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The 2017 Longline Survey of the Gulf of Alaska and Eastern Bering Sea on the FV *Ocean Prowler*: Cruise Report OP-17-01

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ABSTRACT

The Alaska Fisheries Science Center (AFSC) has annually completed a bottom longline survey in Alaska since 1978. The survey samples demersal waters of the upper continental slope and is primarily designed to assess sablefish (*Anoplopoma fimbria*), although several other groundfish species are caught in significant numbers. In 2017, the 40th annual longline survey sampled stations in the Bering Sea and the Gulf of Alaska. The primary objectives of the survey were to determine the relative abundance of sablefish and other groundfish species, collect sablefish otoliths to determine the age composition of the population, and to tag and release a subsample of selected groundfish to determine movement patterns.

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INTRODUCTION

On 28 August 2017, the Alaska Fisheries Science Center (AFSC) completed the 40th annual longline survey of Alaska sablefish (*Anoplopoma fimbria*) and other groundfish resources of the upper continental slope (Fig. 1). This survey was designed to continue the time series (1978-94) 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. Since 1996, the eastern Aleutian Islands have been surveyed in even years and the eastern Bering Sea has been surveyed in odd years. The Gulf of Alaska and eastern Bering Sea were sampled in 2017. The purpose of this report is to summarize raw survey data and detail survey operations. Data generated from the longline survey will be used for calculating relative population numbers and weights. This information is available by management area and station at: https://www.afsc.noaa.gov/maps/longline/Map.php. Ultimately, the data will be used for assessing stock status of Alaska groundfish. Stock Status and Fishery Evaluation (SAFE) reports can be found at: https://www.npfmc.org/safe-stock-assessment-and-fishery-evaluation-reports.

METHODS

Survey Objectives

1. Collect relative abundance and size composition data of the most commercially important groundfish species: sablefish, shortspine thornyhead (*Sebastolobus alascanus*), Greenland turbot (*Reinhardtius hippoglossoides*), Pacific cod (*Gadus*

macrocephalus), and rougheye (*Sebastes aleutianus*), blackspotted (*S. melanostictus*) and shortraker (*S. borealis*) rockfishes.

2. Collect relative abundance and size composition data of other groundfish species caught during the survey: arrowtooth flounder (*Atheresthes stomias*), grenadiers (Macrouridae), skates (Rajidae), and spiny dogfish (*Squalus acanthias*).
3. Collect sablefish otoliths to study the age composition of the population.
4. Tag and release sablefish, shortspine thornyhead, and Greenland turbot throughout the cruise to determine migration patterns.
5. Conduct special projects related to groundfish biology, seafloor ecology, stock assessment, and marine mammal interactions.

Vessel and Gear

Survey operations were conducted using the FV *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 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* sp.) 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 nautical miles [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 80-skate groundlines, laid end-to-end, were set at each station along the upper continental slope. A single groundline of 80 skates was set at each station in the gullies, except Amatuli Gully (station 87) where 160 skates were set. 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 26 May in Dutch Harbor, Alaska, and ended on 28 August in 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 (Fig. 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 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 2-day experiment was conducted in the Yakutat vicinity (See Appendix). 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.

From 1988 to 1990 the survey period was from 26 June to 12 September. 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 started 45 days later than in 1988 through 1990. Starting in 1995, the survey period was moved back to near the 1988-1990 time periods because of 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 (*Hippoglossus stenolepis*) 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 schedule and desire to finish the survey as early as possible.

In 2017, a total of 16 stations along the upper continental slope of the eastern Bering Sea and 47 stations along the upper continental slope of the Gulf of Alaska were sampled at a rate of one station per day (Fig. 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, 23 stations were sampled in gullies at the rate of 1 or 2 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 presented in Table 2. Not all stations are used in abundance index calculations reported for sablefish, notably gully stations on the continental shelf. However, abundance calculations are performed for all species at all stations and are available at the station level for slope and gully stations.

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 about 0630 hours Alaska Daylight Time. Retrieval began at about 0930 hours and was completed by about 1930 hours.

Data Collection

Catch data were recorded on a hand-held ruggedized 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 barcode-configured measuring board and a barcode reader connected to a ruggedized computer. Length was recorded by depth stratum for sablefish, Pacific cod, giant grenadier (*Albatrossia pectoralis*), arrowtooth flounder, Greenland turbot, shortspine thornyhead, spiny dogfish, and multiple rockfish species. 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 AND DISCUSSION

One-hundred and fifty-six longline hauls were completed in 2017 (Table 3). Sablefish was the most frequently caught species, followed by giant grenadier, shortspine thornyhead, Pacific cod, and Pacific halibut (Table 4). Catch of the most abundant species by station is presented in Table 5. Giant grenadier was the highest catch by weight, followed by sablefish, Pacific halibut, and Pacific cod (Table 6). Average length and weight of sablefish varied by station (Table 7).

A total of 3,323 sablefish, 877 shortspine thornyhead, and 9 Greenland turbot were tagged with external Floy tags and released during the survey. Length-weight data and otoliths were collected from 2,261 sablefish.

Killer whales (*Orcinus orca*) depredating on the catch occurred at 11 stations in the Bering Sea and 2 stations in the western 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 (*Physeter macrocephalus*) observations have been recorded during the longline survey since 1998. Sperm whales were observed during survey operations at 18 stations in 2017. Sperm whales were observed depredating on the gear at one station in the western Gulf of Alaska, four stations in the central Gulf of Alaska, three stations in the West Yakutat region, and nine 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 sablefish. Longline survey catch rates and abundance indices are not adjusted for sperm whale depredation in the survey.

