

**Southeast Alaska Northern Southeast Inside Sablefish
Fishery Information Report With Outlook for the
2012 Fishery**

by

Kamala Carroll

and

Kristen Green

March 2013

Alaska Department of Fish and Game

Divisions of Sport Fish and Commercial Fisheries



Symbols and Abbreviations

The following symbols and abbreviations, and others approved for the Système International d'Unités (SI), are used without definition in the following reports by the Divisions of Sport Fish and of Commercial Fisheries: Fishery Manuscripts, Fishery Data Series Reports, Fishery Management Reports, and Special Publications. All others, including deviations from definitions listed below, are noted in the text at first mention, as well as in the titles or footnotes of tables, and in figure or figure captions.

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

FISHERY MANAGEMENT REPORT NO. 13-08

**SOUTHEAST ALASKA NORTHERN SOUTHEAST INSIDE SABLEFISH
FISHERY INFORMATION REPORT WITH OUTLOOK FOR THE 2012
FISHERY**

by

Kamala Carroll and Kristen Green

Alaska Department of Fish and Game, Division of Commercial Fisheries, Sitka

Alaska Department of Fish and Game
Division of Sport Fish, Research and Technical Services
333 Raspberry Road, Anchorage, Alaska, 99518-1599

March 2013

This research was partially supported under the NOAA grant Interjurisdictional Fisheries Act (IJF) NA08NMF4070534, and the Federally funded Alaska Fisheries Information Network (AKFIN).

The Fishery Management Reports series was established in 1989 by the Division of Sport Fish for the publication of an overview of management activities and goals in a specific geographic area, and became a joint divisional series in 2004 with the Division of Commercial Fisheries. Fishery Management Reports are intended for fishery and other technical professionals, as well as lay persons. Fishery Management Reports are available through the Alaska State Library and on the Internet: <http://www.adfg.alaska.gov/sf/publications/>. This publication has undergone regional peer review.

*Kamala Carroll and Kristen Green,
Alaska Department of Fish and Game, Division of Commercial Fisheries,
304 Lake Street, Room 103, Sitka, Alaska 99835-7563, USA*

This document should be cited as:

Carroll, K., and K. Green. 2013. Southeast Alaska Northern Southeast Inside sablefish fishery information report with outlook for the 2012 fishery. Alaska Department of Fish and Game, Fishery Management Report No. 13-08, Anchorage.

The Alaska Department of Fish and Game (ADF&G) administers all programs and activities free from discrimination based on race, color, national origin, age, sex, religion, marital status, pregnancy, parenthood, or disability. The department administers all programs and activities in compliance with Title VI of the Civil Rights Act of 1964, Section 504 of the Rehabilitation Act of 1973, Title II of the Americans with Disabilities Act (ADA) of 1990, the Age Discrimination Act of 1975, and Title IX of the Education Amendments of 1972.

If you believe you have been discriminated against in any program, activity, or facility please write:

ADF&G ADA Coordinator, P.O. Box 115526, Juneau, AK 99811-5526
U.S. Fish and Wildlife Service, 4401 N. Fairfax Drive, MS 2042, Arlington, VA 22203
Office of Equal Opportunity, U.S. Department of the Interior, 1849 C Street NW MS 5230, Washington DC 20240

The department's ADA Coordinator can be reached via phone at the following numbers:

(VOICE) 907-465-6077, (Statewide Telecommunication Device for the Deaf) 1-800-478-3648,
(Juneau TDD) 907-465-3646, or (FAX) 907-465-6078

For information on alternative formats and questions on this publication, please contact:

ADF&G Division of Sport Fish, Research and Technical Services, 333 Raspberry Road, Anchorage AK 99518 (907) 267-2375.

TABLE OF CONTENTS

	Page
LIST OF TABLES.....	ii
LIST OF FIGURES	ii
LIST OF APPENDICES	ii
ABSTRACT	1
INTRODUCTION.....	1
Sablefish Life History.....	1
FISHERY HISTORY	2
Summary.....	2
Commercial Fishery History, 1906–2010.....	3
2011 Commercial Fishery.....	5
RESEARCH ACTIVITIES	6
Stock Assessment	6
Fishery and Survey CPUE.....	6
Movement Research	7
Experimental off-season Winter fishing.....	7
Maturity Data.....	8
Biological Data.....	8
Fishery Bycatch	9
Alaska Board of Fisheries Changes in NSEI Sablefish Commercial Fishing Regulations, 2003–2012.....	10
Participation.....	11
2012 COMMERCIAL FISHERY.....	11
REFERENCES CITED	12
APPENDIX A: CHRONOLOGY OF NSEI SABLEFISH FISHERY MANAGEMENT ACTION AND CHANGES IN SEASON AND HARVEST.....	31
APPENDIX B: ADF&G LOGBOOK PAGE USED IN THE NSEI SABLEFISH FISHERY	35
APPENDIX C: NSEI LONGLINE SURVEY SPECIFICATIONS, 1988–2011	37
APPENDIX D: CALCULATIONS USED BY ADF&G TO STANDARDIZE COMMERCIAL FISHERY SETS FOR HOOK SPACING.....	39
APPENDIX E: SABLEFISH MATURITY STAGES AND CRITERIA USED BY THE ALASKA DEPARTMENT OF FISH AND GAME	41
APPENDIX F: INSTRUCTIONS FOR DELIVERING FISH OUT OF STATE.....	43
APPENDIX G: PERMITS AND PAPERWORK NEEDED TO FISH IN THE NSEI SABLEFISH FISHERY	45
APPENDIX H: LISTING OF ADF&G REGION I COMMERCIAL FISHERIES GROUND FISH PERSONNEL.....	47

LIST OF TABLES

Table	Page
1. Number of permits and vessels, Annual Harvest Objective, catch, Equal Quota Share, and market price in the NSEI sablefish fishery, 1975–2011.	16
2. Summary of NSEI quota share fishery, 2003–2011.	17
3. Decrement types and amounts for 2010–2012.	18

LIST OF FIGURES

Figure	Page
1. Alaska Department of Fish and Game groundfish statistical areas in Northern Southeast Inside.....	20
2. Northern Southeast Inside sablefish reported catch and annual quota, 1906–2011, and average price per pound, 1977–201.	21
3. NSEI sablefish fishery catch-per-unit-effort in round pounds of fish per hook or per standardized hook, depending on the year, and harvest, 1980–2011.	22
4. NSEI sablefish longline survey catch-per-unit-effort in round pounds per hook and harvest, 1980–2011.....	23
5. Northern Southeast Inside sablefish fishery and survey length frequency distribution, 2004–2007.	24
6. Northern Southeast Inside sablefish fishery and survey length frequency distributions, 2008–2012.	25
7. Northern Southeast Inside sablefish fishery length frequency distributions of male and female sablefish in 2011 and 2002.	26
8. Northern Southeast Inside sablefish fishery age frequency distributions, 2002 to 2011.	27
9. Northern Southeast Inside sablefish longline survey age frequency distributions, 1988–2011.	28
10. Northern Southeast Inside round pounds of bycatch, by species, on commercial longline trips targeting sablefish, 1998–2011.....	29

LIST OF APPENDICES

Appendix	Page
A1. Chronology of NSEI sablefish fishery management action and changes in season and harvest.	32
B1. ADF&G logbook page used in the NSEI sablefish fishery	36
C1. NSEI longline survey specifications, 1988–2011.....	37
D1. Calculations used by ADF&G to standardize commercial fishery sets for hook spacing	40
E1. Sablefish maturity stages and criteria used by the Alaska Department of Fish and Game.....	42
F1. Instructions for delivering fish out of state.....	44
G1. Permits and paperwork needed to fish in the NSEI sablefish fishery.....	46
H1. Listing of ADF&G Region I Commercial Fisheries Groundfish Personnel, and addresses for commercial vessel license application processors.....	48

ABSTRACT

The purpose of this document is to provide information on the state managed Northern Southeast Inside sablefish fishery. This report is designed to be used in conjunction with the 2011–2012 Statewide Commercial Groundfish Fishing Regulations and active news releases and emergency orders, as these inseason actions will supersede information provided in this document.

Keywords: Sablefish, black cod, *Anoplopoma fimbria*, Chatham Strait, Northern Southeast Inside Subdistrict, NSEI, Fishery, Management, Outlook Regulations, Quotas, CPUE, Equal Quota Share, EQS, Alaska

INTRODUCTION

The Southeast Alaska sablefish (*Anoplopoma fimbria*) fishery is the oldest and one of the most lucrative groundfish fisheries managed by the State of Alaska. Sablefish are a commercially important species throughout their range, and are typically harvested using longline or pot gear. The Alaska Department of Fish and Game Southeast Region (department) manages the sablefish fishery in the Northern Southeast Inside (NSEI) Subdistrict (Figure 1).

The NSEI sablefish fishery is currently a limited entry, Equal Quota Share (EQS) longline fishery with 83 permit holders in 2011 (Table 1). While the annual harvest objective (AHO) has decreased from 4,761,905 round pounds at the beginning of the EQS fishery in 1994 to 880,000 round pounds in 2011, the price of sablefish has increased consistently during that time period and remains high at \$5.61 per round lb in 2011 (Table 1). EQS have ranged from 38,889 round pounds per permit holder in 1994 to 10,602 round pounds in 2011. This report summarizes historical NSEI commercial longline fishery and management actions, and details recent commercial fishery harvest, biological data, and CPUE. Relevant Alaska Board of Fisheries (board) decisions from 2003 through 2012 and research activities are also summarized.

SABLEFISH LIFE HISTORY

Sablefish are a member of the Anoplopomatidae family. The species occurs in the North Pacific Ocean, the Bering Sea, and adjacent waters from Hokkaido, Japan to Baja California. Sablefish are divided into two populations. The northern population extends from northern British Columbia through the Gulf of Alaska and west to Japan. The southern population extends from southern British Columbia to the Baja peninsula. Their center of abundance is in the Gulf of Alaska (Wolotira et al. 1993). The northern and southern populations were divided based on differences in size at maturity, growth, and movement (McDevitt 1990). Sablefish are known to be highly migratory and commonly travel over 1,000 miles from natal origin (Maloney and Sigler 2008).

Adult sablefish are demersal (Krieger 1997) and inhabit the deeper water areas of the continental shelf, slope, and deep-water coastal fjords. Most adults live at depths between 200 and 500 fathoms (366 m and 915 m), although they have been found at depths ranging from 100 to 1,000 fathoms (183 m to 1,830 m; Allen and Smith 1988). Sablefish generally move to deeper depths as they age (Maloney and Sigler 2008).

Adult sablefish are opportunistic feeders; prey includes Walleye pollock (*Theragra chalcogramma*), eulachon (*Thaleichthys pacificus*), capelin (*Mallotus villosus*), Pacific herring (*Clupea pallasii*), sandlance (family Ammodytidae), Pacific cod (*Gadus macrocephalus*), and flatfish), squid, euphausids, Pandalid shrimps, and jellyfish (Yang and Nelson 2000). Yearling sablefish feed primarily on euphausids (Sigler et al. 2001b).

Juvenile sablefish are preyed upon by adult coho and Chinook salmon (*Oncorhynchus kisutch* and *Oncorhynchus tshawytscha*). Commercial salmon troll logbooks from 1977 through 1984 reported young sablefish as the fourth most common species in the stomach contents of both species (Wing 1985). Pacific halibut (*Hippoglossus stenolepis*) also prey on adult sablefish, although sablefish make up a minor proportion of the total halibut diet (Yang and Nelson 2000). Cod (*Gadus spp.*), lingcod (*Ophiodon elongatus*), hagfishes (class Myxini), sharks, and killer whales (*Orcinus orca*) have also been reported to eat adult sablefish (Kruse et al. 2000).

Sablefish recruitment is marked by periodic exceptional year classes interspersed with periods of relatively low recruitment. Strong cohorts are apparent when large numbers of one-year old sablefish are observed distributed in shallow water across large regions. During years of typical recruitment, one and two-year old sablefish are found in a few specific shallow water areas. Recruitment is thought to be strongest when periodic global weather events such as El Niño or Pacific Decadal Oscillation phase changes lead to above average sea surface temperatures (Sigler et al. 2003).

Sablefish spawn in pelagic waters at depths of 164–273 fathoms (300–500 m) in late winter and early spring, in areas near the edge of the continental slope (McFarlane and Nagata 1988; Sigler et al. 2001a). One study has found that 50% of females are ready to spawn between six and seven years of age and 50% of males are mature at five years old (Sasaki 1985), but there may be regional variability in growth and maturity rates (McDevitt 1990). Eggs develop at depth and larvae develop near surface waters. Juveniles exhibit rapid growth, growing an average of 1.2 mm per day during their first spring and summer. Juvenile sablefish reside in continental shelf waters, often in bays and nearshore waters, and move deeper with age.

In the Gulf of Alaska, adult male sablefish average fork length (FL) averages approximately 69 cm and average weight is 3.4 kg. Adult females average 83 cm FL and average weight is 6.2 kg (Sigler et al. 2003). Maximum length of sablefish randomly sampled from 1997 through 2011 in NSEI surveys was 111 cm for females and 95 cm for males. Male sablefish averaged 65 cm in FL and females averaged 71 cm FL on the survey.

Sablefish are relatively long lived. Fish over age 40 are commonly observed in commercial fishery samples, and the average age of sablefish sampled from the most recent NSEI commercial fishery was 18 years. The maximum reported age for sablefish in Alaska is 94 years (Kimura et al. 1998), and for NSEI, 81 years. As sablefish are difficult to age, these ages should be considered approximate (Pearson and Shaw 2004).

The current federal stock assessment for the Gulf of Alaska estimates the sablefish natural mortality rate at 0.10 (Hanselman et al. 2011). This is similar to several published estimates for the Gulf of Alaska (Johnson and Quinn 1988; Sigler et al. 2001a), although 0.11 (Funk and Bracken 1984) has been used by federal sablefish managers in the past (Sigler et al. 2003).

