.70	-155.18	165	325
76	148	22-Aug	80	55.69	-155.18	55.64	-155.25	365	577
126	149	23-Aug	80	57.35	-155.04	57.35	-155.17	238	240
127	150	23-Aug	80	57.35	-155.25	57.33	-155.38	246	259
124	151	24-Aug	80	56.99	-155.06	57.00	-155.19	175	233
125	152	24-Aug	80	57.00	-155.31	57.04	-155.41	253	266
122	153	25-Aug	80	56.19	-155.97	56.19	-156.09	200	239
123	154	25-Aug	80	56.23	-156.13	56.25	-156.24	247	266
120	155	26-Aug	80	55.79	-156.08	55.77	-156.19	203	237
121	156	26-Aug	80	55.75	-156.20	55.73	-156.33	243	252

Table 4. Catch in number by species for the 2013 NMFS longline survey. SF = sablefish, PC = Pacific cod, GR = giant grenadier, PH = Pacific halibut, ATF = arrowtooth flounder, GT = Greenland turbot, RF = rougheye and shortraker rockfish, ST = shortspine thornyheads, SK = skate, OS = other species.

Station	SF	PC	GR	PH	ATF	GT	RF	ST	SK	OS
1	127	74	2103	61	94	69	11	36	274	187
2*	30	348	2767	168	209	35	9	6	254	333
4	107	103	2185	212	310	72	49	23	209	104
6*	129	468	1809	263	265	55	97	29	420	278
8	116	519	1584	175	207	94	78	87	230	251
10*	39	140	2268	20	105	0	96	159	240	290
12*	7	427	2035	190	71	31	15	170	310	248
13*	3	584	829	33	78	0	65	208	131	300
15*	13	852	932	218	167	0	145	304	111	348
17*	78	787	863	27	362	47	14	126	78	281
18*	761	185	712	145	697	307	3	83	231	65
20*	328	789	19	234	272	44	9	88	251	364
22*	98	1278	25	210	631	41	4	55	156	616
32*	372	776	23	425	281	8	383	660	206	186
33	563	960	288	334	190	64	154	241	136	280
34	827	0	137	43	244	317	4	152	348	80
62	1260	249	1781	36	34	0	550	363	24	48
63	451	483	1878	84	128	0	549	291	74	47
64*	126	3	339	69	29	0	285	336	31	121
65*	545	394	2034	100	97	0	37	204	96	49
66	1212	203	1694	73	63	0	84	209	42	27
67	657	251	1478	177	114	0	239	358	62	50
68	514	385	731	242	241	0	314	533	50	57
69	442	134	1961	89	51	0	22	221	19	37
70	486	212	1099	161	61	0	27	203	38	110
71*	609	676	1398	174	95	0	15	279	33	56
72	1177	147	696	165	178	0	30	464	25	70
73*	282	9	1878	43	174	0	64	251	18	91
74*	981	30	1089	51	173	0	33	934	36	105
75	171	918	0	525	307	0	24	48	200	150
76	729	172	1000	124	143	0	39	130	177	772
77	1132	1	2304	6	27	0	9	313	3	242
78	707	1	1593	38	63	0	179	419	14	359
79+	946	0	1285	14	64	0	90	400	2	100
80	531	1	1344	95	87	0	187	363	11	82
81	1452	0	1340	35	125	0	54	247	4	188