NMFS has requested the assistance of the fishing fleet to avoid the annual sablefish longline survey stations since the inception of sablefish IFQ management in 1995. We requested that fishermen stay at least 5 nmi away from each survey station for 7 days before and 3 days after the planned sampling date (3 days allow for survey delays). In 2017 there were an unusually high number of recorded interactions. Four vessels were contacted or observed by the survey vessel in the Bering Sea and 13 in the Gulf of Alaska. Of these, one was a crabber, three were bottom trawlers, one was a longliner targeting halibut, three were sablefish pot vessels, and nine were longliners

targeting sablefish. Of these, survey operations at six stations were altered or likely affected by other vessels fishing too close to the station. The six stations affected were station 32, 66, 71, 89, 86, and 76. The vessels were contacted by the survey vessel and were encouraged to avoid survey stations.

Gear damage and loss occurs during survey operations and may have impacts on catch. In 2017, the gear parted at seven stations (6, 33, 108, 104, 101, 85, and 523) but was subsequently successfully hauled from the opposite end of the set. Thereby, no gear was lost due to snagging of the bottom (Table 3).

Tagging operations did not happen during the last six stations fished in the Bering Sea (Stations 18, 20, 22, 34, 33, and 32) due to the departure of one contract biologist. Otoliths and lengths were collected at these stations. However, the number of random lengths collected was much lower than when operating at full staffing levels.

Several special projects were conducted during the 2017 longline survey. Livers, ovaries, and maturity stage information were collected randomly during Leg 1 from sablefish sampled for specimen data. This information will be used to help evaluate sablefish maturity and to validate visual maturity stage classifications recorded during the survey. Satellite pop-up tags were deployed on spiny dogfish and blood samples were obtained in the Gulf of Alaska. Information from the dogfish tag releases and blood samples will be used to investigate discard mortality rates and stress response from capture events. Sperm whale observations and photo identifications were conducted in collaboration with a separate vessel at two stations during Leg 3. Yelloweye rockfish (*Sebastes ruberrimus*) samples were collected for a study trying to develop hormone

profiles to reconstruct reproductive life histories. Finally, tissue samples from five species were collected for a stable isotope analysis.

Table 1. -- Leg numbers, dates, and personnel for the 2017 NMFS longline survey.

Leg	Dates	Personnel	Affiliation
1	26 May – 14 June	Pat Malecha (partial)	AFSC – ABL
		Chris Lunsford (partial)	AFSC – ABL
		Dennis Jaszka	Contract Biologist
		Sabrina Cobb (partial)	Contract Biologist
2	14 June – 3 July	Kari Fenske	AFSC – ABL
		Lisa Hillier	Volunteer
		Veronica Frans	Contract Biologist
3	5 July – 19 July	Chris Lunsford	AFSC – ABL
		Dennis Jaszka	Contract Biologist
		Sabrina Cobb	Contract Biologist
4*	20 July – 22 July	Dave Csepp	AFSC – ABL
		Suzanne Romain	AFSC - FMA
		Dennis Jaszka	Contract Biologist
		Sabrina Cobb	Contract Biologist
5	23 July – 2 Aug.	Dana Hanselman	AFSC – ABL
		Rachel Cashman	Volunteer
		Dennis Jaszka	Contract Biologist
		Sabrina Cobb	Contract Biologist
6	4 Aug. – 15 Aug.	Katy Echave	AFSC – ABL
		Curry Cunningham	AFSC – ABL
		Dennis Jaszka	Contract Biologist
		Sabrina Cobb	Contract Biologist
7	16 Aug.- 28 Aug.	Karson Coutré	AFSC – ABL
		Matt Callahan	UAF
		Dennis Jaszka	Contract Biologist
		Sabrina Cobb	Contract Biologist

* 2-day experimental leg.
AFSC – ABL – Alaska Fisheries Science Center – Auke Bay Laboratories.
AFSC – FMA – Alaska Fisheries Science Center – Fisheries Monitoring and Analysis.
UAF – University of Alaska Fairbanks.

Table 2. -- Stations fished in 2017 NMFS longline survey. Sablefish management area refers to the North Pacific Fishery 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

Table 2. -- Cont.

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
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
139	West Yakutat	Gully	No

Table 2. -- Cont.

Station number	Sablefish management area	Station type	Abundance calculations
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
523	Central Gulf of Alaska	Slope	No
525	Central Gulf of Alaska	Slope	No

Table 3. -- Set information by station and haul for the 2017 NMFS longline survey. Positions in decimal degree (DD) format.

