

**Fishery Management Report No. 10-40**

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**The Southeast Alaska Northern Southeast Inside  
Sablefish Fishery Information Report With Outlook to  
the 2010 Fishery**

by

**Kamala Carroll**

and

**Cleo Brylinsky**

November 2010

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Alaska Department of Fish and Game

Divisions of Sport Fish and Commercial Fisheries



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<b>Weights and measures (metric)</b>		<b>General</b>		<b>Mathematics, statistics</b>	
centimeter	cm	Alaska Administrative Code	AAC	<i>all standard mathematical signs, symbols and abbreviations</i>	
deciliter	dL	all commonly accepted abbreviations	e.g., Mr., Mrs., AM, PM, etc.	alternate hypothesis	$H_A$
gram	g	all commonly accepted professional titles	e.g., Dr., Ph.D., R.N., etc.	base of natural logarithm	$e$
hectare	ha	at	@	catch per unit effort	CPUE
kilogram	kg	compass directions:		coefficient of variation	CV
kilometer	km	east	E	common test statistics	(F, t, $\chi^2$ , etc.)
liter	L	north	N	confidence interval	CI
meter	m	south	S	correlation coefficient	
milliliter	mL	west	W	(multiple)	R
millimeter	mm	copyright	©	correlation coefficient (simple)	r
		corporate suffixes:		covariance	cov
<b>Weights and measures (English)</b>		Company	Co.	degree (angular)	$^\circ$
cubic feet per second	ft <sup>3</sup> /s	Corporation	Corp.	degrees of freedom	df
foot	ft	Incorporated	Inc.	expected value	$E$
gallon	gal	Limited	Ltd.	greater than	>
inch	in	District of Columbia	D.C.	greater than or equal to	≥
mile	mi	et alii (and others)	et al.	harvest per unit effort	HPUE
nautical mile	nmi	et cetera (and so forth)	etc.	less than	<
ounce	oz	exempli gratia	e.g.	less than or equal to	≤
pound	lb	(for example)		logarithm (natural)	ln
quart	qt	Federal Information Code	FIC	logarithm (base 10)	log
yard	yd	id est (that is)	i.e.	logarithm (specify base)	log <sub>2</sub> , etc.
		latitude or longitude	lat. or long.	minute (angular)	'
<b>Time and temperature</b>		monetary symbols (U.S.)	\$, ¢	not significant	NS
day	d	months (tables and figures): first three letters	Jan, ..., Dec	null hypothesis	$H_0$
degrees Celsius	°C	registered trademark	®	percent	%
degrees Fahrenheit	°F	trademark	™	probability	P
degrees kelvin	K	United States (adjective)	U.S.	probability of a type I error (rejection of the null hypothesis when true)	$\alpha$
hour	h	United States of America (noun)	USA	probability of a type II error (acceptance of the null hypothesis when false)	$\beta$
minute	min	U.S.C.	United States Code	second (angular)	"
second	s	U.S. state	use two-letter abbreviations (e.g., AK, WA)	standard deviation	SD
<b>Physics and chemistry</b>				standard error	SE
all atomic symbols				variance	
alternating current	AC			population sample	Var
ampere	A			sample	var
calorie	cal				
direct current	DC				
hertz	Hz				
horsepower	hp				
hydrogen ion activity (negative log of)	pH				
parts per million	ppm				
parts per thousand	ppt, ‰				
volts	V				
watts	W				

***FISHERY MANAGEMENT REPORT NO. 10-40***

**THE SOUTHEAST ALASKA NORTHERN SOUTHEAST INSIDE  
SABLEFISH FISHERY INFORMATION REPORT WITH OUTLOOK TO  
THE 2010 FISHERY**

by

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## 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 2009–2010 Commercial Groundfish Fishing Regulations and active News Releases and Emergency Orders, as these inseason actions will supersede information provided in this document.

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

## INTRODUCTION

The sablefish (*Anoplopoma fimbria*) fishery is the oldest and most lucrative groundfish fishery managed by the State of Alaska. Sablefish, also known as blackcod, is a commercially important species throughout its range, and is typically harvested using longline or pot gear. The Alaska Department of Fish and Game Southeast Region (ADF&G, Region I) manages the sablefish fishery in the Northern Southeast Inside Subdistrict (NSEI) (Figure 1), commonly known as the Chatham sablefish fishery. ADF&G also manages a smaller sablefish fishery in the Southern Southeast Inside (SSEI) Subdistrict (Vaughn M. 2010).

The NSEI sablefish fishery is currently a limited entry, Equal Quota Share (EQS) fishery with 87 permit holders (Table 1), and is limited to longline gear. While the Annual Harvest Objective (AHO) has decreased from 4,761,905 round pounds at the beginning of the EQS system to 1,063,000 round pounds in 2010 the price of sablefish remains high. Equal quota shares have ranged from 38,889 round pounds per permit in 1994 to 12,170 in 2009. This report summarizes the commercial longline fishery and the management of sablefish in NSEI from the early years of the fishery through the present and details the recent overall harvest, biological data, catch per unit of effort (CPUE), longline fishing patterns and fishery bycatch. Relevant Board of Fish decisions from 2003 through 2009 and recent department biological research activities are also summarized.

## SABLEFISH LIFE HISTORY

Sablefish are one of two species that make up the Anoplopomatidae family that also includes skillfish (*Erilepis zonifer*). They occur only in the North Pacific Ocean, the Bering Sea, and adjacent waters from Hokkaido, Japan to Baja California. Their greatest abundance is in the Gulf of Alaska (Wolotira et al. 1993). 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. These 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 1000 miles from where they were born (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 fm (366 m and 915 m), although they have been found at depths ranging from 100 to 1000 fm (183 m to 1,830 m) (Allen and Smith 1988). Fish generally move to deeper depths as they age (Maloney and Sigler 2008).

Adult sablefish are opportunistic feeders, preying on fishes (including pollock (*Theragra chalcogramma*), eulachon (*Thaleichthys pacificus*), capelin (*Mallotus villosus*), herring (*Clupea pallasii*), sandlance (family Ammodytidae), Pacific cod (*Gadus macrocephalus*), and flatfish,

squid, euphasids (also known as krill), Pandalid shrimps and jellyfish (Yang and Nelson 2000). Yearling sablefish feed primarily on euphasids (Sigler et al. 2001b).

Juvenile sablefish are preyed upon by adult coho and Chinook salmon (*Oncorhynchus kisutch* and *Oncorhynchus tshawytscha*). ADF&G 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*) have also been documented to eat 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 across many different shallow water areas. During more typical years, 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 (PDO) phase changes lead to above average sea surface temperatures (Sigler et al. 2003).

Sablefish spawn in pelagic waters at depths of 300–500 m (164–273 fm) in the late winter and early spring, in areas near the edge of the continental slope (Sigler et al. 2001, McFarlane and Nagata 1988). One study has found that fifty percent of females are ready to spawn when they are 6.5 years old and fifty percent of males are mature at 5 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 1.19 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 length is 69 cm and average weight is 3.4 kg. Adult females average 83 cm 6.2 kg (Sigler et al. 2003). Sablefish randomly sampled from 1997 through 2009 in NSEI during ADF&G surveys had a maximum length of 111 cm for females and 95 cm for males. Survey males averaged 65 cm and females averaged 71 cm.

Sablefish are relatively long lived. Fish over age 40 are commonly found in commercial fishery samples, and the average age of sablefish sampled from the most recent commercial fishery is 18. The maximum reported age for sablefish in Alaska is 94 years (Kimura et al. 1998), and for NSEI, 79 years. As sablefish are difficult to age, these ages should be considered approximate (Pearson and Shaw 2004).

The current National Marine Fisheries Service (NMFS) stock assessment for the Gulf of Alaska estimates the sablefish mortality rate at 0.10 (Hanselman et al. 2009). This is in agreement with several published estimates for the Gulf of Alaska (Sigler et al. 2001, Johnson and Quinn 1988), although a higher estimate of 0.112 (Funk and Bracken 1984) has been used by federal managers in the past (Sigler et al. 2003). Hoenig's formula for estimating natural mortality yields a rate of 0.05 (5%) for NSEI sablefish (Hoenig 1983).

# FISHERY HISTORY

## SUMMARY

Although directed fishing was recorded as early as 1913, the majority of sablefish landed in the early 20<sup>th</sup> century were bycatch in the halibut fishery (Bergmann 1975). There were peaks in directed effort during both World Wars, and peaks associated with demand from the vitamin industry (Figure 2) (Bracken 1983). The 1940s brought the beginning of localized depletions and more active fishery management (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 (Turriss 2000). Harvest has been substantial since the 1970s despite some fluctuations in price (Table 1). The primary management tools used by ADF&G and its pre-statehood predecessor Alaska Department of Fisheries were guideline harvest ranges (GHRs) and season limitations until 1994, when the fishery became an Equal Quota Share (EQS) fishery. This occurred after a series of years in which the GHR was overharvested and seasons were limited to just 24 hours. The EQS system remains in place to the present day, with 87 participants (Table 1). Due to a lack of evidence of recent strong year classes and concerns that current stock levels remain low compared to historic levels, the AHO (Annual Harvest Objective) has declined from 4,761,905 round pounds in 1994 to 1,063,000 round pounds in 2010. The price per pound for sablefish has been consistently high since 1994. The fishery has been limited to longline gear since 1981.

## HARVEST AND REGULATION HISTORY, 1906–2009

The first recorded commercial sablefish landing in Southeast inside waters was landed as bycatch in the halibut fishery in 1906 (Kolloen 1944, Bergmann 1975), like the majority of early sablefish landings. A directed landing was recorded as early as 1913. Effort and prices increased during World War I, during which time the market name “sablefish” was introduced in favor of “blackcod,” 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 (Kolloen 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 fishing vessel *Wolverine* began targeting sablefish with small-eyed hooks and 9 to 13 foot hook spacing (Bracken 1983). It was believed that the smaller hooks would 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 when using the new gear compared to standard halibut gear (Edson 1954).

Along with 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; Kolloen 1944). The season was reduced in 1945 from year round to between mid March and late November. The department 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 continued to be slow through 1971 as prices remained low (Turriss 2000), CPUE was not as high as it had been, and there were some years of bad weather and opportunities in other fisheries (Bracken 1983). During the 1970s, the sablefish export market to Japan began developing and interest in sablefish fishing increased again (Turriss 2000). At the same time there was a large international (Canadian and Japanese) sablefish fishery in the waters offshore from Southeast Alaska (Bracken 1983).

The department shortened fishing seasons and implemented guideline harvest ranges (GHRs) as effort escalated in the 1970s and 1980s (Figure 2, Appendix A; Bracken 1983). The fishery which had been open to both longline and pot gear was restricted to longline gear only in 1981. An industry recommended harvest limit of 1 million dressed pounds was implemented in 1973. ADF&G recommended a reduction in quota to 850,000 dressed pounds in 1979 and then moved to a guideline harvest range of 500,000 to 900,000 dressed pounds in 1980 based on historic catches. Fleet effort and efficiency continued to increase dramatically and by 1984 the season was reduced to five days in the NSEI area. In 1985, a limited entry program was implemented for the sablefish fishing fleet in NSEI and the guideline harvest range (GHR) was set at 500,000 to 1,500,000 dressed pounds. Still, the overall 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. In order to stay within harvest objectives, the department continued to reduce the number of fishing days. The season length went from 76 days in 1980 to one day in 1987. A one-day opening continued until 1993. In that year, the fleet harvested 3,640,000 dressed pounds, 2,140,000 pounds over the upper bounds of the 1,500,000 dressed pound GHR.

The fishery catch per unit effort (CPUE) (round pounds per hook) was low in the early 1980s, increasing in the mid 1980s with the recruitment of very strong year classes (Figure 3; Carlile et al. 2002). Due to these strong year classes the CPUE remained above 1 pound per hook from 1982 through 1993. However, the CPUE began to decline after 1993.

In an effort to improve management and to promote a safer fishery, the Alaska Board of Fisheries (BOF) adopted an EQS system for the NSEI fishery beginning in 1994, to be evaluated in 1997 (Appendix A and B). This plan was recommended by a working group of industry representatives and state fisheries managers after extensive negotiations. Under the EQS system each permit holder was given an equal share of the annual quota and the season was extended. The upper end of the GHR was increased to 3 million dressed pounds (4.76 million pounds round weight) at the time this system was implemented. The EQS system was made permanent in 1997 based on fleet and department recommendations. Logbooks detailing catch and effort by set became mandatory (Appendix C). At that same time the season was set in regulation for September 1 through November 15 and until 2003 the GHR was set at 1.59 to 4.8 million round pounds. Beginning in 2003 the EQS has been based on the annual harvest objective (AHO) and annual EQSs have ranged from 12,170 to 20,787 round pounds (Table 1). The EQSs vary annually based on the AHO and number of legal participants for that year. Sablefish harvest has been extremely close to the harvest objective since the beginning of the EQS system, although there have been some individual overages (Figure 2, Table 2).

In 1994 the fishery pound-per-hook CPUE began to show a marked decline (Figure 3). A declining fishery CPUE between 1993 and 1994 was not unexpected because of the change in

management from a derby style to the EQS fishery. However, the decline in fishery CPUE beginning in 1994 was of concern. The round pounds-per-hook CPUE continued to decline until 1998 when it leveled off at 0.50 round pounds-per-hook, the lowest fishery CPUE on record (fishery CPUE estimation began in 1980). There was a rise in CPUE from 2002 through 2004 and then CPUE held steady at about 0.71 round pounds per hook from 2004 to 2006. CPUE rose again in 2007 and 2008 but dropped in 2009 to 0.81 round pounds per hook.