FISHERY HISTORY

SUMMARY

Although directed fishing for sablefish in NSEI waters was recorded as early as 1913, the majority of sablefish landed in the early 20th century were taken as bycatch in the halibut fishery (Kollien 1944). Directed effort peaked during both World Wars. Other early fishery harvest peaks are associated with demand from the vitamin industry (Figure 2; Bracken 1983). The

1940s brought the beginning of localized depletions and more active fishery management in NSEI (Appendix A). After a period of decline in price and effort during the 1950s and 1960s, the sablefish export market to Japan developed in the 1970s, fueling the next period of fishery growth (Turris 2000). Harvest has been substantial since the 1970s despite some fluctuations in price (Table 1). The primary management tools used by the department and its pre-statehood predecessor (Alaska Department of Fisheries) were guideline harvest ranges (GHR) and season limitations. In 1994, the fishery became an EQS fishery. This occurred after a series of years in which the guideline harvest level was exceeded and seasons were limited to 24 hours in length. The EQS system remains in place, with 83 current participants (Table 1).

COMMERCIAL FISHERY HISTORY, 1906–2010

Similar to the majority of early sablefish landings the first recorded commercial sablefish landing in Southeast Alaska inside state waters occurred as bycatch in the halibut fishery in 1906 (Kollien 1944). Directed landing were recorded as early as 1913. Effort and prices increased during World War I, when the market name “sablefish” was introduced in favor of “black cod,” but the fishery declined after the war (Figure 2; Bracken 1983).

The 1940s saw a major spike in sablefish fishing effort (Figure 2), due in large part to vitamin industry demand for sablefish livers (Bracken 1983), and military demand for vitamin A supplements to enhance soldiers’ night vision (United Press 1942). In 1943, the price per pound for sablefish was 10 cents for the flesh, 35 cents for the viscera and \$1.65 for the liver (Kollien 1944). The highest estimated sablefish harvest recorded in the NSEI area was in 1947, at 6.5 million round pounds. During this time, fishermen experimented with halibut gear modifications to specifically target sablefish. In 1948, the F/V *Wolverine* began targeting sablefish with small-eyed hooks and 9–13-ft hook spacing (Bracken 1983). Smaller hooks were thought to reduce the loss of fish due to spin-off as the gear was hauled to the surface. The Alaska Department of Fisheries conducted a gear comparison survey in Chatham Strait in 1949 and concluded that catch per skate of sablefish was greatly improved with the smaller hook gear compared to standard halibut gear (Edson 1954).

Despite the increased effort and efficiency that occurred during the 1940s, there were declines in CPUE and average fish weight. The fleet moved out of Frederick Sound, once a prime fishing ground, due to diminished catch, and into Chatham Strait (Figure 1). The commercial fleet expressed concern that the spawning stock was being heavily harvested and requested a season limitation (Appendix A; Kollien 1944). The season was reduced in 1945 from year round to between mid-March and late November. Alaska Department of Fisheries did not establish a quota.

Harvest levels and prices slumped after the 1940s (Figure 2) due to the end of the war, development of synthetic vitamins, and a surplus of sablefish meat in cold storage facilities. The fishery was slow through 1971 concurrent with low market prices (Turris 2000), low CPUE, and increasing opportunity in other fisheries (Bracken 1983). During the 1970s, however, the sablefish export market to Japan began developing and interest in sablefish fishing increased again (Turris 2000). At the same time there was a large international (Canadian and Japanese) sablefish fishery developing in the waters offshore from Southeast Alaska (Bracken 1983).

The department shortened fishing seasons and implemented GHRs as effort escalated in the 1970s and 1980s (Figure 2, Appendix A; Bracken 1983). The fishery was restricted to longline gear in 1981. An industry recommended harvest limit of one million dressed pounds was implemented in 1973. The department recommended a reduction in quota to 850,000 dressed

pounds in 1979 and then implemented a 500,000 to 900,000 dressed pounds GHR in 1980 based on historic catches. Fleet effort and efficiency continued to increase and by 1984 season length was reduced to five days in NSEI. In 1985, a limited entry program was implemented for the sablefish fishing fleet in NSEI and the GHR was set between 500,000 and 1,500,000 dressed pounds. The operating efficiency of the NSEI longline fleet increased seven-fold after the limited entry program was established, the average number of hooks set per vessel per day increased from 4,791 in 1984 to 28,514 in 1993. Season length was reduced to stay within the GHR from 76 days in 1980 to one day annually between 1987 and 1993. In 1993, the fleet harvested 3,640,000 dressed pounds (2,140,000 pounds over the upper end of the GHR).

Fishery CPUE (round pounds per hook) was low in the early 1980s, but increased in the mid-1980s with recruitment of strong year classes (Figure 3; Carlile et al. 2002). Due to these strong year classes, CPUE remained greater than one pound per hook from 1982 through 1993 before declining after 1993.

The board adopted an EQS system for the NSEI fishery in 1994 to improve management and promote a safer fishery (Appendix A). The EQS approach was recommended by a working group of industry representatives and state fisheries managers after extensive negotiations (Carroll and Brylinsky 2010). Under the EQS system each permit holder was given an equal share of the annual quota and the fishing season was set in regulation from September 1 through November 15. In addition, the upper end of the GHR was increased to three million dressed pounds (4.76 million pounds round weight) when the EQS system was implemented. The EQS system was made permanent in 1997, at which time logbooks also became mandatory. Total sablefish harvest has been at or near the AHO since 1994 (Figure 2, Table 1). Beginning in 2003, an AHO has been set based on a biomass estimate and a harvest rate rather than a GHR (Tables 1 and 2, Appendix A).

In 1994, after the implementation of EQS, the fishery CPUE began to show a marked decline through 1998, when the lowest fishery CPUE was recorded for NSEI since 1980 (Figure 3). As a result, the fishery AHO was lowered 35% in 1999 from 4.80 million round pounds to 3.12 million round pounds (Figure 2). The department further lowered the AHO by an additional 30% in 2001 to 2.18 million round pounds based on continued low CPUE and a developing stock assessment program, which included a preliminary mark-recapture-based estimate of biomass. In 2002 the AHO was set at 2.01 million round pounds based on a decline in the mark-recapture biomass estimate (Carlile et al. 2002; Richardson and O'Connell 2002). In 2002, an outside panel of experts reviewed the department's developing mark-recapture stock assessment program and suggested changes for future years (Leaman et al. 2002). The department worked to incorporate these changes in methodology, and since 2003, an AHO has been determined by applying a harvest rate to the most current biomass estimate from the mark recapture and decrementing for sablefish mortality in other fisheries.

Between 2003 and 2008, the department used an $F_{40\%}$ biological reference point, (resulting in a harvest rate ranging from 0.101 to 0.138). In 2010, an independent review of the NSEI stock assessment methodology (Mueter 2010) described the stock level in Chatham Strait as very low relative to the historic unfished biomass and that current harvest rates were not sustainable. This information, in part, led to the use of more conservative harvest rates ($F_{45\%}$ in 2009) and $F_{50\%}$ in 2010 and 2011. The department intends to use a $F_{50\%}$ harvest rate in 2012.

In 2010, in an effort to reduce sablefish mortality from the department's testfish harvest in NSEI, the department began allowing permit holders to harvest their personal quota share (PQS) during the department's annual NSEI longline survey. By allowing three permit holders to participate during the 2010 survey the decrement for department survey removals was reduced 33%. In 2011, six permit holders participated in the NSEI longline survey reducing survey removals by 54%. In 2012, three permit holders are scheduled to harvest their PQS during the longline survey.

2011 COMMERCIAL FISHERY

AHO for the 2011 NSEI sablefish fishery was 880,000 round pounds, a 17% reduction from 2010 primarily due to a decrease in biomass.

EQS decreased 13% in 2011 to 10,602 round pounds. The reduction in EQS was not commensurate with the AHO reduction because of reduced department survey removals and the loss of four permits from the fishery. Total commercial harvest in 2011 was 882,779 round pounds, just over the 2011 AHO (Table 2). Total PQS that could legally be harvested after accounting for legal overages and underages from the 2010 season was 879,678 round pounds. There were 83 eligible permit holders in 2011, four less than in 2010 (Table 1). PQS are calculated to accommodate overages and underages from the previous year. Prior to the start of the commercial fishery the department notified each permit holder of the number of pounds that would be added to or deducted from their 2011 season EQS. For 2011, the maximum amount that could be carried forward from 2010 was 611 round pounds (Table 2). In 2011, 83 permit holders using 59 vessels made a total of 94 landings (Table 2). Sixty-seven percent of permit holders made one landing and 25% made two landings. Over 54% of vessels that participated in the 2011 fishery have participated each of the past 10 years. Since implementation of EQS, the number of vessels participating in the fishery has decreased 47% and the number of permits has decreased 31%. The average ex-vessel price reported at the time of landing for NSEI sablefish in 2011 was \$5.61 per round pound, up from \$4.06 in 2010, yielding an ex-vessel value of approximately \$4.9 million dollars for the total harvest (Table 2).

The majority of NSEI sablefish harvest occurs in statistical areas 345631 and 345701 in central Chatham Strait (Figure 1). Since 2008, harvest in these areas has accounted for over 68% of the total harvest.

In 2011, the majority of landings were made in Sitka (47%), 28% were made in Petersburg and 13% in Juneau. A small amount of harvest was landed in Hoonah and Ketchikan, and processed onboard a floating catcher/processor.

Distribution of landings has shifted from Petersburg to Sitka since 2001 with major landing ports of Sitka, Petersburg, Juneau, and Hoonah. The proportion of catch landed in Juneau decreased in 2011 to 13%, while Hoonah has consistently averaged 7% of total landings since 2001. Landings in Kake, Wrangell, Ketchikan, Excursion Inlet, Pelican, at floating processors, at other Alaskan ports, or out of state, are less than 10% of the total landings every year. Landings made outside of Alaska require coordination with additional agencies and additional permits (Appendix C).

In 2011, just over 95% of the harvest was landed in the round (whole fish). The remainder are landed eastern cut (dressed fish). In most years, between 3% and 8% of sablefish landings are eastern cut. In 2011, approximately 0.3% or 1,364 round pounds of the total commercial harvest

was retained as personal use (home pack). The proportion of the commercial catch reported to be retained for personal use has increased since 2004.

RESEARCH ACTIVITIES

STOCK ASSESSMENT

Prior to 1988, limited fisheries independent information was derived from department surveys, at-sea sampling on surveys and opportunistic tag and release events. Additional fisheries information was obtained from a voluntary logbook program or dockside interviews to collect catch and effort data from fishermen. Since 1988, an annual longline survey has been conducted to provide the department with fishery independent estimates of relative abundance. The survey is based on a random stratified design with fixed survey stations (Carlile et al. 2002). Age, weight, sex, maturity and length data are also collected on the survey. Since 1997, longline survey methods have been standardized and are now consistent with federal survey methods, allowing for comparison of sablefish CPUE between state and federal waters (Richardson 2003a).

Mark-recapture studies to estimate sablefish biomass in NSEI have been conducted annually since 1997, with the exception of 2011, when the survey was canceled due to mechanical issues with the survey vessel. These studies involve marking and releasing a subsample of sablefish and then using the proportion of recovered marked fish among the total number of fish captured in the commercial fishery to estimate the population size and exploitation rate (Dressel 2009). Fish were captured using longline gear from 1997 to 1999, but in 2000 pot gear was used. Pot gear eliminated the hook shyness effect which reduced the probability of recapture by the longline fishery in the marking year. Marking of fish occurs in NSEI during May and June, and marked fish are distributed among statistical areas in proportion to the commercial catch taken from each area during the previous three years. Fishermen and fish processors are encouraged to return tags and to note the recovery location of tagged fish in exchange for rewards. (For a detailed description of mark-recapture methodology, see Carlile et al. 2002 and Stahl and Holum 2011).

Department longline survey data, biological data from port sampling in the commercial fishery and sampling at sea in the survey, and the biomass estimate from the mark-recapture study are used to assess population and determine the AHO on an annual basis.

FISHERY AND SURVEY CPUE

NSEI fishery and survey CPUE are analyzed separately to obtain relative abundance indices for sablefish. As of 2011, a general linearized model has been used to calculate fishery CPUE. In the model, hook spacing are standardized to 1-m (Appendix D), fish-ticket landings by trip are apportioned by set, and sets shallower than 450 m are excluded (to avoid including sets where fishermen may not be targeting only sablefish). This creates a relative abundance index that will perform similarly across years, rather than an absolute index that may be affected by changes in fishery behavior (number of dual-target sets and target specification) or management actions over time. The threshold depth was based on the catch ratio of halibut to sablefish of all sets during 2007–2010; this excluded about 14% of the sets.

Fishery CPUE was at a relative low in 2000 of 0.44 round pounds per standardized hook, stabilized from 2004–2006, and then increased from 2006 through 2008 (Figure 3). Since 2008 (0.89 round pounds per standardized hook), fishery CPUE has dropped to 0.73 round pounds per

standardized hook in 2010. In 2011, fishery CPUE increased to 0.86 round pounds per standardized hook. CPUE for 1999–2011 are still well below the extremely high CPUE of the early 1980s that were supported by exceptionally strong year classes.

In addition to fishery CPUE, the longline survey provides a fishery-independent abundance index. Two-meter hook spacing has been used on the Chatham Strait sablefish longline survey from 1997 to 2011. Hook spacing was also standardized to 1-m with the same method used for fishery data (Appendix D). The 2011 longline survey CPUE was 1.82 round pounds per hook, which is higher than previous five years. The lowest survey CPUE of the past ten years was 1.15 in 1999 and 1.11 in 2000 (Figure 4).

Fishery CPUE has historically been lower than survey CPUE. Unlike the fishery, all catch on surveys is accounted for, including fish that are small, predated, lost, etc., thus resulting in a higher CPUE.