Station	Haul	Date	# Skates retrieved	Start latitude	Start longitude	End latitude	End longitude	Start depth (m)	End depth (m)
				Bering Sea					
17	1	30-May	90	56.04	-169.62	55.99	-169.72	196	498
17	2	30-May	90	55.99	-169.75	55.97	-169.89	416	497
12	3	31-May	90	56.63	-172.37	56.58	-172.43	192	575
12	4	31-May	90	56.57	-172.45	56.50	-172.52	642	723
8*	5	1-Jun	90	57.70	-174.24	57.70	-174.24	155	477
8*	6	1-Jun	90	57.72	-174.25	57.78	-174.32	514	766
2*	7	2-Jun	90	58.62	-176.64	58.58	-176.74	152	446
2*	8	2-Jun	90	58.58	-176.55	58.76	-176.85	522	827
1*	9	3-Jun	90	58.78	-177.57	58.81	-177.70	193	230
1*	10	3-Jun	90	58.82	-177.72	58.86	-177.84	411	586
4*	11	4-Jun	90	58.48	-175.83	58.50	-175.95	464	850
4*	12	4-Jun	90	58.50	-175.67	58.48	-175.80	230	434
6	13	5-Jun	90	58.33	-174.31	58.40	-174.36	168	364
6	14	5-Jun	90	58.41	-174.37	58.38	-174.49	405	536
10*	15	6-Jun	90	56.83	-173.38	56.90	-173.41	225	521
10*	16	6-Jun	90	56.91	-173.42	56.97	-173.46	490	596
13*	17	7-Jun	90	56.47	-171.45	56.46	-171.59	198	509
13*	18	7-Jun	90	56.46	-171.61	56.46	-171.74	354	664
15*	19	8-Jun	90	56.16	-170.13	56.66	-170.77	141	445
15*	20	8-Jun	90	56.13	-170.78	56.16	-170.90	465	470
18*	21	10-Jun	90	56.25	-169.16	56.20	-169.26	161	648
18*	22	10-Jun	90	56.18	-169.38	56.13	-169.36	639	741
20	23	11-Jun	90	55.81	-168.79	55.84	-168.92	201	614
20	24	11-Jun	90	55.85	-168.94	55.91	-169.01	670	718
22*	25	12-Jun	90	55.46	-168.01	55.43	-168.13	162	268
22*	26	12-Jun	90	55.42	-168.16	55.39	-168.28	293	593
34	27	13-Jun	90	53.35	-168.98	53.31	-168.90	884	632
34	28	13-Jun	90	53.31	-168.86	53.29	-168.81	657	496
33*	29	14-Jun	90	53.59	-168.32	53.61	-168.21	123	821
33*	30	14-Jun	90	53.61	-168.20	53.62	-168.09	123	766
32*	31	15-Jun	90	53.77	-167.33	53.72	-167.38	139	560
32*	32	15-Jun	90	53.72	-167.39	53.69	-167.47	451	597
				Gulf of Alaska					
62	33	17-Jun	80	52.66	-169.00	52.62	-169.09	141	498
62	34	17-Jun	80	52.62	-169.10	52.56	-169.20	348	375
63	35	18-Jun	80	52.97	-168.14	52.92	-168.20	112	420
63	36	18-Jun	80	52.92	-168.21	52.85	-168.22	316	656

Table 3. -- Cont.

Station	Haul	Date	# Skates retrieved	Start latitude	Start longitude	End latitude	End longitude	Start depth (m)	End depth (m)
64*	37	19-Jun	80	53.19	-166.85	53.13	-166.87	223	316
64*	38	19-Jun	80	53.12	-166.88	53.06	-166.91	339	593
65	39	20-Jun	80	53.58	-165.68	53.52	-165.72	123	259
65	40	20-Jun	80	53.51	-165.73	53.45	-165.77	300	496
66	41	21-Jun	80	53.74	-164.47	53.69	-164.55	139	286
66	42	21-Jun	80	53.68	-164.57	53.63	-164.66	327	636
67	43	22-Jun	80	53.97	-163.26	53.91	-163.31	118	328
67	44	22-Jun	80	53.91	-163.33	53.87	-163.42	375	623
68	45	23-Jun	80	54.13	-161.64	54.09	-161.72	125	316
68	46	23-Jun	80	54.09	-161.74	54.06	-161.85	248	676
69	47	24-Jun	80	54.31	-161.07	54.26	-161.15	182	396
69	48	24-Jun	80	54.26	-161.17	54.20	-161.24	411	904
70	49	25-Jun	80	54.37	-160.23	54.31	-160.28	141	280
70	50	25-Jun	80	54.30	-160.27	54.23	-160.30	356	648
71*	51	26-Jun	80	54.50	-159.26	54.44	-159.30	156	285
71*	52	26-Jun	80	54.44	-159.34	54.38	-159.40	291	614
72	53	27-Jun	80	54.63	-158.58	54.57	-158.64	134	391
72	54	27-Jun	80	54.57	-158.66	54.50	-158.72	330	782
73	55	28-Jun	80	54.87	-157.74	54.79	-157.81	191	389
73	56	28-Jun	80	54.85	-157.74	54.79	-157.81	357	682
74	57	29-Jun	80	55.24	-156.67	55.18	-156.73	161	350
74	58	29-Jun	80	55.18	-156.74	55.12	-156.74	335	682
75	59	30-Jun	80	55.64	-155.85	55.58	-155.86	150	217
75	60	30-Jun	80	55.56	-155.86	55.50	-155.83	219	217
148	61	6-Jul	80	54.65	-132.83	54.60	-132.91	148	377
149	62	6-Jul	80	54.60	-133.03	54.59	-133.15	409	395
108	63	7-Jul	80	54.46	-133.92	54.49	-134.01	336	425
108	64	7-Jul	80	54.50	-134.01	54.55	-134.07	435	661
107	65	8-Jul	80	54.90	-134.29	54.96	-134.35	230	576
107	66	8-Jul	80	54.96	-134.36	55.01	-134.45	452	875
106	67	9-Jul	80	55.35	-134.73	55.39	-134.70	307	580
106	68	9-Jul	80	55.40	-134.83	55.39	-134.94	443	818
105	69	10-Jul	80	55.56	-134.98	55.58	-135.06	241	507
105	70	10-Jul	80	55.59	-135.07	55.63	-135.15	486	774
144	71	11-Jul	80	55.93	-134.91	56.00	-134.91	198	355
145	72	11-Jul	80	56.04	-134.93	56.09	-135.02	366	352
104	73	12-Jul	80	55.98	-135.44	56.02	-135.53	336	636
104	74	12-Jul	80	56.03	-135.53	56.07	-135.60	576	788
103	75	13-Jul	80	56.39	-135.35	56.38	-135.48	155	187

Table 3. -- Cont.

