

Fishery Data Series No. 08-62

2007 NSEI (Chatham Strait) Sablefish Tagging Survey

by

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and

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Alaska Department of Fish and Game

Divisions of Sport Fish and Commercial Fisheries



Symbols and Abbreviations

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Weights and measures (metric)		General		Measures (fisheries)	
centimeter	cm	Alaska Administrative Code	AAC	fork length	FL
deciliter	dL			mid-eye to fork	MEF
gram	g	all commonly accepted abbreviations	e.g., Mr., Mrs., AM, PM, etc.	mid-eye to tail fork	METF
hectare	ha			standard length	SL
kilogram	kg	all commonly accepted professional titles	e.g., Dr., Ph.D., R.N., etc.	total length	TL
kilometer	km				
liter	L	at	@	Mathematics, statistics	
meter	m	compass directions:		<i>all standard mathematical signs, symbols and abbreviations</i>	
milliliter	mL	east	E	alternate hypothesis	H _A
millimeter	mm	north	N	base of natural logarithm	<i>e</i>
		south	S	catch per unit effort	CPUE
Weights and measures (English)		west	W	coefficient of variation	CV
cubic feet per second	ft ³ /s	copyright	©	common test statistics	(F, t, χ^2 , etc.)
foot	ft	corporate suffixes:		confidence interval	CI
gallon	gal	Company	Co.	correlation coefficient	
inch	in	Corporation	Corp.	(multiple)	R
mile	mi	Incorporated	Inc.	correlation coefficient	
nautical mile	nmi	Limited	Ltd.	(simple)	r
ounce	oz	District of Columbia	D.C.	covariance	cov
pound	lb	et alii (and others)	et al.	degree (angular)	°
quart	qt	et cetera (and so forth)	etc.	degrees of freedom	df
yard	yd	exempli gratia		expected value	<i>E</i>
		(for example)	e.g.	greater than	>
Time and temperature		Federal Information Code	FIC	greater than or equal to	≥
day	d	id est (that is)	i.e.	harvest per unit effort	HPUE
degrees Celsius	°C	latitude or longitude	lat. or long.	less than	<
degrees Fahrenheit	°F	monetary symbols		less than or equal to	≤
degrees kelvin	K	(U.S.)	\$, ¢	logarithm (natural)	ln
hour	h	months (tables and figures): first three letters	Jan, ..., Dec	logarithm (base 10)	log
hour	h	registered trademark	®	logarithm (specify base)	log ₂ , etc.
minute	min	trademark	™	minute (angular)	'
second	s	United States (adjective)	U.S.	not significant	NS
		United States of America (noun)	USA	null hypothesis	H ₀
Physics and chemistry		U.S.C.	United States Code	percent	%
all atomic symbols		U.S. state	use two-letter abbreviations (e.g., AK, WA)	probability	P
alternating current	AC			probability of a type I error	
ampere	A			(rejection of the null hypothesis when true)	α
calorie	cal			probability of a type II error	
direct current	DC			(acceptance of the null hypothesis when false)	β
hertz	Hz			second (angular)	"
horsepower	hp			standard deviation	SD
hydrogen ion activity	pH			standard error	SE
(negative log of)				variance	
parts per million	ppm			population	Var
parts per thousand	ppt,			sample	var
	‰				
volts	V				
watts	W				

FISHERY DATA REPORT NO. 08-62

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ABSTRACT

The Alaska Department of Fish and Game (ADF&G) manages the Northern Southeast Inside (NSEI) Subdistrict sablefish (*Anoplopoma fimbria*) fishery in Southeast Alaska. Mark-recapture methods are used to estimate abundance of this resource. In 2007 longlined pot gear was set to catch sablefish in the NSEI management area, which includes the waters of Chatham Strait and Frederick Sound. Forty-two sets were made with a total of 1,695 pots to capture 7,742 sablefish. Healthy sablefish greater than 500 mm were tagged, finclipped, and released. A total of 6,158 sablefish were tagged, and tags were successfully distributed within and among statistical areas in similar proportion to the 2006 commercial catch. Every 11th sablefish was retained as a biological sample, and otoliths, length, sex, and maturity state were collected. A total of 673 biological samples were collected.

Key words: Sablefish, black cod, NSEI, Chatham Strait, Frederick Sound, tagging, mark-recapture

INTRODUCTION

Sablefish is one of the most commercially important species in Southeast Alaska. The NSEI longline fishery occurs in the deep water fjords of Chatham Strait (between 58°19'N and 56°10'N latitude) and in Frederick Sound (approximately 134°25'W, 56°51'N to 133°54'W, 57°22'N; Figure 1). During the 2007 commercial fishery, the average price paid per round pound was \$2.67 and the total ex-vessel value was \$4 million. Sablefish are a long-lived species with a maximum reported age of 79 years in Southeast Alaska, and with 40-year old fish commonly occurring in commercial harvests (K. Munk, Alaska Department of Fish and Game, Fishery Biologist, personal communication). Careful management of the NSEI commercial fishery is necessary to achieve sustainability of this high-valued resource.

Alaska Department of Fish and Game (ADF&G) manages the NSEI sablefish commercial fishery by setting annual harvest quotas based on abundance estimates determined from mark-recapture methods. A survey is performed annually to tag and finclip sablefish as the marking portion of the study; the recapture portion occurs from port sampling sablefish landed by the NSEI sablefish longline fishery. During the tagging survey, sablefish are marked throughout the NSEI Subdistrict in proportion to the prior year commercial catch by statistical area. For mark recovery, port samplers observe the majority of NSEI longline sablefish landed in the three major ports of Sitka, Juneau, and Petersburg. Fish are carefully examined for tail clips, and the total number of fish with and without tail clips, along with marking information is used to determine a Petersen estimate of abundance. The sablefish tagging survey occurs during June, ending approximately a month and a half before the NSEI longline fishery begins on August 15. Sablefish have been tagged and/or finclipped in the NSEI Subdistrict since 1997. From 1997 to 1999, sablefish were captured during the survey using longline gear. The pattern of recaptures by the longline fishery indicated that fish were gear shy due to their initial capture by longline gear for marking (Carlile et al. 2002). As a consequence, capture of sablefish for marking shifted to longlined pots in 2000.

The survey also provides tagging and biological information used to study sablefish movement and biological parameters. This report summarizes the results from the 2007 NSEI sablefish tagging survey.

OBJECTIVES

1. Capture, tag, finclip, and release at least 7,500 sablefish greater than 500 mm in order to estimate population abundance based on a Petersen mark-recapture estimate.
2. Capture, measure, and release sablefish 500 mm and less.
3. Tag fish among statistical areas in proportion to the 2006 commercial catch from each area.
4. Tag fish within statistical areas to insure complete mixing.
5. Collect biological samples from the total size distribution of sablefish captured.

METHODS

OPERATIONS

The survey was performed in statistical areas where at least 3% of the NSEI 2006 sablefish longline fishery catch occurred (Table 1). The R/V *Zoltoi*, a 101' research vessel, was chartered to conduct the sablefish pot tagging survey from June 1 through June 25, 2007. Contract costs were \$115,000 and included fuel, food, bait, and all fishing gear. The vessel crew and scientific staff are listed in Appendix A.

