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2007 NSEI (Chatham) Sablefish Longline Survey Field Report

by

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and

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Alaska Department of Fish and Game **Division of Commercial Fisheries**

Symbols and Abbreviations

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Weights and measures (metric)

centimeter	cm
deciliter	dL
gram	g
hectare	ha
kilogram	kg
kilometer	km
liter	L
meter	m
milliliter	mL
millimeter	mm

Weights and measures (English)

cubic feet per second	ft^3/s
foot	ft
gallon	gal
inch	in
mile	mi
nautical mile	nmi
ounce	oz
pound	lb
quart	qt
yard	yd

Time and temperature

day	d
degrees Celsius	°C
degrees Fahrenheit	°F
degrees kelvin	K
hour	h
minute	min
second	s

Physics and chemistry

all atomic symbols	
alternating current	AC
ampere	A
calorie	cal
direct current	DC
hertz	Hz
horsepower	hp
hydrogen ion activity (negative log of)	pH
parts per million	ppm
parts per thousand	ppt, ‰
volts	V
watts	W

General

Alaska Administrative Code	AAC
all commonly accepted abbreviations	e.g., Mr., Mrs., AM, PM, etc.
all commonly accepted professional titles	e.g., Dr., Ph.D., R.N., etc.
at	@
compass directions:	
east	E
north	N
south	S
west	W
copyright	©
corporate suffixes:	
Company	Co.
Corporation	Corp.
Incorporated	Inc.
Limited	Ltd.
District of Columbia	D.C.
et alii (and others)	et al.
et cetera (and so forth)	etc.
exempli gratia (for example)	e.g.
Federal Information Code	FIC
id est (that is)	i.e.
latitude or longitude	lat. or long.
monetary symbols (U.S.)	$, ¢
months (tables and figures): first three letters	Jan,...,Dec
registered trademark	®
trademark	™
United States (adjective)	U.S.
United States of America (noun)	USA
U.S.C.	United States Code
U.S. state	use two-letter abbreviations (e.g., AK, WA)

Measures (fisheries)

fork length	FL
mideye-to-fork	MEF
mideye-to-tail-fork	METF
standard length	SL
total length	TL

Mathematics, statistics

all standard mathematical signs, symbols and abbreviations	
alternate hypothesis	H_A
base of natural logarithm	*e*
catch per unit effort	CPUE
coefficient of variation	CV
common test statistics	(F, t, χ^2, etc.)
confidence interval	CI
correlation coefficient (multiple)	R
correlation coefficient (simple)	r
covariance	cov
degree (angular)	°
degrees of freedom	df
expected value	*E*
greater than	>
greater than or equal to	≥
harvest per unit effort	HPUE
less than	<
less than or equal to	≤
logarithm (natural)	ln
logarithm (base 10)	log
logarithm (specify base)	$\log_2$, etc.
minute (angular)	'
not significant	NS
null hypothesis	H_O
percent	%
probability	P
probability of a type I error (rejection of the null hypothesis when true)	α
probability of a type II error (acceptance of the null hypothesis when false)	β
second (angular)	"
standard deviation	SD
standard error	SE
variance	
population	Var
sample	var

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ABSTRACT

This report presents methods and data from the 2007 sablefish longline survey conducted in the Northern Southeast Inside (NSEI) Subdistrict of Southeast Alaska. Catch rates, bycatch data and biological data including sablefish lengths, sex ratios, and ages are presented. Some data from the 2003–2006 annual surveys are also presented. The overall catch per unit of effort (CPUE) for the survey was 0.33 fish per hook and 2.4 round pounds per hook.

Keywords: Sablefish, longline survey, NSEI, Chatham Strait, CPUE, *Anoplopoma fimbria*, management, assessment

INTRODUCTION

The Alaska Department of Fish and Game (ADF&G) conducts annual longline surveys in the Northern Southeast Inside Subdistrict of Southeast Alaska to assess the condition of sablefish (*Anoplopoma fimbria*) in this area (Figure 1). In 2007, the annual NSEI sablefish survey was conducted from August 4 through August 10 and was the 20th assessment survey for NSEI. The same 44 stations have been set annually since 1997 (Figure 2).

OBJECTIVES

The primary objectives of the 2007 survey were to:

1. Calculate the catch per unit of effort (CPUE) for sablefish at the 44 stations surveyed annually in the Chatham Strait portion of the NSEI Subdistrict
2. Enumerate, to the lowest possible taxonomic group, all fish captured
3. Collect a random sample of biological data (n=550) including otoliths (aging structures), length, weight, sex, and stage of gonad maturity from a subsample of sablefish and an additional random sample (n=550) of sablefish length measurements.
4. Collect gonad samples from a subsample of female sablefish at various stages of maturity for histological analysis
5. Collect biological data including length, weight, and sex, from all *Sebastes* rockfishes caught
6. Collect lengths from a subsample of shortspine thornyheads (*Sebastolobus alascanus*)

Other survey tasks were to:

1. Recover tagged sablefish and record recovery information and length of tagged fish
2. Enumerate seabirds after gear retrieval at each station for North Pacific Fisheries Management Council research

METHODS

SURVEY AREA

The survey area extended from 57° 56.44’ N latitude and 134° 48.14’ W longitude to 56° 05.30’ N latitude and 134° 30.50’ W longitude and included the four statistical areas in Chatham Strait where the major proportion of the commercial fishery occurs: 345731, 345701, 345631, and 345603 (Figure 2). There are 44 stations within the survey area.

The station locations within the survey area were originally randomly selected from areas of potential sablefish habitat greater than 200 fm deep, then fished during subsequent surveys.

There have been some station eliminations and modifications over time, with a major standardization of stations occurring in 1997. The 44 stations fished within the survey area in 2007 have all been fished during annual surveys since 1997 with only slight modifications to their position. Since the last publication of a NSEI longline survey report, which covered the 2002 survey, (Richardson 2003), the south end of station 23, near Wilson Cove, was moved slightly to the west and the south end of station 25, at Woody Point, was moved slightly to the west to avoid bottom conditions that had previously caused major gear problems.

SET INFORMATION

Sets were made in the same direction as the tidal current. Haulback direction was dependent on the tide, wind direction, and currents. Sets were allowed to soak for a minimum of three and a maximum of 11 hours, which is consistent with National Marine Fisheries Service (NMFS) survey protocol. If it was necessary to set differently from the standard set coordinates due to circumstances such as tidal currents or weather, the set was to pass through the start latitude and longitude and be made as close to the original location points as possible.

Set information collected at each station included the date and time of set and haul, start and end coordinates, the depth of each anchor and skate as they went overboard, haulback order, wind direction and estimated speed, and bottom substrate. Substrate was evaluated based on the skipper's interpretation of sounder information and any substrate that came up on fishing gear. Comments on any problems with the gear or other factors impacting CPUE were noted along with observations regarding the presence of sharks, whales, or any other information of biological interest.

VESSELS

ADF&G awards annual 14-day charter agreements to three commercial longline vessels to fish 14 or 15 stations each during the same time period, splitting the survey area into three distinct areas and allowing all stations to be fished within a single seven day period. The contract length is longer than the anticipated survey length to allow for delays associated with weather, gear, or other problems.

The 2007 Request for Bids specified a maximum bid of $30,000 for each portion of the survey and that a vessel could not fish more than one portion. Annual contracts were awarded to the three vessels with the lowest bids. Department staff assigned each vessel to a portion of the survey.

The *F/V Seaview* was awarded an annual contract ($28,500) and conducted the longline survey in the northern portion (Trip #3), fishing 15 stations (Figure 2). The *F/V Charles T* was awarded an annual contract ($27,495) and conducted the longline survey in the central portion (Trip #2), fishing 15 stations. The *F/V Masonic* was awarded an annual contract ($28,000) and conducted the longline survey in the southern portion (Trip #1), fishing 14 stations.

Each vessel was required to provide at least three experienced crew members in addition to the skipper (Appendix B). The crew operated the vessel and baited, set, retrieved, and repaired all longline gear. Two ADF&G scientific personnel were assigned to each vessel to collect the set, hook accounting, and biological data.

GEAR

In 2000, ADF&G contracted Lummi Fishery Supplies in Seattle to build skates of conventional longline gear. These skates were built to replicate the gear used in NMFS longline surveys in order to make the ADF&G sablefish catch and effort data from internal state waters comparable with NMFS data from the outside waters of the Gulf of Alaska. To eliminate bias introduced by new gear, all gear was fished prior to its use as survey gear.

A string of gear consisted of a flag pole, an array of buoys, buoy line of length dependent upon the set depth, a 60 pound (27 kg) longline anchor, 150 fm (274 m) of running line, 25 skates of 45 #13/0 Mustad circle hooks, a second 150 fm of running line, a second 60 pound longline anchor, a second buoy line, a second array of buoys and a second flagpole. Beginning in 2000, a 7 pound (3 kg) lead ball was snapped to the end of each skate. Hooks were front threaded to gangions secured to beckets tied into the groundline at 6.5 foot (2 m) intervals. The hook was 15 inches (38 cm) from the groundline, which was the length of the gangion and the becket when tied together and attached to groundline. Sixteen feet (5 m) of groundline were left bare at each skate end. Gangions were medium lay #60 nylon round braided twine, beckets were medium lay #72 nylon becket twine, and the groundline was medium lay 3/8 inch (1 cm) nylon American Line SSR 100. The vessel crew attached new hooks on all skates prior to each survey.

All ADF&G survey vessels used Pacific States Marine Fishery Commission issued seabird avoidance devices (BADs).

BAIT

Argentine illex (*Illex argentinus*), 100–200 gm squid was used as bait and the rate of use averaged 11.2 pounds (5.1 kg) per 100 hooks. Only the squid body was used as bait; the head and tentacles were discarded. Bait pieces were 1.5–2 inches (3.8–5.0 cm) long. Bait was thawed within 24 hours of use. This bait protocol replicates NMFS bait protocol and is consistent with previous ADF&G surveys from 2000 through the present.

International Marine Industries, Inc., in Newport, Rhode Island won the bait bid to provide 7,740 pounds of Argentine illex for the NSEI survey. The winning bid was $.83 a pound ($1.83/kg), including shipping costs, for bait sent to Petersburg and $.91 ($2.00/kg) for bait sent to Juneau.