Station	Haul	Date	# Skates retrieved	Start latitude	Start longitude	End latitude	End longitude	Start depth (m)	End depth (m)
103	76	13-Jul	80	56.39	-135.49	56.37	-135.61	191	250
102	77	14-Jul	80	56.85	-136.00	56.89	-136.09	246	750
102	78	14-Jul	80	56.91	-136.10	56.97	-136.13	636	912
101	79	15-Jul	80	57.19	-136.24	57.22	-136.34	234	753
101	80	15-Jul	80	57.24	-136.34	57.29	-136.38	610	863
100	81	16-Jul	80	57.62	-136.54	57.62	-136.65	242	682
100	82	16-Jul	80	57.62	-136.68	57.66	-136.76	690	625
142	83	17-Jul	80	57.92	-137.01	57.92	-137.13	446	407
143	84	17-Jul	80	57.97	-137.08	57.97	-137.21	421	246
99	85	18-Jul	80	57.95	-137.38	57.88	-137.49	211	708
99	86	18-Jul	80	57.89	-137.51	57.89	-137.61	682	666
98	87	19-Jul	80	58.14	-138.74	58.15	-138.85	309	769
98	88	19-Jul	80	58.16	-138.86	58.18	-138.97	545	539
97	89	20-Jul	80	58.47	-139.47	58.46	-139.58	196	542
97	90	20-Jul	80	58.46	-139.61	58.42	-139.69	459	630
138	95	25-Jul	80	59.42	-140.94	59.43	-141.08	205	299
139	96	25-Jul	80	59.42	-141.17	59.36	-141.25	326	330
96	97	26-Jul	80	58.68	-140.64	58.68	-140.76	284	744
96	98	26-Jul	80	58.69	-140.78	58.72	-140.88	563	795
95	99	27-Jul	80	59.05	-141.35	59.05	-141.48	296	521
95	100	27-Jul	80	59.05	-141.51	59.05	-141.63	580	841
94	101	28-Jul	80	59.39	-142.18	59.42	-142.29	246	480
94	102	28-Jul	80	59.43	-142.31	59.47	-142.40	434	966
93	103	29-Jul	80	59.55	-142.57	59.59	-142.68	136	589
93	104	29-Jul	80	59.60	-142.70	59.57	-142.80	582	673
137	105	30-Jul	80	59.67	-143.39	59.71	-143.49	299	316
136	106	30-Jul	80	59.75	-143.57	59.76	-143.71	165	308
92	107	31-Jul	80	59.56	-143.66	59.56	-143.79	175	739
92	108	31-Jul	80	59.57	-143.82	59.58	-143.94	608	679
91	109	1-Aug	80	59.52	-144.72	59.48	-144.84	187	509
91	110	1-Aug	80	59.48	-144.86	59.45	-144.96	539	759
90	111	2-Aug	80	59.50	-145.54	59.51	-145.67	166	638
90	112	2-Aug	80	59.52	-145.69	59.52	-145.81	696	552
89	113	3-Aug	80	59.26	-146.87	59.22	-146.97	202	607
89	114	3-Aug	80	59.21	-147.00	59.17	-147.08	555	884
134	115	5-Aug	80	59.62	-146.97	59.56	-147.04	216	215
135	116	5-Aug	80	59.52	-147.15	59.45	-147.15	223	215
88	117	6-Aug	80	59.15	-147.60	59.09	-147.61	271	530
88	118	6-Aug	80	59.08	-147.62	59.00	-147.63	530	943

Table 3. -- Cont.

Station	Haul	Date	# Skates retrieved	Start latitude	Start longitude	End latitude	End longitude	Start depth (m)	End depth (m)
87	119	7-Aug	80	59.13	-148.65	59.05	-148.65	159	204
87	120	7-Aug	80	59.04	-148.65	58.97	-148.65	231	250
132	121	8-Aug	80	59.08	-149.41	59.04	-149.52	190	231
133	122	8-Aug	80	58.95	-149.51	58.93	-149.61	248	243
130	123	9-Aug	80	58.73	-149.19	58.77	-149.08	180	220
131	124	9-Aug	80	58.80	-149.05	58.84	-148.93	241	256
86	125	10-Aug	80	58.69	-148.33	58.62	-148.33	286	466
86	126	10-Aug	80	58.64	-148.29	58.58	-148.28	438	950
85	127	11-Aug	80	58.29	-148.62	58.22	-148.66	261	516
85	128	11-Aug	80	58.21	-148.67	58.15	-148.70	550	839
84	129	12-Aug	80	57.97	-149.17	57.91	-149.25	182	502
84	130	12-Aug	80	57.91	-149.30	57.85	-149.35	514	873
128	131	13-Aug	80	58.00	-149.84	57.99	-149.97	227	269
129	132	13-Aug	80	58.08	-149.90	58.07	-150.03	299	306
83	133	14-Aug	80	57.63	-149.92	57.56	-149.95	416	566
83	134	14-Aug	80	57.55	-149.96	57.49	-149.99	584	891
82	135	15-Aug	80	57.40	-150.57	57.33	-150.59	227	505
82	136	15-Aug	80	57.32	-150.61	57.26	-150.60	516	711
535	137	18-Aug	80	57.36	-150.67	57.29	-150.67	225	501
535	138	18-Aug	80	57.28	-150.68	57.20	-150.67	511	780
523	139	19-Aug	80	57.22	-151.04	57.15	-151.04	195	568
523	140	19-Aug	80	57.14	-151.05	57.07	-151.05	559	596
81	141	20-Aug	80	57.12	-151.05	57.12	-151.22	266	525
81	142	20-Aug	80	57.05	-151.29	56.98	-151.28	575	840
80	143	21-Aug	80	56.48	-152.22	56.42	-152.28	148	588
80	144	21-Aug	80	56.42	-152.31	56.35	-152.36	401	601
79	145	22-Aug	80	56.30	-153.09	56.26	-153.18	257	708
79	146	22-Aug	80	56.27	-153.20	56.22	-153.28	478	829
78	147	23-Aug	80	55.99	-154.03	55.93	-154.02	246	464
78	148	23-Aug	80	55.92	-154.03	55.86	-154.02	507	864
77	149	24-Aug	80	56.04	-154.58	55.98	-154.57	237	505
77	150	24-Aug	80	55.97	-154.59	55.90	-154.57	573	889
76	151	25-Aug	80	55.76	-155.14	55.71	-155.16	170	299
76	152	25-Aug	80	55.69	-155.18	55.64	-155.20	339	636
122	153	26-Aug	80	56.18	-155.97	56.18	-156.08	199	241
123	154	26-Aug	80	56.23	-156.13	56.25	-156.25	251	270
120	155	27-Aug	80	55.79	-156.08	55.76	-156.19	209	241
121	156	27-Aug	80	55.75	-156.20	55.73	-156.32	245	255

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

Table 4. -- Total estimated catch in numbers of major species (>100 individuals) caught in the 2017 NMFS longline survey by management area.