The survey gear was used to capture live sablefish and consisted of pots attached to a longline to make a string or set. The pots were cone-shaped with a 5' diameter and two opposing tunnels. Each set included about 40 pots with approximately 240 feet of line between each pot. Chopped bait was placed in a bait bag inside each pot. The bait mixture was 3 lbs of chopped herring to 1 lb of chopped squid. In addition, about 3 lbs of pollock were hung inside each pot. In general, two pot strings were set and hauled per day. Pots were soaked for 10 to 25 hours. The minimum soak time was used in areas with a large quantity of "sand fleas" (amphipods) to prevent sablefish mortalities. Captured sablefish and bycatch were released from each pot into a live well that was set up as a temporary holding tank.

DATA COLLECTION

Sablefish greater than 500 mm were finclipped, tagged, and released. Fish were tagged dorsally using orange T-bar tags numbered from 023355–029537. Tagged fish were also marked with a finclip on the upper lobe of their caudal fin (Figure 2) and sampled for length.

Fish were not tagged or finclipped if they were 500 mm or less or if they were determined to have reduced survival ability due to flea bites, injuries, or a lack of vigor. All discarded and released fish were measured for fork length.

Biological samples were collected from the entire size distribution of fish captured. Otoliths, length, sex, and a maturity state were sampled from the first fish of every pot string and every 11th fish thereafter. Maturity state was determined by macroscopic visual examination of the gonads according to a six-stage scale (Table 2).

Fish that were previously tagged with an ADF&G tag and were in good health were re-released after recording the tag number and fork length (to the nearest cm). Fish that were captured that were previously tagged but were not in good health or dead, were retained and sampled for length, otoliths, sex, and maturity.

Bycatch species were identified and counted by species. Rockfish of the genus *Sebastes* were retained, whereas shortspine thornyhead rockfish (*Sebastolobus alascanus*) were released along with all other bycatch.

SAMPLE DESIGN

The target tagging goal was initially set at 6,000 sablefish; however, the tagging goal was adjusted after the first few days of the survey. Generally, the vessel moves from north to south down Chatham Strait to sample statistical areas. Consequently, the tagging goal may be adjusted on a survey after sampling the northern areas with the consideration of time and difficulty of capturing healthy fish in other statistical areas.

Sablefish were tagged among statistical areas in proportion to the 2006 commercial catch from each area based on the target tagging goal set (Table 1). Once the approximate quota was reached for a statistical area, then the next statistical area was sampled. If a quota was reached in the middle of a set, then the remainder of the set was processed if only a few fish were left in the remaining pots. If a large quantity of fish were left in the pots then the sablefish in the remaining pots were estimated and released without tagging or sampling. If the tagging goal for an area was not met in the time frame available, then the area was left.

In order to distribute tagged fish throughout a statistical area, no overlapping sets were performed within a statistical area, and sets were performed both over the latitudinal (north-south) and longitudinal (east-west) range of a statistical area.

Other considerations to set placement were tagging history of an area and availability of habitat. The number of sablefish captured and tagged during previous pot tagging surveys was used to help determine placement of sets. Depths greater than 200 fathoms were considered possible sablefish habitat. In addition, fishing was avoided at established set locations for the NSEI longline survey.

RESULTS AND DISCUSSION

SCHEDULE

The 2007 sablefish pot tagging survey occurred from 2 to 24–June. The R/V *Zoltoi* left Sitka on 2–June, and the crew set the first gear on 2–June. During most days of the survey, two strings of gear were set, and the two strings of gear set the previous day were hauled (Appendix B). The survey began in central Chatham Strait near the entrance to Peril Strait and moved northward just north of the entrance to Icy Strait. Sets were then performed from northern Chatham Strait in a southerly direction to Frederick Sound. Sets 1–16 were made in central and northern Chatham Strait in statistical areas 345803, 345731, and 345701, 2–9 June. The R/V *Zoltoi* docked in Petersburg on 10–June and obtained additional bait and supplies. Sets 17–22 were executed in a southwest direction in Frederick Sound from 11 to 13–June in statistical areas 335701 and 345702. Sets 23–42 were performed in the southern end of Chatham Strait from 14–23 June (statistical areas 345631 and 345603 and southern tip of 345701) and were generally set in a southward direction (Figure 1). The survey was completed in statistical area 345603 on 24–June.

SET INFORMATION

A total of 1,695 pots were deployed with 1,690 pots successfully recovered in 42 sets during the 2007 tagging survey. The sets were made in depths from 182 to 401 fathoms. Soak time averaged 18.7 hours and ranged from 10 to 24.9 hours. Haul time averaged 1.8 hours and ranged from 1.1 to 4 hours (Appendix B).

CATCH AND TAGGING INFORMATION

Ten different species of fish and two species of crab were caught and identified during the survey in 2007 (Appendix C). Sablefish were the dominant species of fish caught, followed by arrowtooth flounder (*Atheresthes stomias*), dover sole (*Microstomus pacificus*), Pacific halibut (*Hippoglossus stenolepis*), and roughey rockfish (*Sebastes aleutianus*). In addition, 43 groundfish were not identifiable due to sand flea damage. A total of 121 invertebrates were captured, including 113 golden king (brown) crab (*Lithodes aequispina*). A total of 9,677 individual fish or invertebrates were caught (Appendix D).

A total of 7,742 sablefish were caught during the 2007 survey; 6,158 of these fish were tagged, finclipped, and released (Appendix E). A total of 212 fish captured were 500 mm or less; as a result, lengths were taken but fish were released without application of a tag or finclip. The catch included 86 fish previously tagged by ADF&G; one of these fish was tagged during the 2007 survey. All of the fish previously tagged by ADF&G were re-released with their original tag. In addition, one fish was captured that was previously tagged by the Department of Fisheries and Oceans (DFO) in Canada. This fish was retained, biological information collected, and the tag was returned to DFO. An additional 193 fish were captured and then discarded or released without tagging because they were dead or not healthy due to sand flea damage or other injuries, such as pot abrasions or a torn mouth. In addition, an estimated 418 sablefish were released without tagging because either the quota was reached for an area or pot contents were discarded to ease the release of a shark. A total of 673 sablefish were retained for biological sampling.