Due to poor fishery performance over the prior 5 years (Figure 3) and acknowledgement of the general decline in sablefish abundance coastwide (Sigler et al. 1997), the fishery annual harvest objective (AHO) was lowered 35% in 1999 from 4.8 million round pounds to 3.12 million round pounds (Figure 2). ADF&G further lowered the AHO by 30% in 2001 to 2.184 million round pounds based on fishery CPUE trends and an ADF&G mark-recapture-based estimate of exploitation rate. The 2002 AHO was set at 2.005 million round pounds based on an exploitable biomass estimate from the 2001 mark-recapture project and adjusted for bycatch mortality estimates (Richardson and O'Connell 2002, Carlile et al. 2002). An outside review panel of experts from other fisheries met during this year to discuss the ADF&G stock assessment program and suggest changes for future years (Leaman et al. 2002). The 2002 AHO remained in place for 2003 (Richardson and O'Connell 2003). The biomass and  $F_{40\%}$  ( $F_{40\%} = 0.137$ ) harvest rate estimates were updated for 2004, and the AHO was increased to 2.245 million round pounds. The 2005 AHO was lowered to 2.053 million round pounds based on the same  $F_{40\%}$  ( $F_{40\%} = 0.137$ ) harvest rate applied to an updated biomass estimate from the 2004 mark-recapture project. The 2005 allowable biological catch (ABC) and total allowable catch (TAC) were rolled over and used for the 2006 fishery. An updated biomass estimate and updated  $F_{40\%}$  harvest rate ( $F_{40\%} = 0.116$ ) were applied to the 2007 fishery, and the AHO was 1.488 million round pounds. The 2007 biomass estimate and harvest rate ( $F_{40\%} = 0.116$ ) were both rolled over for the 2008 fishery so that staff time could be spent producing a detailed stock assessment report (Dressel, 2009). The resulting AHO was slightly higher in 2008 because the amount decremented for the halibut fishery was reduced due to reductions in the halibut quota. The 2008 AHO was 1.508 million round pounds. The 2009 AHO was based on an updated biomass estimate from the 2008 mark-recapture project, an  $F_{45\%}$  (0.104) harvest rate, and decrements for other fisheries as in the past but with the addition of a deduction for sablefish harvested in the annual longline survey. The AHO for 2009 was 1,071,000 round pounds. The work performed by the consultant hired in 2007 by the department to evaluate stock assessment methods revealed that the stock level in Chatham Strait is at a low level relative to the historic unfished biomass and the harvest rates used in 2007, 2008 (0.116) and in 2009 (0.104) were unsustainably high for a population at this level. For this reason the department has proceeded with caution and conservatism with regard to the harvest of sablefish from Chatham Strait. A harvest rate of  $F_{50\%}$  (0.071) was used in 2010.

The NSEI sablefish fishery is important to the Southeast Alaska economy. The price of sablefish has been consistently high since the EQS system began (Table 1). 1994, 1995, and 1998 were the only years in which the price was less than \$2.00 per round pound.

As a result of consistently high sablefish prices the NSEI fishery has remained lucrative in spite of dropping quotas. Permits issued for NSEI by the Commercial Fisheries Entry Commission (CFEC) have steadily increased in value over time and are among the most valuable fishing permits statewide. The CFEC estimated the value of a permit to be over \$300,000 in 2009. Permits are not administered by ADF&G. Detailed information regarding permits and licensing

should be obtained directly from the CFEC by phone at (907) 789-6150 or online at <http://www.cfec.state.ak.us>.

## **BOARD OF FISH CHANGES IN NSEI SABLEFISH COMMERCIAL FISHING REGULATIONS, 2003–2009**

During the January 2003 Alaska Board of Fisheries (BOF) meeting, the BOF made several changes in regulations affecting the NSEI sablefish fishery. The regulations put into place during that meeting were:

- The opening date for the fishery was changed from September 1 to August 15, giving families some time to fish before the beginning of the school year.
- Randomly selected permit holders may fish outside of the regular season at the department's request and under the terms of a Commissioner's permit to gather biological and catch data during years when the final AHO is determined by January 1.
- Permit holders 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 equal quota share as an overage or underage. The initial regulation stated permit holders could transfer up to 5% of their legal harvest to another permit holder, but this was repealed in 2006.
- Sablefish regulations were updated to clarify data sources used by the department for setting annual guideline harvest limits.
- Record keeping requirements for permit holders specified they must maintain inseason records of their cumulative catch and provide this information to buyers.
- Thornyhead, shorttraker, roughey and redbanded rockfish may be taken only as bycatch.

In 2006, the ability of fishermen to transfer overages was repealed because it proved to be problematic. The details of the transfer requirements, such as whether the overage recipient must be at the processor to receive the overage or whether transfer agreements must be reached before fishing, were not made clear in the provision. It was also noted some permit holders began fishing trips after finishing their annual EQS, then transferred the overage to other users. This was not the intent of the regulation. Finally, 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 of Fish did renew the overage/underage provision without the transferability, which had been due to sunset in May 2006.

No changes that directly affect commercial sablefish operations were made at the 2009 BOF meeting. However, regulations requiring that sablefish caught by sport fishermen be reported specifically in charter logbooks and creel surveys instead of being reported as "other" species will give commercial fisheries managers more information about the magnitude of the sport sablefish catch than they have had in the past.

## **PARTICIPATION**

Between 1975 and 1984 the fleet size ranged from a low of 46 permits in 1982, to a high of 125 permits in 1976 (Table 1). In 1985 the Commercial Fishery Entry Commission (CFEC) implemented the limited entry program for the NSEI sablefish fishery with the objective that there would eventually be approximately 73 permanent permit holders. As of the beginning of

2010 the CFEC has 8 cases yet to be decided. Five of these cases are currently in litigation. Of the 87 permits that may fish in 2010, 71 are permanent permits and the remainders are interim use permits. Thirty permanent permits are still in the name of the original permit holder. Permits are not administered by ADF&G. Detailed information regarding permits and licensing should be obtained directly from the CFEC by phone at (907) 789-6150 or online at <http://www.cfec.state.ak.us>.

## **RESEARCH ACTIVITIES**

### **STOCK ASSESSMENT**

In 1988, annual longline surveys (Richardson 2003a, Richardson 2003c, Richardson 2003e, Vaughn and Sayer 2007, Vaughn 2009) began which provided the department with a fishery independent estimate of CPUE measured at set survey stations, an independent estimate of sablefish longline bycatch, and the ability to collect age, weight and length (AWL) measurements from a sample of sablefish unaffected by commercial fishery selectivity. The fishery and biological information available to ADF&G prior to 1988 was derived from limited ADF&G surveys, at sea sampling on those surveys and tagging efforts which were conducted opportunistically. Additional information was obtained from voluntary logbooks or dockside interviews provided by fishermen. The survey design was modified during the early years of implementation but has been consistent since 1997 (Appendix D). Current longline survey methods are also consistent with federal survey methods, allowing for comparison of sablefish CPUE between state and federal waters (Richardson 2003a).

Mark-recapture studies have been conducted since 1997 (Carlile et al. 2002, Richardson 2003b, Richardson 2003d, and Richardson 2001). These studies involve marking and releasing a subsample of sablefish and then using the proportion of recovered marks among the total number of fish captured in the commercial fishery to estimate the population size. Fish were marked from a longline vessel from 1997 to 1999, but in 2000 ADF&G switched to using pots to capture sablefish for marking because fish captured with longline gear exhibited hook shyness during the year of marking making them less available for capture by longline gear in that year. Marking occurs in NSEI during June, and marks are distributed among statistical areas in proportion to the commercial catch taken from each area. Marks are also distributed across different depths within each statistical area, approximating as closely as possible the distribution of commercial fishery sets with the constraint of reaching overall marking goals within the time contracted for the survey. Fishery logbooks are used to determine the distribution of commercial sets by statistical area and depth. Marked and unmarked fish are counted by ADF&G personnel when fish are delivered to the processor. Fishermen are encouraged to turn in tags and to note the recovery location of tagged fish in exchange for rewards, and to be entered in an annual drawing for cash prizes. Fish processor workers are also encouraged to turn in tags to receive a reward (Carlile et al. 2002).

A private consultant was hired in 2007 to evaluate current stock assessment methods for Chatham Strait sablefish and to explore alternatives. The consultant's review suggests that the development of an age-structured assessment (ASA) model that incorporates mark-recapture information is the preferred option for fully integrating the available data for sablefish in Chatham Strait (Mueter, 2010). An ASA model can incorporate a number of data types measured over time, such as fishery and survey weight at age, fishery and survey CPUE, fishery and survey age or length compositions, fishery or survey sex composition, mark-recapture estimated

abundance, survey maturity at age, and commercial catch. An ASA model can provide a reconstruction of historical abundances and an evaluation of current stock status relative to historical and unfished levels. It can also estimate important management parameters. The consultant's recommendations were published by ADF&G in early 2010 (Mueter, 2010)

In addition to the estimation of population size by mark-recapture methods, other sources of information used by ADF&G to assess the fish population condition are biological data from a subsample of fish caught in the commercial fishery and longline survey (age, weight, length, and maturity (Appendix F)), logbooks (Appendix C), and personal communication with fishermen. Dockside port sampling began in 2000, logbooks became mandatory in 1997 and increased in detail in 2003. Fishery CPUE is calculated using commercial fish ticket records and commercial logbooks, adjusting for hook spacing in the manner of Sigler (2000; Appendix E). All these data sources can influence management decisions regarding research design and the quota for the following year.

ADF&G began estimating unreported fishing mortality of NSEI sablefish in 2002 and subtracting it from the allowable biological catch (ABC) to obtain the AHO. The halibut fishery bycatch mortality is estimated based on bycatch rates of sablefish caught during the International Pacific Halibut Commission (IPHC) annual longline survey on stations in NSEI that have at least one end of the set deeper than 99 fms. This rate is then applied to the estimated amount of halibut likely to be caught in NSEI in the coming year using the current year halibut quota. A portion (25%) of this sablefish bycatch from the halibut fishery is assumed to be deadloss. In addition 3% of the ABC is subtracted to account for fish taken in subsistence, personal use and sportfish fisheries and as deadloss in non-halibut fisheries. There has been little information available as to the magnitude of most of these other sources of mortality, but the Department of Fish and Game Sport Fish Division in 2009 began requiring that sport-charter logbooks reflect the catch of sablefish, those logbooks however did not have a designated spot for that information. The 2010 logbooks do and in the future it is expected that information from the sport-charter logbooks will better inform ADF&G about the level of harvest of sablefish in the sportfish fishery.

## **ADDITIONAL RESEARCH**

Sablefish are known to move extensively throughout their range. State, federal, and international agencies have cooperated in order to track fish movement with tagging methods. Fish were tagged and released in early years in cooperative studies with NMFS, on several ADF&G surveys and opportunistically on other historic surveys in order to provide more information about adult sablefish movement. ADF&G maintains a database of tag and recovery locations of fish tagged with ADF&G tags. ADF&G also returns other agency tags recovered in state commercial fisheries or on ADF&G surveys to each appropriate agency.

In 2003 a regulation went into effect allowing limited fishing outside of the regular season for research purposes and by commissioner permit only. This regulation was implemented as a result of a public proposal requesting that the NSEI sablefish fishery season be concurrent with that of the federal IFQ halibut fishery, and the fact that the department did not have any data on the stock condition during the first half of the proposed season. In 2004 and 2005 permit holders were randomly selected from a list of permit holders who expressed interest in fishing in winter and spring under terms specified by the commissioner for the purpose of gathering fishery and biological information outside of the regular NSEI season. An ADF&G observer was on board

each vessel to facilitate bycatch accounting and sablefish sampling, and to scan for passive integrated transponder (PIT) tags released by the department the previous season.

In the experimental off-season fisheries, fishing was poor in January and early February. Sablefish were less available to the gear than during the regular NSEI sablefish season and there was a greater proportion of immature fish present. It is unknown what the primary cause for that was, but it is possible that either mature sablefish were present but spawning and uninterested in the gear, mature fish were not residing in Chatham during spawning, or dogfish were outcompeting sablefish for the hooks. Of the few mature fish that were caught, most were ripe. There was extremely high dogfish bycatch during January and February, and dogfish outnumbered sablefish on some sets.

Fishing in the off-season fishery improved with an increase in catch rates after late February, with more large mature fish captured. Fishing was thought to be good in part because the vessels did not have the possibility of making sets in an area that had just been set by another vessel unbeknownst to them, as occurs in the regular season. In 2005, the off-season fishery tended to catch more, and smaller, males compared to the regular season. The mean length of males was 63.5 cm in the off season and 65 cm in the regular season, while it was 72 cm for females during both seasons.

The off-season fishery can only be opened if the AHO for the coming season is determined by January 1 of that year. This has not occurred since 2005. Researching the off season fishery also became difficult for the department due to the logistics of placing staff on vessels, situations which endangered staff, and compliance problems such as fishing in areas other than those requested for research and over-harvesting quotas.

The department conducted a study to evaluate the use of passive integrated transponder (PIT) tags to mark sablefish in 2004. These are internal tags that can be automatically detected by receivers installed in processing plants. In June 2004, using a chartered pot vessel, ADF&G marked 6,357 sablefish with PIT tags and with a blind mark. Recovery of the PIT tags took place in Sitka throughout the 2004 regular season. Adequate detection rates could not be achieved and so it was determined that there were insufficient benefits to the use of PIT tags to justify their cost. If the tag and recovery effort had been successful the use of PIT tags could have increased the detection rate of the number of marked fish landed, allowed estimation of abundance by size strata, and increased efficiency of the recapture phase of this study (Carlile et al. 2002).

The department provided 6 sablefish from the 2003 NSEI longline survey for the Department of Environmental Conservation (DEC) Environmental Health Fish Monitoring Project for sampling for heavy metals (arsenic, cadmium, lead, chromium, selenium and nickel and methyl mercury). These fish were included in a sample of 40 sablefish collected statewide. The analysis revealed low levels of all heavy metal contaminants tested. According to the Alaska Division of Public Health, the concentrations of heavy metals that were detected are not a public health concern. More in-depth data on heavy metals can be found at [www.state.ak.us/dec/animal/fm-heavymetals.htm](http://www.state.ak.us/dec/animal/fm-heavymetals.htm), and [www.state.ak.us/dec/deh/fishsafety.htm](http://www.state.ak.us/dec/deh/fishsafety.htm).

A research study was performed to determine the accuracy of macroscopic maturity staging of sablefish (Appendix F). In August 2007 ovary samples and data including fork length, weight, and maturity stage were collected from 215 female sablefish during the ADF&G longline survey in the NSEI management area. The maturity stage was determined based on gross morphology, such as color and size of the ovary and egg visibility. Ovary samples were preserved and later prepared for

histological analysis by staining, embedding in wax, and thin slicing. Samples were then examined under a microscope to determine the maturity stage of each ovary. The maturity classification assigned based on microscopic analysis was compared to the macroscopic classification determined during the survey. The analysis confirmed macroscopic maturity staging is appropriate overall and for the determination of whether or not fish are mature or immature (information that is used in the stock assessment). However, at the “maturing juvenile” stage it was interesting to note that at least half of the sablefish appeared to be ready to spawn in the approaching season as expected, but half may not spawn until the following spawning season.