Station	SF	PC	GR	PH	ATF	GT	RF	ST	SK	OS
82	1217	0	1056	165	115	0	45	402	5	26
83	1252	0	1515	1	17	0	4	372	2	108
84	1470	80	415	102	118	0	42	406	17	291
85	1140	5	706	50	51	0	25	521	30	92
86	1076	0	504	68	71	0	107	570	15	65
87	2070	49	0	147	96	0	4	102	82	122
88	1307	6	465	8	74	0	252	388	2	246
89	709	8	1116	26	32	0	24	458	1	135
90	722	13	638	24	22	0	129	429	13	105
91	697	7	598	47	77	0	187	373	11	95
92	829	1	368	5	40	0	27	411	2	32
93	639	1	1049	75	4	0	2	644	14	68
94	651	0	415	24	89	0	34	453	7	71
95	812	0	545	11	9	0	276	502	6	76
96	1527	0	365	4	41	0	319	333	18	69
97	972	1	327	1	57	0	99	268	16	50
98	561	0	722	5	8	0	373	69	2	47
99	669	0	212	8	9	0	97	144	13	226
100	1327	0	318	1	19	0	94	316	6	51
101	1041	3	331	1	26	0	86	404	9	102
102	931	1	443	1	33	0	65	387	7	74
103	185	225	0	417	36	0	0	28	47	800
104	1017	0	257	7	5	0	178	568	36	113
105	1542	5	266	28	21	0	109	358	30	169
106	1305	0	207	1	21	0	160	469	17	92
107	1317	2	247	7	13	0	141	372	12	224
108	1277	17	144	17	42	0	550	358	41	314
120	140	846	0	52	125	0	0	6	217	86
121	398	26	0	44	185	0	0	35	249	76
122	158	513	0	29	154	0	0	8	288	149
123	111	87	0	7	130	0	0	1	185	105
124	46	264	0	243	335	0	0	0	315	115
125	16	414	0	264	190	0	0	0	338	47
126	32	286	0	195	266	0	0	0	233	126
127	15	121	0	182	198	0	0	0	388	53
128	1017	51	0	186	38	0	9	70	37	63
129	809	0	0	27	8	0	3	98	35	12
130	101	2	0	12	40	0	1	250	41	20
131	815	1	0	22	52	0	11	257	35	60
132	801	1	0	12	42	0	0	56	68	39

Station	SF	PC	GR	PH	ATF	GT	RF	ST	SK	OS
133	428	0	0	10	38	0	2	348	48	91
134	838	0	0	20	38	0	69	73	79	142
135	260	0	0	133	76	0	8	60	61	102
136	406	0	0	11	4	0	5	179	10	9
137	235	4	0	62	11	0	1	97	8	33
138	71	0	0	43	27	0	36	209	16	54
139	317	0	0	20	51	0	35	101	31	11
142	775	0	61	6	14	0	8	398	10	21
143	962	0	106	17	92	0	25	186	23	38
144	160	34	0	249	99	0	71	424	72	161
145	651	0	0	33	28	0	96	286	66	130
148	375	166	0	98	38	0	23	127	138	347
149	762	1	0	45	8	0	10	148	127	102
Total	56,969	15,800	58,897	8,332	9,870	1,184	7,809	22,515	8,123	13,027

* Station catch was entirely or partially impacted by killer whale depredation.
\+ Station catch was partially impacted by gear loss or fishing vessel interactions.

Table 5. Mean length, round weight, mean dressed weight, number, and estimated total round weight of sablefish by station for the 2013 NMFS longline survey.