The target tagging goal of 7,500 sablefish was not met in 2007. Prior to the survey a tagging target of 6,000 sablefish was set. However, after high catches of healthy fish at the beginning of the survey in central and northern Chatham Strait (statistical areas 345701, 345731, and 345803), the tagging goal was changed to 7,500 sablefish under the guidance of the groundfish biometrician. In previous surveys high tagging goals were more difficult to reach in the northern area of Chatham Strait due to lower sablefish catches and sand flea damage (Richardson 2003; D. Holum, ADF&G, personal communication). Due to increased catches in the northern statistical areas it was expected that this higher tagging goal for 2007 could be met in the other statistical areas as well. Tagging goals were met in northern and central Chatham Strait statistical areas 345803 and 345731 and nearly met in statistical area 345701. Sablefish catches were lower in southern Chatham Strait and Frederick Sound compared to northern Chatham Strait; hence, tagging goals were not met in Frederick Sound (335701 and 345702) and in southern Chatham Strait (345603 and 345631; Table 3). If the initial tagging target of 6,000 sablefish was maintained, then the target tagging goal would have been met for the survey with 6,158 sablefish tagged; however, the tagging goals in southern Chatham Strait and Frederick Sound statistical areas would still not have been met. In general, tags were distributed consistent with the 2006 percent of harvest by statistical area; the difference between percent tagged in a statistical area and percent of 2006 catch in that area was 7% or less (Table 3). Similar to 2006, sand flea

predation was high in statistical area 345701 in central Chatham Strait; several sets (11–14) were made with a high number of sablefish discarded due to sand fleas compared to other sets (Appendix E). By contrast, sand flea predation for statistical area 345731 was much lower in 2007 than in 2006; as a result, it was easier to meet tagging goals in this statistical area (O’Connell and Holum 2007).

Smaller to mid-sized sablefish (390–650 mm) composed a greater proportion of the catch in central Chatham Strait (345731 and 345701), whereas mid-sized to larger fish (660–1090 mm) composed a greater proportion of the catch in northern Chatham Strait, Frederick Sound (345702 and 335701), and the adjacent statistical area (345631). Around Cape Ommaney (345603) there was a similar proportion of the size classes examined (Figure 3; Table 4).

BIOLOGICAL INFORMATION

The 7,310 sablefish fork lengths collected in 2007 exhibited a larger range of lengths and a greater average length compared to 2006 (O’Connell and Holum). The length varied from 390 mm to 1,090 mm with an average length of 645 mm (Figure 4). The length frequency histogram was slightly skewed to the right with the trailing tail attributed to the larger fish lengths. The histogram may not exhibit this trailing pattern for smaller fish lengths, because smaller fish may differentially recruit to the pot gear, and fish less than 400 mm rarely recruit to the pot gear (J. Stahl, ADF&G, unpublished data; Figure 4). Of the 6,158 sablefish tagged, fork lengths were recorded for 6,150 fish. The average length of sablefish tagged and released was 645 mm; the same value estimated for all sablefish captured and measured (Figure 5). Of the 673 biological samples, otoliths were collected from 671 fish and fork lengths were collected from 670 fish with an average length of 648 mm (Figure 6). Females had a greater average length of 679 mm compared to an average male length of 618 mm (Figure 7); females accounted for 58% of the sampled fish compared to 42% for males.

During the timing of the pot survey (June), the majority of females sampled were mature (maturity stages 3–6) and at the early stages of preparation for the upcoming spawning season (Jan.–April)¹. Sixty-five percent of females were classified into a post-spawning condition (stage 5 or 6); these fish did not have eggs visible to the “naked eye”. However, many of these fish probably have some yolk development in their oocytes¹. Very few females were considered to be ripe (stage 3; 3%) or spawning (stage 4; <1%). In addition, 10% of females were classified as immature (stage 1) and 22% as maturing juvenile (stage 2; Figure 8). Immature fish are not expected to spawn in the approaching season, but at least half of the maturing juvenile would probably spawn in the approaching season¹. The majority of male sablefish were classified into an inactive maturity state; 44% were classified as post-spawning (stage 5 or 6) and 46% as either immature (stage 1) or maturing juvenile (stage 2). Only a small percentage of male sablefish were considered to be ripe (stage 3; 10%) or spawning (stage 4; 1%; Figure 8).

¹ J. Stahl, ADF&G, unpublished results

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TABLES AND FIGURES

Table 1.—Number of sablefish to tag by NSEI statistical area for a given number of total tags for all statistical areas.

Number of fish to tag by statistical area and by total number of fish tagged for all areas													
Statistical area	2006 harvest (whole lbs)	Approximate proportion of 2006 catch	3,500	4,000	4,500	5,000	5,250	5,500	5,750	6,000	6,500	7,000	7,500
			335701	61,839	2.90%	101	116	130	145	152	159	167	174
345534	183	negligible	0	0	0	0	0	0	0	0	0	0	0
345603	264,155	12.38%	433	495	557	619	650	681	712	743	804	866	928
345631	675,530	31.65%	1,108	1,266	1,424	1,583	1,662	1,741	1,820	1,899	2,057	2,216	2,374
345701	670,312	31.41%	1,099	1,256	1,413	1,570	1,649	1,727	1,806	1,884	2,041	2,198	2,356
345702	59,515	2.79%	98	112	125	139	146	153	160	167	181	195	209
345731	260,490	12.21%	427	488	549	610	641	671	702	732	793	854	915
345803	142,426	6.67%	234	267	300	334	350	367	384	400	434	467	500
355707	1,158	negligible	0	0	0	0	0	0	0	0	0	0	0
355801	3,213	negligible	0	0	0	0	0	0	0	0	0	0	0
355830	20	negligible	0	0	0	0	0	0	0	0	0	0	0
365804	526	negligible	0	0	0	0	0	0	0	0	0	0	0
Grand Total	2,139,366	100.00%	3,500	4,000	4,500	5,000	5,250	5,500	5,750	6,000	6,500	7,000	7,500

Table 2. Sablefish maturity condition using a six-stage scale for macroscopic examination of gonads.

Maturity code	Condition	Macroscopic examination	
		Males	Females
1	Immature	Testes very narrow, parallel, flat and ribbon-like, almost clear in color. Longitudinal creases are easily discernible.	Ovaries appear as two narrow ovoids. May be vained.
2	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 coming year. More veined. Cloudy, but not necessarily throughout.
3	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.
4	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.
5	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.
6	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 follicular structure.

Table 3.–Marking goals and actual number of marked sablefish released by statistical area for the NSEI tagging survey, 2007.

Statistical area	Approximate percent of 2006 catch	Goal based on 7,500 tagged	Number tagged	Percent tagged	Released <500 mm
335701	3%	217	78	1%	0
345603	12%	928	661	11%	5
345631	32%	2,374	1,597	26%	18
345701	31%	2,356	2,332	38%	152
345702	3%	209	72	1%	1
345731	12%	915	915	15%	22
345803	7%	500	503	8%	14

Table 4.–Proportion of sablefish by length class in each statistical area for the NSEI tagging survey, 2007.