Species/Complex	Bering Sea	Western GOA	Central GOA	West Yakutat	East Yakutat Southeast	Total
Sablefish	7,081	11,443	34,992	13,521	17,380	84,417
Giant grenadier	22,036	18,244	20,073	3,310	4,031	67,694
Shortspine thornyhead	2,649	2,591	7,019	3,975	4,659	20,893
Pacific cod	7,475	3,013	1,573	126	458	12,645
Pacific halibut	1,710	809	4,363	1,464	1,080	9,426
Rougheye/blackspotted rockfish	332	1,901	1,261	639	2,430	6,562
Shortraker rockfish	1,356	938	912	706	1,078	4,991
Arrowtooth flounder	2,371	407	1,399	224	315	4,716
Spiny dogfish	0	5	1,149	359	1,598	3,111
Longnose skate	1	290	732	274	502	1,799
Aleutian skate	1,163	101	353	31	32	1,680
Aleutian/Bering/Alaska skate complex	560	68	635	56	83	1,402
Redbanded rockfish	0	28	220	199	936	1,383
Walleye pollock	1,145	9	80	8	5	1,247
Sea anemone, unidentified	73	35	458	125	454	1,145
Pacific grenadier	15	2	759	293	48	1,117
Greenland turbot	1,012	0	0	0	0	1,012
Whiteblotched skate	944	2	0	0	0	946
Lips or jaws - depredation	713	73	33	17	51	887
Commander skate	860	4	1	0	9	874
Dover sole	0	7	389	66	131	593
Sea pen or sea whip	35	8	452	35	15	545
Brittle star	63	64	196	15	55	393
Yelloweye rockfish	0	26	22	46	218	312
Starfish, unidentified	35	7	96	23	121	282
Coral/bryozoan, unidentified	152	29	33	8	21	243
Spotted ratfish	0	0	0	0	213	213
Yellow Irish lord	205	8	0	0	0	213
Skates unidentified	134	13	5	0	21	173
Flathead sole	120	6	41	2	0	169
Longspine thornyhead	0	0	55	7	94	156
Snail, unidentified	51	34	51	2	2	140
Unidentified	25	16	66	9	13	129
Gorgonian coral, unidentified	20	57	10	4	36	127
Sponge, unidentified	22	56	30	7	12	127
Crinoid, unidentified	3	0	114	2	7	126
Basket star, unidentified	30	2	54	12	6	104

Table 5. -- Catch in number by station for major species in the 2017 NMFS longline survey. SF = sablefish, PC = Pacific cod, GR = giant grenadier, PH = Pacific halibut, ATF = arrowtooth flounder, GT = Greenland turbot, RF = rougheye, blackspotted, and shortraker rockfish, ST = shortspine thornyhead, SK = skate, OS = Other Species.

Station	SF	PC	GR	PH	ATF	GT	RF	ST	SK	OS
				Bering Sea						
1*	171	732	1,727	25	23	19	14	117	249	465
2*	102	271	2,238	25	110	81	2	25	106	548
4*	229	298	1,308	7	33	32	19	71	187	309
6	143	695	1,880	327	128	34	113	35	231	248
8*	101	288	2,130	105	59	38	40	99	141	68
10*	183	153	2,609	46	213	18	188	311	230	271
12	256	198	2,377	163	259	131	32	125	175	186
13*	37	545	2,354	18	68	1	336	228	96	295
15*	16	651	1,617	14	29	0	241	271	32	225
17	129	277	1,059	27	185	76	71	172	34	102
18*	210	309	1,367	12	66	8	36	112	190	325
20	1,410	330	903	93	584	158	24	216	158	82
22*	617	969	83	30	228	73	37	42	172	152
32*	536	758	108	112	137	7	389	437	114	315
33*	927	1,001	239	581	86	19	146	288	121	474
34	2,014	0	37	125	163	317	0	100	283	93
				Gulf of Alaska						
62	853	397	2,706	40	31	0	719	139	28	58
63	1,281	218	2,049	69	65	0	316	282	18	35
64*	485	46	1,554	20	5	0	245	239	12	96
65	1,121	661	2,339	86	7	0	17	123	54	80
66	1,590	112	2,052	34	28	0	110	185	37	41
67	1,594	251	967	126	76	0	612	359	65	86
68	1,093	354	714	170	114	0	613	781	46	105
69	1,704	138	2,170	32	34	0	96	192	25	18
70	1,105	545	2,064	116	32	0	10	140	52	80
71*	617	291	1,629	116	15	0	103	151	46	81
72	1,706	84	1,700	88	47	0	102	213	16	31
73	1,156	31	1,229	28	25	0	242	137	36	25
74	1,625	10	1,049	69	53	0	27	374	16	138
75	404	245	0	513	27	0	10	8	79	118
76	996	154	745	68	39	0	50	208	38	431
77	1,452	34	2,384	8	23	0	46	342	9	154
78	1,368	14	1,530	160	28	0	147	359	7	369
79	2,034	0	1,160	7	34	0	95	354	0	52
80	1,503	29	529	87	71	0	200	350	7	99
81	1,890	0	1,106	34	84	0	45	204	4	210
82	1,825	5	908	278	73	0	106	257	5	45

Table 5. --Cont.