Station	Mean Length	Mean Round Weight(kg)[1]	Mean Dressed Weight(lbs)[2]	Number of Sablefish	Est. Total Round Weight(kg)[3]
1	63.84	2.77	3.85	127	352
2	59.64	2.43	3.38	30	73
4*	66.13	3.13	4.34	107	335
6*	64.24	3.11	4.32	129	401
8	67.29	3.32	4.61	116	385
10*	67.19	3.3	4.59	39	129
12*	61.5	2.44	3.39	7	17
13*	66	3.06	4.26	3	9
15	67.01	3.27	4.54	13	42
17*	60.62	2.35	3.27	78	184
18	61.68	2.48	3.44	761	1886
20	62.39	2.55	3.55	328	838
22	59.82	2.21	3.07	98	216
32	64.04	2.84	3.94	372	1056
33	60.52	2.39	3.32	563	1346
34*	60.66	2.43	3.37	827	2009
62*	57.98	2.05	2.85	1260	2587
63*	62.47	2.69	3.74	451	1215
64*	52.56	1.44	2	126	181
65*	59.5	2.19	3.04	545	1193
66	58.23	2.05	2.85	1212	2489
67	65.51	3.08	4.28	657	2024
68	66.28	3.24	4.5	514	1665
69	58.57	2.18	3.03	442	965
70	58.62	2.15	2.98	486	1044
71*	58.72	2.17	3.01	609	1321
72	62.11	2.62	3.64	1177	3086
73*	54.6	1.66	2.31	282	468
74	63.55	2.8	3.89	981	2749
75	56.78	1.92	2.66	171	328
76	60.13	2.32	3.22	729	1688
77	63.6	2.85	3.95	1132	3221
78	65.54	3.1	4.31	707	2194
79	64.62	2.9	4.03	946	2744
80	65.74	3.09	4.29	531	1641
81	65.88	3.15	4.38	1452	4578

Station	Mean Length	Mean Round Weight(kg)[1]	Mean Dressed Weight(lbs)[2]	Number of Sablefish	Est. Total Round Weight(kg)[3]
82	64.66	3	4.16	1217	3648
83	68.39	3.62	5.03	1252	4538
84	66.62	3.28	4.55	1470	4815
85	68.19	3.59	4.99	1140	4094
86	68.15	3.51	4.88	1076	3781
87	62.61	2.62	3.64	2070	5419
88	70.15	3.88	5.38	1307	5066
89	69.16	3.68	5.12	709	2612
90	65.72	3.15	4.37	722	2272
91	68.59	3.69	5.12	697	2569
92	67.03	3.39	4.71	829	2810
93	67.74	3.47	4.82	639	2217
94	65.42	3.09	4.29	651	2013
95	73.29	4.54	6.31	812	3689
96	74.76	4.88	6.78	1527	7453
97	70.49	4.04	5.61	972	3923
98	72.19	4.55	6.33	561	2555
99	71.56	4.2	5.84	669	2813
100	72.0	4.29	5.95	1327	5688
101	69.5	3.87	5.37	1041	4025
102	69.54	3.9	5.42	931	3633
103	60.96	2.59	3.6	185	479
104	65.36	3.18	4.41	1017	3230
105	69.97	3.92	5.45	1542	6048
106	67.38	3.51	4.88	1305	4584
107	66.97	3.47	4.82	1317	4571
108	67.42	3.49	4.85	1277	4463
120	59.76	2.24	3.12	140	314
121	57.88	2.03	2.83	398	810
122	59.99	2.27	3.15	158	359
123	58.78	2.14	2.97	111	238
124	65.23	2.93	4.07	46	135
125	64.14	2.8	3.88	16	45
126	63.03	2.65	3.68	32	85
127	60.08	2.28	3.16	15	34
128	63.15	2.7	3.75	1017	2748
129	62.33	2.56	3.55	809	2068
130	61.01	2.43	3.38	101	246

Station	Mean Length	Mean Round Weight(kg)[1]	Mean Dressed Weight(lbs)[2]	Number of Sablefish	Est. Total Round Weight(kg)[3]
131	65.11	2.96	4.12	815	2416
132	59.08	2.14	2.98	801	1716
133	62.04	2.53	3.52	428	1084
134	55.41	1.72	2.39	838	1441
135	54.89	1.68	2.34	260	437
136	62.51	2.64	3.67	406	1072
137	59.96	2.43	3.37	235	571
138	57.55	2.09	2.9	71	148
139	58.69	2.16	3	317	685
142	64.23	2.93	4.06	775	2267
143	64.28	2.97	4.12	962	2853
144	70.79	4.03	5.6	160	645
145	74.77	4.9	6.8	651	3189
148	64.78	2.95	4.09	375	1106
149	61.02	2.39	3.32	762	1819

* Station catch was entirely or partially impacted by killer whale depredation.