Statistical area	Number 390–650 mm	Number 660–1090 mm	Proportion 390–650 mm	Proportion 660–1090 mm
335701	26	62	0.30	0.70
345603	391	369	0.51	0.49
345631	776	1075	0.42	0.58
345701	1864	1029	0.64	0.36
345702	23	62	0.27	0.73
345731	707	354	0.67	0.33
345803	234	338	0.41	0.59

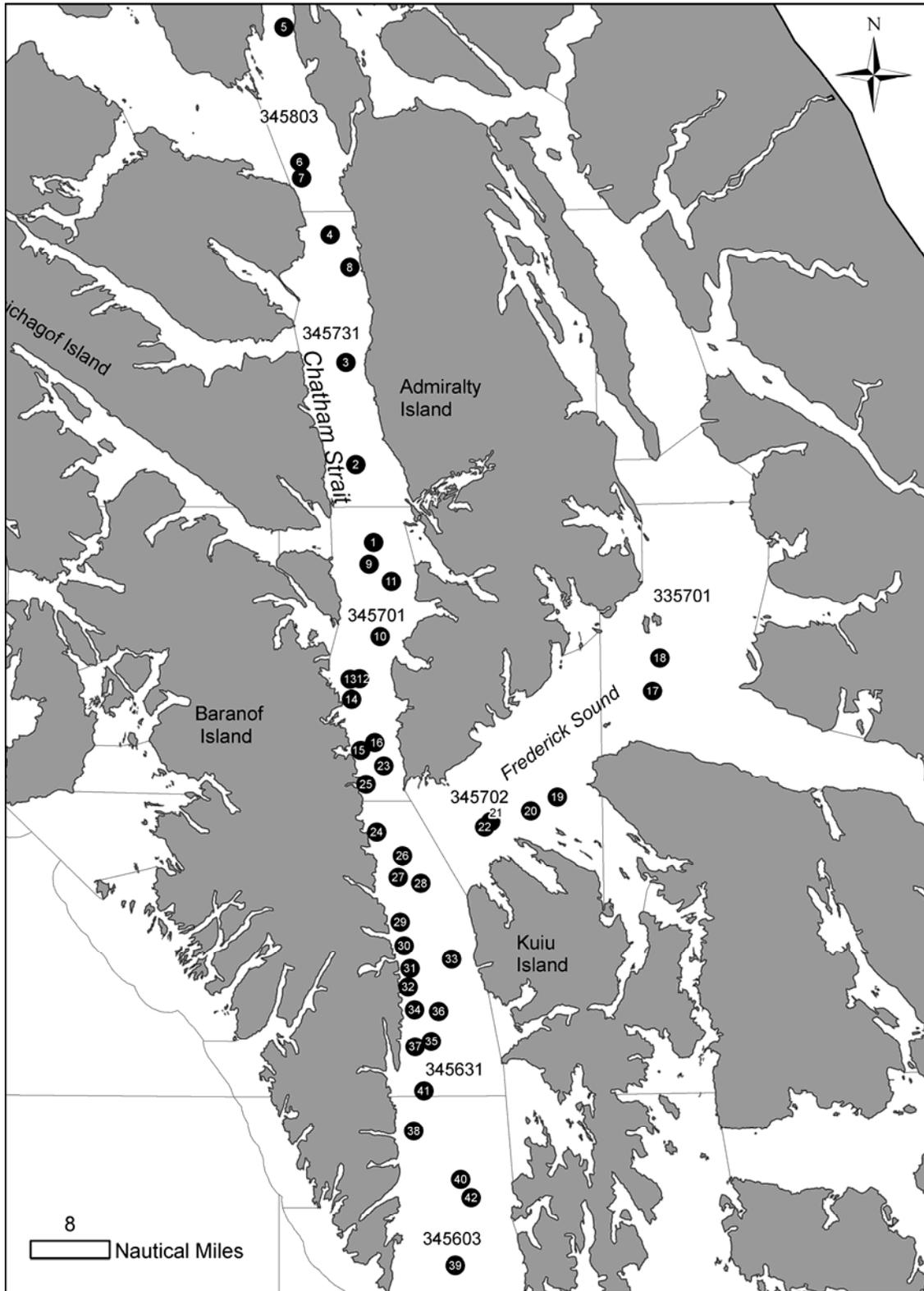


Figure 1.—Set locations for the NSEI sablefish tagging survey, 2007.

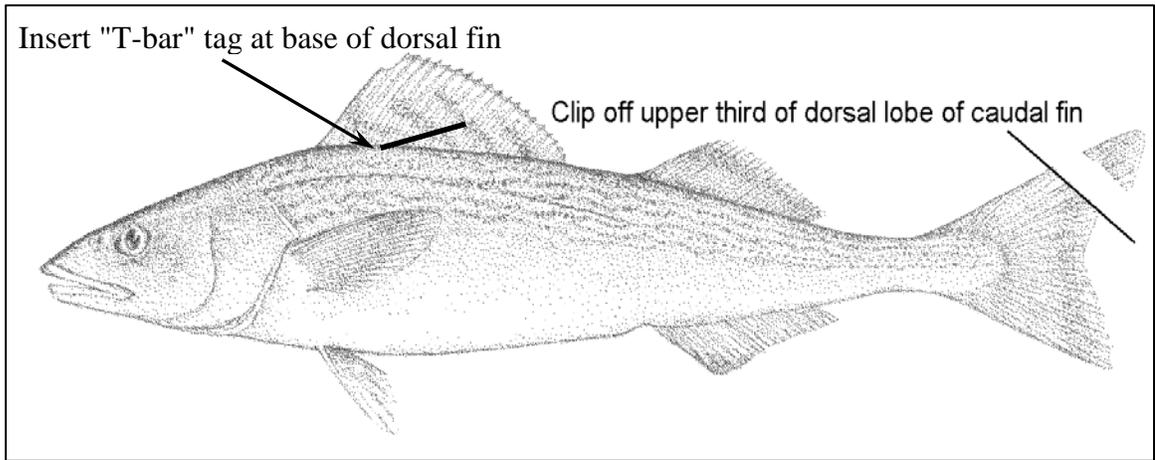


Figure 2.—Sablefish marking guidelines, NSEI tagging survey, 2007. Sablefish are double-marked with an upper caudal finclip and a T-bar tag.