SCHEDULE

The survey began on August 4 and concluded on August 10. The survey was scheduled to correspond with the timing of previous surveys, occurring during the favorable tide series (Appendix C) just prior to the start of the commercial fishing season. Each vessel delivered their catch from the first portion of the survey to the Trident Seafoods tender, the F/V Kesia Dawn on August 7. The F/V Masonic offloaded early in the morning at Little Port Walter, the F/V Charles T offloaded at mid day in Warm Springs Bay, and the F/V Seaview offloaded in the evening in Basket Bay. The F/V Seaview offloaded their catch from the second half of the survey to the F/V Kesia Dawn at the end of the day on August 9 at Point Thatcher. The F/V Masonic and F/V Charles T delivered their final catch to the Trident Seafoods plant in Petersburg on August 10.

HOOK ACCOUNTING, CATCH, AND CPUE

ADF&G staff classified each hook as it broke the surface of the water. A hook without a fish on it was recorded as “bare,” “bait,” or “invalid” (bent, broken, missing, snarled). A whole skate was considered invalid if greater than 25% of the hooks were missing, in a snarl, or stripped.

Sablefish that broke the surface on a hook but were not landed were recorded as "lost." Sablefish less than approximately 45 cm (18 inches) long were recorded as "small" and immediately returned to the water with the exception of biological samples. Sablefish that were not marketable were discarded with the discard reason reported if known. All other fish that broke the surface attached to a hook were identified to the lowest possible taxonomic group. All species other than sablefish and rockfish were immediately released.

The CPUE in terms of sablefish per hook for an individual station was calculated using only valid skates. The number of sablefish, including lost and released sablefish but not those caught on invalid skates, was divided by the number of hooks on valid skates retrieved at that station.

The CPUE in terms of round pounds per hook for an individual station was calculated by multiplying the fish per hook CPUE for the station by the average weight of the fish sampled at that station. The overall fish per hook CPUE for the survey was calculated by dividing the total number of sablefish on valid skates by the total number of hooks retrieved. The overall round pounds per hook CPUE was calculated by multiplying the overall fish per hook CPUE for the survey by the average weight of sablefish sampled at all stations.

BIOLOGICAL SAMPLING

Every 10^{th} sablefish from the first 13 skates of each set was sampled. Length and weight were measured, sex and maturity were assessed, and otoliths were removed from each biological sample. Additional lengths were collected from every 11^{th} sablefish from the first 13 skates of each set.

Lengths were measured to the nearest cm from the tip of the snout to the fork of the tail using a measuring board with an attached measuring tape. Weights were taken to the nearest 0.1 kg using a Salter Heavy-Duty Hanging (#235-10S) metric (44 lb/20 kg) scale. If seas were too rough to obtain repeatable weights during a haul, fish were not weighed. Sablefish sex and maturity were assessed from visual observation of the gonads. Fish were classified into six maturity categories: immature, maturing juvenile, mature/developing, spawning, spent/post spawning, and resting (Appendix D). After sampling, fish were cleaned and dressed to industry standards by ADF&G staff.

Otoliths were cleaned on board the vessels using warm water with highly diluted detergent, hand-dried, and stored dry in plastic multi-cell trays. They were aged at the ADF&G Division of Commercial Fisheries Mark, Tag, and Age Laboratory in Juneau using the break-and-burn technique.

A subsample of ovaries was preserved for later histological analysis, the purpose of which was to evaluate whether examination of gross ovary morphology could successfully predict whether a fish would spawn in the upcoming year. During the survey, cross sections of ovaries at various stages of maturity were collected and preserved in a 10% formalin solution.

Sebastes rockfish lengths and weights were taken using the same methods and equipment used for sablefish. Sex was determined by examination of the urogenital papillae. All *Sebastes* rockfish were retained on the vessel. The length of every shortspine thornyhead (*Sebastolobus alascanus*) caught on the first 13 skates of each set was measured. The same measurement methods were used as those for sablefish. Shortspine thornyheads were released immediately after measurement.

TAGGED SABLEFISH

All ADF&G tagged sablefish encountered during the survey were retained. Tags were collected and the associated recovery information was recorded for each fish. Fish tagged by agencies other than ADF&G were handled according to the protocols specified by the release agency.

SAMPLING FOR OTHER AGENCIES

Seabird Occurrence Survey

Seabird occurrence data were collected to aid the North Pacific Fisheries Management Council (NPFMC) in revisions to seabird avoidance measures in groundfish and halibut hook-and-line fisheries of Alaska. ADF&G staff enumerated seabirds to the lowest possible taxonomic level in two zones: the area within 50 m of the vessel stern and the visible area greater than 50 m away. Staff also recorded supplemental information including wind direction, Beaufort sea state, bird avoidance device (BAD) performance, and maximum visibility.

BID TO PURCHASE ADF&G FISH

The department solicited bids from area processors to purchase the fish caught during the survey. The 2007 bids were based upon the catch delivered during the 2006 survey. Trident Seafoods in Petersburg submitted the winning bid (Appendix E).

RESULTS

SET INFORMATION

All 44 stations were surveyed (Appendix A). A total of 25 skates and 1,125 hooks were set at each station and a total of 1,100 skates were deployed during the survey. Out of the 1,100 skates set, a total of 35 skates from 18 different sets were classified as invalid and not included in the calculation of CPUE. The longline gear parted at stations 13, 16, and 55 due to hang up and operational problems and the longline was bitten in half by a shark at station 37. All skates on the parted sets were recovered by running to the opposite end and hauling from there. No other on board alterations were made to the set plan.

CATCH AND CPUE

The CPUE in terms of fish per hook (Table 1) ranged from 0.18 at station 24, Point Caution, to 0.50 at station 52, mid Point Alexander. The overall CPUE was 0.33. The CPUE in terms of round pounds per hook ranged from 1.11 lb/hook (0.51 kg/hook) at station 24 to 4.48 lbs/hook (2.03 kg/hook) at station 52, and the survey average was 2.39 lbs/hook (1.08 kg/hook).

The 2007 survey CPUE was similar to the 2006 survey CPUE of 2.41 lbs/hook (Table 2). The 2005 survey had the highest CPUE of the past five annual surveys, 2.85 lbs/hook, and 2004 had the lowest, 2.12 lbs/hook.

A total of 15,942 sablefish were caught during the survey on both valid and invalid skates and 15,253 were retained. A total of 15,548 sablefish were caught on valid skates and 14,879 were retained (Table 3). Of the remaining sablefish on valid skates, 438 were lost at the roller, 96 were discarded due to sand flea damage, 94 were discarded due to shark damage, 34 were released due to small size, and 7 were discarded for miscellaneous reasons.

The occurrence of sand flea damage was most widespread at the northernmost stations in the survey area (Table 3). No sablefish were discarded due to sand fleas in the southernmost

statistical area: 345603. Some sablefish were discarded with excessive flea bites at 5 out of 12 stations in area 345631, at 8 out of 13 stations in area 345701, and at all 12 stations in area 345731 (Table 3, Figure 2). Sand flea damage was a problem at the northern end of the survey despite attempts to keep the gear soaking for as close to the 3 hour minimum as possible (Appendix F). Sleeper sharks or evidence of shark predation was observed on 34 of the 44 stations.

BYCATCH

A total of 3,395 fish and 19 other animals were caught as bycatch. Of these, 3,325 fish and all of the other animals were caught on valid subsets (Table 4). Bycatch species composition varied between stations. Shortspine thornyhead (*Sebastolobus alascanus*) was the primary bycatch species, comprising 42% of the total bycatch. Skates (*Raja* spp. and *Bathyraja* spp.) were the next most frequent bycatch, comprising 35%. Dover sole (*Microstomus pacificus*) and halibut (*Hippoglossus stenolepis*) made up 10% and 4% of the bycatch, respectively. The remaining bycatch species, from highest to lowest frequency caught, were: arrowtooth flounder (*Atheresthes stomias*), rougheye rockfish (*Sebastes aleutianus*), shortraker rockfish (*Sebastes borealis*), Pacific sleeper shark (*Somniosus pacificus*), coral (class Anthozoa), redbanded rockfish (*Sebastes babcocki*), Pacific cod (*Gadus macrocephalus*), grenadier (family Macrouridae), spiny dogfish (*Squalus acanthias*), brown king crab (*Lithodes acquispina*), sculpin (family Cottidae), and spotted ratfish (*Hydrolagus colliei*). These species combined accounted for 6% of the bycatch.

BIOLOGICAL DATA

Sablefish

Length and weight were measured, sex and maturity were assessed, and otoliths were taken from 790 sablefish. An additional 769 sablefish were measured for length only, for a total of 1,559 length measurements. Lengths ranged from 46 to 106 cm (18 to 42 in). The mean length of fish sampled in 2007 was 67 cm (26 in) (Figure 3). The 2006 mean length was 68 cm (27 in), the 2005 mean was 67 cm (26 in), and the mean was 65 cm (26 in) in both 2004 and 2003 (Figure 4).

The sex ratio of the sampled sablefish was 56% female. Females were larger than males with a mean fork length of 70 cm (27 in) compared to the male mean fork length of 63 cm (25 in) (Figure 5). The mean weight of all the sablefish sampled was 3.3 kg (7.3 lbs) (Table 1). Females averaged 3.8 kg (8.3 lbs) and males averaged 2.8 kg (6.1 lbs).

Ages were determined for 775 sablefish. The age estimates ranged from 2 to 56 years with an average age of 12 years (Figure 6). The mode age was 9, which was also the median. Male ages ranged from 2 to 56 years and averaged 13 years and female ages ranged from 3 to 48 years and averaged 11 years.

Visual inspection of the gonads indicated approximately 20% of the males and 18% of the females sampled had not previously spawned (Table 5). The majority of the fish, 41% of the males and 55% of the females, were classified as “mature/developing,” meaning they were going to spawn in the upcoming season (Appendix D). Sections from 215 fish ovaries were preserved to be made into slides for histological analysis.

Sebastes Rockfishes

A total of 15 redbanded rockfish (*Sebastes babcocki*), 55 rougheye rockfish (*S. aleutianus*), and 62 shortraker rockfish (*S. borealis*) were sampled for length and sex. The average fork lengths were 47, 44, and 65 cm (19, 17, and 26 in), respectively. Weights were measured for 15 redbanded rockfish, 54 rougheye rockfish, and 49 shortraker rockfish. Average weights were 1.8, 1.5, and 5.1 kg (4.0, 3.3, and 11.2 lbs), respectively, and percents female were 27, 51, and 39.

Shortspine Thornyheads

Lengths were taken from 638 shortspine thornyheads. Fork lengths ranged from 25 to 83 cm (10 to 33 in) with a mean length of 40 cm (16 in). The 83 cm fish was unusually large. Only four thornyhead rockfish 80 cm (31 in) long or longer have been recorded out of 9,028 total measured on NSEI surveys.