[1] Mean weight was estimated by applying a length-weight relationship to the length frequency distribution from each station.

[2] Mean dressed weight was estimated using a recovery rate of 0.6 of round weight in pounds.

[3] Estimated total round weight is the product of mean round weight and the number of hooked sablefish that came to the surface including a small percentage that were lost during landing and fish tagged and released.

Table 6. Total estimated catch (numbers) of major species (> 100 individuals) caught in 2013 NMFS longline survey. These estimates are for all fish landed including fish tagged and released.

Species/Complex	Bering Sea	Western GOA	Central GOA	West Yakutat	East Yakutat Southeast	Total
Giant grenadier	18,579	17,190	3,641	5,094	14,393	58,897
Sablefish	3,598	23,625	15,829	7,615	6,302	56,969
Shortspine thornyhead	2,427	7,592	5,310	4,189	2,997	22,515
Pacific cod	8,290	4,031	455	34	2,990	15,800
Arrowtooth flounder	4,183	3,798	569	407	913	9,870
Pacific halibut	2,758	3,075	942	352	1,205	8,332
Aleutian/Bering/Alaska Skate Complex	1,794	2,720	152	43	253	4,962
Rougheye rockfish	408	834	1,253	416	1,451	4,363
Shortraker rockfish	718	457	931	659	670	3,434
Walleye pollock	1,630	970	7	24	33	2,664
Lips or Jaws - Whale Predation	1,413	35	25	17	102	1,592
Sea anemone unident.	70	611	398	89	93	1,261
Longnose skate	0	482	437	87	202	1,208
Greenland turbot	1,184	0	0	0	0	1,184
Spiny dogfish	2	259	713	8	25	1,007
Redbanded rockfish	0	143	696	142	21	1,002
whiteblotched skate	897	0	0	0	0	897
Pacific grenadier	6	634	83	141	4	868
Sea pen or Sea Whip	12	633	4	28	14	691
commander skate	619	4	14	0	9	646
Dover sole	1	326	170	96	27	620
Brittlestarfish	33	350	24	12	90	509
Spotted ratfish	0	0	286	0	0	286
Yelloweye rockfish	0	31	178	43	16	268
Skates unidentified	164	42	32	6	4	248
Flathead sole	149	65	0	1	13	228
Yellow Irish lord	222	0	0	0	3	225
Sponge, unidentified	47	38	16	7	71	179
Starfish unident.	12	53	55	28	3	151
Longspine Thornyhead	0	49	89	6	0	144
Rosethorn rockfish	0	1	69	35	0	105

Table 7. Total estimated catch in weight (kg) of major species (>100 kg) caught by management area in the 2013 NMFS longline survey. Weight is derived from length-weight relationship when lengths available. For all other species, an average weight was used to estimate total weight from catch in numbers. These estimates are for all fish landed including fish tagged and released.

Species/Complex	Bering Sea	Western GOA	Central GOA	West Yakutat	East Yakutat Southeast	Total
Giant grenadier	83,456	57,182	12,758	15,847	45,507	214,749
Sablefish	9,278	68,234	57,892	28,112	14,683	178,198
Pacific cod	26,981	13,218	1,264	132	8,120	49,715
Pacific halibut	16,275	18,146	5,559	2,077	7,111	49,167
Arrowtooth flounder	7,535	5,996	1,011	785	1,479	16,807
Shortspine thornyhead	2,928	4,596	3,677	2,452	1,876	15,529
Longnose skate	0	3,593	3,258	649	1,506	9,006
Rougheye rockfish	582	1,078	2,106	496	1,963	6,225
Shortraker rockfish	1,205	701	1,394	1,156	875	5,331
Whiteblotched skate	4,832	0	0	0	0	4,832
Greenland turbot	4,332	0	0	0	0	4,332
Walleye pollock	2,316	1,378	10	34	47	3,785
Spiny dogfish	6	583	1,486	18	68	2,161
Commander skate	1,973	13	45	0	29	2,059
Redbanded rockfish	0	254	1,236	252	37	1,779
Skates unidentified	832	213	162	30	20	1,258
Spotted ratfish	0	0	1,041	0	0	1,041
Dover sole	1	485	253	143	40	922
Pacific grenadier	7	578	68	140	3	796
Yelloweye rockfish	0	89	513	124	46	773
Pacific sleeper shark	173	289	58	0	58	578
Sea anemone unident.	19	169	110	25	26	349
Yellow Irish lord	186	0	0	0	3	189
Whitebrow skate	177	0	9	0	3	189
Mud skate	166	0	14	0	0	179
Flathead sole	107	46	0	1	9	163
Eelpout, unidentified	132	0	1	0	0	134
Sea pen or Sea Whip	2	120	1	5	3	131
Coho salmon	0	41	38	41	0	120
Roughtail skate	0	16	95	3	0	113
Lingcod	0	8	57	41	0	107