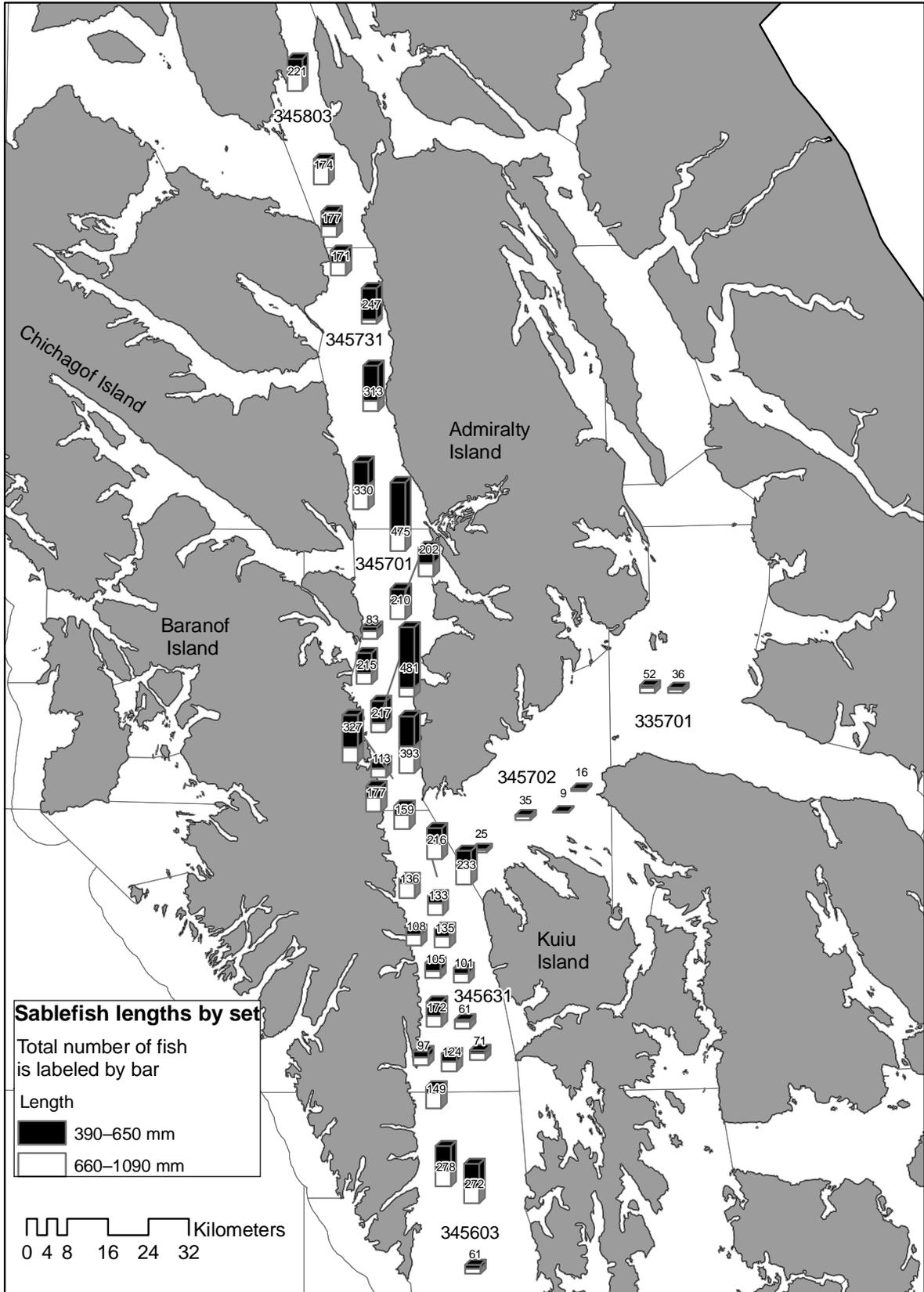


Figure 3.—Sablefish length distribution mapped by set, NSEI tagging survey, 2007.

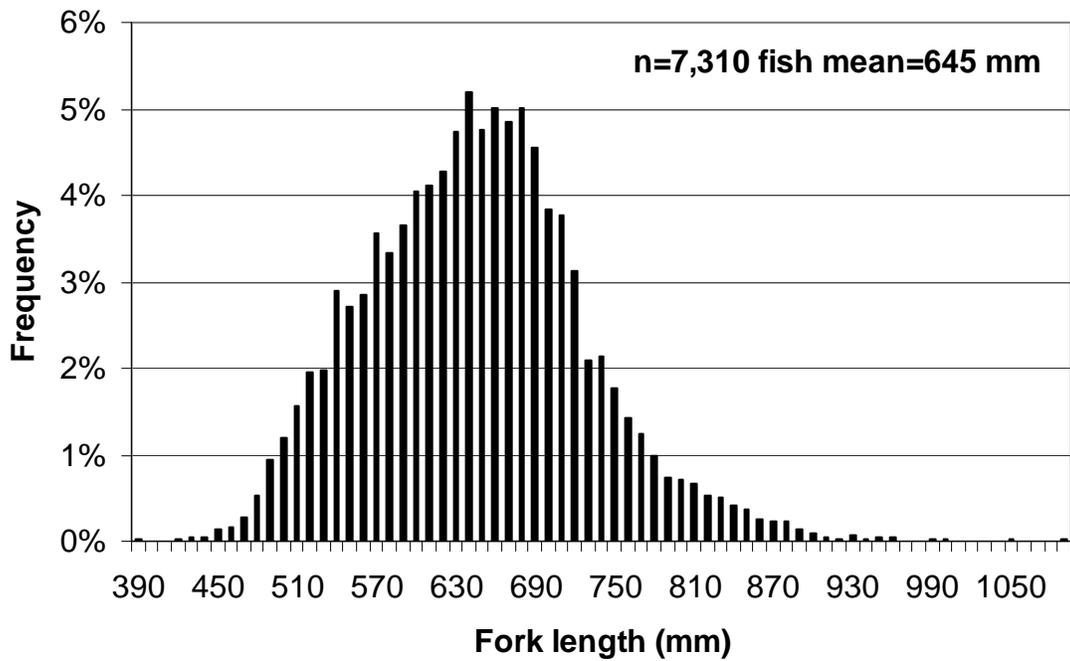


Figure 4.—Length frequency distribution for all sablefish captured and sampled for length during the NSEI tagging survey, 2007.

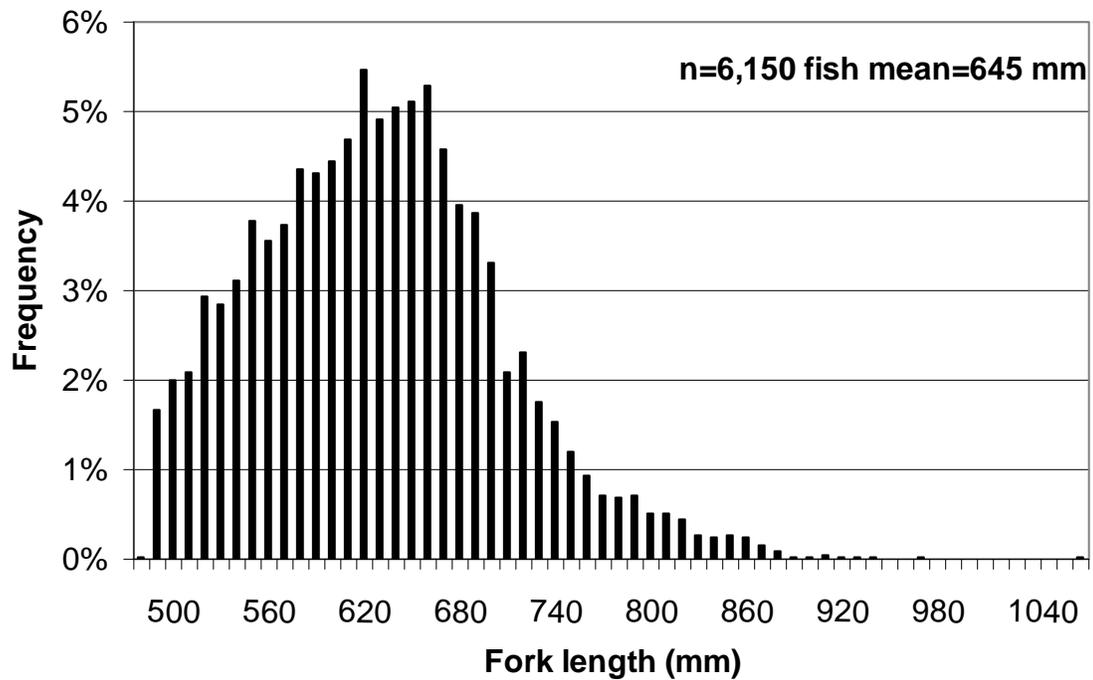


Figure 5.—Length frequency distribution for sablefish marked and released during the NSEI tagging survey, 2007.