## **2009 COMMERCIAL FISHERY**

### **COMMERCIAL FISHERY**

The annual harvest objective (AHO) for the Northern Southeast Inside (NSEI) sablefish fishery was 1,071,000 round pounds. The AHO was reduced 29% from the 2008 AHO of 1,508,000 round pounds due to a decrease in biomass and the use of a more conservative harvest rate. A reduction in the EQS was mitigated due to the application of the harvest rate to the less conservative biomass estimate (the point estimate rather than the lower 90% confidence limit) and the reduction of 8 permits to the fishery. The total directed harvest in 2009 was 1,071,554 round pounds, 100.1% of the AHO (Table 2). The total amount of Personal Quota Share pounds that could legally be harvested after accounting for legal overages and underages from the 2008 season was 1,065,276. There were 88 eligible permit holders in 2009, eight fewer than in 2008 (Table 1). The 2009 individual quota share (EQS) was 12,170 round pounds, a 22% decrease from the 2008 EQS of 15,710 round pounds. The AHO was 1,488,000 round pounds in 2007 and 2,053,000 round pounds in 2005 and 2006. There were 103 eligible permit holders in 2007, 105 in 2006, and 106 in 2005.

2009 was the 6th year during which personal quota shares (PQS) were produced to accommodate overages and underages. The department sends every permit holder a certified letter before the commercial fishing season which states the number of pounds that will be added to or deducted from their personal quota share (PQS) in the upcoming season. For 2009 the maximum amount that could be carried forward from 2008 was 786 round pounds, and the maximum amount that could be carried forward from 2009 is 609 round pounds (Table 2). Forty one permit holders reported legal overages totaling 13,378 round pounds in 2009. There were six permits with illegal overages, totaling 2,408 round pounds. Since the overage/underage provision was created, the amount of pounds landed illegally has fluctuated. The highest amount of pounds landed illegally in this period was 9,248 in 2005 and the lowest was 1,100 in 2003. In the years immediately prior to the overage/underage provision, over 10,000 round pounds of sablefish were landed illegally per year.

The average ex-vessel price reported at the time of landing for NSEI sablefish in 2009 was \$3.34 per round pound, up from \$3.15 in 2008. This yielded an ex-vessel value of approximately \$3.5 million dollars for the total harvest.

In 2009, 88 permit holders using 69 vessels made a total of 114 fishing trips (116 landings) (Table 2). Sixty four percent of permit holders made one landing for their entire season, and an additional 22% finished their season in two landings. Over 50% of the vessels that participated in the 2009 fishery have participated each of the past 10 years. Since 1994, when the fishery became EQS, the number of vessels participating in the fishery has decreased 38% and the

number of permits has decreased 28%. This indicates an increase in the number of permit holders sharing trips on one vessel.

In 2003 the opening day for the NSEI fishing season was changed in regulation from September 1 to August 15. This change in season has had the effect of slowing participation on opening day (Table 2). This year, for the sixth consecutive year, the NSEI sablefish fishery opened at 8:00 A.M. on August 15, 2 weeks earlier than 1997–2002, and remained open through noon November 15 as set in regulation (5AAC28.110(a (1))). In 2009, 14% of the fleet (12 vessels) began fishing on opening day. In contrast, the 2002 fishery opened on September 1 and 53 (62%) of the vessels fished on opening day. The trend in vessels fishing in the opening week of the season is similar to that of opening day. The decrease in early participation is due in part to a portion of the fleet participating in other August fisheries, especially the salmon seine fishery.

The majority of the NSEI harvest continues to come from the two statistical areas in central Chatham, 345631 and 345701 (Figures 4 and 5). In 2009 the combined harvest from these two statistical areas represented 67.5% of the total harvest, which is a decrease from 74.6% in 2008, although up from 62.1% in 2007 and 63.2% in 2006.

In 2009, the majority of landings (45%) were made in Sitka. Twenty-seven percent were made in Petersburg and 20% in Juneau. Small portions of the catch were landed in Hoonah and Wrangell, and caught onboard a floating catcher/processor.

The distribution of landings has changed since 2001. In 2001, 42% of sablefish landings were made in Petersburg and 32% were made in Sitka. Since then, the proportion of Petersburg landings has decreased each year except in 2007 and 2008, and the proportion of landings in Sitka has increased every year. The proportion of the catch landed in Juneau has fluctuated around an average of 15%, and in Hoonah around an average of 8%. At least one landing has been made in Kake, Wrangell, Ketchikan, Excursion Inlet, Pelican, at floating processors, at other Alaskan ports, or in Bellingham, WA since 2001. These minor ports combined make up less than 10% of the total landings every year. Landings made outside of Alaska require coordination with additional agencies and additional permits (Appendix G).

In 2009, just under 96% of the harvest was landed round, with over 4% landed eastern (or j) cut similar to 2007 and 2008. About 2,336 pounds in 2009 and 2,240 in 2008, or 0.2% of the total harvest each year, were landed as personal use. This is an increase from 2004-2007 when 0.1% was landed as personal use.

## **CPUE**

Because of the complexity of fishery data, several steps were taken to get relatively standard abundance index. First, longline gear used in the fishery has variable hook spacing. Therefore fishery hook spacing is standardized to 1 meter hook spacing before CPUEs are calculated using the formula found in Appendix E. Sablefish fishery CPUE should only be calculated from sets that target sablefish, as sets made with other targets have the potential to negatively bias CPUE. Because many sablefish permit-holders also own halibut permits, they may make sablefish-target and halibut-target sets on a single trip. Trip targets must be determined because fishery CPUE is calculated from fish-ticket landings and fish-ticket landings can be specified only to trip and not to set. This year we figured out one way to exclude the mix target trips by depth. Since the logbook data are not available during 1908-1996, the fishery CPUE was recalculated from all trips with an average depth greater than 450 meters (about 86% of trips) during 1997-2009.

Excluding shallow trips can result in a higher CPUE than using trips across all depth ranges because shallow sets have lower catch rate. However, this method only excluded about 14% of the trips and is a relative index that will perform more similarly across years than one with all sets due to annual changes in target reporting and in the percent of dual target trips.

Fishery CPUE has increased over the past ten years (Figure 3). However the 2009 CPUE was 0.81 round pounds per standardized hook, a considerable decrease from 0.92 in 2008 but greater than eight of the last ten years. The 2004–2006 seasons' CPUE remained fairly constant at 0.71. In 2007, fishery CPUE increased to 0.83. The CPUEs for 1999–2009 are still well below the extremely high CPUEs of the early 1980's that were supported by exceptionally strong year classes.

Both conventional gear and snap-on gear are used in the NSEI sablefish fishery. In 2009, 94% of the hooks were set using conventional gear. The remainders were set using snap-on gear. In 2008 93% of hooks were set using conventional gear. During 2003 through 2007, between 95% and 96% of hooks were set using conventional gear. If not standardized for hook spacing the average CPUE of sets using snap on gear was higher in all years than the CPUE of sets using conventional gear because of the considerably wider hook spacing used in snap on gear.

For comparison the 2009 and 2008 longline survey CPUE was 1.78 round pounds per hook, an increase from 1.63 in 2007 and 1.72 in 2006, but lower than the 2005 CPUE of 1.97 round pounds per hook. The lowest survey CPUEs of the past ten years were 1.14 in 1999 and 1.10 in 2000 (Figure 3). Hook spacing in the longline survey is 2 meters which is consistent with NMFS survey gear specifications. The survey CPUE is also standardized to 1 meter hook spacing so that it is comparable to the fishery CPUE.

## **BIOLOGICAL DATA**

Neither the commercial fishery nor survey length data show evidence of significant recruitment in the years 2000–2009. The fishery length frequency distribution has changed since 2000 with the curve steepening and shifting to the right (Figure 6, Figure 7, Figure 8). These figures also indicate that the mode shows a similar trend but with a more gradual shift through the years. There has been a steady increase in average fork length of harvested fish, from a low point of 65 cm in 2001 to 71 cm in 2007 through 2009. The length frequency distribution of female fish harvested in the commercial fishery has steepened more dramatically than the length frequency distribution of male fish between 2002, the first year during which commercial samples were sexed, and 2009 (Figure 9). If the shift in commercial fishery sample length distribution was due primarily to increased release of small fish (high grading) or increased targeting of large fish, survey length frequency data would be unchanged from 2000 to 2009. However, the survey length frequency distributions also show a steepening and shifting over time.

Compared to the commercial fishery, the survey consistently has a higher frequency of fish that are less than 50 cm long, which contributes to the slightly smaller average size (Figure 6, Figure 7, and Figure 8). The differences between the survey and commercial fishery data suggest that, although the change over time in average fish size is likely due to a lack of recruitment in the fishery, there is also some release of smaller fish and potentially targeting of larger fish in the commercial fishery. This is not surprising, as the price per pound for larger fish is higher than the price per pound for smaller fish, and anecdotal evidence suggests some commercial fishermen believe it is beneficial to the fishery to release fish less than about 50 cm long.

Age data also show a lack of recent recruitment to the fishery. The age distribution has narrowed in the commercial fishery between 2002, the first year during which commercial samples were aged, and 2009 (Figure 10). The NSEI commercial fishery was primarily dominated by fish between 7 and 9 years old from 2002 through 2007, and 6 year old fish were very abundant in addition to 8 year olds in the 2004 fishery (Figure 10). Ten year old fish were the most abundant in the 2008 commercial fishery while in 2009 the most abundant were 11 year old fish.

There is a longer record of age samples from the longline survey than the commercial fishery. Age samples from the longline survey show a dramatic change in the shape of the age distribution between the 1990s and recent years (Figure 11). In years 2003–2009 there are fewer age classes over all and very few young fish. In the years 1992–2000 the age data shows strong recruitment and evidence of significant age classes of older fish.

The age data from NSEI do not clearly show individual strong year classes that can be tracked through time. Tag data suggests that once recruited in NSEI, most sablefish are resident and therefore it is expected that it would be possible to track strong year classes (Carlile et al. 2002). It is possible that sablefish are recruiting into the NSEI area at a variety of ages by emigrating from other areas. If this is occurring it could mask the progression of year classes that might normally be evident when fish recruit to a population at a single young age, or series of younger ages, and then progress, over time, through the population. Sablefish are difficult to age (Pearson and Shaw 2004) and aging errors may also mask the contribution of strong year classes to the fishery. The NMFS Gulf of Alaska (GOA) stock assessment lists the 1997 and 2000 year classes as strong recruitments and the 1995 year class as average (Hanselman et al 2009).

The sex ratio of the survey and of the fishery samples has changed since 2002, the first year from which sex data are available. The percentage of males in the regular season fishery decreased from 45% in 2002 to 33% in 2009. The longline survey sex ratio has also changed but not as dramatically. It decreased from 54% in 2002 to 41% male in 2009. It is difficult to evaluate how much of this change is due to gear selectivity and how much indicates an actual change in population sex ratio. Longline gear generally selects for larger fish and females reach a larger maximum size and grow faster than males. The sex ratio data for sablefish sampled on the mark-tag survey using pot gear, which is not as selective for larger fish as longline gear, was 45% male in 2002 and 37% male in 2009.

The maturity data from port samples show a steady decline in the proportion of fish in maturity categories 1 and 2, immature and developing to maturity, from 25% in 2002 to 3% in 2009 (Appendix F). This decline in young immature fish is consistent with the noticeable lack of recruitment into Chatham.

Average weight has increased in the last 6 years which could be the result of a lack of recruitment or may be the result of the increased proportion of female fish in the catch. The average round weight of fish sampled from the 2009 commercial fishery was 4.1 kg (9.0 lbs), an increase from the 2002 average of 3.8 kg (8.3 lbs). The average weight was also 4.1 kg (9.0 lbs) in 2008 and 2007.

## **FISHERY BYCATCH**

There were 47,059 round pounds of thornyhead, 9,131 round pounds of shortraker, and 5,569 round pounds of roughey rockfish landed as bycatch in the 2009 NSEI sablefish fishery (Figure 12). Other bycatch species landed, in order of abundance, were Pacific cod (*Gadus*

*macrocephalus*), arrowtooth flounder (*Atheresthes stomias*), redbanded rockfish (*Sebastes babcocki*), yelloweye rockfish (*Sebastes ruberrimus*), quillback rockfish (*Sebastes maliger*), lingcod (*Ophiodon elongatus*), canary rockfish (*Sebastes pinniger*) and silvergray rockfish (*Sebastes brevispinus*). There were 1,743 round pounds of redbanded rockfish (*Sebastes babcocki*) landed; a little over 1,000 round pounds of Yelloweye rockfish (*Sebastes ruberrimus*) and less than 100 round pounds of each of the other species were 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 thornyhead, shortraker, and roughey rockfish round pounds landed on trips targeting sablefish has been about 5% or 6% of the round pounds of sablefish landed on sablefish target trips since 2003 (Figure 12). This is a decline from 7% in 2002, 10% in 2001, and a peak of 15% in 2000. Prior to 2003, fish caught in excess of sablefish bycatch limits could be landed and sold on miscellaneous finfish permits. Fish were considered bycatch in the sablefish fishery in this report regardless of the permit on which they were landed if they were caught during trips in which sablefish were targeted. In 2003, the Board of Fish made shortspine thornyhead, roughey, and shortraker rockfish bycatch only species. Therefore, any amount of these rockfish caught in excess of bycatch limits must either be retained for personal use, donated to charity, or sold with the proceeds going to the state.

Since July 2000, a full retention policy has been in place for inside state waters that requires all *Sebastes* rockfishes caught to be landed and weighed. Shortspine thornyhead are *Sebastes* rockfish. They were not included in this requirement because they do not have a swim bladder and therefore do not incur embolism mortality, and can be released unharmed.

The catch of sharks or skates can occasionally be in excess of 1,000 pounds in a trip and sometimes as high as 4,500 pounds, but the true magnitude of the bycatch can not be known because the fish are not weighed or well counted before being discarded and reporting diligence of at-sea discards is variable. Sharks are a nuisance to fishermen as they become tangled in the gear and cannot be sold. Skates up to their bycatch limit can legally be sold but processors do not always purchase them.

Halibut are also taken in the sablefish fishery and can be landed as part of a permit holder's International Pacific Halibut Commission (IPHC) individual fishing quota (IFQ), if applicable. They are then technically considered a target species in a dual fishery. If the permit holder does not have IFQ or has already caught their IFQ for the year, halibut must be released at sea. Halibut observed as bycatch in ADF&G longline surveys typically survive capture and appear vigorous when they are released.