Station	SF	PC	GR	PH	ATF	GT	RF	ST	SK	OS
83	1,389	0	2,509	2	18	0	7	246	5	163
84	1,541	65	619	165	109	0	29	631	18	224
85	1,514	34	1,011	71	48	0	85	463	12	214
86	1,179	32	686	234	48	0	305	559	31	139
87	833	40	0	249	32	0	3	204	199	345
88	1,104	15	490	86	42	0	448	522	29	335
89	1,340	64	526	152	28	0	97	356	8	228
90	1,250	15	555	279	15	0	140	290	23	148
91	1,801	9	347	148	25	0	38	381	30	103
92	1,613	0	498	135	6	0	47	195	15	26
93	1,642	0	254	109	8	0	30	936	16	65
94	1,347	4	232	144	48	0	185	554	41	154
95	1,500	0	419	132	13	0	482	559	19	123
96	1,058	0	479	28	11	0	193	263	16	118
97	1,670	1	268	24	19	0	116	249	24	88
98	1,223	0	585	7	5	0	355	121	2	27
99	1,333	1	329	26	6	0	69	266	8	644
100	1,749	7	508	12	15	0	41	374	9	91
101	1,313	1	472	12	18	0	239	424	5	114
102	1,240	1	503	8	26	0	166	296	17	99
103	309	216	0	565	28	0	0	19	117	1,183
104	603	0	353	7	0	0	220	437	19	194
105	298	4	232	32	0	0	150	388	18	194
106	1,045	4	304	7	2	0	377	418	16	156
107	973	2	123	14	3	0	606	268	14	149
108	1,026	3	115	15	2	0	990	251	17	232
120	625	221	0	291	85	0	5	10	66	99
121	823	10	0	317	88	0	1	29	72	103
122	857	360	0	297	68	0	2	0	88	54
123	933	28	0	96	44	0	0	0	130	169
128	844	103	0	343	47	0	3	78	13	44
129	1,179	1	0	179	54	0	5	57	51	22
130	323	2	0	33	8	0	3	183	35	36
131	742	24	0	51	30	0	20	298	49	101
132	427	23	0	55	8	0	3	116	150	117
133	291	0	0	19	19	0	14	226	76	99
134	394	0	0	19	3	0	9	42	57	302
135	182	1	0	128	1	0	0	21	77	480
136	527	22	0	126	14	0	68	114	44	218
137	608	1	0	88	6	0	30	67	30	15

Table 5. --Cont.

Station	SF	PC	GR	PH	ATF	GT	RF	ST	SK	OS
138	203	11	0	93	18	0	17	170	30	102
139	632	0	0	30	32	0	19	90	62	49
142	754	0	171	11	12	0	4	233	16	61
143	1,149	0	67	18	111	0	24	152	35	131
144	234	67	0	145	21	0	81	318	81	190
145	872	0	1	33	21	0	50	277	62	192
148	477	149	0	118	26	0	13	108	118	490
149	1,112	2	0	26	0	0	11	60	52	100
523	2,110	2	1,074	174	66	0	37	256	2	74
535	1,743	6	1,344	214	77	0	124	272	9	43

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

Table 6. -- Total estimated catch in weight (kg) of major species (>100 kg) caught in the 2017 NMFS longline survey by management area. Weight (kg) derived from length-weight relationship when lengths available. For all others an average weight proxy from longline fisheries was applied to numbers caught.

Species/Complex	Bering Sea	Western GOA	Central GOA	West Yakutat	East Yakutat Southeast	Total
Giant grenadier	93,985	51,091	61,589	10,623	12,790	230,079
Sablefish	12,080	21,706	87,162	42,111	53,372	216,431
Pacific halibut	10,091	4,774	25,746	8,639	6,373	55,623
Pacific cod	24,934	9,251	4,700	380	1,268	40,533
Shortspine thornyhead	2,933	1,684	4,165	2,227	3,084	14,093
Longnose skate	7	2,162	5,457	2,043	3,742	13,412
Rougheye/blackspotted	462	2,581	1,703	818	4,273	9,837
Arrowtooth flounder	4,677	838	2,980	516	606	9,617
Aleutian skate	6,343	551	1,925	169	175	9,163
Shortraker rockfish	2,224	1,286	1,411	1,306	1,765	7,992
Spiny dogfish	0	17	2,269	825	4,287	7,399
Whiteblotched skate	5,085	11	0	0	0	5,095
Commander skate	2,741	13	3	0	29	2,786
Greenland turbot	2,494	0	0	0	0	2,494
Redbanded rockfish	0	50	391	353	1,662	2,455
Walleye pollock	1,627	13	114	11	7	1,772
Pacific grenadier	19	3	616	251	40	929
Pacific sleeper shark	116	347	231	0	231	925
Yelloweye rockfish	0	75	63	133	629	900
Dover sole	0	10	579	98	195	882
Skate, unidentified	680	66	25	0	107	878
Spotted ratfish	0	0	0	0	775	775
Sea anemone unidentified	20	10	127	35	126	317
Lingcod	0	0	33	107	123	263
Yellow Irish lord	172	7	0	0	0	179
Big skate	0	40	40	30	40	150
Octopus	82	6	25	6	6	126
Flathead sole	86	4	29	1	0	121
Pacific ocean perch	65	2	34	6	6	113
Silvergray rockfish	0	0	2	9	95	105
Sea pen or sea whip	7	2	86	7	3	103

Table 7. -- Mean length, round weight, mean dressed weight, number, and estimated total round weight of sablefish by station for the 2017 NMFS longline survey.