TAGGED SABLEFISH RECOVERY

A total of 80 sablefish with ADF&G tags were caught. The majority, 33, were tagged in 2007 (Figure 7). Fish tagged from 1988 through 2007 were recovered. The average ADF&G tag recovery rate for the survey was 5.0 tags per thousand fish. Three tags from other agencies were recovered.

SAMPLING FOR OTHER AGENCIES

Seabird Occurrence Survey

Seabird occurrence observations were performed at every survey station. Seabirds were present during haulback at 28 of the 44 stations. Black-footed albatross (*Phoebastria nigripes*) were observed at Stations 58, 57, 55, 1, and 3. Other species observed included northern fulmar (*Fulmaris glacialis*), herring gull (*Larus argentatus*), glaucous-winged gull (*Larus glaucescens*), and fork-tailed storm-petrel (*Oceanodroma furcata*). The data were sent to the International Pacific Halibut Commission (IPHC) for compilation and analysis.

For information on seabird bycatch in commercial longline fisheries:
http://wsg.washington.edu/communications/onlinepubs.html

FISH TICKET AND LANDING DATA

A total of 111,067 round pounds of sablefish and 917 round pounds of rockfish were landed for a value of $299,874. Thirty-one percent of the sablefish catch by weight came from statistical area 345631, 26% from 345701, 26% from 345731, and 16% from 345603. Forty-one percent of the fish were graded as 5/7 pounds, 27% were 4/5 grade, 15% were +7, 14% were 3/4, and 4% were -3. Eight percent of the catch was graded as #2.

REFERENCES CITED

Richardson, Beverly J. 2003. 2002 NSEI (Chatham) Sablefish Longline Survey Report. Alaska Department of Fish and Game, Regional Information Report Series No. 1J03-35, Juneau, Alaska.

Table 1.–Sablefish catch per unit of effort (CPUE), hook condition, and average weight at each station (Valid skates only).

Station	Total hooks	Bare hooks	Baited hooks	Invalid hooks	Sablefish	Fish /total hooks	Avg. weight (kg)	Kg/ total hooks	Avg. weight (lbs)	Lbs/ total hooks
1	1,059	319	311	51	238	0.22	3.4	0.8	7.5	1.7
3	1,162	246	438	53	344	0.30	4.3	1.3	9.4	2.8
4	1,100	457	181	37	376	0.34	2.6	0.9	5.8	2.0
5	1,039	349	203	47	375	0.36	3.5	1.3	7.6	2.8
6	1,073	417	123	43	428	0.40	3.9	1.6	8.7	3.5
7	1,135	226	425	38	361	0.32	4.2	1.3	9.2	2.9
8	1,105	351	317	30	306	0.28	3.6	1.0	7.9	2.2
9	1,072	364	182	16	420	0.39	3.7	1.4	8.1	3.2
10	1,113	503	74	8	462	0.42	3.5	1.5	7.8	3.2
13	1,073	474	180	30	335	0.31	3.1	1.0	6.8	2.1
15	1,116	386	134	25	476	0.43	3.6	1.5	7.9	3.4
16	858	316	97	24	374	0.44	3.4	1.5	7.4	3.2
18	1,073	398	229	42	296	0.28	3.5	1.0	7.6	2.1
19	1,064	322	325	15	322	0.30	3.8	1.2	8.5	2.6
21	1,131	362	262	26	395	0.35	3.6	1.2	7.8	2.7
22	1,106	160	560	42	228	0.21	3.3	0.7	7.2	1.5
23	1,124	277	552	17	214	0.19	4.8	0.9	10.5	2.0
24	1,073	304	390	11	193	0.18	2.8	0.5	6.2	1.1
25	1,133	201	431	49	317	0.28	3.1	0.9	6.7	1.9
27	1,123	308	363	31	337	0.30	3.6	1.1	7.8	2.4
28	1,073	298	490	18	199	0.19	3.5	0.7	7.8	1.4
29	1,080	249	397	32	266	0.25	3.5	0.9	7.6	1.9
30	1,124	220	353	24	440	0.39	4.3	1.7	9.6	3.7
32	1,120	158	451	26	427	0.38	3.5	1.3	7.7	2.9
33	1,030	97	552	30	293	0.28	2.0	0.6	4.5	1.3
35	1,118	157	558	21	337	0.30	3.0	0.9	6.6	2.0
37	1,023	84	635	21	230	0.22	3.2	0.7	7.0	1.6
39	1,124	174	376	27	498	0.44	2.9	1.3	6.5	2.9
41	1,114	157	480	52	393	0.35	3.2	1.1	7.1	2.5
42	1,119	133	569	26	345	0.31	2.9	0.9	6.4	2.0
43	1,125	143	554	16	368	0.33	3.6	1.2	7.8	2.6
44	1,123	160	522	34	343	0.31	2.3	0.7	5.1	1.5
45	1,110	138	680	32	223	0.20	3.0	0.6	6.6	1.3
46	1,123	166	469	20	420	0.37	2.7	1.0	6.0	2.2
47	1,104	190	328	46	469	0.42	2.8	1.2	6.1	2.6
49	1,120	168	318	49	509	0.45	2.7	1.2	5.9	2.7
51	1,127	253	340	30	457	0.41	**seas too rough to weigh**			
52	916	310	79	58	455	0.50	4.1	2.0	9.0	4.5
53	1,154	506	237	48	338	0.29	3.0	0.9	6.5	1.9
54	1,006	225	332	34	247	0.25	3.1	0.8	6.7	1.7
55	990	264	132	61	450	0.45	2.9	1.3	6.4	2.9
56	1,115	234	408	25	331	0.30	2.6	0.8	5.7	1.7
57	1,066	188	361	40	417	0.39	4.3	1.7	9.6	3.7
58	1,024	359	277	36	296	0.29	**seas too rough to weigh**			
Overall	47,760	11,771	15,675	1441	15,548	0.33	3.3	1.1	7.3	2.4

Table 2.–Sablefish fish per hook and round pounds per hook CPUE at each station, 2003–2007.

	2007		2006		2005		2004		2003	
Station	Fish/hook	lbs/hook	Fish/hook	lbs/hook	Fish/hook	lbs/hook	Fish/hook	lbs/hook	Fish/hook	lbs/hook
1	0.22	1.68	0.37	2.59	0.54	5.16	0.30	2.48	0.33	2.50
3	0.30	2.78	0.23	1.93	0.33	2.22	0.14	1.00	0.31	2.17
4	0.34	1.98	0.40	3.18	0.42	2.78	0.36	2.15	0.44	2.54
5	0.36	2.76	0.37	2.57	0.36	2.70	0.20	1.03	0.38	2.53
6	0.40	3.47	0.43	3.77	0.41	3.43	0.26	1.84	0.37	2.93
7	0.32	2.93	0.33	3.00	0.39	3.35	0.23	1.84	0.43	3.55
8	0.28	2.17	0.34	2.49	0.33	2.36	0.22	2.41	0.39	2.39
9	0.39	3.15	0.30	2.31	0.34	2.66	0.27	2.49	0.23	1.91
10	0.42	3.24	0.40	3.54	0.42	3.00	0.26	2.07	0.25	2.09
13	0.31	2.12	0.22	1.77	0.28	2.03	0.29	2.07	0.23	1.67
15	0.43	3.36	0.40	2.54	0.40	2.58	0.52	2.65	0.41	2.51
16	0.44	3.24	0.33	2.53	0.36	2.76	0.46	3.09	0.34	2.20
18	0.28	2.10	0.36	2.84	0.34	2.83	0.35	2.73	0.27	1.76
19	0.30	2.56	0.32	2.49	0.32	2.57	0.23	1.55	0.30	2.19
21	0.35	2.74	0.37	2.63	0.40	2.96	0.45	1.96	0.34	2.84
22	0.21	1.49	0.27	1.86	0.19	1.16	0.34	2.10	0.28	1.98
23	0.19	1.99	0.20	1.84	0.23	1.89	0.32	2.23	0.19	1.27
24	0.18	1.11	0.29	1.92	0.33	2.56	0.27	2.37	0.34	2.57
25	0.28	1.88	0.34	2.50	0.32	2.51	0.32	2.37	0.36	3.00
27	0.30	2.35	0.31	2.54	0.28	2.01	0.21	1.43	0.40	3.00
28	0.19	1.44	0.24	1.75	0.22	1.83	0.21	1.73	0.24	2.52
29	0.25	1.88	0.34	2.80	0.25	1.61	0.32	1.68	0.38	2.44

-continued-

Table 2.–Page 2 of 2.

	2007		2006		2005		2004		2003	
Station	Fish/hook	lbs/hook	Fish/hook	lbs/hook	Fish/hook	lbs/hook	Fish/hook	lbs/hook	Fish/hook	lbs/hook
30	0.39	3.74	0.24	1.41	0.32	3.23	0.38	2.22	0.47	3.96
32	0.38	2.94	0.24	1.86	0.35	3.17	0.38	2.66	0.37	2.41
33	0.28	1.28	0.13	0.89	0.20	1.32	0.33	1.67	0.47	2.46
35	0.30	1.98	0.20	1.46	0.26	1.97	0.27	1.64	0.21	1.55
37	0.22	1.57	0.18	1.42	0.25	2.06	0.31	2.01	0.25	1.44
39	0.44	2.87	0.25	2.14	0.43	3.51	0.27	2.20	0.19	1.95
41	0.35	2.51	0.35	3.35	0.45	3.21	0.31	2.38	0.36	3.13
42	0.31	1.98	0.23	1.80	0.37	2.90	0.32	2.13	0.26	1.67
43	0.33	2.56	0.26	2.30	0.51	3.99	0.31	2.43	0.36	2.23
44	0.31	1.54	0.22	1.76	0.48	3.49	0.39	2.24	0.27	1.75
45	0.20	1.32	0.24	2.46	0.47	3.19	0.32	2.35	0.35	2.42
46	0.37	2.24	0.25	1.83	0.41	2.72	0.34	2.14	0.36	2.35
47	0.42	2.58	0.25	1.96	0.60	4.77	0.29	2.08	0.37	2.22
49	0.45	2.70	0.30	2.25	0.61	3.76	0.39	2.71	0.51	2.87
51	0.41	-----	0.35	2.85	0.41	3.24	0.28	1.84	0.34	3.00
52	0.50	4.48	0.51	3.85	0.38	3.53	0.34	2.47	0.23	2.29
53	0.29	1.91	0.41	3.23	0.42	2.28	0.26	1.53	0.38	2.14
54	0.25	1.65	0.32	2.55	0.40	2.87	0.30	2.42	0.28	2.31
55	0.45	2.92	0.38	2.17	0.50	3.40	0.53	2.90	0.45	2.78
56	0.30	1.70	0.31	2.32	0.43	3.09	0.28	1.94	0.42	2.99
57	0.39	3.74	0.42	3.33	0.42	4.07	0.28	2.70	0.37	2.97
58	0.29	-----	0.40	3.49	0.40	3.21	0.17	1.19	0.29	2.49
Overall	0.33	2.39	0.31	2.41	0.37	2.85	0.31	2.12	0.34	2.41

Table 3.–Sablefish retention and discard status at each station from valid skates.