Table 8. - Stations and skates at each station that were depredated upon by killer whales in the 2013 NMFS longline survey. Start skate refers to skate where killer whales began affecting catch. End skate refers to the last skate that was affected.

Station	Region	Start Skate	End Skate
2	Bering Sea	92	180
6	Bering Sea	142	180
10	Bering Sea	7	180
12	Bering Sea	37	180
13	Bering Sea	1	180
15	Bering Sea	1	180
17	Bering Sea	4	180
18	Bering Sea	142	180
20	Bering Sea	91	180
22	Bering Sea	161	180
32	Bering Sea	1	71
64	Western Gulf of Alaska	1	160
65	Western Gulf of Alaska	81	160
73	Central Gulf of Alaska	1	160
74	Central Gulf of Alaska	80	160

Table 9. Stations that had sperm whales present during hauling operations in the 2013 NMFS longline survey. Depredation is defined as sperm whales being present with the occurrence of damaged fish on the line.

Station	Region	Depredation	Number of Whales
64	Western Gulf of Alaska	No	1
65	Western Gulf of Alaska	No	1
73	Central Gulf of Alaska	No	1
77	Central Gulf of Alaska	Yes	1
84	Central Gulf of Alaska	No	1
85	Central Gulf of Alaska	Yes	1
86	Central Gulf of Alaska	No	2
92	West Yakutat	Yes	1
93	West Yakutat	Yes	4
94	West Yakutat	Yes	2
98	East Yakutat/Southeast	Yes	1
99	East Yakutat/Southeast	Yes	1
100	East Yakutat/Southeast	Yes	1
101	East Yakutat/Southeast	Yes	2
102	East Yakutat/Southeast	No	2
104	East Yakutat/Southeast	Yes	2
106	East Yakutat/Southeast	Yes	1
107	East Yakutat/Southeast	Yes	1