MOVEMENT RESEARCH

Sablefish are known to move extensively throughout their range. State, federal, and international agencies cooperate in order to track fish movement through tagging. The department maintains a database of tag and recovery locations of fish tagged externally with ADF&G tags. Department staff return other agency tags recovered in the commercial sablefish fishery or on department surveys to each appropriate agency.

The department conducted a study to evaluate the use of Passive Integrated Transponder (PIT) tags to mark sablefish in 2004. PIT tags are internal tags that can be automatically detected by receivers used by port samplers in processing plants. The goal of this study was to increase the detection rate of marked fish landed in the commercial fishery in the mark-recapture study, and estimate abundance by size category. In June 2004, the department marked 6,357 sablefish with PIT tags in addition to external marks during the annual mark-recapture survey. Recovery of the PIT tags took place in Sitka throughout the 2004 season. Adequate detection rates could not be achieved due to a high failure rate of the detection receivers and it was determined that the data gathered through PIT tag employment did not justify the cost.

In 2010, the department shared state-waters sablefish tag database with NOAA sablefish stock assessment scientists. This project will take place over several years with the goal of estimating migration rates of sablefish in the Gulf of Alaska.

EXPERIMENTAL OFF-SEASON WINTER FISHING

An experimental winter survey occurred in 2004 and 2005. This fishery was conducted in part due to an industry-generated proposal to change the NSEI sablefish fishing season to match the federal Individual Fishing Quota (IFQ) halibut fishery, adopted by the Alaska Board of Fisheries in 2003. Little information was available on NSEI stock status during the winter months when the IFQ season typically begins. The board adopted a regulation allowing fishing for sablefish, during the closed season, under a commissioner's permit for the purpose of gathering fishery and biological information outside of the commercial NSEI season. In 2004 and 2005, NSEI permit holders were randomly selected from a list of interested permit holders to fish in the winter and spring under terms specified by the commissioner. A department observer was on board each vessel to collect data, and to scan caught sablefish for PIT tags released the previous season.

During the experimental fishery, CPUE was low in January and early February compared to the commercial NSEI sablefish season, and more immature fish were caught relative to the summer. Potential hypotheses for the high proportion of immature fish in the catch were 1) mature sablefish were present but spawning and uninterested in the gear, 2) mature fish were not residing in the area fished during spawning, or 3) high spiny dogfish catch meant reduced sablefish catchability.

Experimental fishery CPUE improved after late February and a greater proportion of large, mature fish were captured. In 2005, the experimental fishery tended to catch more, and smaller, male sablefish compared to the commercial fishery. The mean fork length of males was 64 cm in the experimental fishery and 65 cm in the commercial fishery, while it was 72 cm for females during both seasons.

MATURITY DATA

A study to determine the accuracy of macroscopic maturity staging of sablefish was conducted in August 2007 (Appendix E). Ovary samples, fork length, weight, and maturity stage were collected from 215 female sablefish during the department longline survey in NSEI. Maturity stage was determined visually based color and size of the ovary and egg visibility. Ovary samples were then preserved and prepared for histological analysis. The maturity classification assigned based on microscopic analysis was compared to the macroscopic classification determined during the survey. The results confirmed visual maturity classification is appropriate for assessing maturity.

BIOLOGICAL DATA

Fishery length frequency distribution has narrowed (i.e., fewer age classes are contributing to the catch) and length frequency mode has increased over time (Figures 5 and 6). Average fork length of harvested fish has increased from 67 cm in 2002 to 71 cm in 2007 through 2010. Since 2002, length data are available for female and male fish individually. Both female and male length frequency distributions show the same trend as the overall fishery length distributions, but the trend is more apparent for females (Figure 7). Length frequency data collected on the survey show a similar narrowing and increasing trend over the same time period (Figures 5 and 6). Although smaller fish are caught on the survey than the in fishery due to the absence of high grading of small fish on the survey, strong recruitment has not been observed in either the survey or fishery since 2002.

Age data has been collected in the NSEI fishery since 2002. Similar to length distribution, commercial fishery age distribution has narrowed between 2003 and 2010 (Figure 8). The mode of the most abundant age-class in the fishery has increased from 7-year-olds in 2002 to 9-year-olds in 2007 to 13-year-olds fish in 2011 (Figure 8).

There is a longer record of age samples from the longline survey than the commercial fishery. In the late 1980s, the age frequency histograms are narrow, but there is still evidence of older age classes in the survey. Age distributions in the 1990s show strong recruitment and a broad range of ages in the population (Figure 9). There is no evidence of strong recruitment after 2003–2010, and there are fewer age classes present overall (Figure 9).

The percentage of males in the fishery decreased from 45% in 2002 to as low as 32% in 2005, up to 36% in 2006, although it remained steady around 34% through 2009 until an increase was seen in 2010 to 36% and again to 37% in 2011. Longline survey sex ratio has also changed but

not as dramatically, decreasing from 54% in 2002 to 41% male by 2009, increasing in 2010 to 47% and also in 2011 to 54%. By comparison, the sex ratio data for sablefish sampled on the mark-tag pot survey was 45% male in 2002 and 37% male in 2009. Biological samples have not been taken on the mark-tag pot survey since 2009. The longline survey provides biological samples representative of all of the exploitable population (i.e., individuals that are available to commercial gear) and is constrained to random fixed stations through time. The fishery tends to select for larger fish (i.e., female fish) and differences in fishing effort location and depth from year to year may influence sex ratios of fish landed in the fishery. Longline gear generally selects for larger fish than does pot gear and females reach a larger maximum size and grow faster than males. Maturity data from port sampling has shown a steady decline in the proportion of immature and developing fish from 25% in 2002 to a low of 3% in 2008 and 2009. In both 2010 and 2011 the proportion of immature fish rose to 5% (Appendix E).

The average round weight of fish sampled from the 2011 commercial fishery was 8.9 lb and 8.8 lb in 2010, similar to the average weights of 2005 and 2006. This has been a decrease from the average weight of 9.0 lb observed from 2007 through 2009.

FISHERY BYCATCH

There were 30,012 round pounds of shortspine thornyhead (*Sebastolobus* spp), 11,829 round pounds of shorttraker (*Sebastes borealis*), and 3,634 round pounds of rougheye (*Sebastes aleutianus*) rockfish landed as bycatch in the 2011 NSEI sablefish fishery (Figure 10). Other bycatch species landed, in order of abundance, were Pacific cod (*Gadus macrocephalus*), yelloweye rockfish (*Sebastes ruberrimus*), redbanded rockfish (*Sebastes babcocki*), quillback rockfish (*Sebastes maliger*), spiny dogfish shark (*Squalus acanthias*), arrowtooth flounder (*Atheresthes stomias*), and silvergray rockfish (*Sebastes brevispinis*). There were 7,435 round pounds of Pacific cod, 1,083 round pounds of yelloweye rockfish, 364 round pounds of redbanded rockfish, 320 round pounds of quillback, and less than 100 round pounds of each of the other species landed during the fishery. Skates (Rajidae), Dover sole (*Microstomus pacificus*), additional quantities of arrowtooth flounder and other flatfish, and Pacific sleeper sharks (*Somniosus pacificus*) are also caught as bycatch but are typically discarded at sea.

The combined total of shortspine thornyhead, shorttraker, and rougheye rockfish round pounds landed on trips targeting sablefish has been between five and 15% of the round pounds of sablefish landed on sablefish target trips since 2000 (Figure 10). Prior to 2003, fish caught in excess of sablefish bycatch limits could be landed and sold on Commercial Fisheries Entry Commission (CFEC) miscellaneous finfish interim use permits. Fish were considered bycatch in the sablefish fishery in this report if they were caught during trips in which sablefish were targeted, regardless of the permit on which they were landed.

Since July 2000, all *Sebastes* spp. rockfishes caught must be landed and weighed. Shortspine thornyhead (*Sebastolobus* spp.) are not included in this requirement because they do have open swim bladders, do not incur embolism mortality, and can be released alive. *Sebastes* spp. rockfish in excess of bycatch limits can be sold with the proceeds forfeited to the state or may be either retained for personal use or donated.

Sharks and skates are rarely retained due to limited market interest. The reported catch of sharks and skates can occasionally be high, but the true magnitude of the bycatch is unknown because counts are estimated and fish are not weighed before being discarded. In addition, at-sea discards of skates and sharks may go unreported.

Pacific halibut are also taken in the sablefish fishery and are required to be landed if the NSEI permit holder has halibut IFQ quota available and the halibut is of legal size. If landed, Pacific halibut are considered a target species in a dual target fishery.

ALASKA BOARD OF FISHERIES CHANGES IN NSEI SABLEFISH COMMERCIAL FISHING REGULATIONS, 2003–2012

In 2003 the Alaska Board of Fisheries adopted several regulatory changes for the NSEI sablefish fishery, notably:

- The opening date for the fishery was changed from September 1 to August 15.
- Randomly selected permit holders may fish during the closed season under terms of a commissioner's permit to gather data.
- Permit holders in NSEI are allowed to release healthy sablefish but are required to document the number of fish released in their logbook. All injured or dead sablefish must be retained.
- The retention of sablefish for use as bait is prohibited in state waters.
- Permit holders are allowed to carry over up to 5% of their annual EQS as an overage or underage, adopted with a May 2006 sunset provision.
- Sablefish regulations were updated to clarify data sources used by the department for setting the AHO.
- Record keeping requirements for permit holders specified they must maintain inseason records of their cumulative catch and provide this information to buyers.
- Thornyhead, shortraker, rougheye and redbanded rockfish may be taken only as bycatch.

In 2006, the practice of allowing fishermen to transfer overages was rescinded because it proved to be administratively problematic and difficult to enforce. While the majority of permit holders did not utilize the provision, the few transfers that were made were difficult to track in the fish ticket system. The board did not adopt any regulations directly affecting the commercial sablefish in 2009.

In 2012, the board adopted several changes to sablefish regulations.

- The department is no longer required to randomly select from interested permit holders when authorizing the take of sablefish outside of established seasons. The goal of this change in regulation is to allow permit holders to harvest their quota share during the survey, thus reducing department survey removals.
- Subsistence and personal use permit is required for the harvest of subsistence/personal use sablefish.
- Subsistence-caught groundfish must be offloaded from a vessel before longline gear is operated from that vessel for the commercial harvest of groundfish, and vice versa for the operation of subsistence gear targeting groundfish while commercial groundfish are still aboard the vessel.
- Regulations regarding the operation of longline gear in NSEI and SSEI during the 72-hour period before the fishing season opens, and 24-hour period after the fishing season closes were clarified.

PARTICIPATION

Between 1975 and 1984, sablefish fleet size ranged from 46 permits in 1982, to 125 permits in 1976 (Table 1). There will eventually be 73 permanent permit holders. Of the 79 permits that are permitted to fish in 2012, 71 are permanent permits and the remainders are interim-use permits. As of May 2012 three interim-use permit applicants have final decisions by CFEC but it is yet to be decided whether they will receive permanent permits, three applicants are awaiting final decisions by CFEC, one applicant denied a permit by CFEC has filed an appeal with the Alaska Superior Court, and one denied applicant settled with the Office of the Attorney General accepting his denial in return for a final interim-use permit in 2012. Twenty-one permanent permits remain in the name of the original issuant.

Permits issued for NSEI by CFEC have steadily increased in value over time and are among the most valuable fishing permits statewide. CFEC estimated the value of a permit to be \$332,300 at the end of 2011. Detailed information regarding permits and licensing may be obtained by contacting CFEC by phone at (907) 789-6150 or online at <http://www.cfec.state.ak.us>.

2012 COMMERCIAL FISHERY

The 2012 NSEI sablefish fishery is scheduled to open August 15 at noon and will run through noon on November 15. There are 79 permit holders eligible to fish during the 2012 season. The 2012 NSEI sablefish fishery AHO Announcement was released on June 27, 2012. The AHO for the 2012 fishery is 975,000 round pounds, and the EQS is 12,342 round pounds (Table 3).