## **2010 COMMERCIAL FISHERY**

The 2010 NSEI sablefish fishery opened August 15 at noon and will run through noon on November 15<sup>th</sup>. There are 87 permit holders eligible to fish during the 2010 season.

### **BIOMASS ESTIMATE**

The estimate of sablefish abundance in NSEI at the time of the 2009 fishery was calculated using mark-recapture methods and the Petersen estimator. From this estimate, a forecast of biomass for 2010 was developed by decrementing for natural mortality, adding for recruitment, and converting from fish abundance to biomass. A harvest rate was then applied to the forecasted

biomass to obtain the allowable biological catch (ABC). For 2010, a harvest rate of  $F_{50\%}$  (0.071) was applied to the point estimate of the 2010 forecasted biomass. After deducting for deadloss in the halibut fishery, subsistence, personal use, sport fishing and deadloss in non-halibut fisheries the AHO for the fishery was 1,063,000 round pounds which is less than a 1% drop from the 2009 AHO (1,071,000).

For a detailed reporting of the stock assessment methods used for the 2007 NSEI sablefish AHO, see Dressel (2009). The methods used for calculating the 2010 AHO were nearly identical to those used for the 2007 AHO with three notable changes. These are:

- For 2010, a more conservative harvest rate was used ( $F_{50\%}$  (0.071)) instead of  $F_{45\%}$  (0.104).
- For 2010, the harvest rate was applied to the point estimate of the sablefish biomass forecast, whereas for 2007 the harvest rate was applied to the 90% lower confidence interval of forecasted biomass.
- For 2010, an additional decrement for testfish harvest was incorporated. This decrement is determined by calculating the average testfish harvest from the previous 3 years longline surveys with the round pound equivalent of three 2009 equal quota shares deducted.

## **UNREPORTED MORTALITY**

Sablefish are taken incidentally in fisheries for other species, most notably in the halibut longline fishery. There are no data available on the magnitude or mortality of these catches in the commercial fishery, therefore we use data obtained from the International Pacific Halibut Commission (IPHC) to estimate the likely deadloss in that fishery. We use the most recent available past year's IPHC fishery catch information to anticipate how the fishing will occur spatially, and IPHC annual survey catch information from the previous year to obtain a ratio of sablefish to legal halibut. We apply this ratio to the current year halibut quotas to estimate the anticipated deadloss for the current year. Inputs for determining deadloss in 2010 were 2008 IPHC fishery information, 2009 IPHC stock assessment survey information and the 2010 halibut quotas. Because the ratio of sablefish to legal halibut have a wide range and change significantly from year to year we use an average of the ratio for the three most recent years. The ratio used in 2010 was 0.682 (2007–2009 average). Only halibut survey stations where at least one end is deeper than 99 fathoms and occurring in the area of NSEI where the commercial sablefish fishery occurs are used for this ratio determination. Commercial catch data provided by IPHC indicated that approximately 9.8% of the 2008 2C halibut quota was taken in waters of NSEI in sets deeper than 99 fathoms outside the regular NSEI sablefish season. The 2010 2C quota was 4,400,000 pounds, and the estimated halibut catch that would be taken in waters of NSEI in sets deeper than 99 fathoms outside the regular sablefish season was 431,950 pounds. Applying a 0.682 bycatch rate to this portion of the quota results in a potential bycatch of sablefish of 294,590 round pounds. We assume 25% of this poundage is deadloss, resulting in a 73,647 round pound decrement.

An additional 3% of the ABC is deducted to account for other sources of mortality, which include incidental catch in the crab fisheries, subsistence, sport, and personal use fishing, and discard or unreported mortality in the directed sablefish fishery. Until July 18, 2003, when the use of sablefish as bait was prohibited, sablefish could legally be taken for use as bait from inside

state waters. Deadloss in the directed fishery may be the result of sandflea and shark predation, hooking injuries on released fish, and fish lost either before retrieval or because of lost gear.

The combined decrement applied to the TAC for the 2010 fishery to account for the deadloss in the directed halibut fishery, other sources of mortality (3% of the ABC), and removals by the department for test fisheries totaled 187,831 round pounds.

### **DIRECTED FISHERY QUOTA**

The 2010 directed fishery quota will be 1,063,000 round pounds. This is less than a 1% drop from the 2009 AHO of 1,071,000 round pounds. There are currently 87 permits for this fishery, one less than in 2009; therefore the individual quota share (EQS) will be 12,218 round pounds (one half of one percent more than last year's EQS of 12,170 round pounds). The exact poundage allowed for each permit holder fishing in 2010 (personal quota share (PQS)) will be a combination of the 2010 EQS and the amount debited or credited based on their legal overage/underage during the 2009 fishery. The maximum amount of pounds that could be carried over to 2010 from 2009 was 609.

Fishermen should have received a letter from the Alaska Department of Fish and Game issuing their 2010 PQS adjustment amount.

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## **TABLES**

Table 1.—Number of permits and vessels, catch, Equal Quota Share (EQS), and price in the NSEI sablefish fishery, 1969–2010.

Year	No. permits <sup>a</sup>	No. vessels	Round lbs landed <sup>b</sup>	EQS	Average price /round lb <sup>c</sup>
1970	—	—	421,344	—	—
1971	—	—	315,692	—	—
1972	—	—	1,089,150	—	—
1973	—	—	977,995	—	—
1974	—	—	815,731	—	—
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	2,951,056	—	—
1986	138	144	3,874,269	—	\$0.74
1987	158	163	3,861,546	—	\$0.91
1988	149	147	4,206,509	—	\$1.08
1989	151	149	3,767,518	—	\$0.77
1990	121	119	3,281,393	—	\$1.08
1991	127	122	3,955,189	—	\$1.74
1992	115	115	4,267,781	—	\$1.75
1993	120	114	5,795,974	—	\$0.97
1994	121	112	4,713,552	38,889	\$1.94
1995	121	116	4,542,348	38,889	\$1.70
1996	121	118	4,672,701	38,889	\$2.12
1997	122	111	4,753,394	39,300	\$2.43
1998	116	106	4,688,008	41,700	\$1.57
1999	112	98	3,043,273	28,000	\$2.18
2000	111	93	3,082,159	28,600	\$2.40
2001	111	87	2,142,617	19,600	\$2.13
2002	109	86	2,009,380	18,400	\$2.40
2003	108	88	2,001,643	18,565	\$2.39
2004	108	88	2,229,954	20,787	\$2.03
2005	106	82	2,026,131	19,400	\$2.49
2006	105	80	2,033,786	19,550	\$2.69
2007	103	77	1,501,478	14,500	\$2.67
2008	96	71	1,513,040	15,710	\$3.15
2009	88	69	1,071,554	12,170	\$3.34
2010 <sup>d</sup>	87	—	—	12,218	—

<sup>a</sup> 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.

<sup>b</sup> Records from prior to 1985 are incomplete; harvest levels were approximated using a variety of sources.

<sup>c</sup> Based on price recorded on fish ticket at time of landing. Initial dock price adjustment payments are included though coop prices are preliminary.

<sup>d</sup> At the publication time of this report the 2010 fishery was still underway.

Table 2.—Summary of NSEI quota share fishery, 2000–2009. All fish quantities are in round pounds.

	2009	2008	2007	2006	2005	2004	2003	2002	2001
Annual Harvest Objective (AHO)	1,071,000	1,508,000	1,488,000	2,053,000	2,053,000	2,245,000	2,005,000	2,005,000	2,184,000
Equal Quota Share (EQS)	12,170	15,710	14,500	19,550	19,400	20,787	18,565	18,400	19,600
Sum of Personal Quota Shares <sup>a</sup> (PQS)	1,065,276	1,503,937	1,498,133	2,053,122	2,061,422	2,241,338	n/a	n/a	n/a
Allowable over/underage	609	786	723	978	970	1,039	n/a	n/a	n/a
Total directed harvest	1,071,554	1,513,040	1,501,478	2,033,786	2,026,131	2,229,954	2,001,643	2,009,380	2,142,617
Percentage of AHO harvested	100.1	100.3	100.9	99.1	98.7	99.3	99.8	100.2	98.1
Illegal overages	2,408	3,155	5,254	1,989	9,248	2,402	1,100	17,459	11,930
Permits with illegal overages	6	7	10	4	10	9	4	40	—
Legal overages	13,378	20,545	18,332	16,009	27,861	25,479	21,821	—	—
Permits with legal overages	41	50	45	39	45	46	49	—	—
CFEC permits eligible for EQS	88	96	103	105	106	108	108	109	111
CFEC permits fished	88	96	103	105	106	108	108	109	111
Permanent permits	59	54	43	41	41	41	40	39	—
Interim use permits	29	42	60	64	61	67	68	70	—
Permits under court appeal	4	4	4	4	4	5	4	—	—
Total number of vessels	69	71	77	80	82	88	88	86	87
Number of trips	114	123	140	175	168	203	—	—	—
Average no. landings per permit <sup>b</sup>	1.7	1.5	1.6	1.9	1.9	2	2.1	2.1	2.7
Permits finishing in one trip	57	55	61	44	49	44	41	34	20
Permits finishing in two trips	19	34	27	42	37	39	36	48	43
Vessels fishing opening day	12	12	16	20	38	26	25	52	48
CPUE standardized for hook spacing (rnd lbs/hook)	0.81	0.92	0.83	0.71	0.71	0.71	0.75	0.63	0.50
Average price of NSEI sablefish	\$3.34	\$3.15	\$2.67	\$2.69	\$2.49	\$2.03	\$2.39	\$2.40	\$2.13
Fishery ex-vessel value in millions	\$3.5	\$4.7	\$4.0	\$5.4	\$5.0	\$4.5	\$4.8	\$4.8	\$4.6

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

<sup>b</sup> Number of landings is approximate.

## **FIGURES**

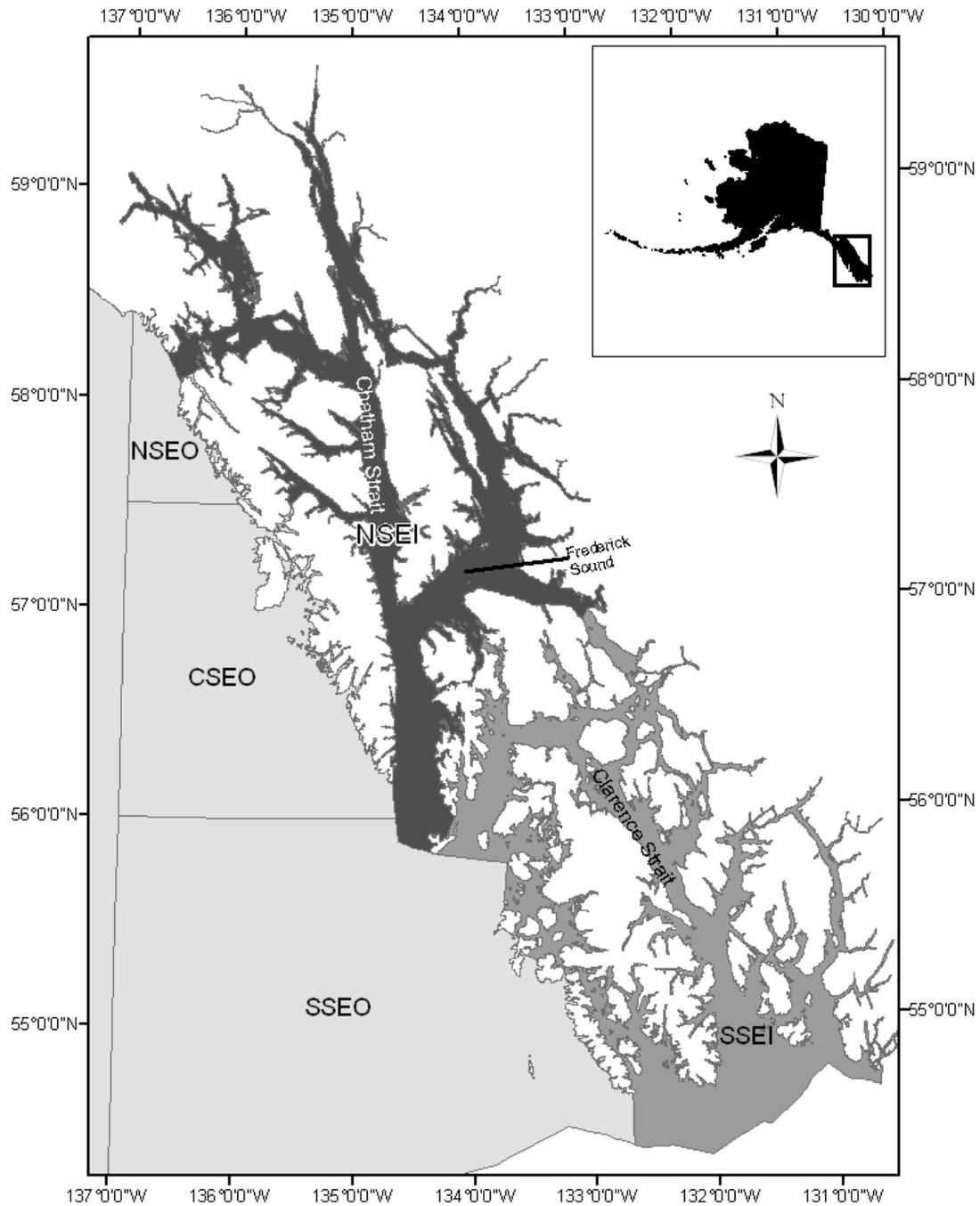


Figure 1.—Management areas for the state sablefish fisheries in Southeast Alaska, including Northern Southeast Outside (NSEO), Northern Southeast Inside (NSEI), Central Southeast Outside (CSEO), Southern Southeast Outside (SSEO), and Southern Southeast Inside (SSEI).