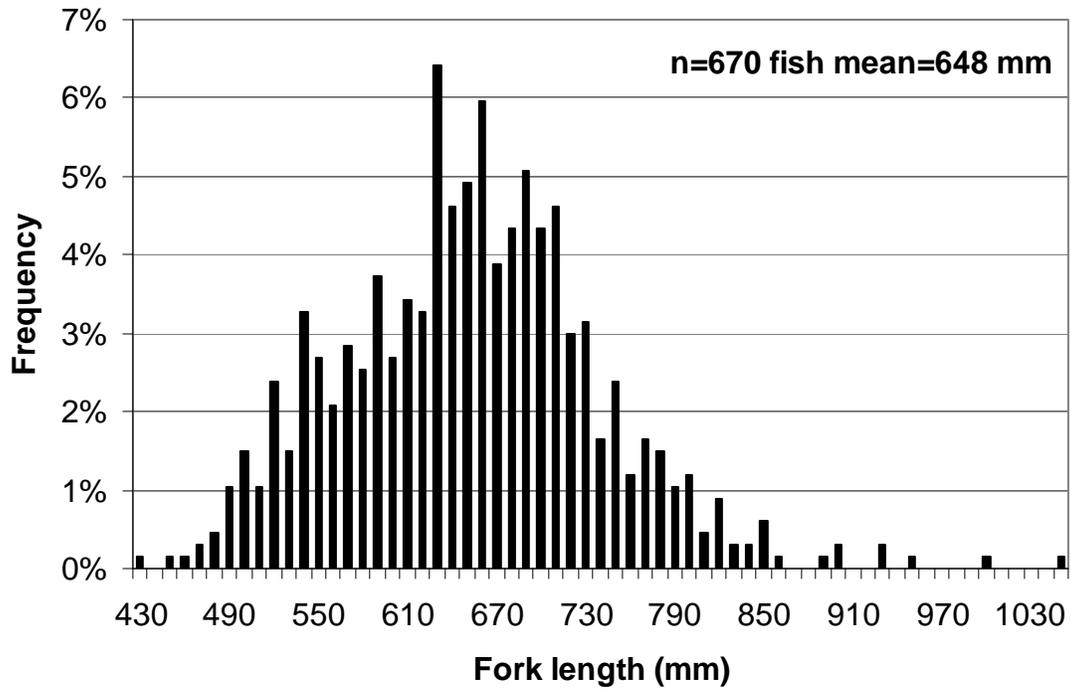


Figure 6.—Sablefish length frequency distribution for biological samples collected during the NSEI tagging survey, 2007.

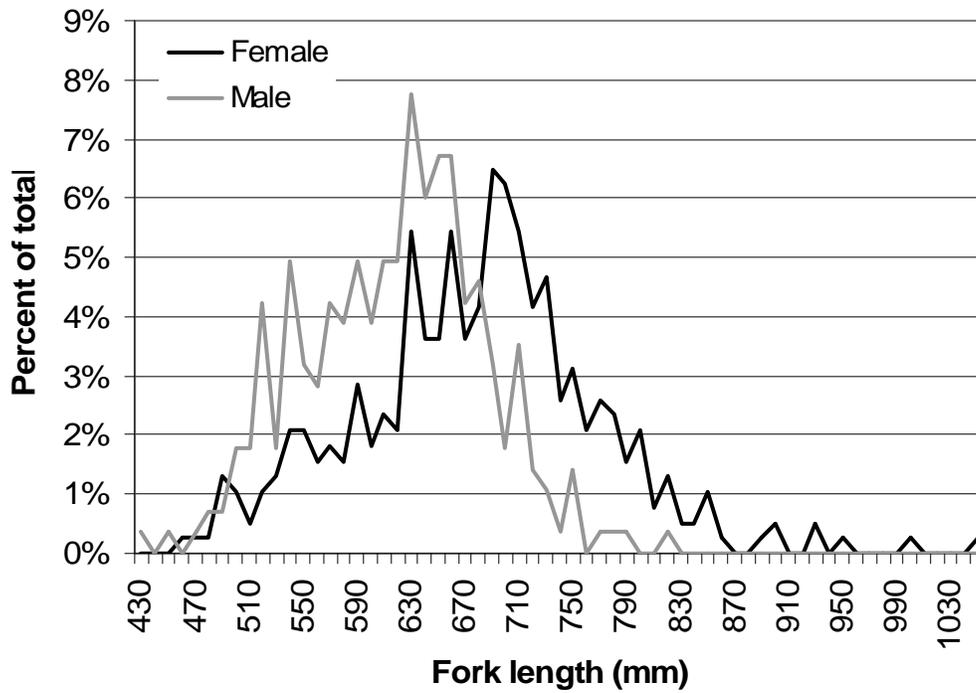


Figure 7.—Sablefish length frequency distributions, by sex, for biological samples collected during the NSEI tagging survey, 2007.

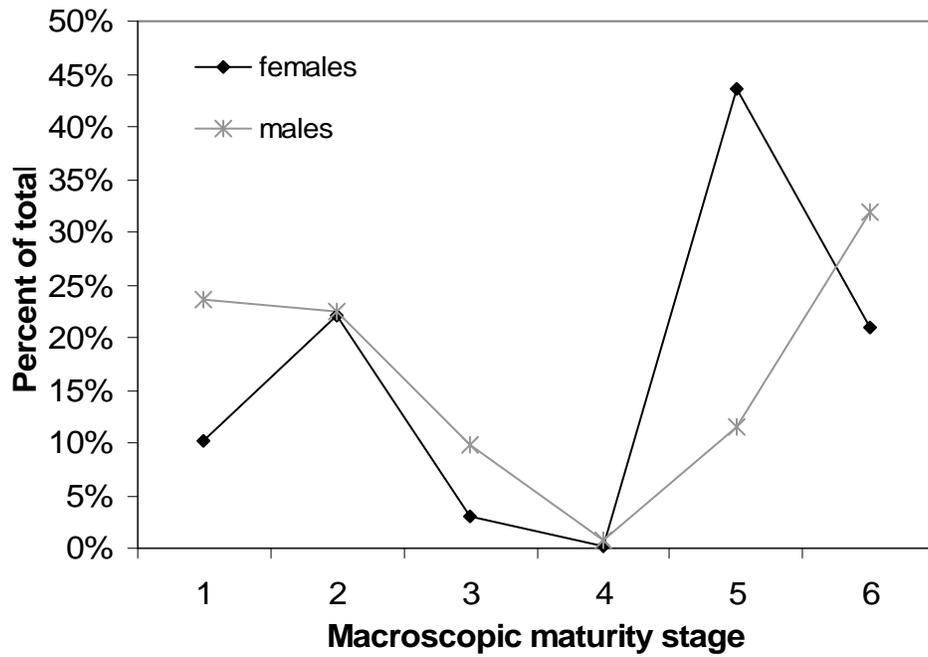


Figure 8.—Frequency of occurrence of macroscopic maturity stages, by sex, for sablefish biological samples collected during the NSEI tagging survey, 2007.