REFERENCES CITED

- Allen, M. J., and G. B. Smith. 1988. Atlas and zoogeography of common fishes in the Bering Sea and north Pacific. National Oceanic and Atmospheric Administration Technical Report No. NMFS-NWFSC 66.
- Bracken, B. 1983. The history of the U.S sablefish fishery in the Gulf of Alaska, 1902–1982. Alaska Sea Grant Report 83–8:41–47.
- Carlile, D. W., B. Richardson, M. Cartwright, and V. M. O’Connell. 2002. Southeast Alaska stock assessment activities 1988–2001. Alaska Department of Fish and Game, Division of Commercial Fisheries, Regional Information Report 1J02-02, Douglas.
- Carroll, K., and C. K. Brylinsky. 2010. The Southeast Alaska Northern Southeast Inside sablefish fishery information report, with outlook to the 2010 fishery. Alaska Department of Fish and Game, Fishery Management Report No. 10-40, Anchorage.
- Dressel, S. C. 2009. 2006 Northern Southeast Inside sablefish biomass estimate and 2007 forecast and quota. Alaska Department of Fish and Game, Fishery Data Series No. 09-50, Anchorage.
- Edson, Q. A. 1954. Preliminary report on the Alaska sablefish fishery. Pacific Marine Fisheries Commission Bulletin 3:39-56.
- Funk, F., and B. Bracken. 1984. Growth of sablefish in Southeastern Alaska. Alaska Sea Grant Report 83–8:51–57.
- Hanselman, D. H., C. R. Lunsford, and C. J. Rodgveller. 2011. Assessment of the sablefish stock in Alaska [In] Stock Assessment and Fishery Evaluation Report for the Groundfish Resources of the Gulf of Alaska, p. 477–582. North Pacific Fishery Management Council, Anchorage.
- Johnson, S. L., and T. J. Quinn II. 1988. Catch-age analysis with auxiliary information of sablefish in the Gulf of Alaska. Contract report to National Marine Fishery Service, Auke Bay, Alaska. Center for Fisheries and Ocean Sciences, University of Alaska, Juneau.
- Kimura, D. K., A. M. Shaw, and F. R. Shaw. 1998. Stock structure and movement of tagged sablefish, *Anoplopoma fimbria*, in offshore northeast Pacific waters and the effects of El Nino-Southern Oscillation on migration and growth. Fishery Bulletin 96:462-481.
- Kolloen, L. N. 1944. Sablefishing: Alaska decline calls for closed season. Pacific Fisherman. December 1944:73-77.
- Krieger, K. 1997. Sablefish, *Anoplopoma fimbria*, observed from a manned submersible. Pages 39–44 [In] Saunders and Wilkins, editors. Biology and Management of Sablefish, *Anoplopoma fimbria*. National Oceanic and Atmospheric Administration National Marine Fisheries Service Technical Report No. 130, Seattle.
- Kruse, G. H., F. C. Funk, H. J. Geiger, K. R. Mabry, H. M. Savikko, and S. M. Siddeek. 2000. Overview of state-managed fisheries in the central and western Gulf of Alaska, Aleutian Islands, and southeastern Bering Sea, with reference to Stellar sea lions. Alaska Department of Fish and Game, Division of Commercial Fisheries, Regional Information Report 5J00-10, Juneau.
- Leaman, B., J. Fujioka, G. H. Kruse, M. Saunders, and M. F. Sigler. 2002. An external review of the Chatham Strait sablefish stock assessment program [In] B. Richardson and V.M. O’Connell. 2002. The Southeast Alaska Northern Southeast Inside sablefish fishery information report, with outlook to the 2002 fishery. Alaska Department of Fish and Game, Division of Commercial Fisheries, Regional Information Report 1J02–34, Douglas.
- Maloney, N. E., and M. F. Sigler. 2008. Age-specific movement patterns of sablefish (*Anoplopoma fimbria*) in Alaska. Fishery Bulletin 106(3): 305–316.
- McDevitt, S. A. 1990. Growth and analysis of sablefish (*Anoplopoma fimbria*), from mark recapture data from the northeast Pacific. M. S. Thesis, University of Washington, Seattle.
- McFarlane, G. A., and W. D. Nagatta. 1988. Overview of sablefish mariculture and its potential for industry. Pages 105–120 [In] Proceedings of the Fourth Alaska Aquaculture Conference. Alaska Sea Grant Report 88–4.

REFERENCES CITED (Continued)

- Mueter, F. 2010. Evaluation of stock assessment and modeling options to assess sablefish population levels and status in the Northern Southeast Inside (NSEI) management area. Alaska Department of Fish and Game, Special Publication No. 10-01, Anchorage.
- Pearson, D. E., and F. R. Shaw. 2004. Sources of age determination errors for sablefish (*Anoplopoma fimbria*). Fishery Bulletin 102(1):127-141.
- Richardson, B. 2003a. 2001 NSEI (Chatham) sablefish longline survey report, August 8–August 13, 2001. Alaska Department of Fish and Game. Alaska Department of Fish and Game, Division of Commercial Fisheries, Regional Information Report IJ03-12, Douglas.
- Richardson, B., and V. M. O’Connell. 2002. The Southeast Alaska northern southeast inside sablefish fishery information report with outlook to the 2002 fishery. Alaska Department of Fish and Game, Division of Commercial Fisheries, Regional Information Report IJ02-34, Douglas.
- Sasaki, T. 1985. Studies on the sablefish resources in the North Pacific Ocean. Bulletin of the Far Seas Fishery Laboratory 22:1-108, Shimizu, Japan.
- Sigler, M. F., C. R. Lunsford, J. T. Fujioka, and S. A. Lowe. 2003. Alaska sablefish assessment for 2004. [In] Stock assessment and fishery evaluation report for the groundfish resources of the Gulf of Alaska for 2004. North Pacific Fisheries Management Council, Anchorage.
- Sigler, M. F., C. R. Lunsford, S. A. Lowe, and J. T. Fujioka. 2001a. Alaska sablefish assessment for 2002. [In] Stock assessment and fishery evaluation report for the groundfish resources of the Gulf of Alaska for 2002. North Pacific Fisheries Management Council, Anchorage.
- Sigler, M. F., T. L. Rutecki, D. L. Courtney, J. F. Karinen, and M-S Lang. 2001b. Young-of-the-year sablefish abundance, growth, and diet. Alaska Fisheries Bulletin 8(1):57-70.
- Stahl, J., and D. Holum. 2011. 2010 NSEI (Northern Southeast Inside Subdistrict) sablefish mark-tag survey. Alaska Department of Fish and Game, Fishery Data Series No. 11-25, Anchorage.
- Turris, B. R. 2000. A comparison of British Columbia’s ITQ fisheries for groundfish trawl and sablefish: similar results from programmes with differing objectives, designs and processes. Pages 254-261 [In] R. Shotton, editor. Use of property rights in fisheries management. Fisheries Technical Paper 404/1, FAO, Rome.
- United Press. 1942. Use of vitamin A restricted by WPB. New York Times, February 10, 1942, p 22.
- Wing, B. L. 1985. Salmon stomach contents from the Alaska troll logbook program 1977-1984. NOAA Technical Memorandum NMFS F/NWC-91.
- Wolotira, R. J., Jr., T. M. Sample, S. F. Noel, and C. R. Iten. 1993. Geographic and bathymetric distributions for many commercially important fishes and shellfishes off the west coast of North America, based on research survey and commercial catch data, 1912-84. National Oceanic and Atmospheric Administration Technical Memorandum No. NMFS-AFSC-6.
- Yang, M .S., and M. W. Nelson. 2000. Food habits of the commercially important groundfishes in the Gulf of Alaska in 1990, 1993, and 1996. National Oceanic and Atmospheric Administration Technical Memorandum No. NMFS-AFSC 112.

TABLES

Table 1.—Number of permits and vessels, Annual Harvest Objective, catch, Equal Quota Share (EQS), and market price in the NSEI sablefish fishery, 1975–2011.

Year	No. permits ^a	No. vessels	Annual Harvest Objective (lb)	Round lb landed ^b	EQS	Average price/round lb ^c
1975	110	-	-	984,179	-	-
1976	125	-	-	970,313	-	-
1977	95	-	-	559,031	-	\$0.70
1978	80	-	-	788,523	-	\$0.72
1979	110	-	-	1,190,356	-	\$0.76
1980	65	-	-	881,469	-	\$0.42
1981	53	-	-	710,147	-	\$0.58
1982	46	-	-	804,004	-	-
1983	68	-	-	1,165,871	-	-
1984	86	-	-	1,329,072	-	\$0.25
1985	105	107	2,380,952	2,951,056	-	-
1986	138	144	2,380,952	3,874,269	-	\$0.74
1987	158	163	2,380,952	3,861,546	-	\$0.91
1988	149	147	2,380,952	4,206,509	-	\$1.08
1989	151	149	2,380,952	3,767,518	-	\$0.77
1990	121	119	2,380,952	3,281,393	-	\$1.08
1991	127	122	2,380,952	3,955,189	-	\$1.74
1992	115	115	2,380,952	4,267,781	-	\$1.75
1993	120	114	2,380,952	5,795,974	-	\$0.97
1994	121	112	4,761,905	4,713,552	38,889	\$1.94
1995	121	116	4,761,905	4,542,348	38,889	\$1.70
1996	121	118	4,761,905	4,672,701	38,889	\$2.12
1997	122	111	4,800,000	4,753,394	39,300	\$2.43
1998	116	106	4,800,000	4,688,008	41,700	\$1.57
1999	112	98	3,120,000	3,043,273	28,000	\$2.18
2000	111	93	3,120,000	3,082,159	28,600	\$2.40
2001	111	87	2,184,000	2,142,617	19,600	\$2.13
2002	109	86	2,005,000	2,009,380	18,400	\$2.40
2003	108	88	2,005,000	2,001,643	18,565	\$2.39
2004	108	88	2,245,000	2,229,954	20,787	\$2.03
2005	106	82	2,053,000	2,026,131	19,400	\$2.49
2006	105	80	2,053,000	2,033,786	19,550	\$2.69
2007	103	77	1,488,000	1,501,478	14,500	\$2.67
2008	96	71	1,508,000	1,513,040	15,710	\$3.15
2009	88	69	1,071,000	1,071,554	12,170	\$3.34
2010	87	65	1,063,000	1,054,276	12,218	\$4.06
2011	83	59	880,000	882,779	10,602	\$5.61

^a Prior to 1985 there was not a NSEI sablefish permit card so the number of permits includes sablefish landings made on permit cards for other fisheries. Permit cards were not issued prior to 1975.

^b Records from prior to 1985 are incomplete; harvest levels were approximated using a variety of sources.

^c Based on price recorded on fish ticket at time of landing.

Table 2.—Summary of NSEI quota share fishery, 2003–2011. All fish quantities are in round pounds.

	2011	2010	2009	2008	2007	2006	2005	2004	2003
Sum of Personal Quota Shares ^a (PQS)	879,678	1,058,362	1,065,276	1,503,937	1,498,133	2,053,122	2,061,422	2,241,338	n/a
Equal Quota Share (EQS)	10,602	12,218	12,170	15,710	14,500	19,550	19,400	20,787	18,565
Percentage of AHO harvested	100.3	99.2	100.1	100.3	100.9	99.1	98.7	99.3	99.8
Allowable over/underage	530	611	609	786	723	978	970	1,039	n/a
Illegal overages	271	2,061	2,408	3,155	5,254	1,989	9,248	2,402	1,100
Permits with illegal overages	1	6	6	7	10	4	10	9	4
Legal overages	13,365	11,687	13,378	20,545	18,332	16,009	27,861	25,479	21,821
Permits with legal overages	43	37	41	50	45	39	45	46	49
CFEC permits fished	83	87	88	96	103	105	106	108	108
Permanent permits	71	71	59	54	43	41	41	41	40
Interim use permits	12	16	29	42	60	64	61	67	68
Number of trips	94	107	114	123	140	175	168	203	-
Average no. landings per permit	1.4	1.4	1.7	1.5	1.6	1.9	1.9	2	2.1
Permits finishing in one trip	56	63	57	55	61	44	49	44	41
Permits finishing in two trips	21	21	19	34	27	42	37	39	36
Vessels fishing opening day	14	10	12	12	16	20	38	26	25
CPUE standardized for hook spacing (rnd lb/hook) ^b	0.86	0.73	0.78	0.89	0.81	0.71	0.71	0.71	0.75
Fishery ex-vessel value in millions	\$4.9	\$4.3	\$3.5	\$4.7	\$4.0	\$5.4	\$5.0	\$4.5	\$4.8

^a PQS is the EQS adjusted for each permit holder's use of the 5% overage/underage provision.

^b In 2010 and 2011 effort from permits participating in the NSEI LL survey were not included in CPUE calculations but were included in harvest, permit, vessel and value figures.

Table 3.—Decrement types and amounts for 2010–2012. Estimated catch is in round pounds of sablefish. Notation is as follows: ADF&G = Alaska Department of Fish and Game, EQS = equal quota share, AHO = annual harvest objective.

Decrement type	2010 estimated mortality	2011 estimated mortality	2012 estimated mortality
Bycatch mortality in halibut fishery	73,647	59,128	51,779
ADF&G longline survey removals (excluding catch retained by permit holders for their EQS)	76,654	50,866	77,499
Guided recreational harvest	N/A	31,109	31,181
Subsistence, personal use, non- guided recreational harvest, and bycatch mortality in non-halibut fisheries	37,529	26,172	25,000
Total Decrements	187,831	167,275	185,459
AHO ^a	1,063,000	880,000	975,000
Number of Permit Holders	87	83	79
EQS	12,218	10,602	12,342

Note: N/A = Not available.

^a AHO is rounded to the nearest 1,000 round pounds.

FIGURES

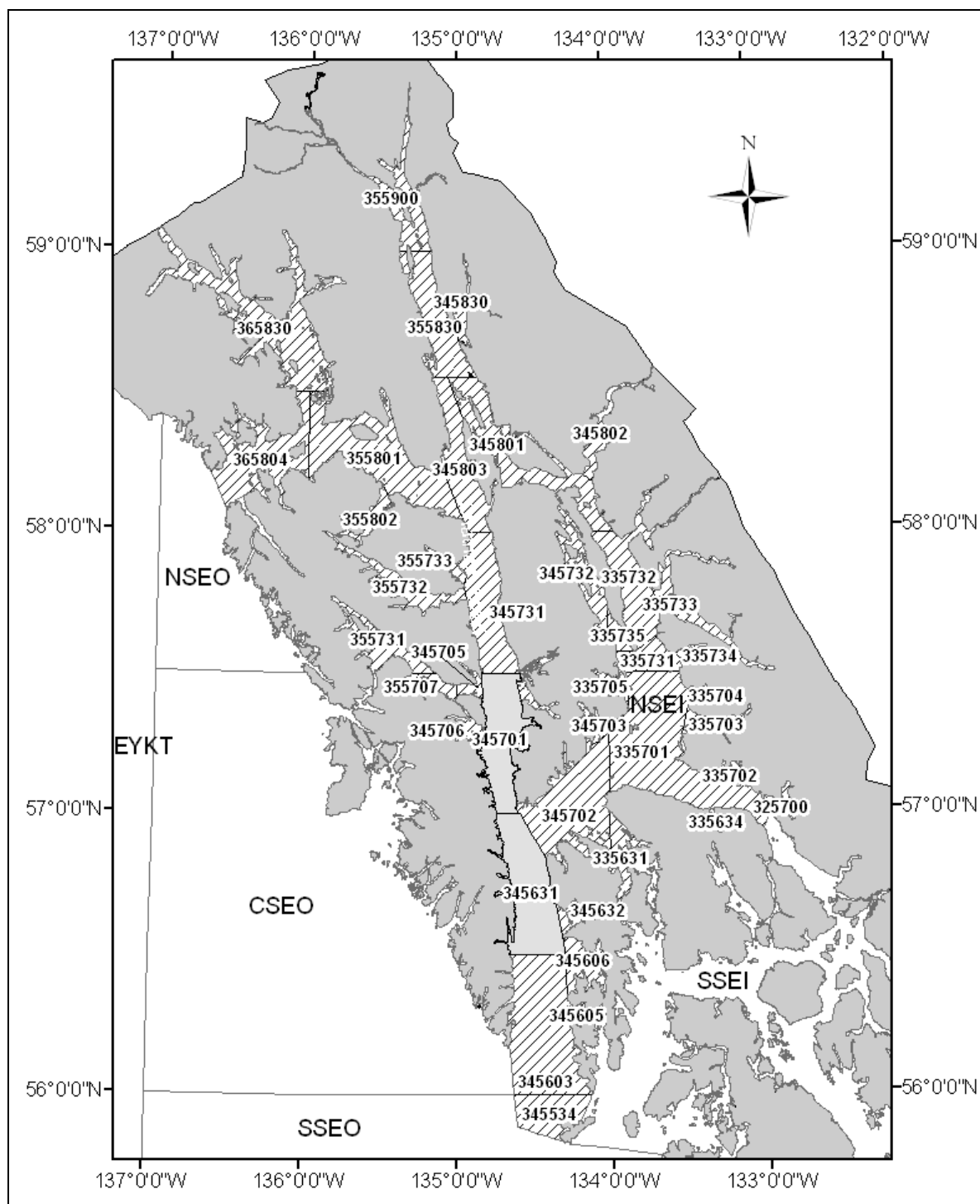


Figure 1.—Alaska Department of Fish and Game groundfish statistical areas in Northern Southeast Inside (NSEI). The majority of the harvest comes from statistical areas 345631 and 345701 which are shaded, with the remainder of the NSEI areas shown with stripes.