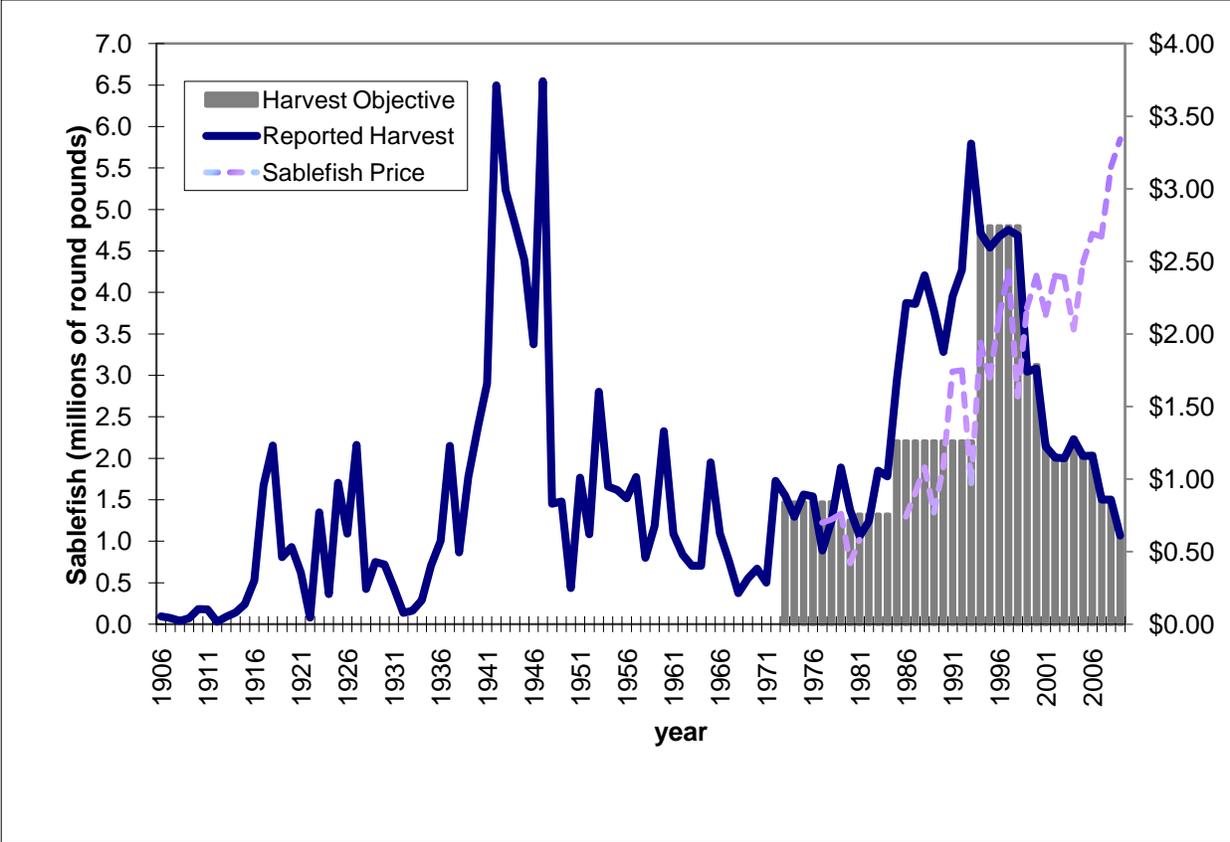


Figure 2.—Northern Southeast Inside (NSEI) sablefish reported catch and annual quota, 1906–2009, and average price per pound, 1977–2009. Records from prior to 1985 are incomplete; harvest levels were approximated using a variety of sources.

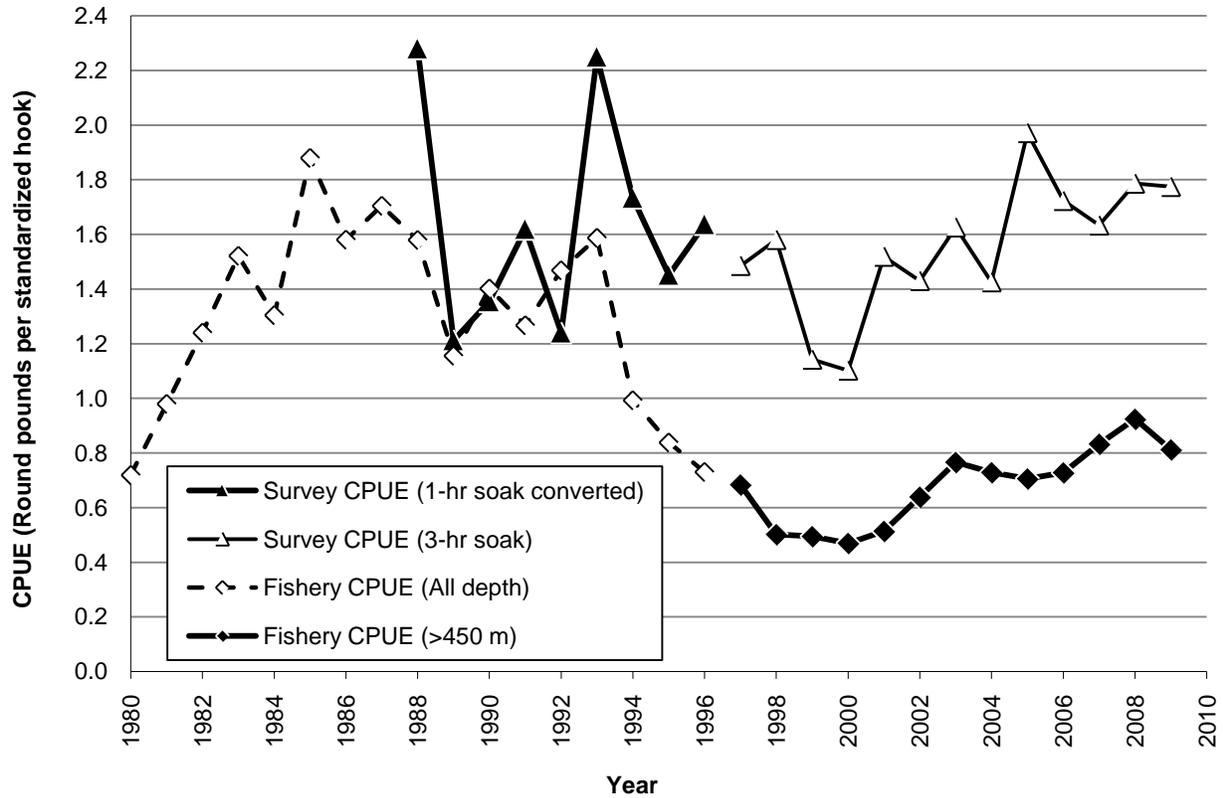


Figure 3.—Northern Southeast Inside (NSEI) commercial sablefish fishery and Alaska Department of Fish and Game (ADF&G) Chatham Strait longline survey CPUE, 1980–2009.

Note: Data used to estimate commercial fishery CPUE from 1997–2009 are from mandatory logbooks and fish tickets. Fish delivery condition (round vs. dressed) is documented on the fish ticket. For years 1997–2001 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 1985–1997 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 (Appendix E). 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. Longline survey soaks during the 1988–1996 surveys were 1 hour long, as opposed to 3–11 hours long during 1997–2009. Therefore, survey CPUE for 1988–1996 was divided by a calibration factor of 0.43 to standardize to a 3+ hr soak.

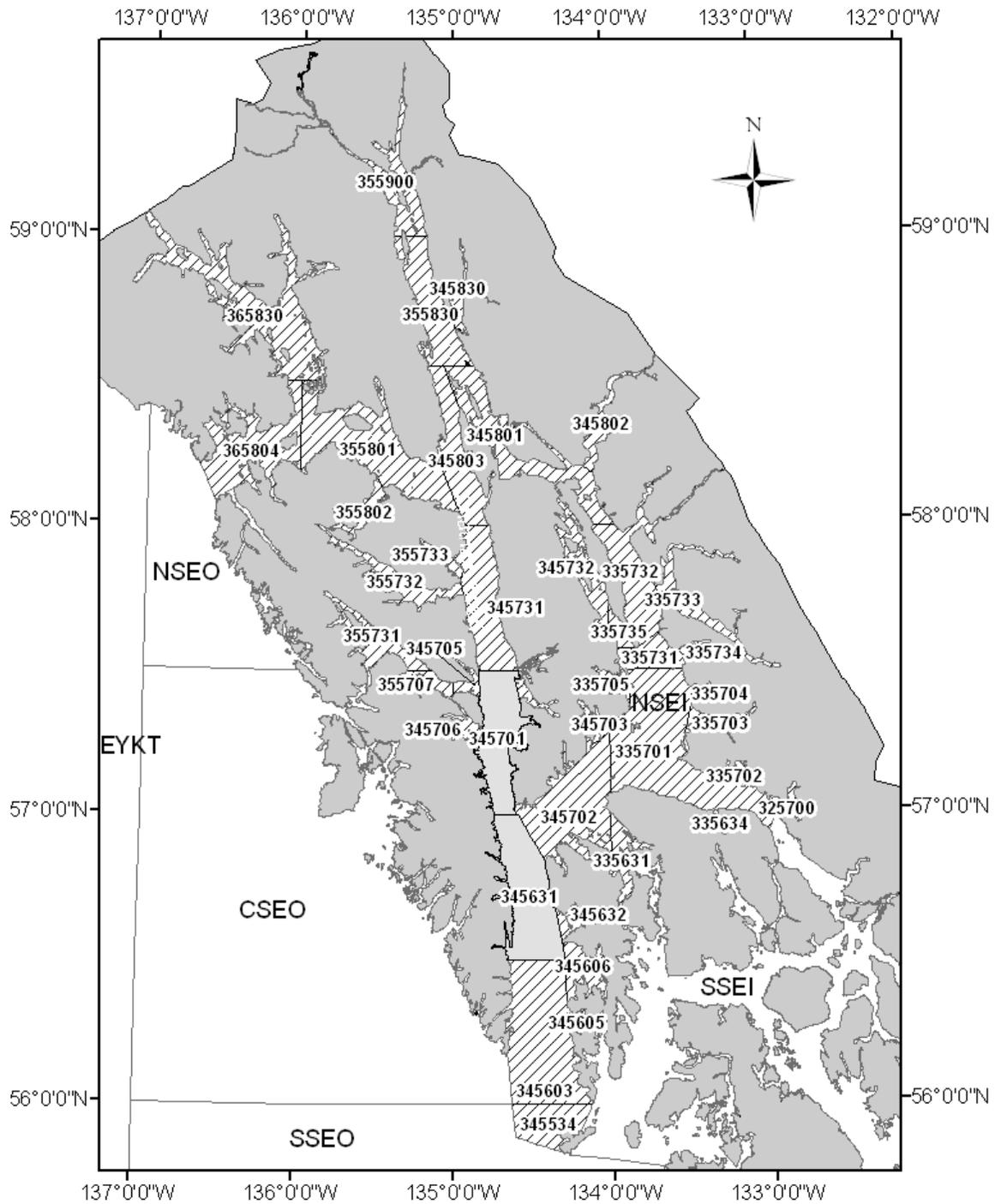


Figure 4.—Alaska Department of Fish and Game groundfish statistical areas in Northern Southeast Inside (NSEI). Statistical areas 345631 and 345701 are shaded.

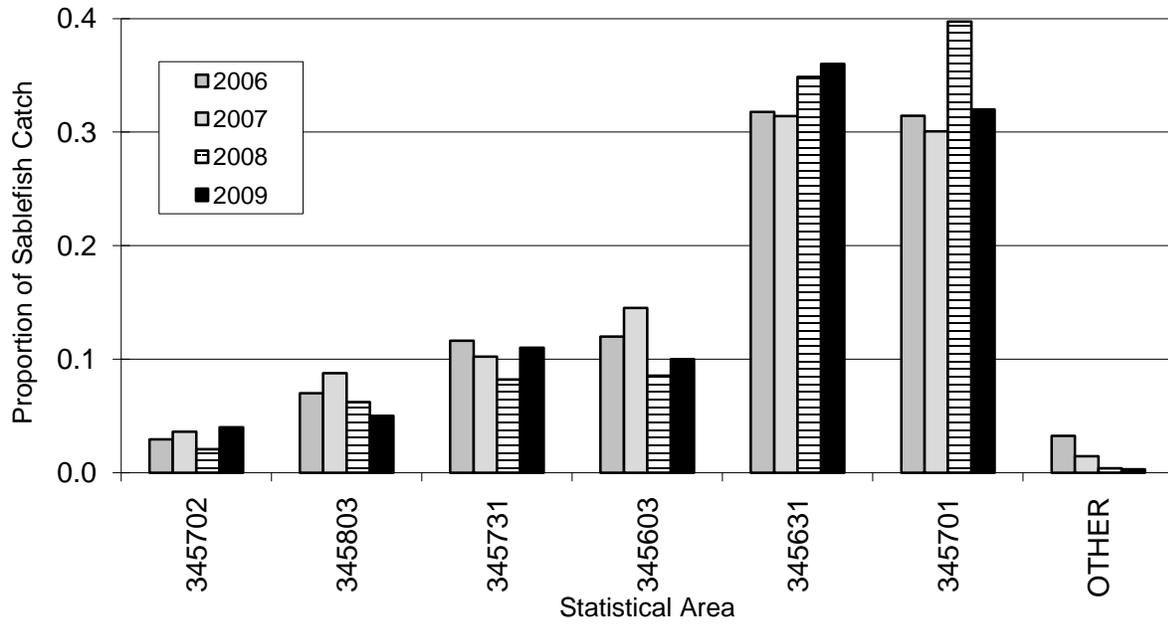


Figure 5.—Northern Southeast Inside (NSEI) sablefish fishery harvest distribution by statistical area and year, from 2006 to 2009. There was no commercial harvest in statistical areas 335731, 335732, 345705, 345534, 345706, 355707, 355801, or 365804 between 2006 and 2009. Harvests under Other denote combined sablefish harvests from statistical areas 335701, and 355830.