	Discarded due to predation			Released Alive			
Station	Sand fleas	Sleeper Sharks	Other injuries	Small Size	Lost at Roller	Retained	Total
1	2	6			14	216	238
3					14	330	344
4		1	1		26	348	376
5					10	365	375
6	3	3			19	403	428
7					25	336	361
8		2			12	292	306
9		2	1	2	7	408	420
10	8	8			6	440	462
13					6	329	335
15	7	9		8	5	447	476
16	3	3		1	15	352	374
18		3		1	3	289	296
19		1		2	2	317	322
21		3	1		8	383	395
22	2	1		1	7	217	228
23	2				2	210	214
24	1	2			1	189	193
25	1	1	1		8	306	317
27	2			1	2	332	337
28	1	1			2	195	199
29	4	2			4	256	266
30	5	2			9	424	440
32		2			11	414	427
33		2		1	8	282	293
35	12	1			7	317	337
37	1	1			7	221	230
39	4	2		1	10	481	498
41	18	3			5	367	393
42	2	4	1	3	8	327	345
43	4	2			5	357	368
44	5				6	332	343
45	1				2	220	223
46	2	3			7	408	420
47	1	2		4	10	452	469
49	2	3	1	8	7	488	509
51	3	7		1	9	437	457
52					24	431	455
53		1			27	310	338
54		3			16	228	247
55		2			14	434	450
56		2	1		17	311	331
57					15	402	417
58		4			16	276	296
Total	96	94	7	34	438	14,879	15,548

Table 4.–Species specific catch at each station on both valid and invalid skates.

Station	SBL	SST	SKT	HAL	DOV	EYE	LNS	SRK	ARR	RBD	SLP	COD	OTH
1	244	83	25	16	6		9	2	3		2		
3	344	38	30		2		1	4	5				
4	376	22	16		10				1				
5	396	31	14	6	18				1				
6	443	29	20	4	3	1	3		1		1		
7	361	44	15	2	9	5	4	4	2				
8	306	42	21	1	32				4		1		
9	434	63	13	1	11	1	1						
10	462	33	29		2						1		
13	344	16	10	2		18		2		3		4	1
15	476	35	44		6		2		2		6		
16	449	24	19	5	8				6		1		
18	300	37	25	4	37	1			1		3		
19	330	44	17	1	14	1	2	2					1
21	395	30	33	3	15			1			1		
22	228	60	36	2	1		8		9				
23	214	47	5		10				1				
24	197	64	44	21	10	15	4	1	5	12	1	1	1
25	317	63	54	1	8	1	1	1	3		1	1	
27	337	49	4	3	24				2		2		
28	203	33	7	4	11	3		8	1				
29	271	59	42	3	22		8		8		1		1
30	440	35	5	2	31			14					
32	427	38	11	1	6		1				1		
33	306	25	30				7						
35	337	12	21	2			7				3		
37	259	20	26	2	4		3		2		1		
39	498	4	22	6	6	2		4		1	2		
41	393	8	15	3	1				2		2		
42	345	10	27	2			5		1		1		
43	368	3	29		4		4		3		1		
44	343	10	43	1			8		1		1		
45	223	10	18	1			6		1		1		
46	420	4	36	2		3		1			1		
47	469		40	9	4	2	8	4			1		2
49	509	4	57	2			9		1		3		
51	457	1	25	5	1	3	4	2			5		
52	538	13	3	1		1		2					
53	338	6	12	1			1		5				
54	262	106	39	8	3		1		20		1		
55	499	43	23	8	2	1	3		12		2		
56	331	43	53	7			7		6		1		
57	428	39	5	1	7	1	1						6
58	325	40		5	1	5	1	11					
Total	15,942	1,420	1,063	148	329	64	119	62	109	16	48	6	13

SBL = sablefish, SST = shortspine thornyhead, SKT = unidentified skate, HAL = Pacific halibut, DOV = Dover sole, EYE = rougheye rockfish, LNS = Longnose skate, SRK = shortraker rockfish, ARR = arrowtooth flounder, RBD = redbanded rockfish, SLP = Pacific sleeper shark, COD = Pacific cod, OTH = other.

Table 5.–Maturity stages of male and female sablefish sampled from observation of gonad gross morphology.

Maturity Stage	Number of Males	Number of Females	Total
Immature	28	24	52
Maturing Juvenile	41	56	97
Mature/developing	140	244	384
Spawning	1	4	7
Spent/post spawning	33	33	66
Resting	101	84	185
Not observed	0	1	1
Total	344	446	790

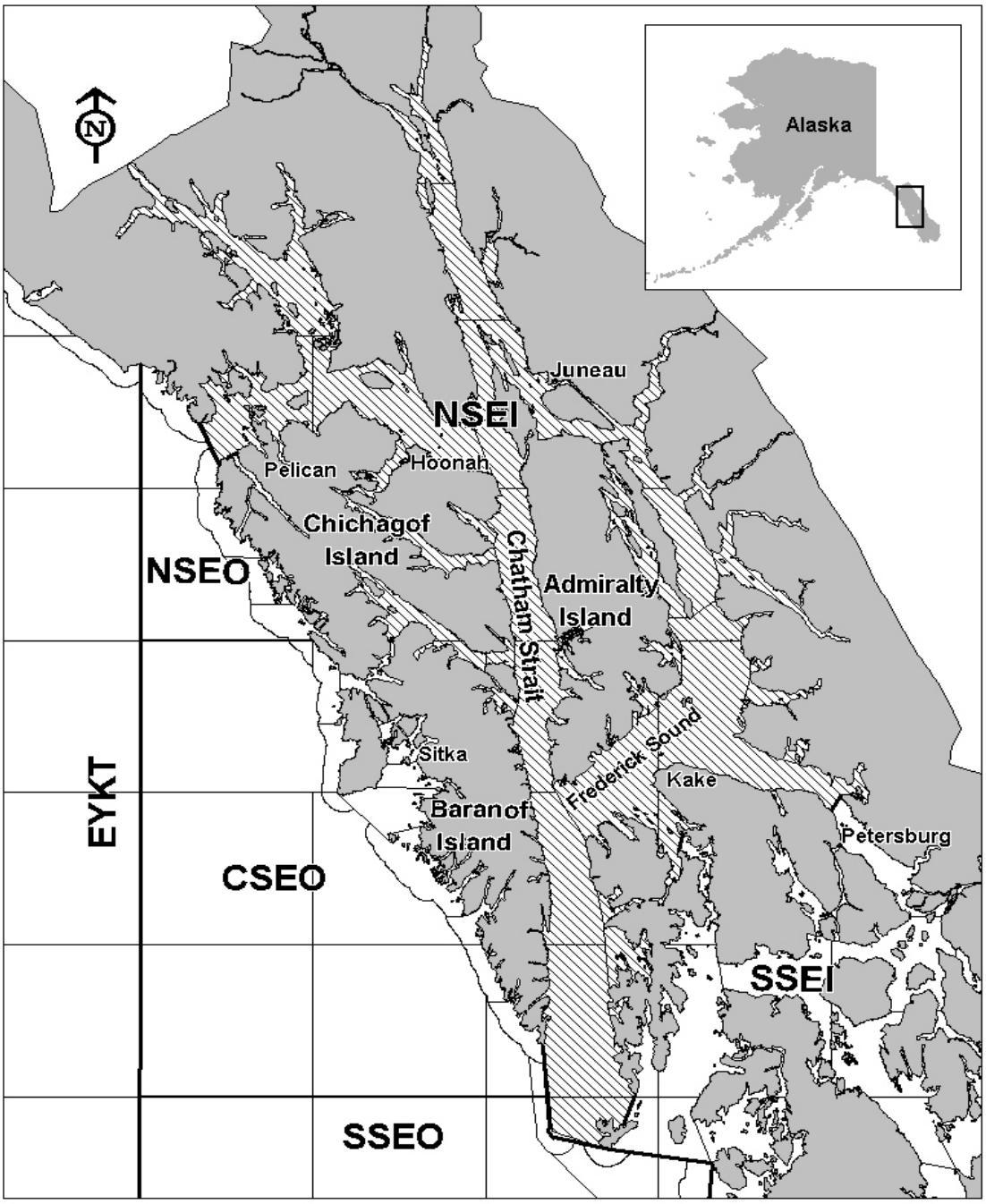


Figure 1.–The NSEI subdistrict.