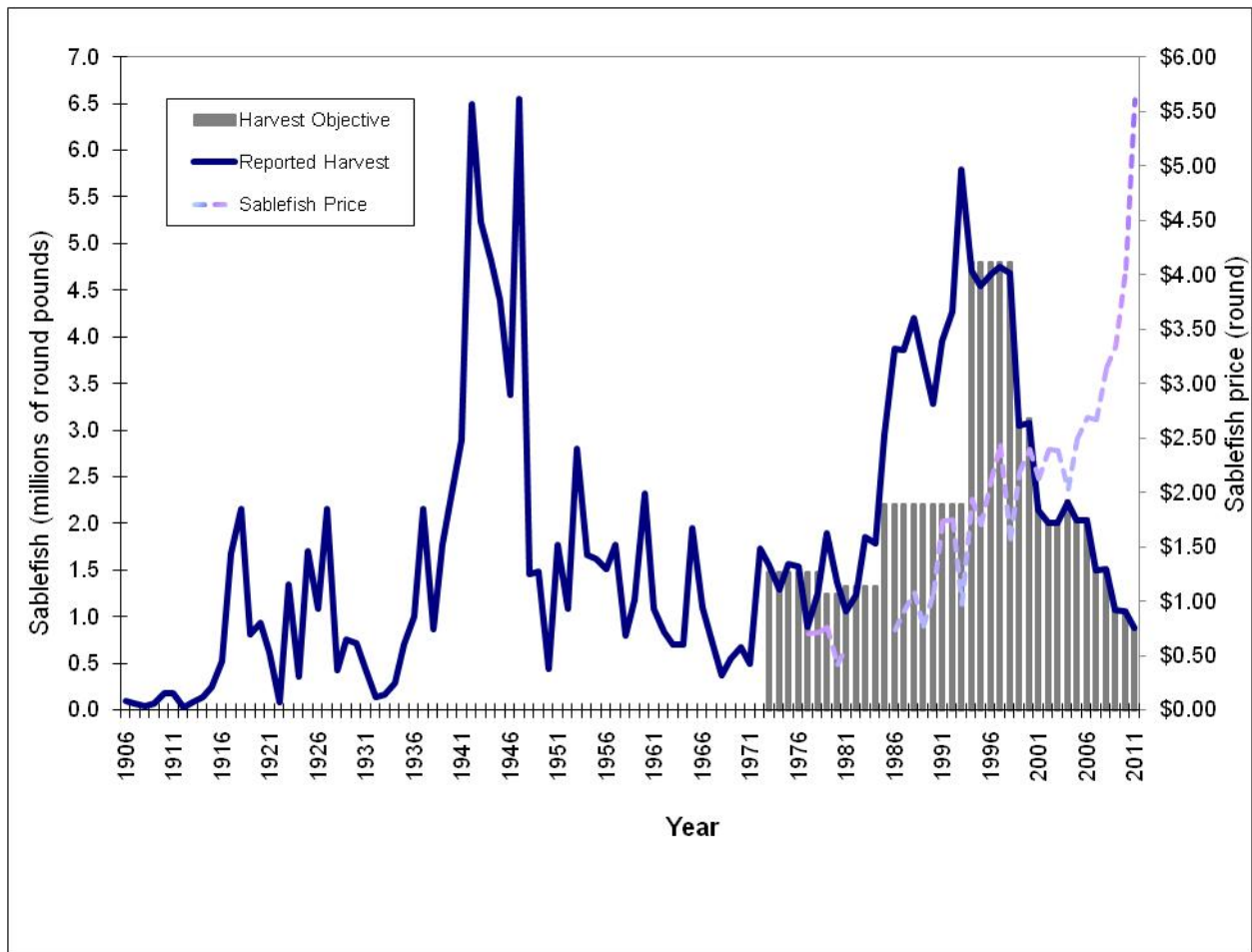
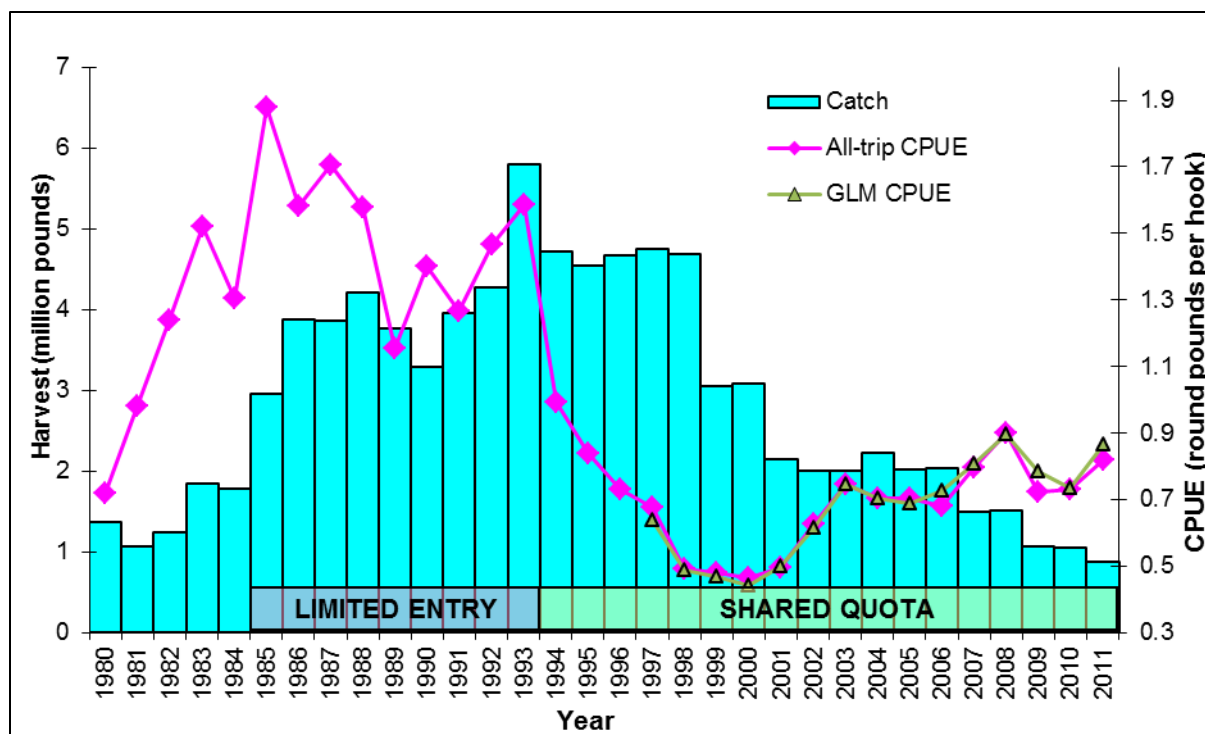


Figure 2.—Northern Southeast Inside (NSEI) sablefish reported catch and annual quota, 1906–2011, and average price per pound, 1977–2011. Records from prior to 1985 are incomplete; harvest levels were approximated using a variety of sources.



Note: Data used to estimate commercial fishery CPUE from 1997–2011 are from mandatory logbooks and fish tickets. Fish delivery condition (round vs. dressed) is documented on the fish ticket. For years 1997–2000 sets with no record of hook spacing or mixed hook spacing (about 5% of sets) were not included. Verification of some records from 1997–2001 is still underway. Data used to estimate commercial fishery CPUE from 1985–1996 are from voluntary dockside interviews and fish tickets. Fish delivery condition and hook spacing records are incomplete from this period. Landings where fish delivery condition or hook spacing could not be determined were excluded. Conversions were made to standardize j-hooks, which were obsolete by the mid-1980s, to circle hooks, currently used by the fleet. Fish catches caught with j-hooks were multiplied by 1.5. Catch and effort data from prior to 1985 are estimated from a variety of records, some incomplete. Conversions were made to standardize j-hooks to circle hooks.

Figure 3.—NSEI sablefish fishery catch-per-unit-effort (CPUE) in round pounds of fish per hook or per standardized hook, depending on the year, and harvest, 1980–2011.

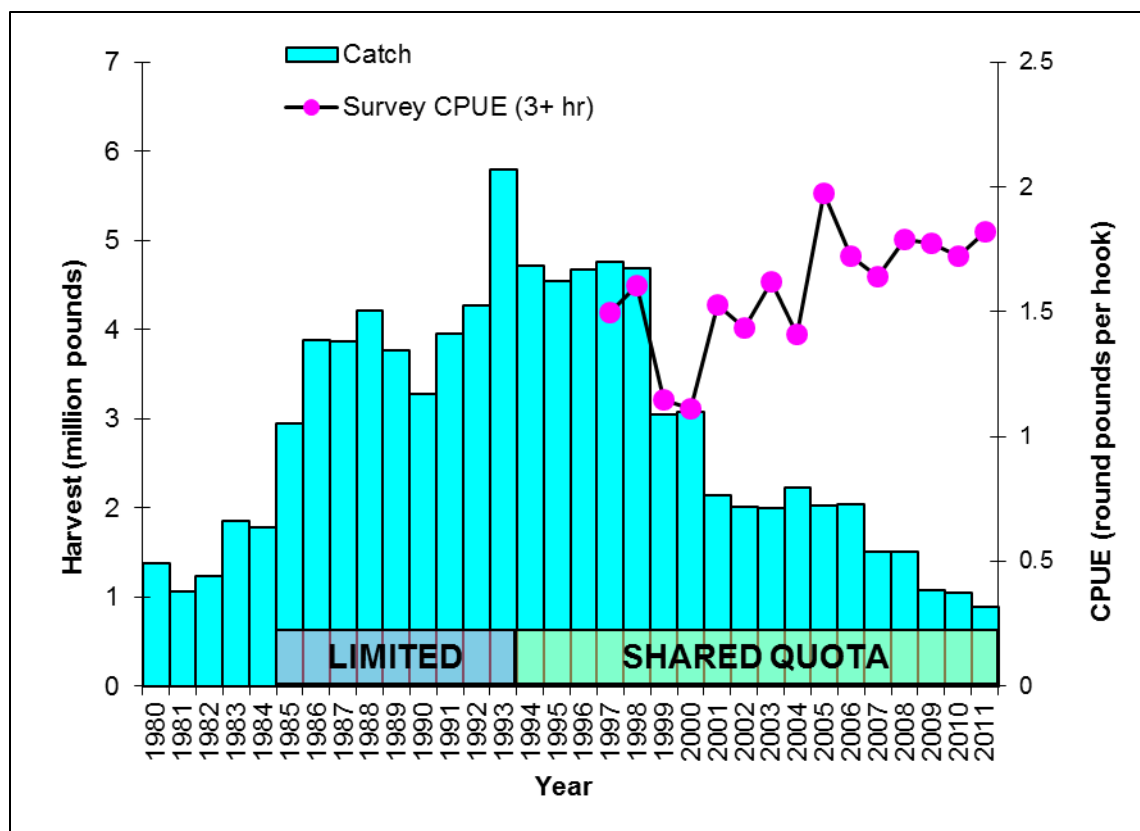


Figure 4.—NSEI sablefish longline survey catch-per-unit-effort (CPUE) in round pounds per hook and harvest, 1980–2011. A three-hour minimum soak time was used on the NSEI sablefish longline survey.