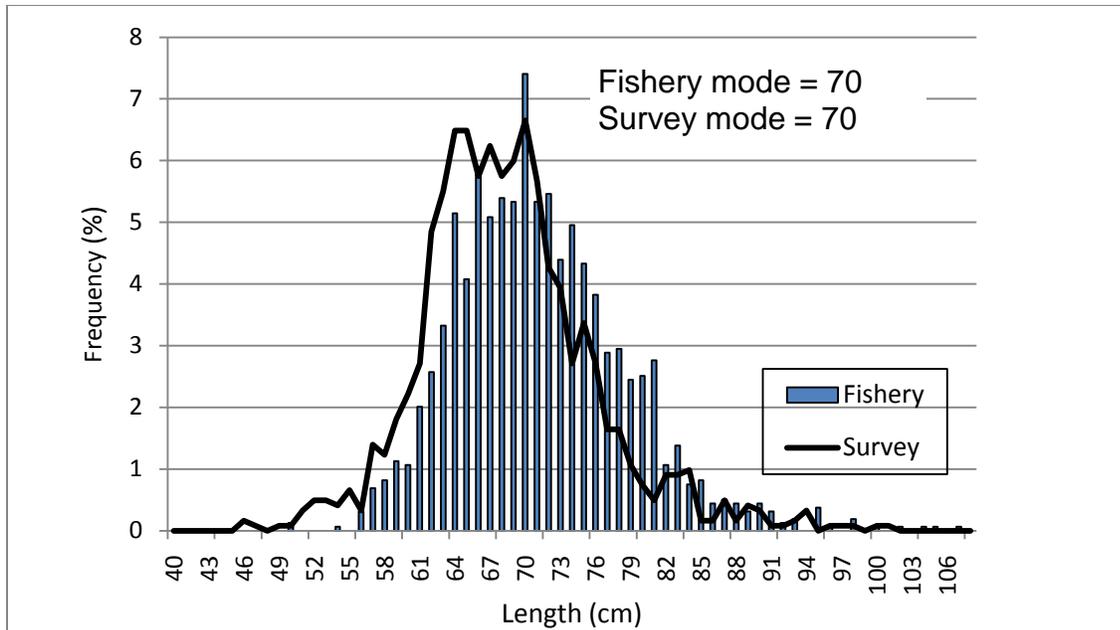


Figure 6.—Northern Southeast Inside (NSEI) sablefish fishery and survey length frequency distribution, 2009.

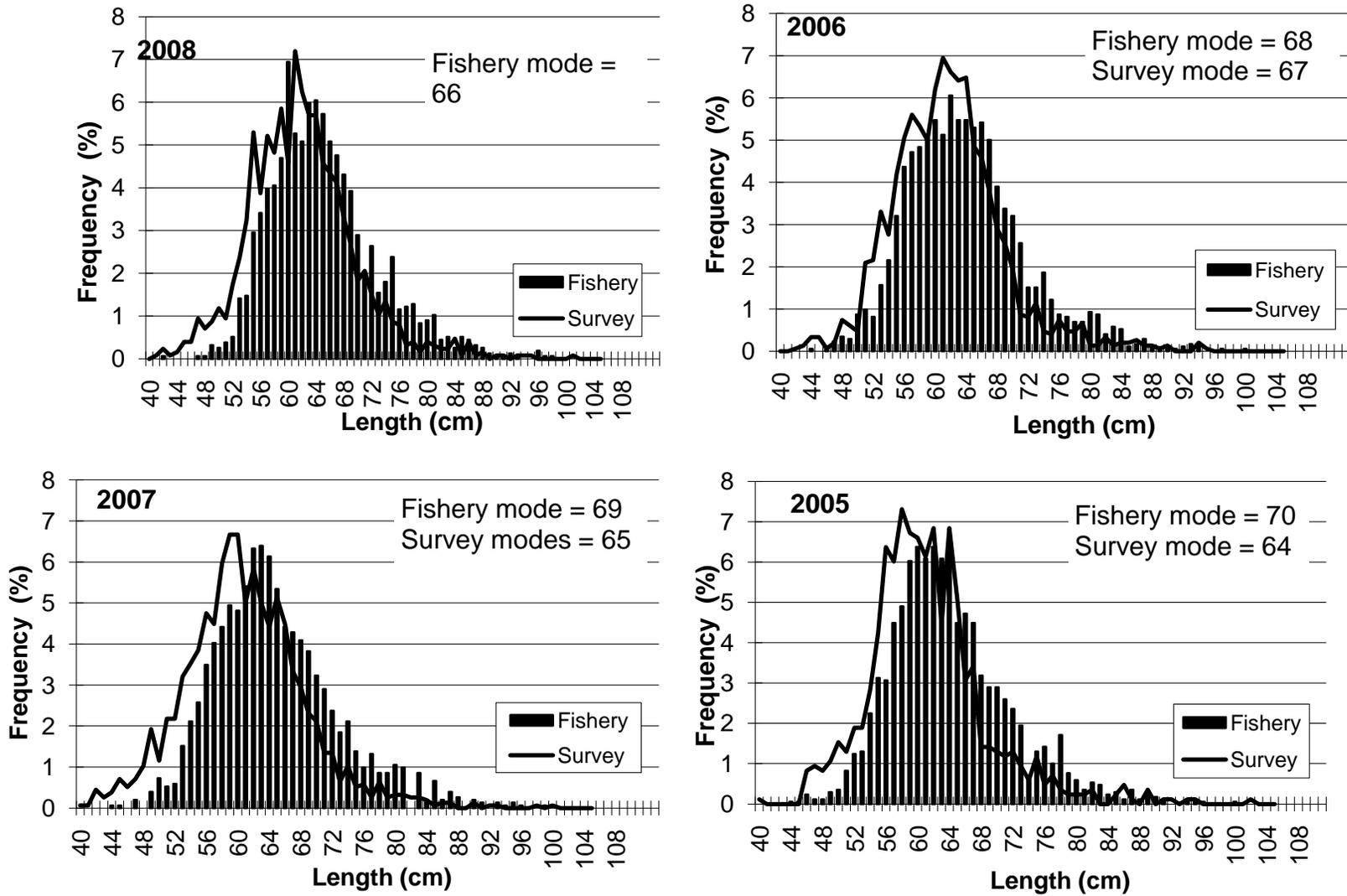


Figure 7.—Northern Southeast Inside (NSEI) sablefish fishery and survey length frequency distributions, 2008–2005.

Figure

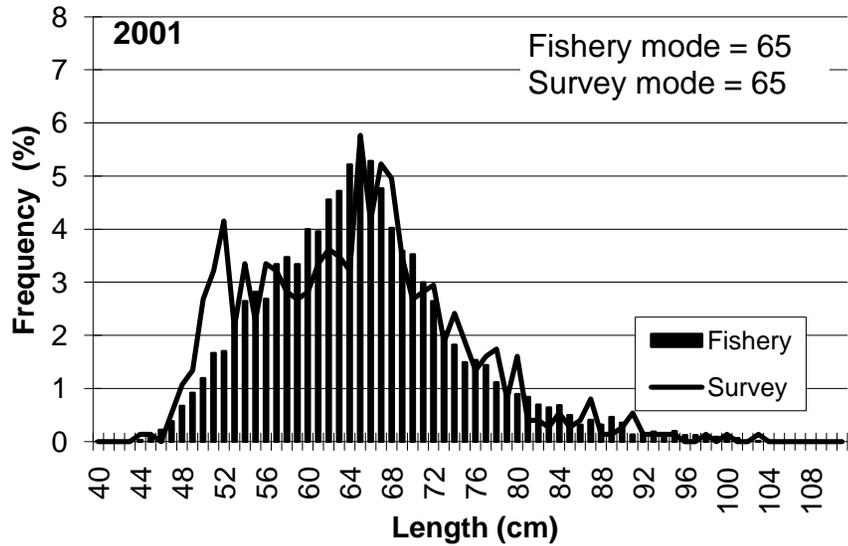
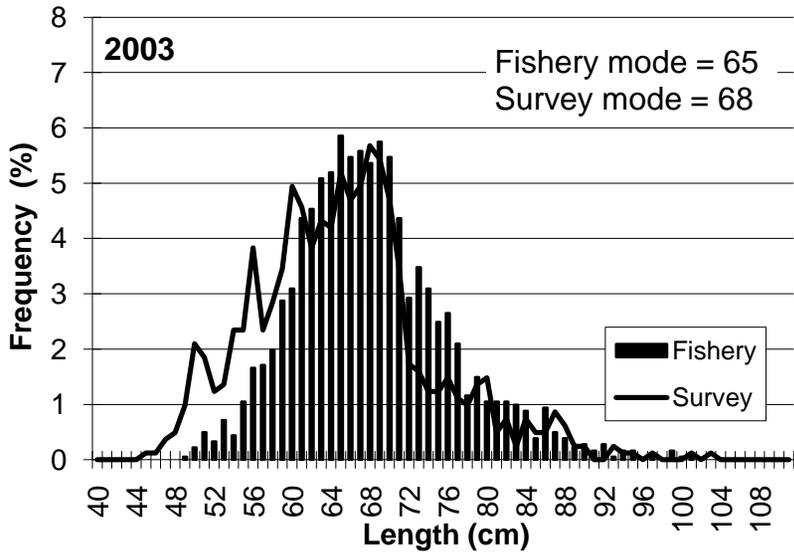
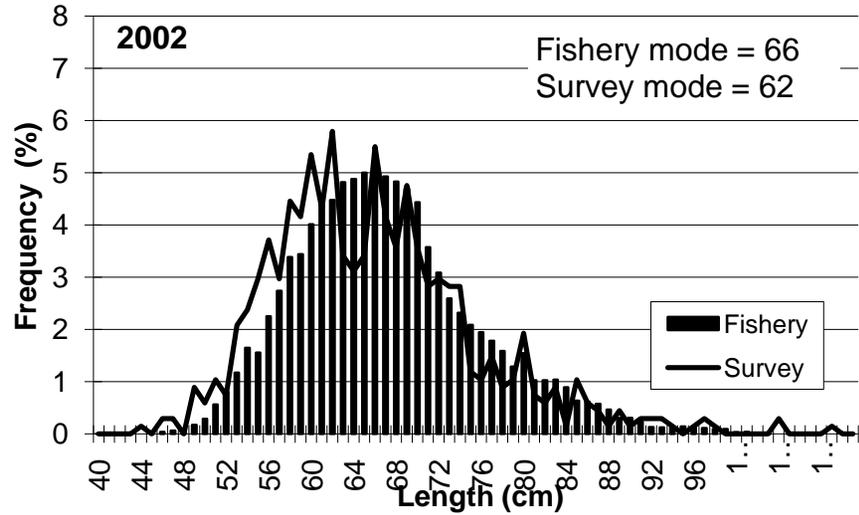
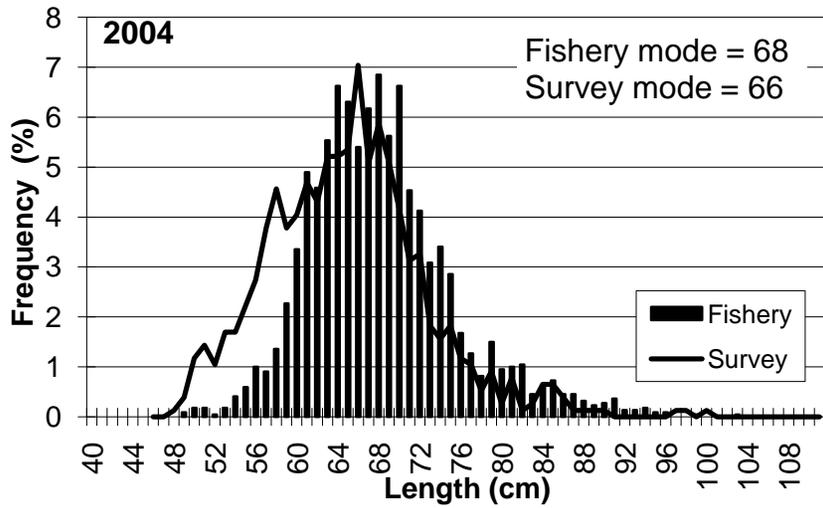


Figure 8.—Northern Southeast Inside (NSEI) sablefish fishery and survey length frequency distributions, 2004–2001.

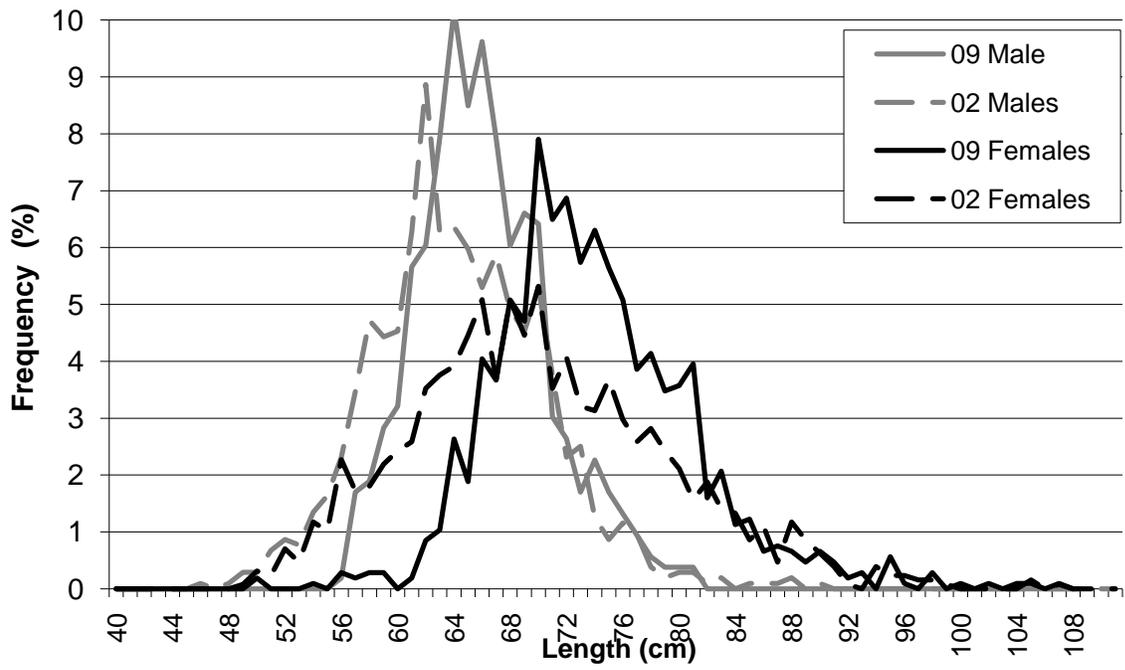


Figure 9.—Northern Southeast Inside (NSEI) sablefish fishery length frequency distributions of male and female sablefish in 2009 and 2002.