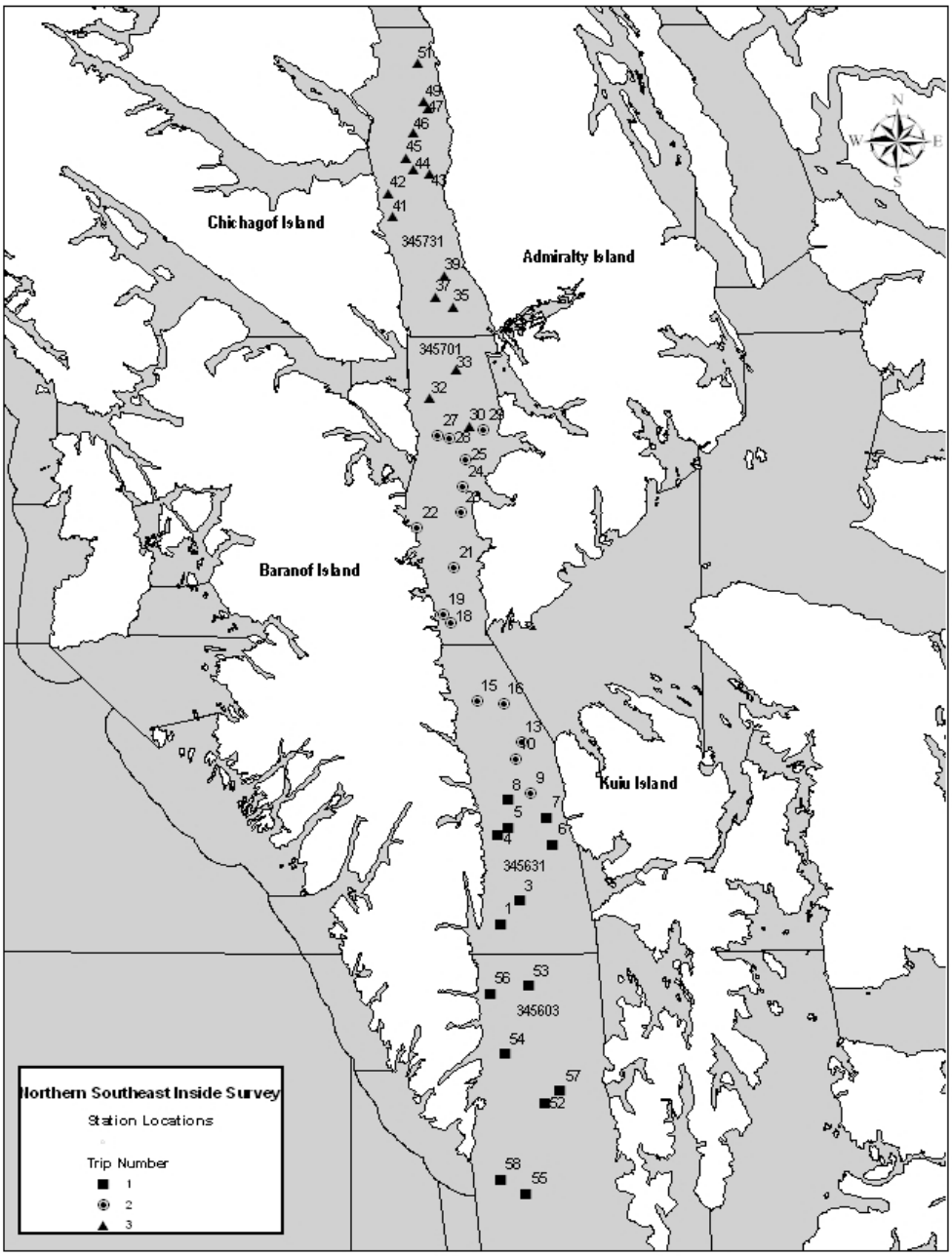


Figure 2.–Survey station locations, statistical areas, and trip station assignments.

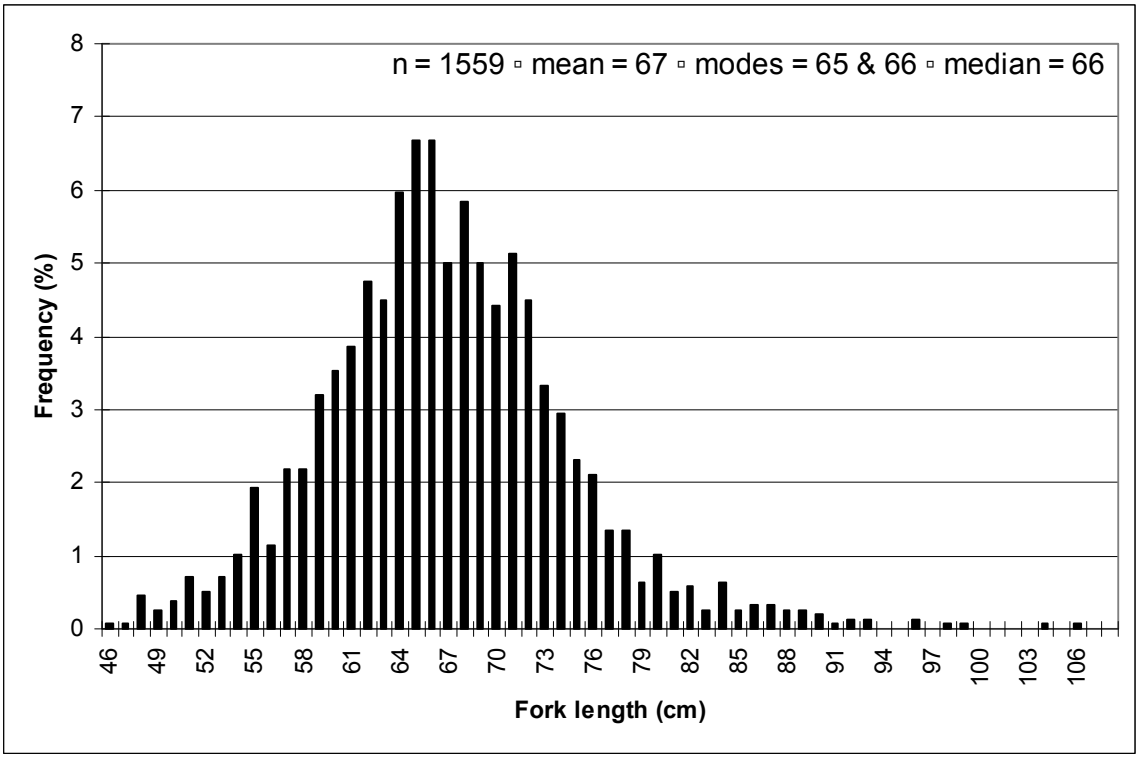
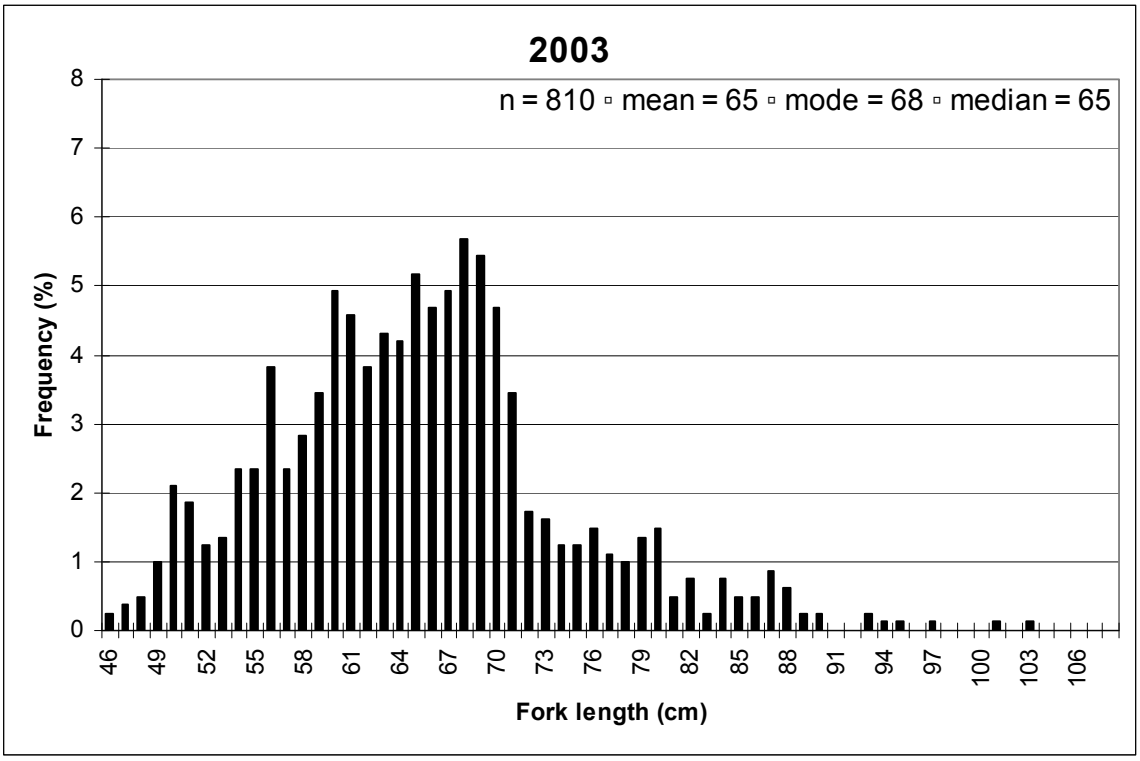


Figure 3.–Sablefish length frequency distribution, sexes combined, 2007.



