

Fishery Management Report No. 08-71

**Report to the Alaska Board of Fisheries, Overview of
Southeast Alaska Sport Fisheries for Rockfish and
Lingcod**

by

Steven McCurdy,

Troy Tydingco,

and

Brian Marston

December 2008

Alaska Department of Fish and Game

Divisions of Sport Fish and Commercial Fisheries



Symbols and Abbreviations

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

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

FISHERY MANAGEMENT REPORT NO. 08-71

**REPORT TO THE ALASKA BOARD OF FISHERIES, OVERVIEW OF
SOUTHEAST ALASKA SPORT FISHERIES FOR ROCKFISH AND
LINGCOD**

by

Steven McCurdy

Alaska Department of Fish and Game, Division of Sport Fish, Craig

Troy Tydingco

Alaska Department of Fish and Game, Division of Sport Fish, Sitka

and

Brian Marston

Alaska Department of Fish and Game, Division of Sport Fish, Yakutat

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

December 2008

Development and publication of this manuscript were partially financed by the Federal Aid in Sport fish Restoration Act(16 U.S.C.777-777K).

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

*Steven McCurdy,
Alaska Department of Fish and Game, Division of Sport Fish
P.O. Box 682, Craig, AK 99921, USA*

*Troy Tydingco,
Alaska Department of Fish and Game, Division of Sport Fish
304 Lake Street #103, Sitka, AK 99835-7563, USA*

*and
Brian Marston
Alaska Department of Fish and Game, Division of Sport Fish,
PO Box 49 Yakutat, AK 99689-0049, USA*

This document should be cited as:

McCurdy, S., T. Tydingco and B. Marston. 2008. Report to the Alaska Board of Fisheries, overview of Southeast Alaska sport fisheries for rockfish and lingcod. Alaska Department of Fish and Game, Fishery Management Report No. 08-71, Anchorage.

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

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

ADF&G ADA Coordinator, P.O. Box 115526, Juneau AK 99811-5526

U.S. Fish and Wildlife Service, 4401 N. Fairfax Drive, MS 2042, Arlington VA 22203

Office of Equal Opportunity, U.S. Department of the Interior, 1849 C Street NW MS 5230, Washington DC 20240

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

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

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

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

TABLE OF CONTENTS

	Page
LIST OF TABLES.....	II
LIST OF FIGURES.....	II
ABSTRACT.....	1
INTRODUCTION.....	1
Fisheries Monitoring Tools.....	1
Statewide Harvest Survey.....	1
Charter Logbooks.....	1
Creel Surveys.....	3
ROCKFISH.....	3
Regulation Development in the Sport Fishery.....	5
Fishery Management Issues.....	8
2009 BOF Proposals.....	10
LINGCOD.....	12
Regulation Development in the Sport Fishery.....	12
Fishery Management Issues.....	12
2009 BOF Proposals.....	20
REFERENCES CITED.....	20

LIST OF TABLES

Table	Page
1. Summary of sport fish regulations for rockfish in Southeast Alaska, 1989–2008.	6
2. Statewide Harvest Survey (SWHS) estimates of the number of rockfish harvested in Southeast Alaska, 1997–2007.	7
3. Total Allowable Catch (TAC) and mortality by fishery of DSR in the Southeast Outside Subdistrict (SEO), 1982–2008.	12
4. List of references for barotrauma studies on rockfish species that look at survival when released at depth.	14
5. Summary of sport fish regulations for lingcod in Southeast Alaska’s lingcod management areas by year.	15