Station	Mean length	Mean round weight (kg)[a]	Mean dressed weight (lbs)[b]	Number of sablefish	Est. total round weight (kg)[c]
			Bering Sea		
1*	54.06	1.6	2.22	171	274
2*	55.23	1.8	2.51	102	184
4*	53.78	1.59	2.21	229	365
6	60.46	2.43	3.38	143	348
8*	58.84	2.28	3.17	101	230
10*	55.69	1.8	2.5	183	329
12	54.33	1.66	2.3	256	425
13*	58.37	2.11	2.93	37	78
15*	61.64	2.69	3.74	16	43
17	59.86	2.3	3.2	129	297
18*	22.61	0.63	0.88	210	133
20	53.69	1.57	2.18	1410	2210
22*	52	1.38	1.92	617	854
32*	NA	NA	NA	536	1696
33*	57.13	1.98	2.75	927	1833
34	43.46	1.38	1.92	2014	2781
			Gulf of Alaska		
62	55.98	1.91	2.65	853	1628
63	59.24	2.28	3.17	1281	2925
64*	49.4	1.18	1.64	485	573
65	55.86	1.81	2.52	1121	2033
66	54.93	1.72	2.39	1590	2731
67	56.59	1.97	2.73	1594	3138
68	59.39	2.34	3.25	1093	2561
69	55.2	1.77	2.45	1704	3011
70	57.3	2	2.78	1105	2208
71*	52.56	1.46	2.02	617	899
72	59.04	2.22	3.08	1706	3785
73	58.49	2.17	3.02	1156	2514
74	60.2	2.34	3.25	1625	3805
75	51.34	1.38	1.91	404	557
76	57.34	2.03	2.82	996	2020
77	61.24	2.51	3.49	1452	3651
78	62.68	2.71	3.76	1368	3705
79	65.29	3.08	4.28	2034	6273

Table 7. -- Cont.

Station	Mean length	Mean round weight (kg)[a]	Mean dressed weight (lbs)[b]	Number of sablefish	Est. total round weight (kg)[c]
80	64.56	2.97	4.12	1503	4463
81	62.21	2.66	3.7	1890	5036
82	61.63	2.59	3.59	1825	4724
83	65	3.04	4.22	1389	4221
84	62.7	2.81	3.9	1541	4326
85	65.28	3.11	4.31	1514	4702
86	63.23	2.77	3.85	1179	3267
87	57.59	2.06	2.86	833	1714
88	62.86	2.78	3.86	1104	3072
89	65.1	3.17	4.4	1340	4249
90	65.93	3.25	4.52	1250	4064
91	64.08	2.95	4.1	1801	5312
92	64.01	3.18	4.41	1613	5122
93	64.88	3.05	4.23	1642	5000
94	61.87	3	4.17	1347	4044
95	71.1	4.17	5.8	1500	6261
96	69.06	3.83	5.31	1058	4048
97	67.4	3.47	4.82	1670	5797
98	69.87	4.04	5.62	1223	4945
99	69.7	4.03	5.59	1333	5367
100	69.96	3.95	5.48	1749	6906
101	65.29	3.15	4.38	1313	4140
102	67.19	3.45	4.8	1240	4283
103	58.28	2.38	3.31	309	736
104	57.27	1.97	2.74	603	1188
105	59.52	2.28	3.17	298	681
106	62.79	2.74	3.81	1045	2868
107	63.21	2.81	3.91	973	2736
108	64.58	3.04	4.22	1026	3114
120	54.98	1.7	2.36	625	1063
121	57.25	1.96	2.72	823	1611
122	55.14	1.71	2.38	857	1466
123	54.85	1.67	2.33	933	1562
128	58.68	2.11	2.93	844	1778
129	61.21	2.39	3.32	1179	2820

Table 7. -- Cont.

Station	Mean length	Mean round weight (kg)[a]	Mean dressed weight (lbs)[b]	Number of sablefish	Est. total round weight (kg)[c]
130	58.12	2.12	2.95	323	686
131	63.46	2.75	3.82	742	2041
132	58.4	2.11	2.93	427	902
133	60.86	2.39	3.32	291	696
134	50.23	1.3	1.81	394	513
135	52.73	1.53	2.12	182	278
136	57.95	2.24	3.11	527	1182
137	60.21	2.59	3.59	608	1572
138	48.58	1.23	1.71	203	250
139	52.95	1.59	2.21	632	1007
142	57.45	2	2.78	754	1509
143	57.44	2.01	2.79	1149	2304
144	65.65	3.4	4.73	234	797
145	64.4	3.11	4.32	872	2711
148	49.06	1.94	2.69	477	925
149	58.8	2.13	2.95	1112	2364
523	61.35	2.5	3.47	2110	5277
535	62.36	2.66	3.69	1743	4635

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

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

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

[c] 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 that were tagged and released.

Table 8. -- Stations and skates depredated by killer whales during the 2017 NMFS longline survey. Number of skates affected refers to skates determined to be depredated and were removed from abundance calculations.

Station	Region	Number of skates affected	Number of skates fished
1	Bering Sea	90	180
2	Bering Sea	90	180
4	Bering Sea	169	180
8	Bering Sea	90	180
10	Bering Sea	41	180
13	Bering Sea	180	180
15	Bering Sea	180	180
18	Bering Sea	161	180
22	Bering Sea	68	180
32	Bering Sea	149	180
33	Bering Sea	69	180
64	Western Gulf of Alaska	160	160
71	Western Gulf of Alaska	121	160

Table 9. -- Stations that had sperm whales present during hauling operations in the 2017 NMFS longline survey. Depredation is defined as sperm whales being present with the occurrence of damaged fish on the line.