APPENDICES

Appendix A.—Crew from the R/V *Zoltoi* and staff from the Alaska Department of Fish and Game on the NSEI pot tagging survey, 2007 (first leg, June 2–10 and second leg, June 11–24).

Name	Position	Affiliation	Leg(s)
John Jorgenson	Skipper	R/V <i>Zoltoi</i>	Both
Don Bolz	Engineer	R/V <i>Zoltoi</i>	Both
Manuel Pasillas	Deck	R/V <i>Zoltoi</i>	Both
Andrew Higashi	Deck	R/V <i>Zoltoi</i>	Both
Deidra Holum	Survey leader	ADF&G	Both
Sherri Dressel	Scientific staff	ADF&G	First (2–6)
Kamala Carroll	Scientific staff	ADF&G	First
Rebecca Knight	Scientific staff	ADF&G	Second
Jennifer Stahl	Scientific staff	ADF&G	First (6–10) and Second

Appendix B.—Detailed set information, including location and timing, for the NSEI pot tagging survey, 2007.

Set	Stat area	Start				End				Date Set	Time set	Hours		Haul direction	# Pots set	Depth (fm)			Substrate
		Lat deg	Lat min	Long deg	Long min	Lat deg	Lat min	Long deg	Long min			Soak time	Haul time			Start	End	Avg	
1	345701	57	26.36	134	42.23	57	27.96	134	40.90	6/2/07	20:00	12.33	4.00	Same	43	314	270	297	Mud
2	345731	57	34.25	134	45.49	57	32.39	134	48.17	6/2/07	21:50	19.17	2.58	Opposite	39	309	337	309	Mud/Gravel
3	345731	57	44.61	134	47.31	57	42.88	134	46.15	6/3/07	15:25	15.83	2.75	Same	40	291	292	286	Mud/Gravel
4	345731	57	57.65	134	50.25	57	59.50	134	52.56	6/4/07	0:30	14.50	1.75	Opposite	40	313	286	307	Mud/Gravel
5	345803	58	18.72	134	59.02	58	17.01	135	1.28	6/4/07	20:30	10.00	2.00	Opposite	40	324	323	326	Mud/Soft
6	345803	58	5.03	134	55.96	58	7.06	134	55.98	6/4/07	13:35	24.92	1.73	Same	40	376	337	355	Mud/Gravel
7	345803	58	3.39	134	55.64	58	1.43	134	54.40	6/5/07	17:00	16.00	1.67	Same	40	323	306	313	Mud
8	345731	57	54.28	134	46.51	57	52.17	134	46.43	6/5/07	12:10	24.08	2.25	Opposite	40	278	269	269	Mud
9	345701	57	24.15	134	43.10	57	22.86	134	40.21	6/6/07	19:20	12.17	2.00	Opposite	40	331	330	317	Mud
10	345701	57	16.76	134	41.07	57	18.60	134	42.98	6/6/07	20:55	14.58	1.25	Same	40	307	295	311	Rock
11	345701	57	22.39	134	38.88	57	20.67	134	40.93	6/7/07	10:40	21.08	1.83	Opposite	40	354	340	341	Mud/Gravel
12	345701	57	12.50	134	44.94	57	13.78	134	47.64	6/7/07	14:30	21.67	1.67	Same	40	342	330	332	Mud
13	345701	57	12.46	134	46.69	57	10.58	134	44.71	6/8/07	11:30	19.50	2.50	Opposite	40	322	336	326	Mud/Soft
14	345701	57	10.36	134	46.44	57	8.64	134	44.76	6/8/07	14:40	21.17	1.83	Opposite	39	327	338	333	Mud
15	345701	57	5.19	134	44.81	57	3.42	134	42.59	6/9/07	10:45	20.58	2.33	Same	42	342	358	337	Mud
16	345701	57	5.97	134	42.15	57	4.29	134	40.93	6/9/07	14:40	20.75	2.08	Opposite	40	354	352	355	Mud
17	335701	57	10.92	133	50.36	57	12.49	133	47.47	6/11/07	23:00	13.33	1.08	Same	40	217	221	230	Mud/Gravel
18	335701	57	14.29	133	48.87	57	12.53	133	52.08	6/12/07	0:20	13.58	1.08	Opposite	40	204	251	313	Mud/Gravel
19	345702	57	0.25	134	8.36	57	2.19	134	5.78	6/12/07	18:00	13.50	1.33	Same	40	203	203	196	Mud/Gravel
20	345702	56	58.87	134	13.33	56	59.90	134	9.36	6/12/07	19:30	15.83	1.43	Same	40	201	210	195	Mud/Gravel
21	345702	56	57.84	134	20.76	56	59.17	134	16.74	6/13/07	10:50	20.42	1.75	Opposite	40	192	182	186	Sand
22	345702	56	57.30	134	21.86	56	55.75	134	25.37	6/13/07	14:10	20.00	1.67	Same	40	191	183	186	Sand
23	345701	57	3.61	134	40.52	57	1.65	134	42.29	6/14/07	15:00	17.42	1.83	Same	40	352	349	357	Mud
24	345631	56	56.87	134	41.85	56	58.34	134	40.37	6/14/07	13:40	23.08	1.58	Opposite	40	340	334	339	Mud/Gravel
25	345701	57	1.72	134	43.80	57	3.81	134	44.87	6/15/07	11:25	21.58	1.67	Same	40	337	344	349	Mud/Clay