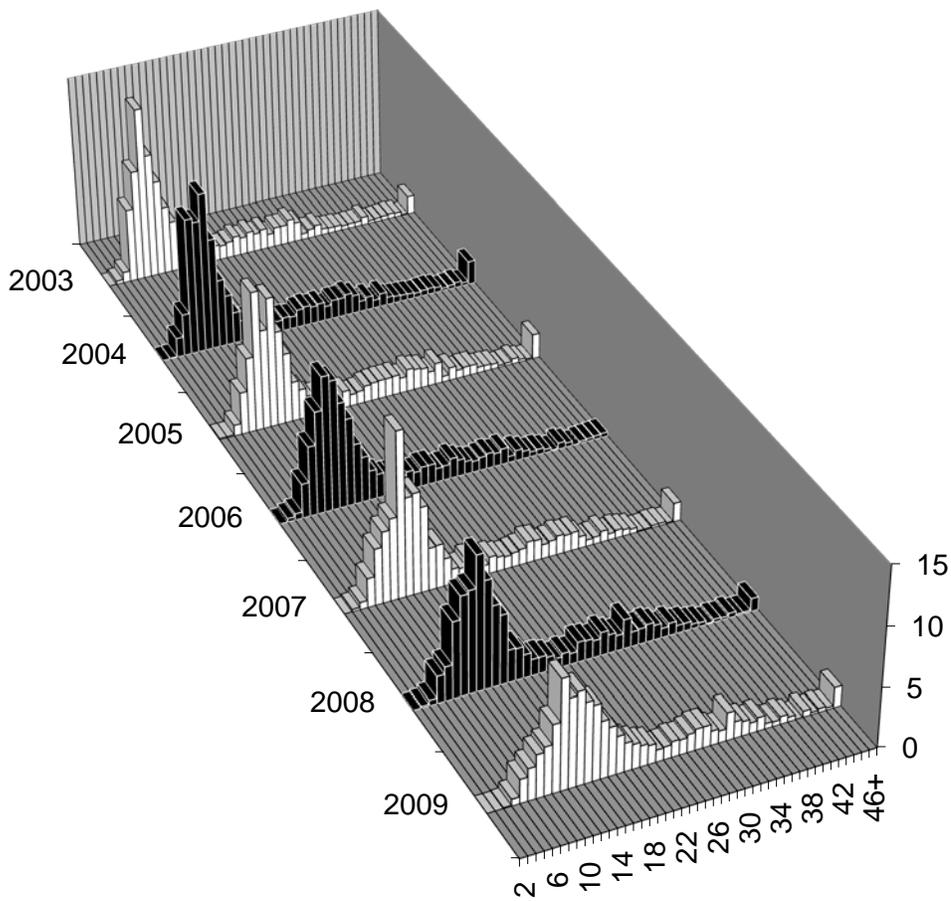


Figure 10.—Northern Southeast Inside (NSEI) sablefish fishery age frequency distributions, 2003 to 2009.

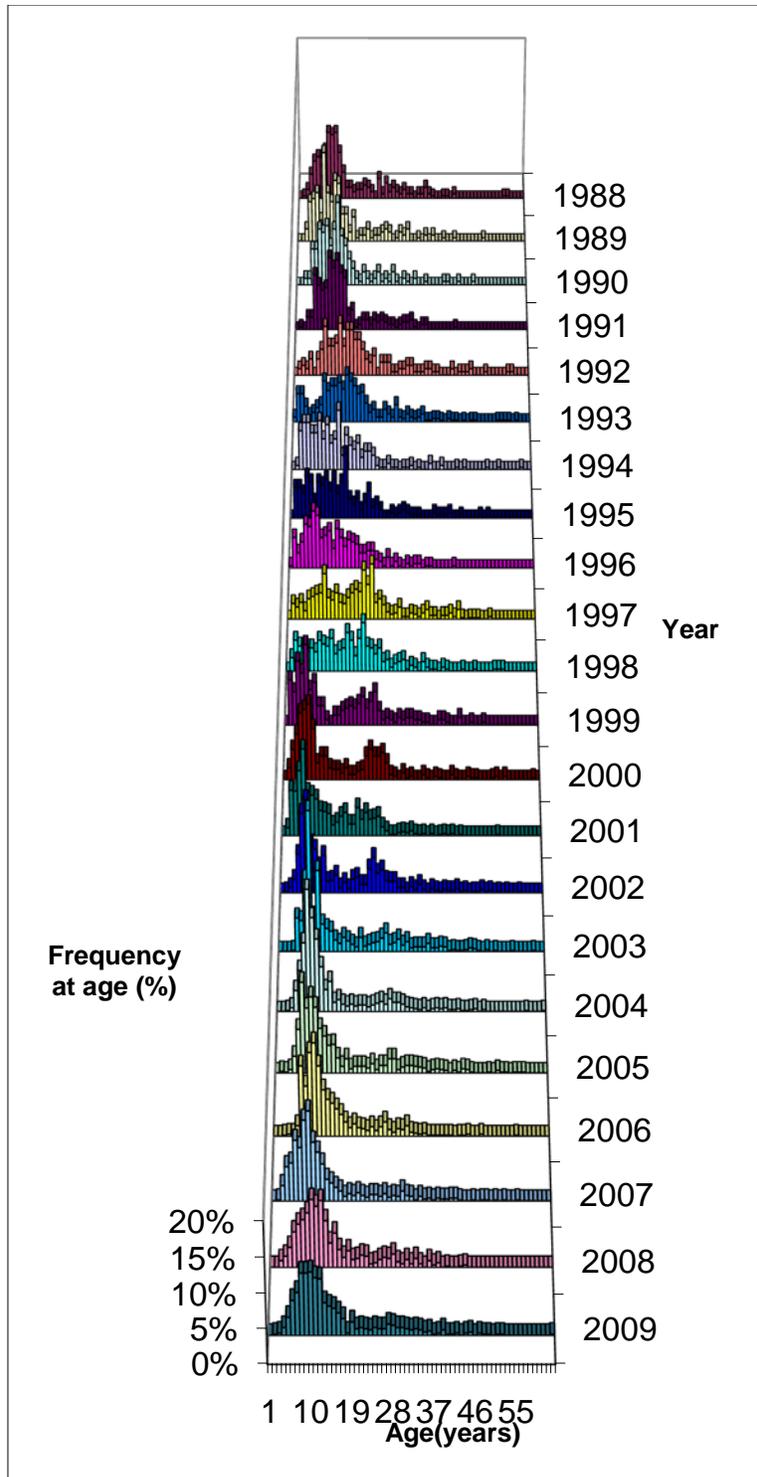


Figure 11.—Northern Southeast Inside (NSEI) sablefish longline survey age frequency distributions, 1988–2009.

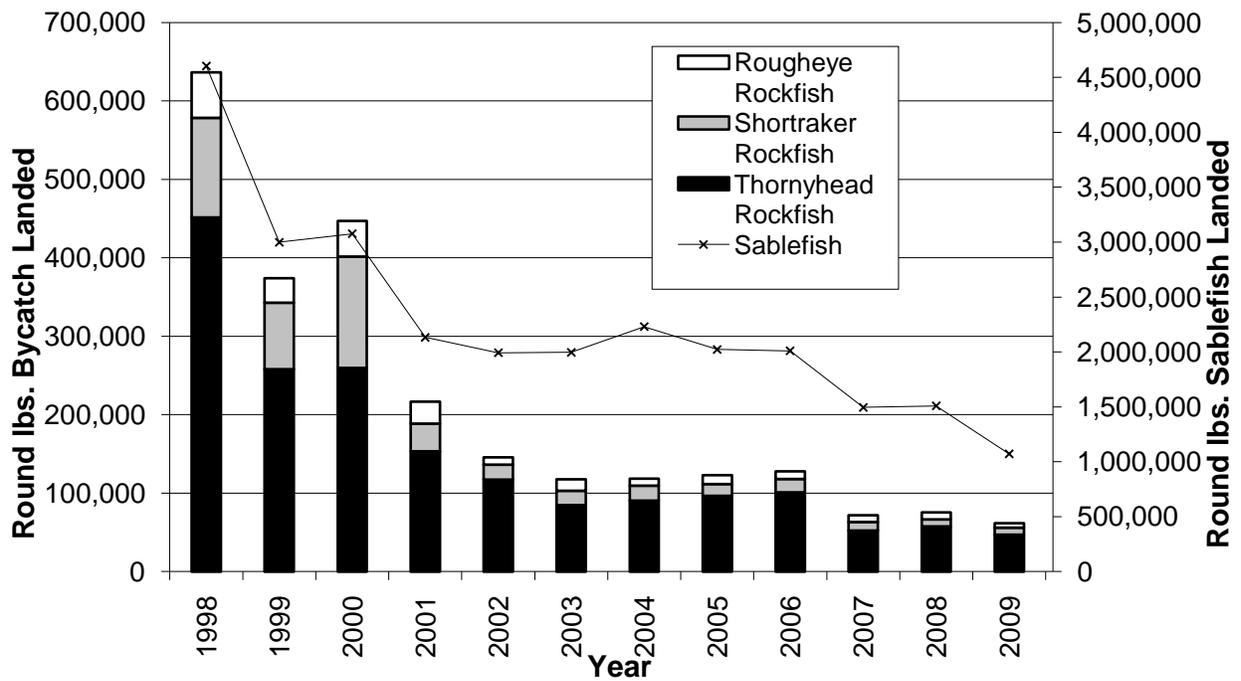


Figure 12.—Northern Southeast Inside (NSEI) round pounds of bycatch, by species, on trips targeting sablefish, 1998–2009.

## **APPENDICES**

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

Year	Harvest Objective	Dates		Management Actions
		Open	Fishery	
1867	no quota	year round		Alaskan Territory purchase began Federal management of AK fisheries.
1871	“	“	“	US Commission of Fish and Fisheries established.
1903	“	“	“	US Bureau of Fisheries established.
1906	“	“	“	An Act for the Preservation and Regulation of the Fisheries of Alaska enacted.
1945	“	3/16–11/30		
1947	“	5/01–11/30		
1959	“	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	“	8/15–10/15		
1970	“	9/15–11/15		Pot gear first allowed.
1972	“	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	“	9/01–11/15		
1976	“	“		Magnuson Fisheries Conservation and Management Act (MFCMA).
1978	“	“		Voluntary agreement by Japanese North Pacific Longline-Gillnet Association to withdraw from the area east of Yakutat Bay.
1979	GHR: 850,000 dr	EO		Sablefish become prohibited species in US fisheries for other species. 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	“	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	“	9/01–9/07, 10/10–10/14		Fishery openings set by EO.
1984	“	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.
1986	“	9/09–9/11		Fishery openings set by EO. No gear in water 72 hours prior to and 24 hours after fishery rule. Fishery openings set by EO.

–continued–

<b>Year</b>	<b>Harvest Objective</b>	<b>Dates Fishery Open</b>	<b>Management Actions</b>
1987	“	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	“	9/13–10/13	In person written registration required prior to fishing. Applied .63 conversion to dressed wt for vessels landing fish round.
1996	“	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	“	
2000	“	“	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	“	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	“	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.
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.

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<b>Year</b>	<b>Harvest Objective</b>	<b>Dates Fishery Open</b>	<b>Management Actions</b>
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	“	8/15–11/15	Overage/underage transfer repealed and the rest of overage/underage policy made permanent.
2007	AHO: 1,488,000 rd	“	
2008	AHO: 1,508,000 rd	“	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	“	
2010	AHO: 1,063,000 rd	“	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.

Appendix B.—Information on regulations for the Northern Southeast Inside Subdistrict (Chatham Strait) sablefish fishery adopted by the Board Of Fisheries in Anchorage, Alaska, March 1994.

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The Department of Fish and Game (department) has received many questions regarding the new regulations for the Northern Southeast Inside (NSEI) Subdistrict (Chatham Strait) sablefish fishery which were passed by the Board of Fisheries (BOF) March 16, in Anchorage. This report provides background material on the fishery and information on what occurred during the BOF meeting.

## BACKGROUND

The NSEI Subdistrict sablefish fishery has been expanding dramatically for over a decade. Rapidly increasing effort resulted in adoption of a limited entry program in 1985. The limited entry program was requested by the industry to halt the increasing number of larger vessels being built for the off-shore fishery from moving into the inside areas. Memos between the department and the Commercial Fisheries Entry Commission (CFEC) document that the limited entry program was never conceived as an end to management problems, but rather as the first step toward developing a comprehensive sablefish management program. Proposals to implement other regulatory measures such as gear or trip limits were rejected by the BOF in 1988 and 1990 because of opposition from the industry.

The fishery has been reduced to a 24-hour annual season since 1987 and, even with the shortened season, the harvest objectives have been consistently exceeded. Most of the increased harvest can be directly attributed to increases in vessel efficiency. In 1984 each vessel set an average of less than 5,000 hooks per boat per day. By 1993 the average had increased to 31,200 hooks per boat per day. The gear and fishing methods have also improved over that time. The 1993 harvest of over 3,600,000 pounds dressed weight was 700,000 pounds above the harvest objective and was the third highest harvest reported in the 87-year history of the fishery. Interview data indicates an additional unreported dead-loss of between 100,000 and 200,000 pounds last season because of lost gear, resulting in an estimated total mortality of nearly 4,000,000 pounds dressed weight during the 1993 fishery.

The reported harvest has exceeded 4,000,000 pounds dressed weight only twice in the history of the fishery, in 1942 and again in 1947. During that period of high harvest levels, the catch per skate dropped dramatically and the sablefish stocks remained at low levels for over 30 years. The historic data suggests that the high harvest taken during the 1993 fishery is not sustainable, at least over the long term.

At the November BOF meetings in Sitka the department proposed increasing the upper end of the guideline harvest range (GHR) from 1,500,000 to 3,000,000 pounds dressed weight. Fisheries performance and department survey data indicates that stock levels increased substantially during the 1980's because of two strong year classes. The population appears to have remained fairly stable since 1989 with annual harvests of between 2,200,000 and 2,800,000 pounds dressed weight. The catch per hook in the 1993 survey, which was conducted just prior to the 1993 fishery, was the highest observed in the area since 1988. This suggests that harvests near 3,000,000 pounds dressed weight are probably sustainable, at least for the short term. However, the staff explained that any impacts on the stock resulting from the near record harvest taken during the 1993 fishery will not be known until after completion of the 1994 pre-season survey. After considerable discussion, the BOF increased the upper end of the GHR to 3,000,000 pounds, but with the stipulation that the department must manage the fishery within the newly adopted range for the 1994, 1995, and 1996 seasons.