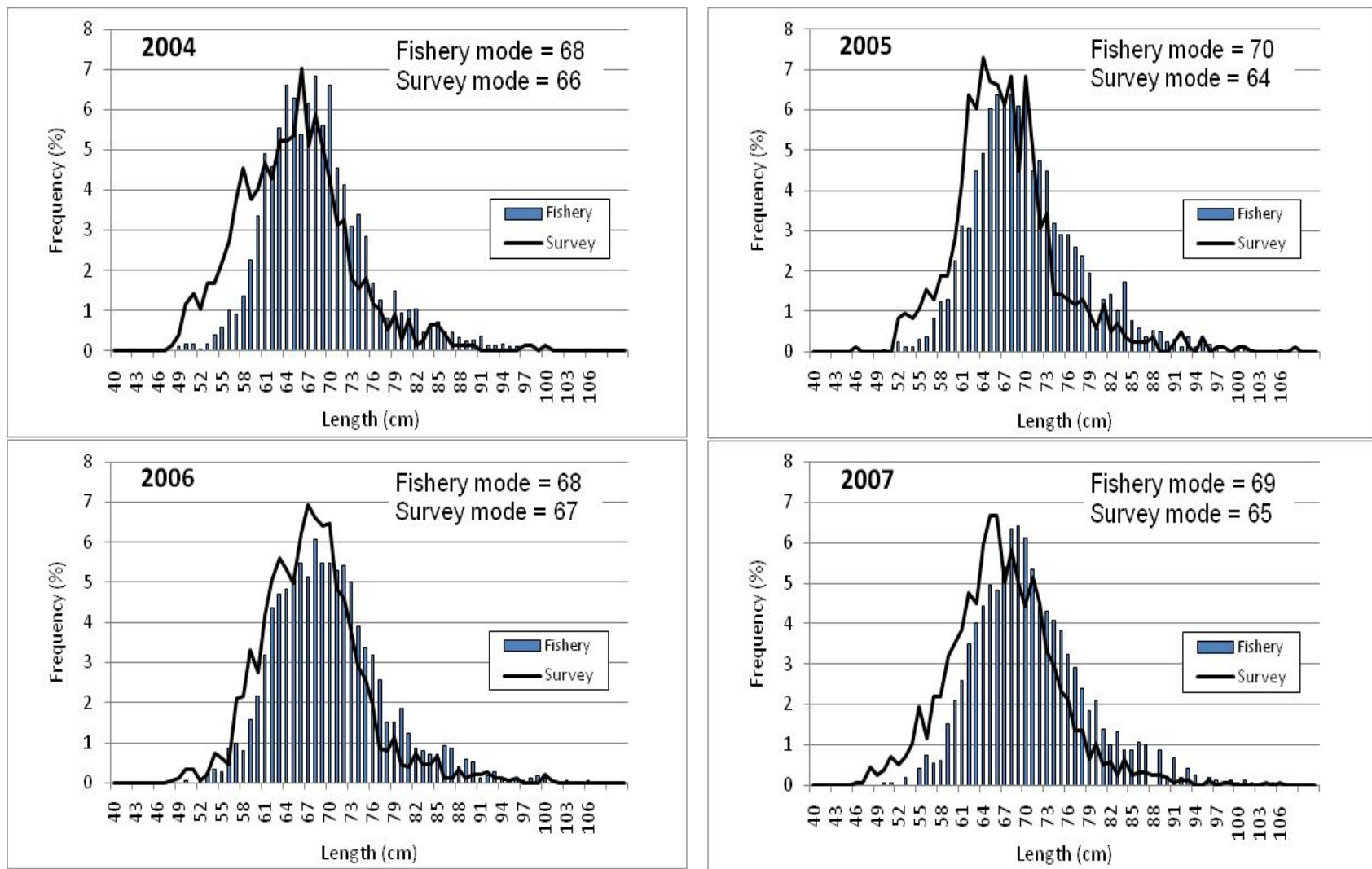


Figure 5.—Northern Southeast Inside (NSEI) sablefish fishery and survey length frequency distribution, 2004–2007.

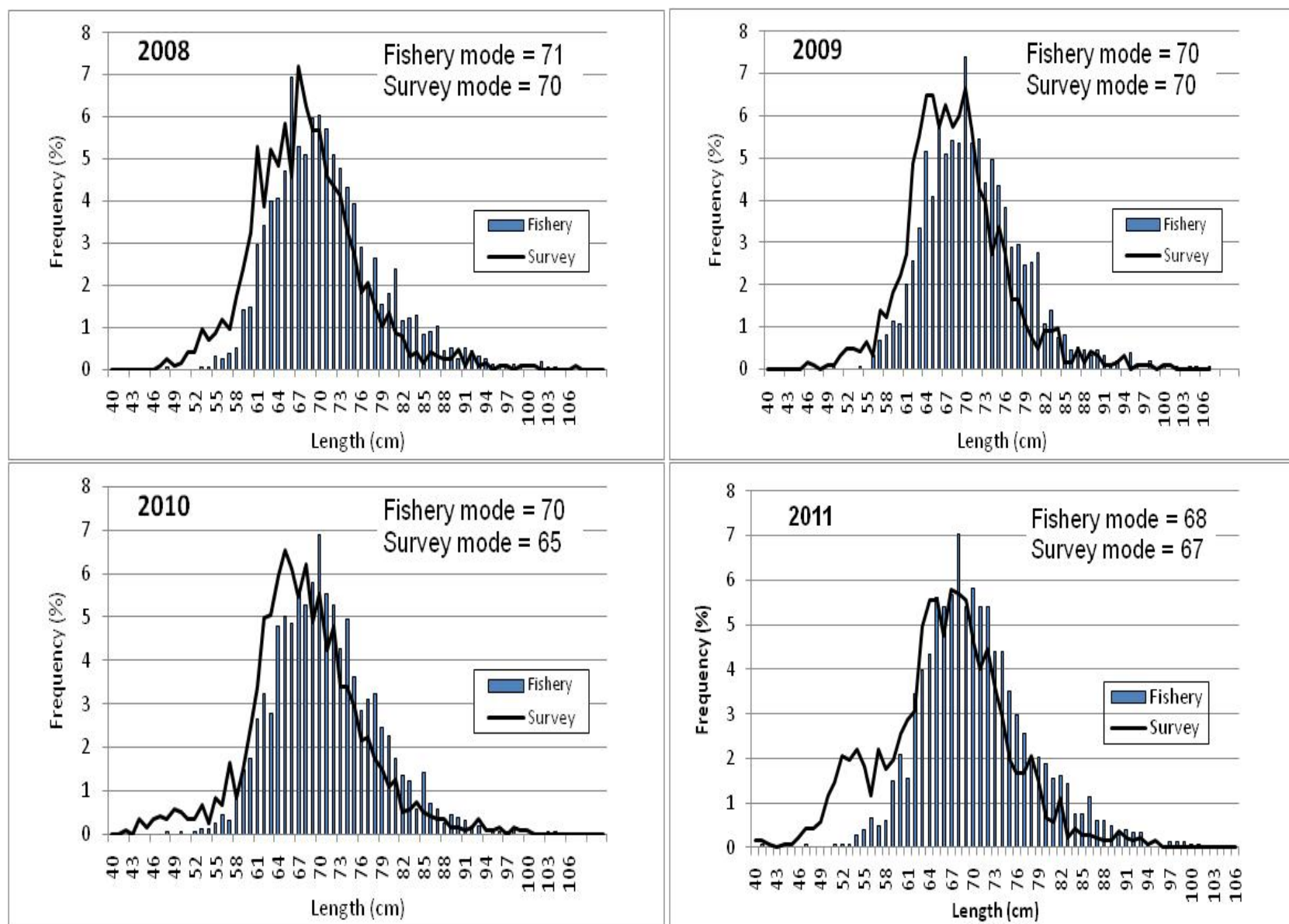


Figure 6.—Northern Southeast Inside (NSEI) sablefish fishery and survey length frequency distributions, 2008–2012.

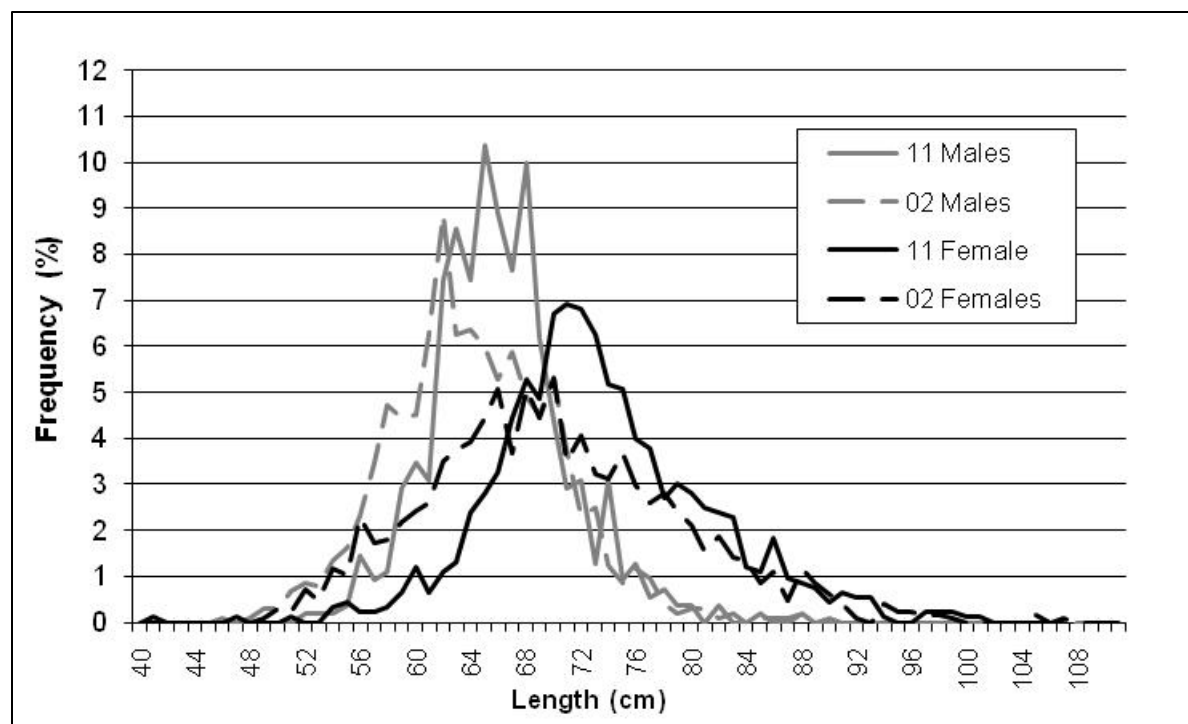


Figure 7.—Northern Southeast Inside (NSEI) sablefish fishery length frequency distributions of male and female sablefish in 2011 and 2002.

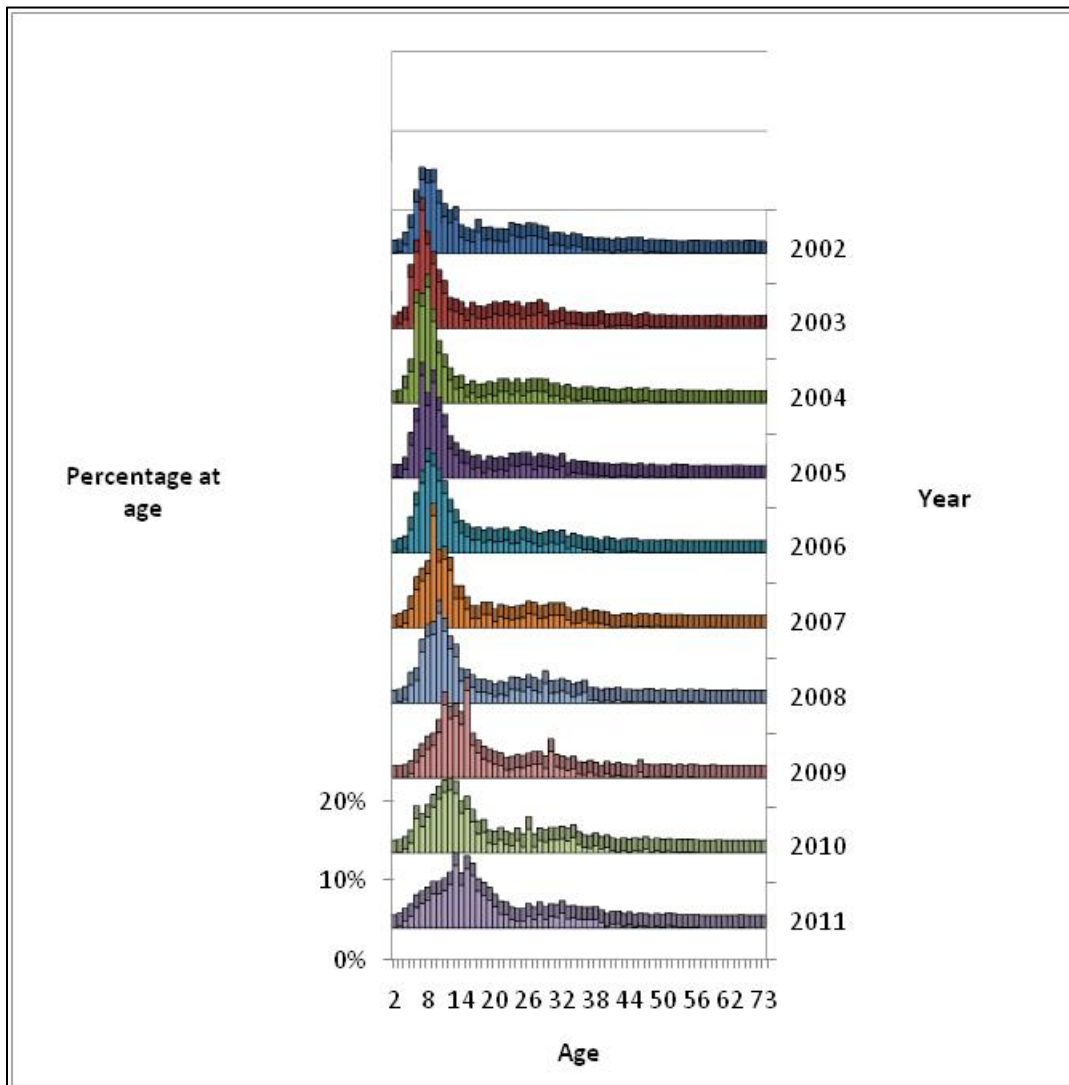
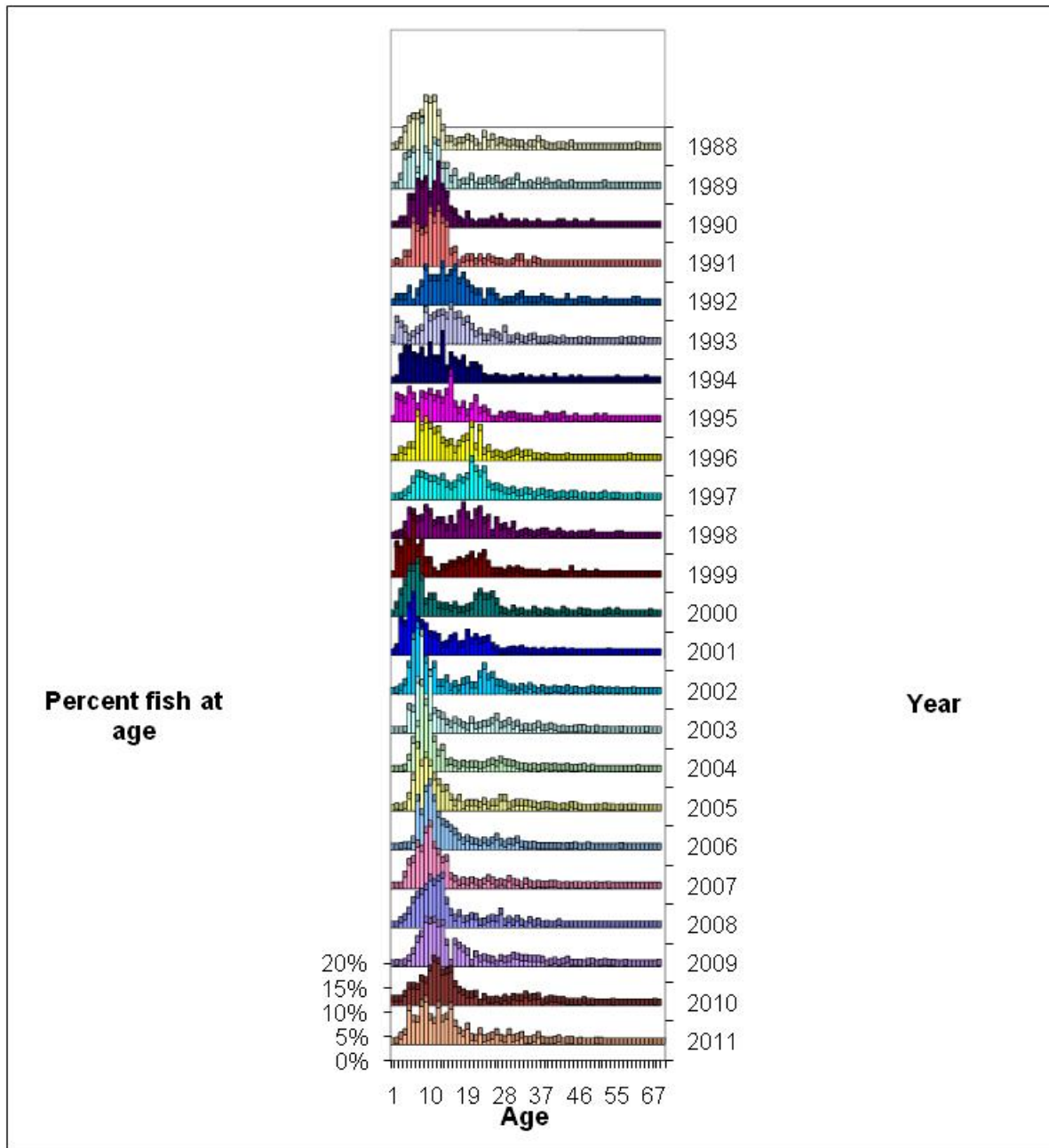