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Set	Stat area	Start				End				Date Set	Time set	Hours		Haul direction	# Pots set	Depth (fm)			
		Lat deg	Lat min	Long deg	Long min	Lat deg	Lat min	Long deg	Long min			Soak time	Haul time			Start	End	Avg	Substrate
26	345631	56	54.44	134	37.15	56	53.58	134	34.13	6/15/07	15:15	22.00	1.92	Opposite	40	353	356	361	Mud
27	345631	56	52.31	134	37.94	56	52.95	134	34.08	6/16/07	12:45	20.25	2.00	Same	40	368	364	359	Mud
28	345631	56	51.68	134	33.75	56	50.97	134	36.83	6/16/07	16:30	20.75	1.50	Same	38	384	380	381	Mud
29	345631	56	47.76	134	37.63	56	48.01	134	33.94	6/17/07	12:15	22.08	1.50	Same	40	392	397	394	Mud/Soft
30	345631	56	45.35	134	36.89	56	46.26	134	33.95	6/17/07	16:30	21.83	1.50	Opposite	38	398	401	394	Mud
31	345631	56	43.03	134	35.85	56	44.04	134	32.69	6/18/07	13:35	17.42	1.83	Same	42	380	399	387	Mud
32	345631	56	41.15	134	36.24	56	42.43	134	33.86	6/18/07	17:10	18.25	1.58	Same	38	377	379	377	Mud/Soft
33	345631	56	43.95	134	28.17	56	41.93	134	29.01	6/19/07	10:20	20.67	1.50	Opposite	42	350	341	349	Mud/Gravel
34	345631	56	38.83	134	35.07	56	37.25	134	33.57	6/19/07	14:00	21.00	1.75	Opposite	40	350	353	351	Mud/Gravel
35	345631	56	35.59	134	32.02	56	33.64	134	29.90	6/20/07	9:50	21.67	1.50	Opposite	43	351	335	353	Mud
36	345631	56	38.64	134	30.62	56	37.03	134	28.84	6/20/07	13:50	21.58	1.58	Opposite	41	372	317	335	Mud/Gravel
37	345631	56	35.05	134	34.97	56	33.12	134	32.83	6/21/07	10:15	21.00	1.67	Opposite	44	312	328	320	Mud/Hard
38	345603	56	26.46	134	35.36	56	28.54	134	34.50	6/21/07	15:30	18.75	1.50	Same	41	323	319	320	Mud
39	345603	56	12.80	134	27.94	56	10.88	134	27.22	6/22/07	14:40	16.75	1.50	Same	43	373	343	359	Sand
40	345603	56	21.52	134	26.83	56	20.20	134	29.04	6/22/07	13:20	21.33	2.00	Same	39	401	362	393	Sand
41	345631	56	30.56	134	33.45	56	32.48	134	31.46	6/23/07	15:45	14.25	1.67	Opposite	45	295	357	326	Sand
42	345603	56	19.66	134	24.99	56	18.40	134	27.34	6/23/07	13:45	19.83	2.08	Same	38	390	398	397	Sand

Appendix C.–Species caught and identified during the NSEI tagging survey, 2007.

Common name	Scientific name
Sablefish	<i>Anoplopoma fimbria</i>
Rougeye rockfish	<i>Sebastes aleutianus</i>
Shortraker rockfish	<i>Sebastes borealis</i>
Redbanded rockfish	<i>Sebastes babcocki</i>
Shortspine thornyhead rockfish	<i>Sebastolobus alascanus</i>
Arrowtooth flounder	<i>Atheresthes stomias</i>
Halibut	<i>Hippoglossus stenolepis</i>
Dover sole	<i>Microstomus pacificus</i>
Pacific sleeper shark	<i>Somniosus pacificus</i>
Pacific cod	<i>Gadus macrocephalus</i>
Tanner crab	<i>Chionoectes bairdi</i>
Golden (brown) king crab	<i>Lithodes aequispina</i>

Appendix D.-Catch by set for the NSEI pot tagging survey, 2007.

Set	Groundfish					Sharks	Rockfish				Invertebrates				Total	
	Sablefish	Pacific cod	Arrowtooth flounder	Halibut	Dover sole	Unknown groundfish	Pacific sleeper shark	Thornyhead	Rougheye	Shortraker	Redbanded	Golden king crab	Tanner crab	Octopus		Coral
1	476		9	2	1			3								491
2	330		9	1	1			2	1							344
3	314		11	2				2								329
4	171		18	12	1											202
5	221		9	6	1			1								238
6	174		8		3			1								186
7	229		7	3				2								241
8	615		10	5			1		1							632
9	203		11	1	2		1	3								221
10	83		2	1	4			3	1	1		4				99
11	210		3	1	4	5										223
12	215			4	8	1		1				1				230
13	485		1	1		2		5								494
14	217				19	2										238
15	327		4	1	39								2			373
16	393		5		24			4								426
17	36		98	45					3							182
18	52		72	11					17			3				155
19	16	9	92	17					55		1	3				193
20	9	5	53	17		4			25			15				128
21	35	1	76	16	2	2		5	14		3	39				193
22	25	9	46	12	2	1			70		3	36				204
23	177		5	3	23						1					209
24	159		6	5	25	1	1	1		1					1	200
25	115		1		18	4		1				3				142
26	233		10	3	15	8	1	2								272
27	217		3	1	44	1		1				1				268
28	136		10	2	40			1								189
29	133		23	3	34			2								195
30	108		28	7	35							2	2			182

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Set	Groundfish					Sharks	Rockfish				Invertebrates				Total	
	Sablefish	Pacific cod	Arrowtooth flounder	Halibut	Dover sole	Unknown groundfish	Pacific sleeper shark	Thornyhead	Rougheye	Shortraker	Redbanded	Golden king crab	Tanner crab	Octopus		Coral
31	135		14	1	21			2								173
32	105		40	3	12								1			161
33	102		4	4	11	7										128
34	172		22	2	8							2				206
35	71		23	2	14	2		1				1		1		115
36	61		7	3	9			6		1		1				88
37	97		39	5	11					1		1				154
38	149		9	3	4	1		2				1				169
39	61		10	6	3			2								82
40	278		3	1	4	1		4		1						292
41	124		6	5	5			3						1		144
42	273		3	2	7	1										286
Total	7742	24	810	219	454	43	4	60	187	5	8	113	5	1	2	9,677

Appendix E.—Numbers of sablefish marked, released, retained, or discarded by set for the NSEI tagging survey, 2007.

Set	Released			Retained		Discarded				Total
	Tagged & finclipped	Small fish <500 mm	Previously tagged by ADF&G	Previously tagged by other agency	Biological sample	Sand fleas	Healthy	Not marketable	Numbers estimated	
1	395	25	10		43			3		476
2	286	3	2		29	5		5		330
3	275	5	5		29					314
4	152	1	1		17					171
5	201				20					221
6	152	3	1		16	2				174
7	150	11			16				52	229
8	202	13		1	21	10		2	366	615
9	174	5	4		19		1			203
10	76				7					83
11	170		1		18	21				210
12	137	9	2		20	47				215
13	364	59	1		41	18		2		485
14	164	10	1		20	21		1		217
15	260	31	3		30	3				327
16	337	10	3		36	6		1		393
17	32				4					36
18	46				5			1		52
19	12	1			2			1		16
20	8				1					9
21	30		1		4					35
22	22				3					25
23	156	2	1		16			2		177
24	138	1	2		15			3		159
25	99	1	2		11	2				115
26	198	2	4		22	6		1		233
27	189	3	3		20			2		217
28	122	1			13					136
29	112	1	1		13	1		5		133
30	91	2	4		10			1		108

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Set	Released			Retained		Discarded				Total
	Tagged & finclipped	Small fish <500 mm	Previously tagged by ADF&G	Previously tagged by other agency	Biological sample	Sand fleas	Healthy	Not marketable	Numbers estimated	
31	115	1	5		13			1		135
32	91	1	2		10			1		105
33	90		1		10	1				102
34	144	4	5		15	2		2		172
35	60		1		7	3				71
36	54		1		6					61
37	83	2	3		9					97
38	129		4		14	2				149
39	53		1		6	1				61
40	242	4	6		25			1		278
41	110		2		12					124
42	237	1	3		25	2		5		273
Total	6,158	212	86	1	673	153	1	40	418	7,742