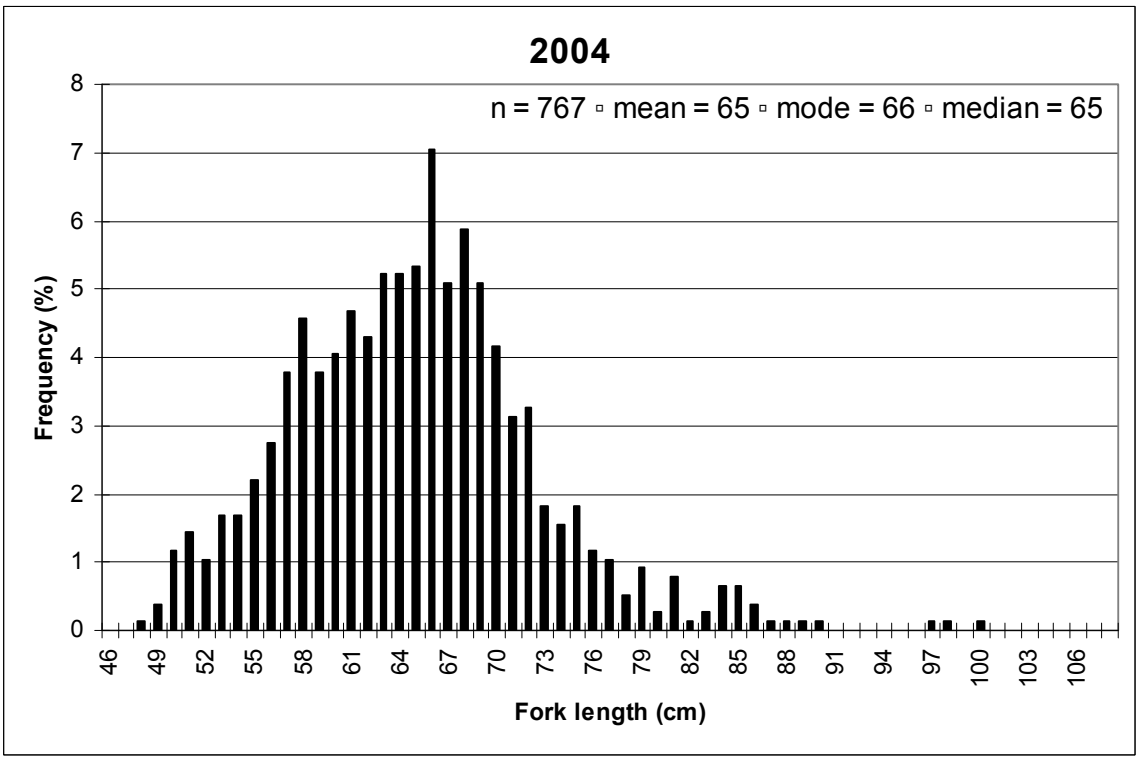


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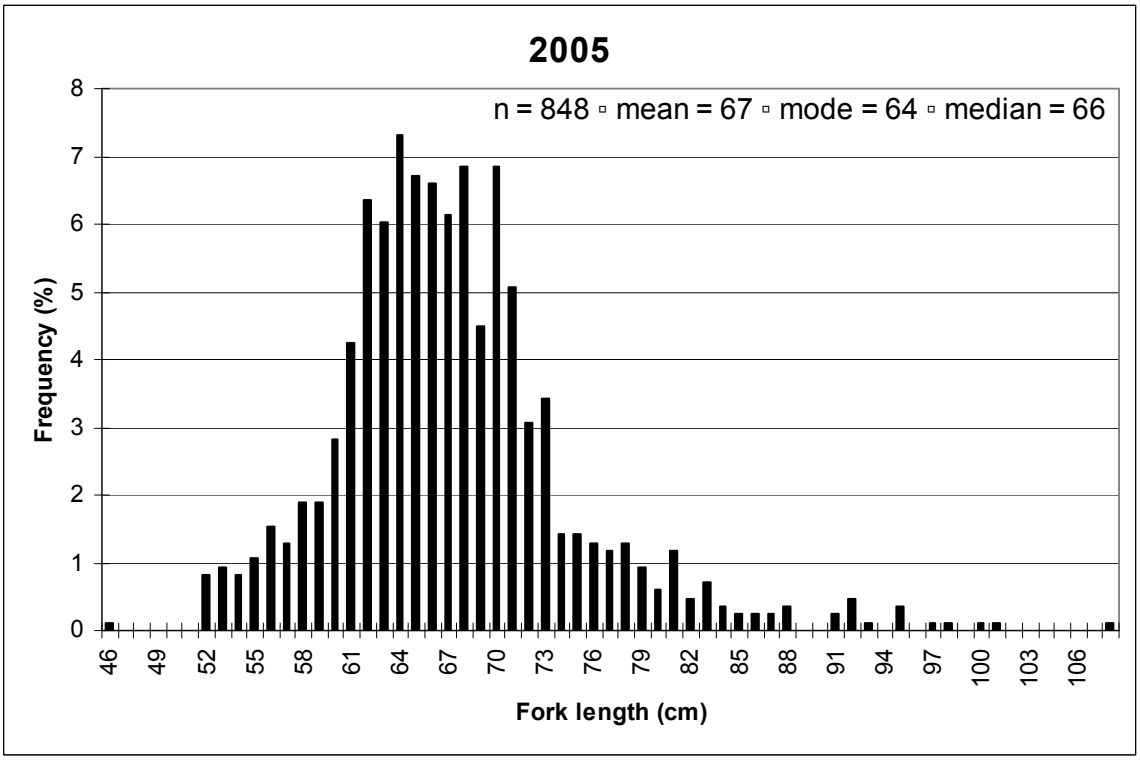
Figure 4.–Sablefish length frequency distributions from the 2003–2006 NSEI sablefish longline surveys.



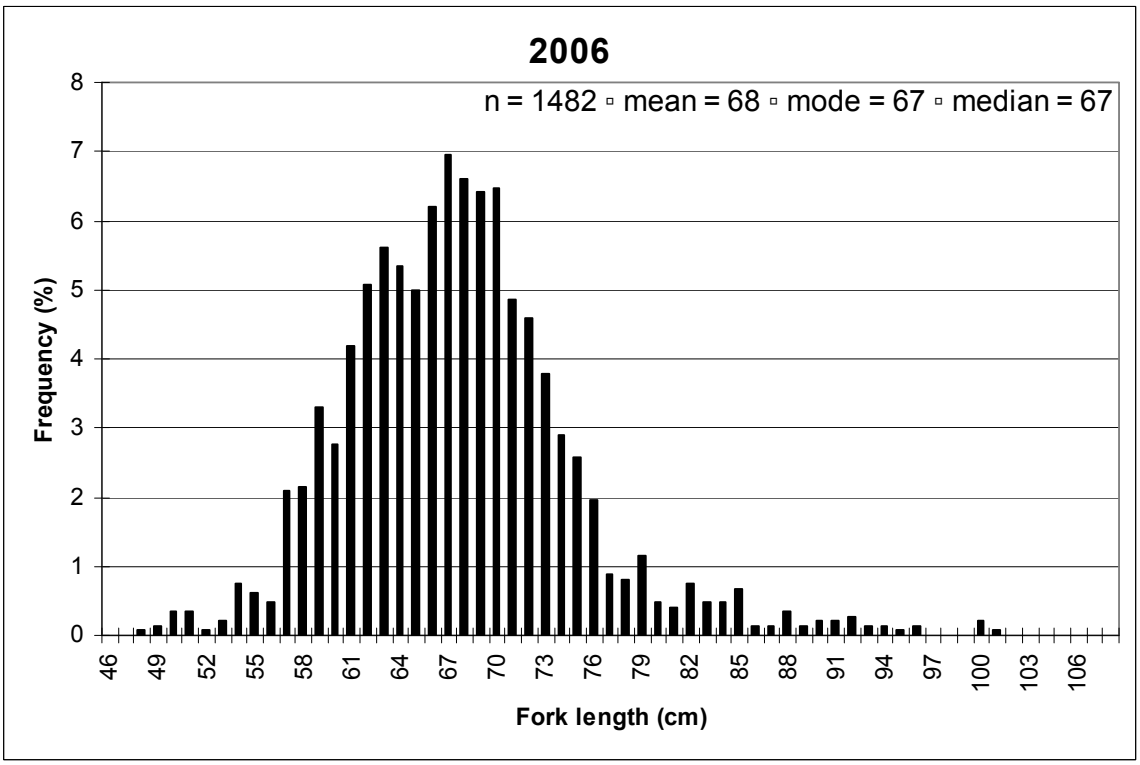


Figure 4.–Continued (page 2 of 2)

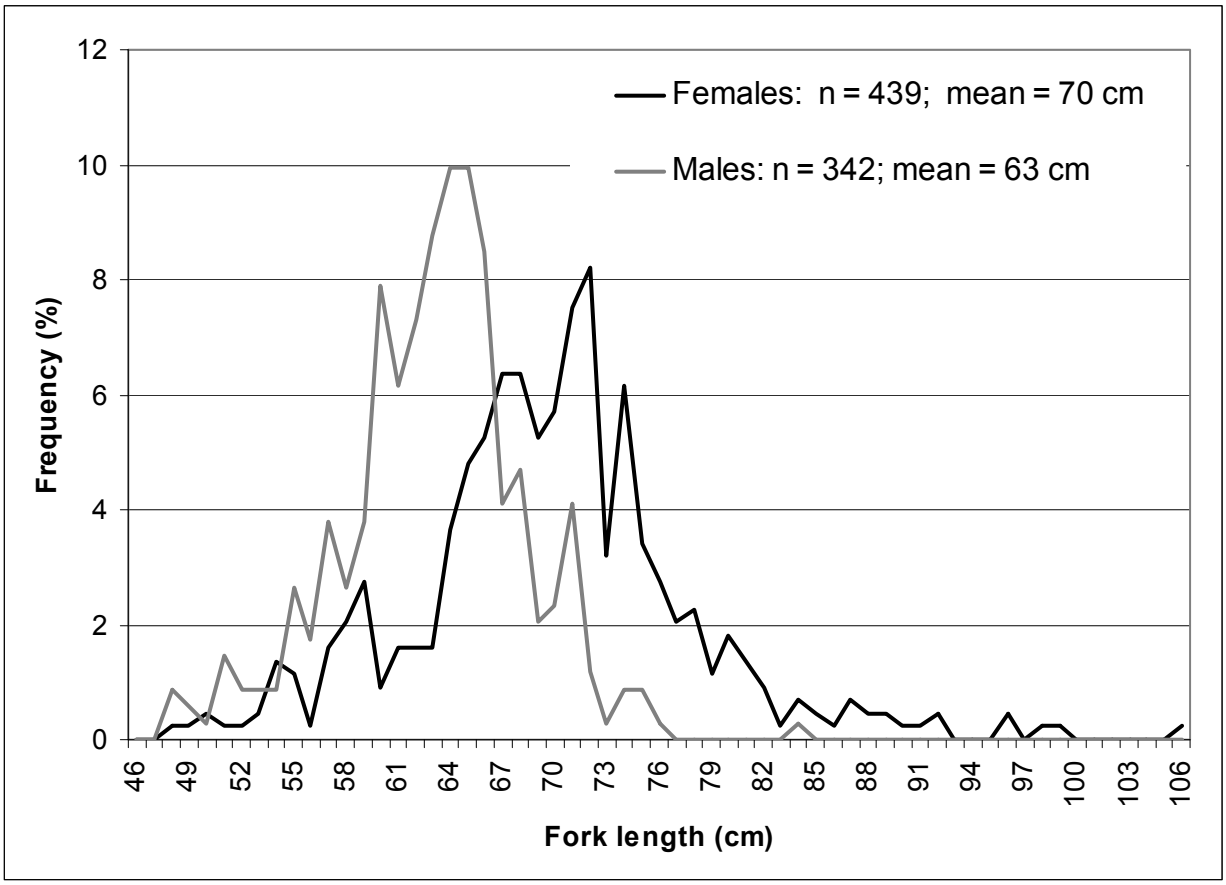


Figure 5.–Sablefish length frequency distribution by sex, 2007.