Figure 8.—Northern Southeast Inside (NSEI) sablefish fishery age frequency distributions, 2002 to 2011.



Note: Please note that there were two age-readers that estimated ages for Figure 9. Reader X aged otoliths from 2002-2006. Reader Y aged nearly all otoliths from 2007–2011. Ages for 2007–2010 (Reader Y) have been calibrated to Reader X.

Figure 9.—Northern Southeast Inside (NSEI) sablefish longline survey age frequency distributions, 1988–2011.

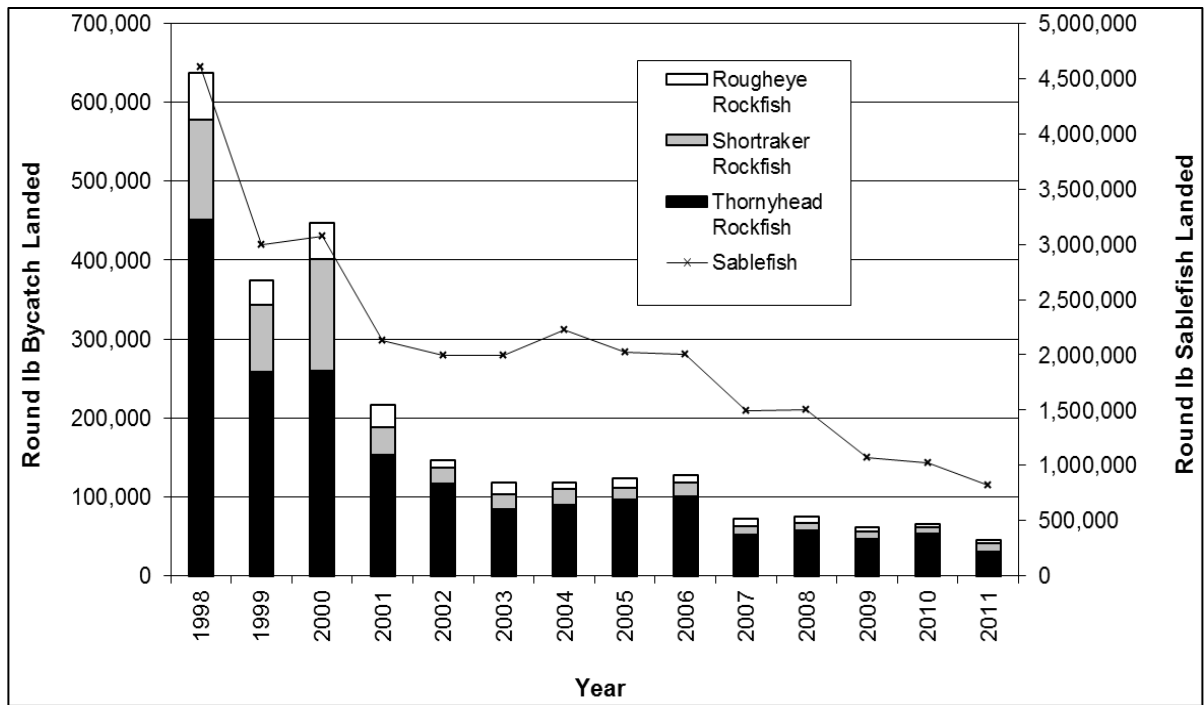


Figure 10.—Northern Southeast Inside (NSEI) round pounds of bycatch, by species, on commercial longline trips targeting sablefish, 1998–2011.

**APPENDIX A: CHRONOLOGY OF NSEI SABLEFISH
FISHERY MANAGEMENT ACTION AND CHANGES IN
SEASON AND HARVEST**

Appendix A1.—Chronology of NSEI sablefish fishery management action and changes in season and harvest. dr = dressed pounds and rd = round pounds.

Year	Harvest Objective	Dates Fishery Open	Management Actions
1867	no quota	year round	Alaskan Territory purchase began Federal management of AK fisheries.
1871	no quota	year round	US Commission of Fish and Fisheries established.
1903	no quota	year round	US Bureau of Fisheries established.
1906	no quota	year round	An Act for the Preservation and Regulation of the Fisheries of Alaska enacted.
1945	no quota	3/16–11/30	
1947	no quota	5/01–11/30	
1959	no quota	5/01–11/30	Alaska Statehood. Fisheries management transferred to the state. Alaska Board of Fish (BOF) maintained regulations already in place in 1959.
1963	no quota	8/15–10/15	
1970	no quota	9/15–11/15	Pot gear first allowed.
1972	no quota	9/01–11/15	Incidental catch allowance reduced to 20%.
1973	GHR: 1,000,000 dr	EO	Quota requested by industry. Fishery closed by Emergency Order (EO).
1974	GHR: 1,000,000 dr	9/01–11/15	
1976	GHR: 1,000,000 dr	9/01–11/15	Magnuson Fisheries Conservation and Management Act (MFCMA).
1978	GHR: 1,000,000 dr	9/01–11/15	Voluntary agreement by Japanese North Pacific Longline-Gillnet Association to withdraw from the area east of Yakutat Bay.
			Sablefish become prohibited species in US fisheries for other species.
1979	GHR: 850,000 dr	EO	Southeast Groundfish Project established.
			Quota reduced by department recommendation to account for portion of previous quota that came from outside waters.
			Season closed by EO.
			Closure to foreign fishery enforced by federal regulation.
1980	GHR: 500,000– 900,000 dr	9/01–11/15	GHR based on harvest from previous ten years \pm two standard deviations from mean.
			Registration 72 hours prior to fishing instituted for all vessels in NSEI by phone, in person, or by radio.
1981	GHR: 500,000– 900,000 dr	9/01–10/10	Fishery closed by EO.
1982	GHR: 300,000– 900,000 dr	9/01–9/15	Fishery restricted to longline only.
			Fishery closed by EO.
1983	GHR: 300,000– 900,000 dr	9/01–9/07, 10/10–10/14	Fishery openings set by EO.
1984	GHR: 300,000– 900,000 dr	1/01–3/03, 9/01–9/05	Groundfish management within the intrusion areas beyond the three-mile territorial limit formally conveyed to the state through an amendment to the MFCMA. (1/01–3/03 open period represents landings in this intrusion area during federal opening).
			Fishery openings set by EO.
1985	GHR: 500– 1,500,000 dr	9/04–9/05, 10/04–10/06	Limited entry program adopted. Vessel operators who could demonstrate a landing prior to 12/31/1984 were eligible to apply.
			First year Chatham specific CFEC permits were issued (C61A).
			Registration requirement repealed due to enforcement difficulty.
			Groundfish management areas went from 5 digit salmon statistical areas to current 6 digit codes. Area boundaries remained the same.
			Requirement for NSEI fish to be unloaded prior to fishing another area and vice versa instituted.
			Fishery openings set by EO.
1986	GHR: 500– 1,500,000 dr	9/09–9/11	No gear in water 72 hours prior to and 24 hours after fishery rule.
			Fishery openings set by EO.

–continued–

Appendix A1.—continued (page 2 of 3)

Year	Harvest Objective	Dates Fishery Open	Management Actions
1987	GHR: 500– 1,500,000 dr	9/15–9/16	Begin 24 hour opening by EO.
1988	GHR: 500– 1,500,000 dr	9/19–9/20	
1989		9/22–9/23	NSEI management area first described in Regulations, previously described as the northern sablefish area. Bait regulations instituted, include sablefish as bait. Up to 2,000 lbs. allowed annually, more with a permit.
1990		9/12–9/13	
1991		9/16–9/17	Statistical area line between Frederick Sound and Chatham Strait changed.
1992		9/17–9/18	
1993		9/25–9/26	
1994	GHR: 1,000,000– 3,000,000 dr AHO: 4,761,905 rd	9/22–10/22	First year of three year trial quota-share system. Regulations specify a single 30 day period during the 9/01–11/15 season. GHR increased and capped at 3,000,000 dr. Annual harvest limit to be set within the GHR based on survey information and divided equally among all eligible permit holders. Written registration required at least one week before season opening. Retention of tagged sablefish allowed. Sablefish taken for use as bait must be "mutilated" and reported on ADF&G fish tickets.
1995	GHR: 1,000,000– 3,000,000 dr AHO: 4,761,905 rd	9/13–10/13	In person written registration required prior to fishing. Applied .63 conversion to dressed wt for vessels landing fish round.
1996	GHR: 1,000,000– 3,000,000 dr AHO: 4,761,905 rd	9/08–11/8	
1997	GHR: 1,590,000– 4,800,000 rd AHO: 4,800,000 rd	9/01–11/15	Equal quota share system made permanent. Sablefish management based on round rather than dressed weight instituted. Confidential logbooks attached to fish tickets made mandatory. Season set in regulation as the entire period between 9/01 and 11/15.
1999	GHR: 1,590,000– 4,800,000 rd AHO: 3,120,000 rd	9/01–11/15	
2000	GHR: 1,590,000– 4,800,000 rd AHO: 3,120,000 rd	9/01–11/15	EYAK was deleted from 72–24 hr rule. Full retention of all rockfish (not including thornyheads) in inside waters in effect July 5th. CFEC review of optimum number of permits (re) confirmed 73 as optimum number.
2001	GHR: 1,590,000– 4,800,000 rd AHO: 2,184,000 rd	9/01–11/15	Sablefish harvest objective was decreased 30% with notification of indications showing further cut necessary to 1,700,000 for 2002. Public meetings were held in Petersburg, Sitka and Juneau.
2002	GHR: 1,590,000– 4,800,000 rd AHO: 2,005,000 rd	9/01–11/15	Outside review panel of fishery experts met in February to assess NSEI stock assessment program. Lowered AHO 8% based on a harvest rate applied to a mark-recapture estimate of biomass.

—continued—

Appendix A1.–continued (page 3 of 3)

Year	Harvest Objective	Dates Fishery Open	Management Actions
2003	AHO: 2,005,000 rd	8/15–11/15	5% overage/underage carry over from one season to the next permitted, including transfer of overage/underage to another permit holder. Discard of healthy fish permitted. Logbook reporting requirements tightened. Selected permit holders allowed to fish outside the regular season at department request to gather data. Sablefish use as bait prohibited. GHR eliminated for clarification purposes.
2004	AHO: 2,245,000 rd	8/15–11/15, offseason trips Jan– Apr	First year of allowable pre-season fishing with Commissioner’s Permit. First year with individual personal quota shares (PQS), Equal Quota Shares (EQS) adjusted for the permit holders’ share of the 5% overage/underage.
2005	AHO: 2,053,000 rd	8/15–11/15, offseason trips Feb– May	
2006	AHO: 2,053,000 rd	8/15–11/15	Overage/underage transfer repealed and the rest of overage/underage policy made permanent.
2007	AHO: 1,488,000 rd	8/15–11/15	
2008	AHO: 1,508,000 rd	8/15–11/15	Meetings with industry held in Sitka, Juneau, and Petersburg to discuss current stock assessment and declines in quota, January.
2009	AHO: 1,071,000 rd	8/15–11/15	
2010	AHO: 1,063,000 rd	8/15–11/15	Meetings with industry held in Sitka, Juneau, and Petersburg to discuss current research, including results from contract work. Three permit holders harvested their PQS in the 2010 NSEI longline survey.
2011	AHO: 880,000 rd	8/15–11/15	Six permit holders harvested their PQS in the 2011 NSEI longline survey.