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Also during the November meeting, the Alaska Longline Fishermen's Association (ALFA) submitted a proposal to implement gear limits and to hold industry/department meetings prior to each season to establish specific regulations for the up-coming season. It was envisioned that this process would be similar to the International Pacific Halibut Commission (IPHC) Conference Board, which meets annually to make management recommendations for the halibut fishery. However, the BOF cannot delegate authority to the department to make management decisions outside of the written regulations except for in-season Emergency Order action, and then only for conservation reasons. The BOF did not feel they were given enough information during the November meeting to adopt specific gear limit regulations and the gear limit proposal was deferred to the March, 1994, BOF meeting in Anchorage.

The BOF requested Linda Behnken, Executive Director of ALFA to coordinate a management workshop with the industry prior to the March meeting to explore additional management options. Linda agreed to coordinate a management workshop, but stated that this should not be considered an official ALFA undertaking and that she would not be willing to coordinate future meetings. The BOF also requested Linda to attend the March BOF meeting in Anchorage to report on the results of the industry workshop, including any specific recommendations from the industry.

The management workshop was held February 3 and 4 in Sitka. All NSEI Subdistrict sablefish permit holders, area processors, the department, CFEC, and the Fish and Wildlife Protection (F&WP) Division of the Department of Public Safety were invited to participate by way of a letter from ALFA. Twenty-eight out of a total of 120 NSEI Subdistrict sablefish permit holders attended. Scott Marshall, Barry Bracken, and Tory O'Connell represented the department, Kurt Schelle represented CFEC, and Sgt. Starbard represented F&WP. Representatives from Sitka Sound Seafood, Seafood Producer's Coop., and Kake Cold Storage also attended. Minutes from the meeting, which were taken by Linda Perkins, are on file at department offices in Petersburg and Sitka.

Department staff explained that the only management tools the department currently has, outside of regulations passed by the BOF, are time and area restrictions and that area closures are not considered to be a viable option for this fishery. It was further explained that, if no other management alternatives were found, the 1994 fishery would very likely need to be less than 24 hours in order to remain within the 3,000,000-pound harvest limit implemented by the BOF. When asked how much less fishing time would be allowed, a quick calculation indicated that, based on the recent annual increase in fleet efficiency and assuming a linear time/harvest relationship, the fishery would need to be reduced to 18 hours or less to remain within a 3,000,000-pound dressed weight limit.

Kurt Schelle informed the group that it is not likely that there will be any notable reduction in the number of permits available over the next two seasons as there are several other fisheries ahead of this one still awaiting final permit resolution. The number of permits might be slightly lower by 1996 and should decrease further after 1996 when more hearing officers will be available for this fishery.

Sgt. Starbard stated that F&WP would not support a gear limit proposal because of the complexity of making a case with longline gear and the number of hooks involved. However, the door was left open for the industry to devise gear restriction regulations, which can be enforced. An industry subgroup was formed to further explore longline gear limits as a future management option.

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The processors who attended indicated that they are concerned with product quality. Many felt that fish were being retained on board or on the dock too long before processing and that some fish are being poorly handled, thus decreasing product value. Some processors have apparently promised to buy more fish than can be processed within a reasonable time and have vessels lined up for five or six days prior to unloading the fish. There were also reports of round fish deliveries to out-of-state processors. Concerns were expressed that this trend compromised earlier efforts to have Chatham Strait fish recognized by the market for their top quality.

The fishermen then began discussing management options. Many wanted to find ways to make gear limits work. Others wanted to maintain a 24-hour fishery until stocks showed a significant downturn. Department staff explained that was not an option given the BOF directive to manage the fishery within a 3,000,000-pound limit. Some fishermen complained, "If only CFEC would do their job, there would be no problem." Still others preferred to further reduce fishing time as the best solution. Trip or fishing period limits were also discussed at some length. During the remaining half day of discussion, the group compiled a rather broad list of management alternatives, which were subsequently placed on a survey, which was mailed to all NSEI Subdistrict sablefish permit holders for completion.

#### BOARD OF FISHERIES MEETING, ANCHORAGE MARCH 14–16, 1994

On March 14, 1994 at the BOF meeting in Anchorage, Groundfish Biologist, Barry Bracken, presented a status report on the NSEI area sablefish fishery and Linda Behnken presented the results of the industry survey. Neither the BOF members nor the department staff had seen the results of the survey prior to the meeting. Of the 120 NSEI Subdistrict sablefish permit holders, 68, or 57% responded to the survey. Of those who responded 75% favored a pre-season registration, 63% favored a vessel size limit, 85% favored trip or fishing period limits, 62% preferred a 30-day open fishing period over several other options ranging from 24 hours to 2.5 months, and 88% favored a sunset clause which would terminate the trip limit regulation at the end of the 1996 season, prior to the next regular BOF cycle which is scheduled to consider S.E. Alaska groundfish issues. Slightly over 79% favored holding annual or bi-annual staff/industry meetings to discuss management options, however, the survey noted that subsequent meetings would not be facilitated by ALFA. Sixty-five percent of the respondents favored a September 26 opening date to a September 1 opening date if the 1994 season lasts more than 24-hours. Only 17% of the respondents preferred retaining time/area closures as the only "management tool" and 35% favored continuing to consider gear limits as a future management option for this fishery.

Public testimony was held on Tuesday. The one individual who testified on this issue was totally opposed to trip limits, including IFQs for the offshore sablefish and halibut fisheries.

The department was requested to write draft regulations based on the results of the industry survey. The draft regulations were submitted to the BOF on March 16, just prior to discussion on the original gear limit proposal. The BOF accepted the draft regulations as substitute language for the original proposal. With the exception of a proposal to limit vessel size, all regulations, which received majority support on the industry survey, were subsequently adopted by unanimous vote. The department asked for clarification of the directive to limit the harvest to 3,000,000 pounds, which was adopted by the BOF in November. The BOF reaffirmed their mandate to the department to manage the fishery within a 3,000,000 pound dressed weight limit for the next three seasons.

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The following is a summary of the new regulations.

1. An annual harvest limit will be determined for each permit holder by dividing the annual harvest objective for the NSEI Subdistrict by the number of permits eligible to fish at the beginning of each season. If the 1994 survey indicates that stocks have remained at high levels, it is estimated that each permit holder will be allowed to harvest approximately 25,000 pounds dressed weight (39,700 pounds round weight) during the 1994 season. To assess the impact this might have on individual harvests, the distribution of past landings greater than 25,000 pounds was computed. In 1987, 17% of the fleet landed over 25,000 pounds, by 1992, 41% of the fleet landed over 25,000 pounds and by 1993, 60% of the fleet landed over 25,000 pounds. Given this information, the BOF acknowledged that the new regulations would result in significant reallocation of the harvest compared to the recent trend, but recognized that it greatly increases the probability that the fishery can be managed within the GHR. This regulation will be repealed immediately after the 1996 season.
2. The annual permit limit may be taken by an individual permit holder at any time during a 30-day season, which is to be set by Emergency Order to occur between September 1 and November 15. Since the proposed language allocates the annual harvest limit to a permit holder rather than to a vessel, conceivably more than one permit holder can fish on a vessel. On the other hand, a small vessel operator will be able to make multiple landings up to the annual harvest limit. A check-in and check-out procedure may be required to accommodate this provision. Based on discussions during the meeting, the BOF believes that the longer season will reduce gear loss and life/safety risks, and improve product quality.
3. The proposed regulatory language will be merged with existing regulations to set the opening date for the fishery. Using this criteria, the 1994 fishery would begin on September 22, a date that avoids the fall halibut opening and coincides with the beginning of the second set of favorable tides in September. The department has received requests to modify the regulations and to open the fishery on September 1. However, the department does not have the authority to modify regulations outside of the Board process. Also, because this is an allocative issue, the department takes a neutral position and will not advocate a change for 1994. The department recognizes that when the halibut fishery comes under IFQ management in 1995, the current provision, which requires that the sablefish seasons be set to avoid conflicts with area 2-C halibut openings, will no longer be required. In future years the permit holders may be polled to pick the opening date from among a number of choices, which satisfy the intent of the regulations.
4. All permit holders must register for the fishery at least seven days prior to the season opening. This will require a written registration and the registration form must be signed by the permit holder(s) who will be on board a specific vessel during the fishery. The proposed language does not have provisions to allow for any changes to be made during the season in the event of unforeseen emergencies, but such provisions may be written into the final regulation.

Copies of the final regulations will be available after they have been reviewed by department staff and the Department of Law. The Department of Law has already provided an opinion that this management approach is within the authority of the BOF and these new regulations should become effective well before the 1994 season.

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Appendix C.- ADF&G logbook page used in the NSEI sablefish fishery.

ADF&G LONGLINE - POT FISHERY LOGBOOK

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

SYSTEM USED	
CONV <input type="checkbox"/>	SNAP <input type="checkbox"/>
OTHER (explain) _____	

LONGLINE GEAR			
HOOK SIZE/TYPE	SKATE LINE SIZE	HOOK SPACING	NUMBER OF HOOKS/SKATE

POT GEAR		
POT DIMENSIONS (ft)	GROUNDLINE WT. OR DIAMETER	POT SPACING (ft)

BAIT(S) USED		%

SET NO.	DATE SET	TIME SET	Lat X Lon Beginning	DATE HAULED	TIME HAULED	Lat X Lon End	AVERAGE DEPTH (fm)	NO. SKATES OR POTS SET	LOST GEAR Y/N - (HOW MUCH?)	COMMENTS/TAGS ATTATCH TAGS HERE FOR THIS SET

CATCH DATA please indicate if catch is in NUMBERS or POUNDS (round) use separate box for each species	TARGET	AMOUNT	SPECIES	AMOUNT										

SET NO.	DATE SET	TIME SET	Lat X Lon Beginning	DATE HAULED	TIME HAULED	Lat X Lon End	AVERAGE DEPTH (fm)	NO. SKATES OR POTS SET	LOST GEAR Y/N - (HOW MUCH?)	COMMENTS/TAGS ATTATCH TAGS HERE FOR THIS SET

CATCH DATA please indicate if catch is in NUMBERS or POUNDS (round) use separate box for each species	TARGET	AMOUNT	SPECIES	AMOUNT										

SET NO.	DATE SET	TIME SET	Lat X Lon Beginning	DATE HAULED	TIME HAULED	Lat X Lon End	AVERAGE DEPTH (fm)	NO. SKATES OR POTS SET	LOST GEAR Y/N - (HOW MUCH?)	COMMENTS/TAGS ATTATCH TAGS HERE FOR THIS SET

CATCH DATA please indicate if catch is in NUMBERS or POUNDS (round) use separate box for each species	TARGET	AMOUNT	SPECIES	AMOUNT										

ADDITIONAL COMMENTS / Did you shake gear and/or sablefish due to reaching your limit? \_\_\_\_\_ How much? \_\_\_\_\_

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

Appendix D.—NSEI longline survey specifications, 1988–2010. In 1995 1- and 3-hr soaks were compared.

Year	Dates	Vessels	Hks/ set	Hk space	Hk size	Gangion 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–	2 m	13 C	0.2–0.3 m	Squid	3–11	½–7	45
		<i>F/V Charles T</i>	1217							
1998	8/13–8/19	<i>F/V Ida June</i>	831–	2 m	13 C	0.2–0.3 m	Squid	3–11	½–7	45
		<i>F/V Charles T</i>	1267							
		<i>F/V Ocean Cape</i>								
1999	8/15–8/23	<i>F/V Ida June</i>	1002–	2 m	13 C	0.2–0.3 m	Squid	3–11	3	45
		<i>F/V Charles T</i>	1129							
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>								
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>								

Appendix E.–Calculations used by ADF&G to standardize commercial fishery sets for hook spacing.

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CPUE is affected by hook spacing and ADF&G adopted the formula used by NMFS for CPUE standardization for commercial sablefish catch data (Sigler 2000):

$$n_s = n_u * 2.2 * (1 - \exp(-0.57 \text{ hook spacing})), \quad (1)$$

Where  $n_s$  is the number of standardized hooks,  $n_u$  is the number of hooks fished and hook spacing is expressed in meters. This formula standardizes the hook spacing to 42". Fishery CPUE is expressed as total round pounds-per-total hooks standardized for hook spacing unless specified otherwise.

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.

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

<b>Maturity stage</b>	<b>Description of males at stage</b>	<b>Description of females at stage</b>
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 G.–Instructions for delivering fish out of state.

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Delivering fish out of state takes prior planning, well in advance of fishing, as several permits and coordination with several agencies are required. In order to take unprocessed fish out of the state, an individual or company must have an exporter license. There are two different types of exporter licenses, buyer or catcher. The buyer can buy from fishers and export unprocessed fish while the catcher can only export their own catch. The Department of Revenue requires the exporter to be bonded and prepay taxes before they can operate. All processor and exporter applications are together in the “2004 Alaska Seafood Processor and Exporter License and Permit Application: Intent to Operate.” The web link for this application is:

<http://www.cf.adfg.state.ak.us/geninfo/permits/intent/instruct.pdf>

Fishers are required to complete a fish ticket and a physical copy of the fish ticket must be provided to ADF&G before the vessel leaves the state. A completed fish ticket must include the following:

1. Weight of each species with the corresponding condition (delivery) 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. Signatures of fishers and processor at bottom of fish ticket.
6. A completed logbook 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 7 days of landing. If the processor is someone other than the fishers, ADF&G must have a letter authorizing the use of the Alaskan processor code used on the fish ticket before the fish ticket is completed and filed with the department.

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

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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. ADF&G logbooks are available at ADF&G offices.
5. Personal Quota Share Tracking Form with individual PQS adjustment for current season, available at ADF&G office.

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.

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

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Scott Kelley, Regional Supervisor	Douglas Office
Debbie Hart, Regional Research Supervisor	802 3 <sup>rd</sup> Street
Jennifer Stahl, Fishery Biologist II	Douglas, AK 99824
Deidra Holum, Fishery Technician V	(907) 465-4250
Martina Kallenberger, Research Analyst II	

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Bill Davidson, Regional Management Supervisor	Sitka
Cleo Brylinsky, Groundfish Project Leader	304 Lake Street, Room 103
Mike Vaughn, Fishery Biologist II	Sitka, AK 99835
Kamala Carroll, Fishery Technician IV	(907) 747-6688

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Rebecca Knight, Fishery Technician IV	Petersburg
Julie Hursey, Fishery Technician II	16 Sing Lee Alley
	Box 667
	Petersburg, AK 99833
	(907) 772-3801

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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

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