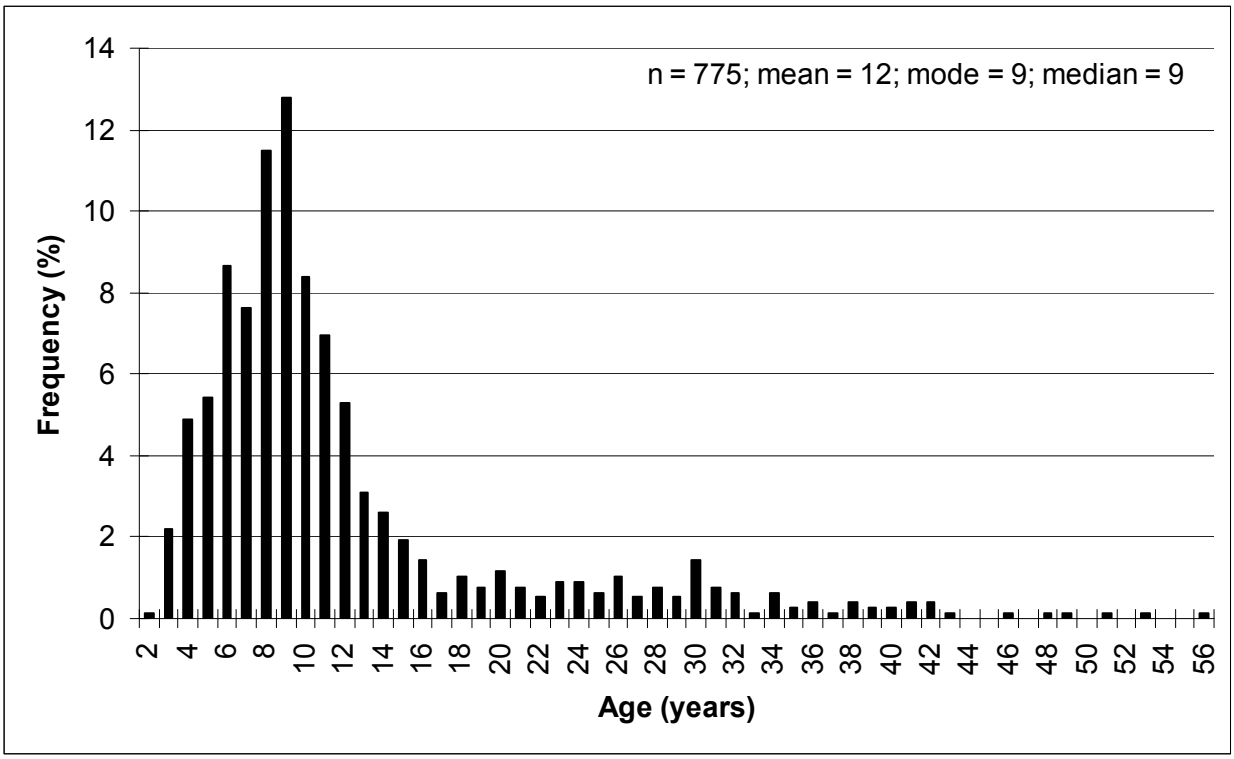


Figure 6.–Age frequency distribution of sampled sablefish.

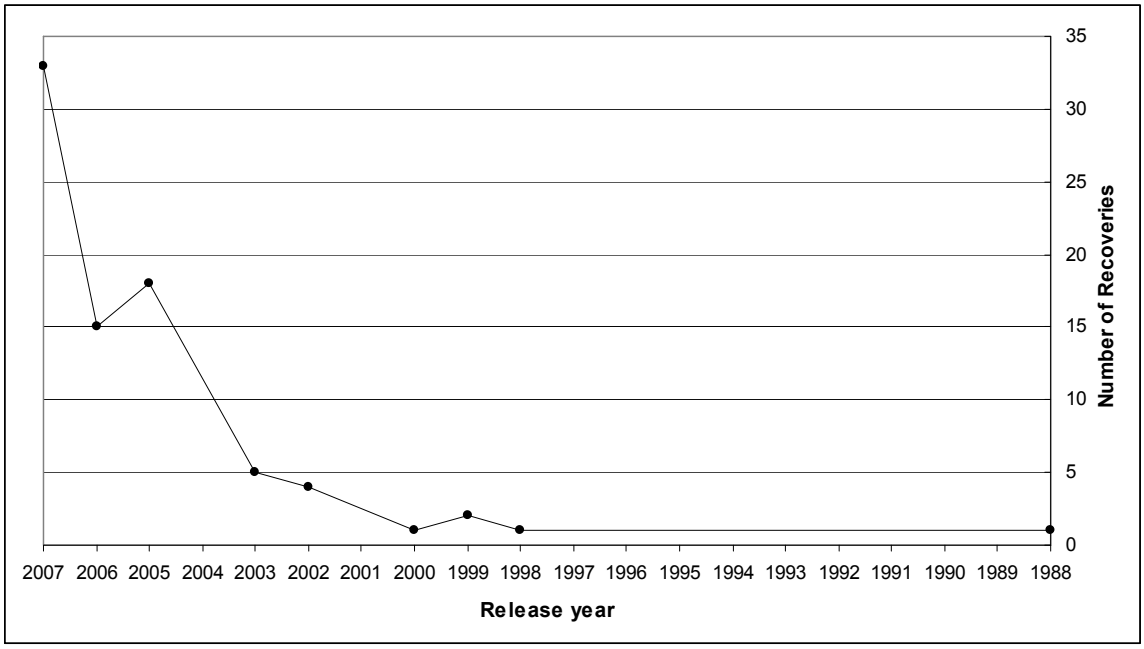


Figure 7.–Tag recoveries by release year.

APPENDICES

Appendix A.–Set location information.

		Start Position				End Position			
Station	Area description	Lat. deg.	Lat. min.	Long. deg.	Long. min.	Lat. deg.	Lat. min.	Long. deg.	Long. min.
1	Patterson Point	56	31.23	134	34.60	56	32.50	134	34.60
3	N Patterson Point	56	35.20	134	31.30	56	33.64	134	31.11
4	Mount Ada	56	39.78	134	34.80	56	41.25	134	34.79
5	S Gut Bay	56	40.49	134	33.12	56	41.90	134	33.09
6	S Washington Bay	56	40.58	134	25.60	56	39.03	134	25.68
7	Washington Bay	56	43.16	134	26.51	56	41.58	134	26.07
8	Gut Bay	56	44.98	134	33.19	56	43.44	134	33.19
9	N Washington Bay	56	44.03	134	28.48	56	45.50	134	29.18
10	Hoggat Bay	56	48.74	134	31.80	56	47.32	134	31.80
13	Kingsmill Point	56	50.56	134	30.79	56	49.16	134	30.80
15	N Red Bluff Bay	56	54.70	134	38.39	56	53.18	134	38.40
16	Yasha Island	56	52.90	134	33.75	56	54.26	134	33.75
18	Cascade Bay	57	2.14	134	42.65	57	0.93	134	42.66
19	N Cascade Bay	57	1.32	134	43.94	57	2.76	134	43.92
21	Warm Springs Bay	57	7.50	134	42.03	57	6.04	134	42.10
22	White Cliff	57	11.36	134	48.38	57	10.05	134	47.37
23	N Wilson Cove	57	11.34	134	41.42	57	12.77	134	40.97
24	Point Caution	57	14.05	134	40.74	57	15.51	134	40.43
25	Woody Point	57	18.19	134	39.94	57	16.84	134	39.92
27	Point Lull	57	18.81	134	44.78	57	20.33	134	44.78
28	Point Lull Middle	57	18.64	134	42.70	57	20.00	134	42.73
29	Chaik Bay	57	20.76	134	36.99	57	19.37	134	37.00
30	Village Point	57	19.73	134	39.41	57	21.21	134	39.26
32	S Point Thatcher	57	22.50	134	46.03	57	24.04	134	46.05
33	Distant Point Middle	57	26.91	134	41.51	57	25.49	134	41.58
35	N Danger Point	57	31.23	134	42.04	57	32.71	134	42.12
37	White Rock Middle	57	33.96	134	45.16	57	32.41	134	45.13
39	Parker Point	57	34.68	134	42.07	57	36.00	134	43.64
41	Basket Bay	57	41.71	134	52.71	57	41.41	134	50.16
42	S S Passage Point	57	42.57	134	52.94	57	44.12	134	53.12
43	S Fishery Creek	57	44.43	134	45.74	57	46.01	134	46.08
44	S Passage Point Middle	57	46.33	134	48.83	57	44.87	134	48.82
45	S Passage Point	57	45.85	134	50.24	57	47.25	134	50.13
46	Fishery Point	57	48.20	134	48.66	57	49.66	134	48.86
47	N Fishery Point	57	52.11	134	46.25	57	50.66	134	45.99
49	Far N Fishery Point	57	52.60	134	46.91	57	51.38	134	47.20
51	Point Hepburn	57	56.44	134	48.14	57	54.98	134	47.78
52	Port Alexander Middle	56	15.51	134	27.30	56	14.00	134	27.30
53	Port Herbert Middle	56	25.14	134	29.67	56	26.47	134	29.84
54	Port Alexander	56	18.42	134	35.00	56	19.84	134	34.16
55	Point Howard Middle	56	5.30	134	30.50	56	6.81	134	30.55
56	Port Herbert	56	26.24	134	36.31	56	24.82	134	36.08
57	Port Malmsbury	56	15.05	134	24.73	56	16.48	134	24.73
58	Cape Ommaney	56	8.06	134	34.79	56	6.57	134	34.89

Appendix B.–Vessels, vessel crew, and scientific staff associated with the 2007 NSEI sablefish survey.

Trip No.	Vessel	Name	Affiliation
Trip 1	Masonic	Bill Lewis	Skipper
		Kyle Underwood	Crew
		Dane Lewis	Crew
		Max Littrel	Crew
		Katie Lewis	Crew
		Sumner Lewis	Crew
		Mike Vaughn	Survey Project Leader, ADF&G
		Karl Wolfe	ADF&G
Trip 2	Charles T	Jim Eastwood	Skipper
		Bo Verasano	Crew
		Gayle Eastwood	Crew
		Roberta Eastwood	Crew
		Kamala Carroll	Vessel lead, ADF&G
		Becky Knight	ADF&G
Trip 3	Seaview	John Etheridge	Skipper
		Bryan Bottleson	Crew
		Glen Galloway	Crew
		Wayne Bigness	Crew
		Deidra Holum	Vessel lead, ADF&G
		Jodi Neil	ADF&G

Appendix C.–Tide table for Baranof Warm Springs, Chatham Strait, August 1–12, 2007.

Date	High tide	Ft.	High tide	Ft.	Low tide	Ft.	Low tide	Ft.
08/01	02:58	15.1	15:47	14.0	09:22	-2.9	17:43	0.6
08/02	03:40	14.5	16:22	14.3	09:59	-2.1	22:28	0.3
08/03	04:25	13.5	16:59	14.4	10:37	-0.9	23:16	0.3
08/04	05:14	12.1	17:40	14.1	11:19	0.8	----	----
08/05	06:12	10.5	18:30	13.5	00:11	0.7	12:08	2.6
08/06	07:27	9.1	15:31	12.9	01:15	1.1	13:08	4.4
08/07	09:04	8.5	20:47	12.6	02:31	1.3	14:28	5.7
08/08	10:40	9.0	22:05	12.8	03:52	1.0	15:58	5.9
08/09	11:51	10.1	23:14	13.4	05:04	0.2	17:15	5.2
08/10	12:43	11.2	-----	-----	06:03	-0.8	18:14	4.0
08/11	12:11	14.1	13:26	12.2	06:51	-1.7	19:03	2.8
08/12	01:01	14.6	14:03	13.0	07:33	-2.2	19:45	1.9

Appendix D.–Sablefish maturity stages and criteria used by the Alaska Department of Fish and Game.