**APPENDIX B: ADF&G LOGBOOK PAGE USED IN THE
NSEI SABLEFISH FISHERY**

Appendix B1.—ADF&G logbook page used in the Commercial NSEI sablefish fishery.

ADF&G LONGLINE • POT FISHERY LOGBOOK

PERMIT HOLDER _____ TARGET SPECIES _____ CREW SIZE (including skipper) _____
 VESSEL NAME _____ PORT OF LANDING _____
 ADF&G NUMBER _____ DATE LEFT PORT _____
 SKIPPER NAME _____ DATE OF LANDING _____

SYSTEM USED
 CONV ☐ SNAP ☐
 AUTOBAITER ☐

LONGLINE GEAR				POT GEAR			BAIT(S) USED %	
HOOK SIZE/TYPE	SKATE LINE LENGTH	HOOK SPACING	NUMBER OF HOOKS/SKATE	POT DIMENSIONS (ft)	GROUNDLINE WT. or DIAMETER	POT SPACING (ft)		

SET NO.	DATE SET	TIME SET	Lat. X Long. Beginning	DATE HAULED	TIME HAULED	Lat. X Long. End	AVERAGE DEPTH (fm)	NO. SKATES or POTS SET	LOST SKATES Y/N—Amount?	COMMENTS ie. discards, whales, etc ATTACH TAGS HERE			
CATCH and BYCATCH DATA please indicate if catch is in NUMBERS or POUNDS (round) List target species and gear by set if mixed				TARGET	AMOUNT	SPECIES	AMOUNT	SPECIES	AMOUNT	SPECIES	AMOUNT	SPECIES	AMOUNT
SET NO.	DATE SET	TIME SET	Lat. X Long. Beginning	DATE HAULED	TIME HAULED	Lat. X Long. End	AVERAGE DEPTH (fm)	NO. SKATES or POTS SET	LOST SKATES Y/N—Amount?	COMMENTS ie. discards, whales, etc ATTACH TAGS HERE			
CATCH and BYCATCH DATA please indicate if catch is in NUMBERS or POUNDS (round) List target species and gear by set if mixed				TARGET	AMOUNT	SPECIES	AMOUNT	SPECIES	AMOUNT	SPECIES	AMOUNT	SPECIES	AMOUNT
SET NO.	DATE SET	TIME SET	Lat. X Long. Beginning	DATE HAULED	TIME HAULED	Lat. X Long. End	AVERAGE DEPTH (fm)	NO. SKATES or POTS SET	LOST SKATES Y/N—Amount?	COMMENTS ie. discards, whales, etc ATTACH TAGS HERE			
CATCH and BYCATCH DATA please indicate if catch is in NUMBERS or POUNDS (round) List target species and gear by set if mixed				TARGET	AMOUNT	SPECIES	AMOUNT	SPECIES	AMOUNT	SPECIES	AMOUNT	SPECIES	AMOUNT

ADDITIONAL COMMENTS—Did you shake gear and/or sablefish due to reaching your limit? _____ Amount of gear? _____ Amount of fish? _____

PHONE NUMBER: _____

WHITE COPY MUST BE ATTACHED TO THE FISH TICKET AT THE TIME OF DELIVERY

APPENDIX C: NSEI LONGLINE SURVEY SPECIFICATIONS, 1988–2011

Appendix C1.—NSEI longline survey specifications, 1988–2011. In 1995 1- and 3-hr soaks were compared.

Year	Dates	Vessels	Hks/ set	Hk space	Hk size	Ganglion length	Bait	Soak (hrs)	SkateWts (lbs)	No. Set
1988	8/14–8/26	<i>F/V Betty</i>	1000	3 m	13 C	NA	Herring	1	No	24
1989	8/07–8/25	<i>F/V Carrie</i>	500	3 m	13 C	NA	Herring	1	No	44
1990	8/26–9/10	<i>F/V Isis</i>	500	3 m	13 C	NA	Herring	1	No	40
1991	8/13–8/30	<i>R/V Stellar</i>	500	3 m	13 C	0.375 m	Herring	1	5	40
1992	8/17–8/31	<i>F/V Charles T</i>	500	3 m	13 C	0.375 m	Herring	1	5	40
1993	8/23–9/08	<i>R/V Medeia</i>	500	3 m	13 C	0.375 m	Herring	1	5	38
1994	8/23–9/05	<i>R/V Medeia</i>	500	3 m	13 C	0.375 m	Herring	1	5	38
1995	8/23–9/08	<i>R/V Medeia</i>	500	3 m	13 C	0.375 m	Herring	1	5	30
							Squid	3		6
							Squid	3		24
1996	8/17–8/31	<i>R/V Medeia</i>	500	3 m	13 C	0.375 m	Herring	1	5	38
	8/19–8/23	<i>F/V Ida June</i>	750	1 m	13 C	0.2 m	Squid	3–7	½	16
1997	8/07–8/13	<i>F/V Ida June</i>	923–1217	2 m	13 C	0.2–0.3 m	Squid	3–11	½–7	45
		<i>F/V Charles T</i>								
		<i>F/V Kruzof</i>								
1998	8/13–8/19	<i>F/V Ida June</i>	831–1267	2 m	13 C	0.2–0.3 m	Squid	3–11	½–7	45
		<i>F/V Charles T</i>								
		<i>F/V Ocean Cape</i>								
1999	8/15–8/23	<i>F/V Ida June</i>	1002–1129	2 m	13 C	0.2–0.3 m	Squid	3–11	3	45
		<i>F/V Charles T</i>								
2000	8/16–8/23	<i>F/V Ida June</i>	1125	2 m	13 C	0.375 m	Squid	3–11	7	45
		<i>F/V Charles T</i>								
		<i>F/V Spirit</i>								
2001	8/08–8/13	<i>F/V Ida June</i>	1125	2 m	13 C	0.375 m	Squid	3–11	7	45
		<i>F/V Charles T</i>								
		<i>F/V Sylvia</i>								
2002	8/13–8/18	<i>F/V Ida June</i>	1125	2 m	13 C	0.375 m	Squid	3–11	7	44
		<i>F/V Charles T</i>								
		<i>F/V Archangel</i>								
2003	8/03–8/07	<i>F/V Masonic</i>	1125	2 m	13 C	0.375	Squid	3–11	7	44
		<i>F/V Ida June</i>								
		<i>F/V Archangel</i>								
2004	8/05–8/09	<i>F/V Masonic</i>	1125	2 m	13 C	0.375	Squid	3–11	7	44
		<i>F/V Charles T</i>								
		<i>F/V Archangel</i>								
2005	7/27–8/02	<i>F/V Charles T</i>	1125	2 m	13 C	0.375	Squid	3–11	7	44
		<i>F/V Seaview</i>								
		<i>F/V Masonic</i>								
2006	8/01–8/07	<i>F/V Charles T</i>	1125	2 m	13 C	0.375	Squid	3–11	7	44
		<i>F/V Seaview</i>								
		<i>F/V Masonic</i>								
2007	8/04–8/10	<i>F/V Charles T</i>	1125	2 m	13 C	0.375	Squid	3–11	7	44
		<i>F/V Seaview</i>								
		<i>F/V Masonic</i>								
2008	8/06–8/12	<i>F/V Charles T</i>	1125	2 m	13 C	0.375	Squid	3–11	7	44
		<i>F/V Seaview</i>								
		<i>F/V Masonic</i>								
2009	7/28–8/03	<i>F/V Ida June</i>	1125	2 m	13 C	0.375	Squid	3–11	7	44
		<i>F/V Sherrie Marie</i>								
		<i>F/V Seaview</i>								
2010	7/31–8/5	<i>F/V Ida June</i>	1125	2 m	13 C	0.375	Squid	3–11	7	44
		<i>F/V Seaview</i>								
		<i>F/V Masonic</i>								
2011	7/25–7/30	<i>F/V Kaia</i>	1125	2 m	13 C	0.375	Squid	3–11	7	44
		<i>F/V Seaview</i>								
		<i>F/V Pacific Dawn</i>								

**APPENDIX D: CALCULATIONS USED BY ADF&G TO
STANDARDIZE COMMERCIAL FISHERY SETS FOR
HOOK SPACING**

CPUE is affected by hook spacing and ADF&G adopted the formula used by NMFS for CPUE standardization for commercial sablefish catch data (Sigler et al. 2001):

$$n_s = n_u * 2.2 * (1 - \exp(-0.57 * h)), \quad (1)$$

Where n_s is the number of standardized hooks, n_u is the number of unstandardized hooks fished, and h is the hook spacing in meters. This formula standardizes the hook spacing to 1 m.

Hook type also affects CPUE. Historically j-hooks were considered the standard hook style for this fishery. Circle hooks, which dramatically increased catchability, were first reported in the NSEI sablefish fishery in 1983. CPUEs for j-hook interview data have been adjusted using a factor of 1.5. This rate is the rate NMFS uses as a conversion from the sharp tara hooks from the Japanese longline survey to circle hooks and should be considered a conservative adjustment factor for j-hooks as it is expected that tara hooks are more effective than j-hooks. No adjustments have been made for differences in bait use or hook size.

**APPENDIX E: SABLEFISH MATURITY STAGES AND
CRITERIA USED BY THE ALASKA DEPARTMENT OF
FISH AND GAME**

Appendix E1.—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 F: INSTRUCTIONS FOR DELIVERING FISH OUT OF STATE

Fishermen delivering unprocessed catch from a state managed sablefish fishery out of state are required to obtain a Catcher Exporter license. The Department of Revenue issues the Fisheries Business License for a Catcher/Exporter and then the Alaska Department of Fish & Game (ADF&G) will issue the Intent to Operate permit. Contact the ADF&G Seafood Industry Coordinator at (907) 465-6131 for more information on these requirements. The web link for the application for a Catcher/Exporter license is:

<http://www.adfg.alaska.gov/index.cfm?adfg=fishlicense.main>

Fishermen are required to complete a hailed weight fish ticket, and a physical copy of the fish ticket must be provided to ADF&G before the vessel leaves the state. When registering for the fishery you can request a hailed weight ticket from ADF&G.

A completed fish ticket must include the following:

1. Weight of each species with the corresponding disposition (i.e., personal use, discards, or overage) and delivery condition code (i.e., round, bled, headed and gutted, etc).
2. An imprint of the valid CFEC gear card.
3. An imprint of a valid Alaskan processor code.
4. A breakdown by percentage of the groundfish statistical areas fished.
5. Fishermen signature at bottom of fish ticket.
6. A completed logbook and the personal quota share form documenting the trip must be attached to the ticket.

If fish weights are estimated on the above fish ticket, a completed fish ticket with final weights must be returned to ADF&G within seven days of landing. The original fish ticket and PQS form will then be edited to reflect final weights.

**APPENDIX G: PERMITS AND PAPERWORK NEEDED TO
FISH IN THE NSEI SABLEFISH FISHERY**

Appendix G1.–Permits and paperwork needed to fish in the NSEI sablefish fishery.

1. CFEC limited entry permit card specific to the NSEI sablefish fishery.
2. ADF&G vessel license.
3. Vessel registration filed with ADF&G prior to fishing and kept onboard while fishing.
4. Logbook completed daily, copies kept on board the vessel for the duration of the fishery, including a record of the round weight delivered to date if multiple deliveries are made per season. Logbook pages documenting the landing must be attached to the fish ticket at the time of landing. Use of ADF&G logbooks is requested. Logbooks are available at local department offices.
5. Personal Quota Share Tracking Form with individual PQS adjustment for current season, available at department offices.

CFEC permit cards, emergency transfer requests, and ADF&G vessel registrations are administered only by the CFEC and not by ADF&G. Applications for these permits are available at ADF&G area offices or on the web at <http://www.cfec.state.ak.us/> .

Fishermen are strongly advised to obtain current Statewide Commercial Groundfish Fishing Regulations books, available at ADF&G offices, and to refer to the regulations and any current news releases before fishing.

**APPENDIX H: LISTING OF ADF&G REGION I
COMMERCIAL FISHERIES GROUND FISH PERSONNEL**

Appendix H1.–Listing of ADF&G Region I Commercial Fisheries Groundfish Personnel, and addresses for commercial vessel license application processors.

Scott Kelley, Regional Supervisor Forrest Bowers, Marine Fisheries Supervisor Jennifer Stahl, Fishery Biologist II Aaron Baldwin, Fishery Biologist II Martina Kallenberger, Research Analyst II	Douglas Office 802 3 rd Street Douglas, AK 99824 (907) 465-4250
Bill Davidson, Regional Management Supervisor Kristen Green, Groundfish Project Leader Mike Vaughn, Fishery Biologist II Kamala Carroll, Fishery Technician IV Rhea Ehresmann, Fishery Technician III	Sitka 304 Lake Street, Room 103 Sitka, AK 99835 (907) 747-6688
Vacant, Fishery Technician IV	Petersburg 16 Sing Lee Alley Box 667 Petersburg, AK 99833 (907) 772-3801
For commercial permits and vessel license applications contact:	State of Alaska Commercial Fisheries Entry Commission (907) 789-6150 National Marine Fisheries Service , Alaska Regional Office (907) 586-7229 Restricted Access Management program (RAM), P.O. Box 21668, Juneau, AK 99802-1668, (907)-586-7202