Station	Region	Depredation
71	Western Gulf of Alaska	Yes
80	Central Gulf of Alaska	Yes
83	Central Gulf of Alaska	Yes
86	Central Gulf of Alaska	Yes
88	Central Gulf of Alaska	Yes
93	West Yakutat	Yes
95	West Yakutat	Yes
96	West Yakutat	Yes
98	East Yakutat/Southeast	Yes
99	East Yakutat/Southeast	Yes
100	East Yakutat/Southeast	Yes
101	East Yakutat/Southeast	Yes
102	East Yakutat/Southeast	Yes
104	East Yakutat/Southeast	Yes
105	East Yakutat/Southeast	Yes
106	East Yakutat/Southeast	Yes
107	East Yakutat/Southeast	Yes
108	East Yakutat/Southeast	No

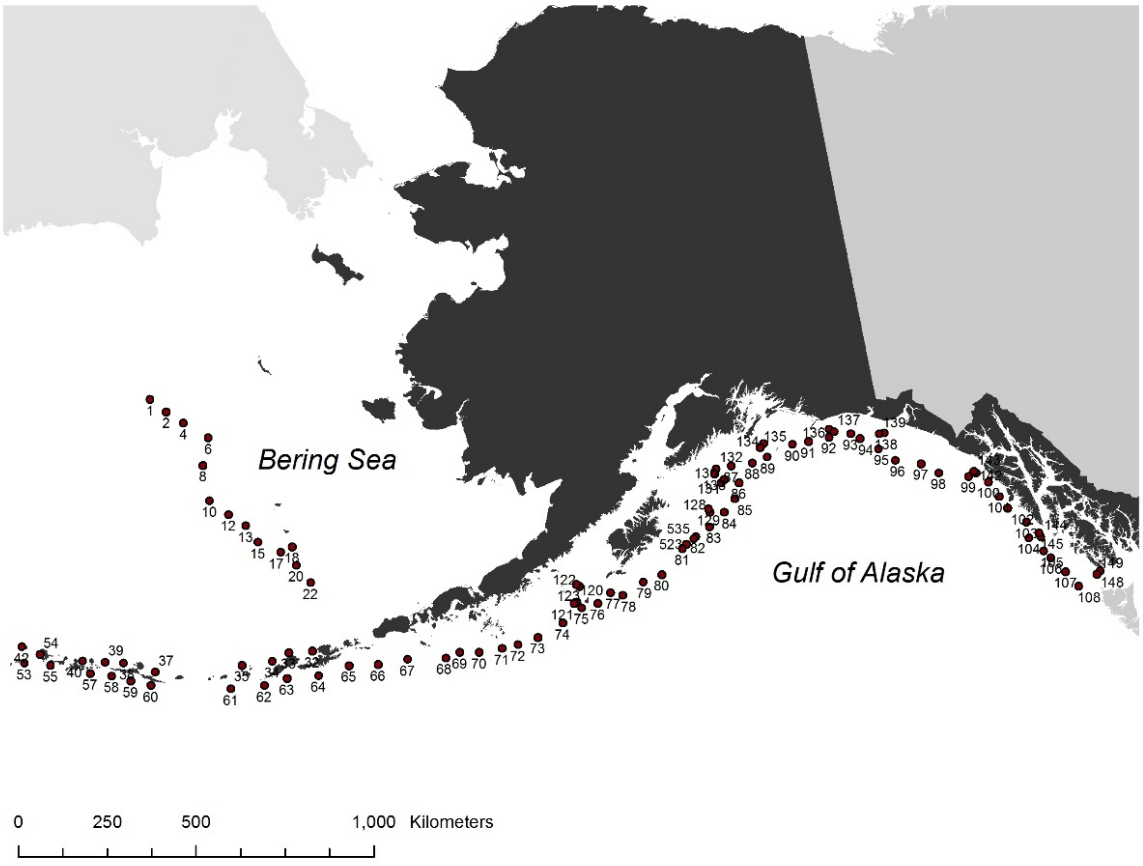

Figure 1. -- Map of NMFS longline survey station locations. Bering Sea stations are sampled in odd years; Aleutian Islands Region stations are sampled in even years; Gulf of Alaska stations are sampled every year.

APPENDIX: Random Versus Standard Survey Station Comparison

A 2-day experiment was conducted near Yakutat from 21 to 22 July to compare the catch rates of randomly selected stations to the catch rates of standard survey stations. The longline survey is predicated on a systematic survey design which samples the same locations every year to detect changes in catch rates and fish abundance from year-to-year. Previous unpublished work tested various regions and determined no significant difference in sablefish catch rates between randomly selected stations and the systematically sampled survey stations. This experiment sampled two randomly selected stations chosen near existing survey stations in the West Yakutat management region. Random stations had similar depth and habitat characteristics throughout the station track of the closest standard survey stations.

During the 2-day experiment, two sets were made each day for a total of four sets (Table A1). Each set consisted of 80 skates. All gear characteristics were identical to what is fished during standard survey sets for standardization among random and standard stations. On all sets combined, 2,611 sablefish, 1,183 giant grenadier, and 1,051 shortspine thornyheads were caught in 2017.

In addition to the random station experiment, the Fisheries Monitoring and Analysis (FMA) Division of the Alaska Fisheries Science Center (AFSC) conducted an Electronic Monitoring (EM) experiment. For this experiment, spectral imaging stereo cameras recorded images of rougheye, blackspotted, and shortraker rockfish. Tissue samples were collected for each specimen imaged as a means for verifying species identifications genetically. This project was designed to evaluate the efficacy of using

spectral imaging and machine learning to positively identify species that are difficult to distinguish.

Appendix Table 1. -- Set information by station and haul for the 2017 NMFS longline survey 2-day experiment. Positions in decimal degree (DD) format.

Set	Date	Start latitude	Start longitude	End latitude	End longitude	Start depth (m)	End depth (m)
1	22-Jul	58.78	-140.90	58.80	-140.99	286	691
2	22-Jul	58.82	-140.99	58.87	-141.07	624	718
3	23-Jul	58.94	-141.08	58.93	-141.09	342	720
4	23-Jul	58.95	-141.99	58.99	-141.13	639	582