Maturity stage	Description of males at stage	Description of females at stage
Immature	Testes very narrow, parallel, flat and ribbon-like, almost clear in color. Longitudinal creases are easily discernable.	Ovaries appear as two narrow (slender) ovoids. May be veined. It may be easiest to determine immature from maturing juvenile ovaries while ovaries are intact in fish.
Maturing juvenile	Testes enlarging, not ribbon-like, with four discernable creases running full length. Light pink in color. Has not spawned before.	Ovaries enlarging, translucent and pinkish to clear: eggs not yet discernable. Has not spawned before. Will spawn in the coming year. More veined. Cloudy, but not necessarily throughout.
Mature/developing	Testes large and white, each with four distinct lobes. No milt present.	Ovaries large and becoming white to yellowish white with developing eggs discernable and firmly attached.
Spawning	Testes very large and white, extruding milt freely under slight pressure or when cut.	Ovaries very large with large translucent eggs loose within ovary or extruding from the oviduct.
Spent/post spawning	Testes large, shriveled, often with wrinkles, and bloodshot. No milt present.	Ovaries shriveled and opaque, soft and flaccid, often reddish in color.
Resting	Testes large and firm, light brown to off-white in color. No milt present. Has spawned previously. May have wrinkles.	Ovaries large, firm and opaque, not shriveled. No eggs discernable. Has spawned previously. Noticeable follicle structure.

Appendix E.–Winning fish buyer bid for 2007 NSEI survey fish from Trident Seafoods in Petersburg.

Species	Cut	Size	Dressed lbs.	Price per lb	Extended price
Sablefish	Eastern cut	under 3	2,363	$3.50	$8,270.50
Sablefish	Eastern cut	3-4	14,757	$3.85	$56,814.45
Sablefish	Eastern cut	4-5	19,980	$4.10	$81,918.00
Sablefish	Eastern cut	5-7	21,105	$4.26	$89,907.30
Sablefish	Eastern cut	7 up	10,001	$4.40	$44,004.40
Sablefish-#2	Eastern cut	under 3	117	$3.30	$386.10
Sablefish-#2	Eastern cut	3-4	645	$3.65	$2,354.25
Sablefish-#2	Eastern cut	4-5	851	$3.90	$3,318.90
Sablefish-#2	Eastern cut	5-7	910	$4.06	$3,694.60
Sablefish-#2	Eastern cut	7 up	411	$4.20	$1,726.20
Rougheye	Head-on		178	$0.35	$62.30
Shortraker	Head-on		857	$0.35	$299.95
Redbanded	Head-on		123	$0.35	$43.05
Idiots	Eastern cut		5	$3.00	$15.00
Idiots	Round		5	$1.50	$7.50
Pacific Cod	Round		5	$0.40	$2.00
Total					$292,824.50

Appendix F.–Set times, soak and haul durations, haul order, and set depth at each survey station.

Trip	Effort	Station	Date	Set Time	Soak duration	Haul duration	Haul order	Set depth Start	End	Avg.
1	1	55	08/05	5:29	3:14	2:27	Opposite	283	292	287
1	2	58	08/05	7:21	6:49	1:49	Same	303	285	295
1	3	52	08/05	12:52	4:46	1:55	Opposite	391	394	394
1	4	57	08/06	5:37	3:24	1:49	Same	366	386	375
1	5	54	08/06	7:30	6:37	2:46	Same	355	294	346
1	6	56	08/06	12:54	4:14	1:43	Opposite	310	307	304
1	7	53	08/07	6:42	3:33	1:42	Opposite	389	383	386
1	8	1	08/07	8:27	6:21	2:26	Same	284	290	288
1	9	3	08/07	13:51	4:15	1:40	Opposite	355	357	358
1	10	4	08/08	6:47	3:04	1:50	Opposite	361	372	368
1	11	5	08/08	9:07	5:00	1:50	Opposite	371	379	375
1	12	8	08/08	13:20	3:41	2:25	Opposite	396	391	398
1	13	7	08/09	5:07	3:07	1:59	Opposite	272	242	260
1	14	6	08/09	5:35	5:43	2:05	Same	283	273	292
2	1	9	08/05	5:22	3:23	1:40	Opposite	354	360	357
2	2	10	08/05	7:55	4:45	1:45	Opposite	364	385	379
2	3	13	08/05	11:57	4:12	2:06	Opposite	210	227	213
2	4	16	08/06	5:32	4:13	1:55	Same	365	347	359
2	5	15	08/06	8:11	6:21	1:50	Opposite	356	364	361
2	6	18	08/06	13:08	4:42	1:39	Opposite	353	338	346
2	7	19	08/07	4:34	3:24	1:32	Same	339	360	346
2	8	21	08/07	10:45	5:25	1:33	Opposite	342	356	346
2	9	22	08/08	4:38	3:25	1:36	Opposite	316	330	319
2	10	23	08/08	6:50	4:40	1:35	Opposite	442	345	420
2	11	24	08/08	10:41	4:19	1:33	Opposite	274	250	224
2	12	25	08/08	14:32	3:15	1:38	Opposite	282	278	277
2	13	29	08/09	4:30	4:21	2:07	Opposite	276	280	292
2	14	28	08/09	7:10	4:45	1:57	Opposite	261	343	292
2	15	27	08/09	11:13	3:52	2:08	Opposite	409	373	386
3	1	51	08/05	5:23	3:19	1:32	Same	231	291	277
3	2	49	08/05	7:24	3:44	1:25	Same	268	273	268
3	3	47	08/05	13:25	3:32	1:34	Same	260	244	257
3	4	46	08/06	5:25	3:38	1:23	Opposite	262	244	254
3	5	45	08/06	8:19	3:42	1:19	Opposite	278	291	282
3	6	44	08/06	11:14	3:40	1:27	Opposite	272	272	272
3	7	43	08/07	5:11	3:26	1:28	Same	283	217	272
3	8	42	08/07	7:27	3:53	1:26	Opposite	306	286	291
3	9	41	08/07	13:27	3:22	1:33	Same	301	253	282
3	10	39	08/08	6:20	3:19	1:30	Same	214	243	220
3	11	35	08/08	8:54	3:47	1:26	Opposite	318	262	297
3	12	37	08/08	11:58	3:18	1:56	Same	310	331	318
3	13	33	08/09	5:48	3:33	1:21	Opposite	300	282	290
3	14	30	08/09	8:26	4:37	1:24	Opposite	326	308	290
3	15	32	08/09	11:58	3:41	1:33	Opposite	357	375	347

Set time is when the second anchor went overboard. Soak duration is between the set time and when the first anchor came aboard. Haul duration is between when the first and second anchors came aboard.

Appendix G.–NSEI longline survey specifications, 1988–2007.
In 1995 1 and 3 hr soaks were compared.

Year	Dates	Vessels	Hks/ set	Hk space	Hk size	Gangion length	Bait	Soak (hrs)	Skate Wts (lbs)	No. Set
1988	8/14–8/26	*F/V Betty*	1000	3 m	13 C	NA	Herring	1	No	24
1989	8/07–8/25	*F/V Carrie*	500	3 m	13 C	NA	Herring	1	No	44
1990	8/26–9/10	*F/V Isis*	500	3 m	13 C	NA	Herring	1	No	40
1991	8/13–8/30	*R/V Stellar*	500	3 m	13 C	0.375 m	Herring	1	5	40
1992	8/17–8/31	*F/V Charles T*	500	3 m	13 C	0.375 m	Herring	1	5	40
1993	8/23–9/08	*R/V Medeia*	500	3 m	13 C	0.375 m	Herring	1	5	38
1994	8/23–9/05	*R/V Medeia*	500	3 m	13 C	0.375 m	Herring	1	5	38
1995	8/23–9/08	*R/V Medeia*	500	3 m	13 C	0.375 m	Herring	1	5	30
							Squid	3		6
							Squid	3		24
1996	8/17–8/31	*R/V Medeia*	500	3 m	13 C	0.375 m	Herring	1	5	38
	8/19–8/23	*F/V Ida June*	750	1 m	13C	0.2 m	Squid	3–7	½	16
1997	8/07–8/13	*F/V Ida June* *F/V Charles T* *F/V Kruzof*	923–1217	2 m	13 C	0.2–0.3 m	Squid	3–11	½–7	45
1998	8/13–8/19	*F/V Ida June* *F/V Charles T* *F/V Ocean Cape*	831–1267	2 m	13 C	0.2–0.3 m	Squid	3–11	½–7	45
1999	8/15–8/23	*F/V Ida June* *F/V Charles T*	1002-1129	2 m	13 C	0.2–0.3 m	Squid	3–11	3	45
2000	8/16–8/23	*F/V Ida June* *F/V Charles T* *F/V Spirit*	1125	2 m	13 C	0.375 m	Squid	3–11	7	45
2001	8/08–8/13	*F/V Ida June* *F/V Charles T* *F/V Sylvia*	1125	2 m	13 C	0.375 m	Squid	3–11	7	45
2002	8/13–8/18	*F/V Ida June* *F/V Charles T* *F/V Archangel*	1125	2 m	13 C	0.375 m	Squid	3–11	7	44
2003	8/03–8/07	*F/V Masonic* *F/V Ida June* *F/V Archangel*	1125	2 m	13 C	0.375	Squid	3–11	7	44
2004	8/05–8/09	*F/V Masonic* *F/V Charles T* *F/V Archangel*	1125	2 m	13 C	0.375	Squid	3–11	7	44
2005	7/27–8/02	*F/V Charles T* *F/V Seaview* *F/V Masonic*	1125	2 m	13 C	0.375	Squid	3–11	7	44
2006	8/01–8/07	*F/V Charles T* *F/V Seaview* *F/V Masonic*	1125	2 m	13 C	0.375	Squid	3–11	7	44
2007	8/04–8/10	*F/V Charles T* *F/V Seaview* *F/V Masonic*	1125	2 m	13 C	0.375	Squid	3–11	7	44