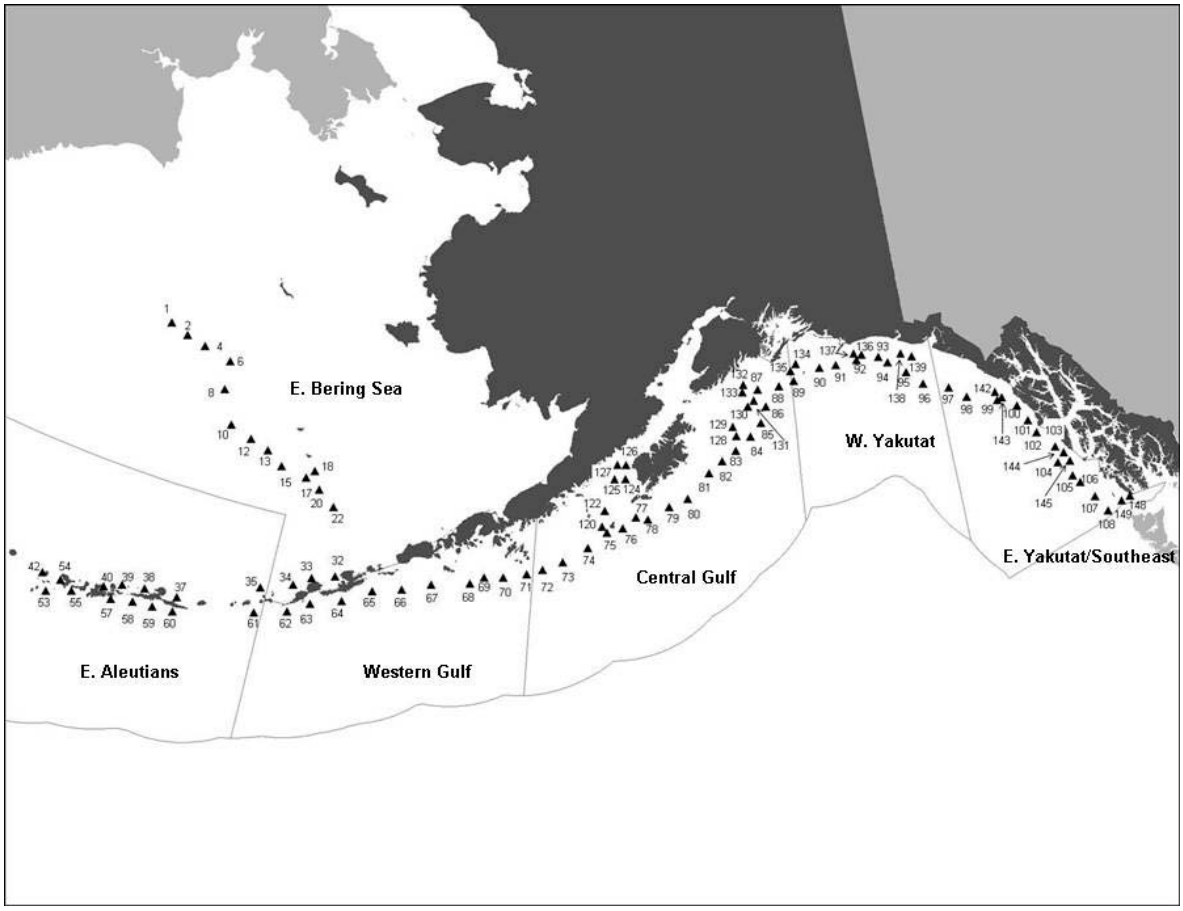

Figure 1. Map of NMFS longline survey station locations and corresponding management areas. Bering Sea stations are sampled in odd years; Aleutian Islands Region stations are sampled in even years; Gulf of Alaska stations are sampled every year.

APPENDIX A: Electronic Data Collection and Hook Tension Device Experiment

A bait experiment was conducted near Yakutat from July 21-22 to test catching efficiency of walleye Pollock (*Theragra calcogramma*) compared to squid (*Illex sp)* bait. Four sets were made in the course of the two days consisting of 160 skates per set (Table A1). Each bait type was interspersed during a set in groupings of 10 skates each starting with squid (e.g., skates 1-10 squid; skates 11-20 pollock...). This resulted in a total of 80 skates baited with squid and 80 skates baited with pollock per set. Results will be tabulated and compared to data gathered during the 2012 longline survey.

During the two-day experiment four sets were completed (Table A1).

Table A1. Set information by station and haul for the 2013 NMFS longline survey 2-day experiment. Positions in decimal degree (DD) format.

Haul	Date	Start Lat	Start Lon	End Lat	End Lon	Start Depth (m)	End Depth (m)
1	21-Jul	59.24	-141.91	59.25	-142.05	525	666
2	21-Jul	59.25	-142.07	59.29	-142.19	581	700
3	22-Jul	59.12	-141.66	59.17	-141.76	552	706
4	22-Jul	59.19	-141.80	59.24	-141.91	576	721