LIST OF FIGURES

Figure	Page
1. Map of Southeast Alaska showing boundaries of the Statewide Harvest Survey areas.	2
2. Map of Southeast Alaska groundfish management areas (the Southeast Outside Subdistrict consist of management areas EYKT, NSEO, CSEO and SSEO).	4
3. Estimated harvest (from the Statewide Harvest Survey) of rockfish in sport fisheries in Southeast Alaska by angler residency for years 1996–2007.	8
4. Number of harvested and released pelagic and non-pelagic rockfish reported on charter logbooks in Southeast Alaska 1999–2008.	10
5. Statewide harvest survey (SWHS) estimates of total rockfish harvest in sport fisheries in Southeast Alaska, as well as for the 3 SWHS outside areas of Prince of Wales Island (G), Sitka (D), and Glacier Bay (B) (these areas combined are basically equivalent to the Southeast Outside Subdistrict), 1977–2007.	11
6. Total allowable catch (TAC) and mortality by fishery and year of demersal shelf rockfish (DSR) in the Southeast Outside Subdistrict, 1994–2008.	13
7. Sport fishery mortality and allocation of demersal shelf rockfish in the Southeast Outside Subdistrict, 2006–2008.	17
8. Number of pounds of lingcod harvested (bars) and guideline harvest levels (lines) in the sport fishery by groundfish management area, 1991–2008.	19

ABSTRACT

The primary purpose of this report is to provide an overview of sport fisheries for, and management of, rockfish *Sebastes spp* and lingcod *Ophiodon elongates* in Southeast Alaska. Catch and harvest information on rockfish and lingcod are summarized in these fisheries, and a history of management actions involving these fisheries is provided. In addition, fishery management issues, in particular regarding proposals to the Board of Fisheries affecting these fisheries, are discussed.

Key words: rockfish, lingcod, sport fishery, Alaska Board of Fisheries, Southeast Alaska.

INTRODUCTION

The Alaska Department of Fish and Game (Department) has jurisdiction over all recreational groundfish fisheries within the internal waters of the state, in coastal waters out to 3 miles offshore, and throughout the Exclusive Economic Zone (EEZ). The Alaska Board of Fisheries (Board) extended existing state regulations governing the sport fishery for all marine species into the waters of the EEZ off Alaska in 1998. This was done under provisions of the Magnuson-Stevens Fishery Conservation and Management Act, which stipulate that states may regulate fisheries that are not regulated under a federal fishery management plan or other applicable federal regulations. In Southeast Alaska, rockfish species (especially yelloweye rockfish, *Sebastes ruberrimus*) and lingcod are the primary groundfish species (other than Pacific halibut, *Hippoglossus stenolepis*) harvested by sport fisheries.

This report, prepared by the Department, updates a similar report prepared for the Board's February 2006 meeting in Ketchikan (Hoffman et al. 2006¹). The objective of this report is to provide an overview of the sport fishery for rockfish and lingcod in Southeast Alaska. Specifically, this report will detail for Southeast Alaska:

1. The history of sport fisheries regulations for rockfish and lingcod and implementation of the various regulations;
2. Rockfish and lingcod harvest by area, residency of angler, and type of angler (guided or unguided);

3. A discussion of the management issues to be decided by the Board of Fisheries; and,
4. An evaluation of the impacts of potential regulatory actions.

FISHERIES MONITORING TOOLS

The Department monitors sport fisheries harvest of rockfish and lingcod via three primary sampling programs: the Statewide Harvest Survey, charter logbooks, and onsite creel surveys. Each program's sampling methods has its uses and limitations.

Statewide Harvest Survey

The Statewide Harvest Survey (SWHS) is an annual postal survey sent to a random sample of sportfishing license holders. It provides estimates of harvest for rockfish and lingcod for the primary sport fishery management areas (Figure 1). The benefits of the SWHS is that it provides a consistent annual estimate of all sport harvest that can be divided into harvest by resident and nonresident anglers, as well as charter and non-charter anglers. The SWHS is conducted after the fishing season has ended and, as a result, estimates are not available until the following year. In addition, harvest estimates for rockfish cannot be subdivided by species or by group (such as pelagic and non-pelagic rockfish). The SWHS also cannot provide accurate estimates of released fish nor does it provide any information on biological characteristics of the catch.

Charter Logbooks

Charter logbooks have been required in Southeast Alaska since 1998. All charter operators are required to report information on harvest and fishing effort in a charter logbook that must be

¹ Hoffman, S., R. Holmes, R. Chadwick, G. Freeman, M. Jaenicke, and D. Tersteeg. 2006. SE Alaska Division of Sport Fish Ground Fish Report, Alaska Board of Fisheries, February 20–26, 2006, unpublished.

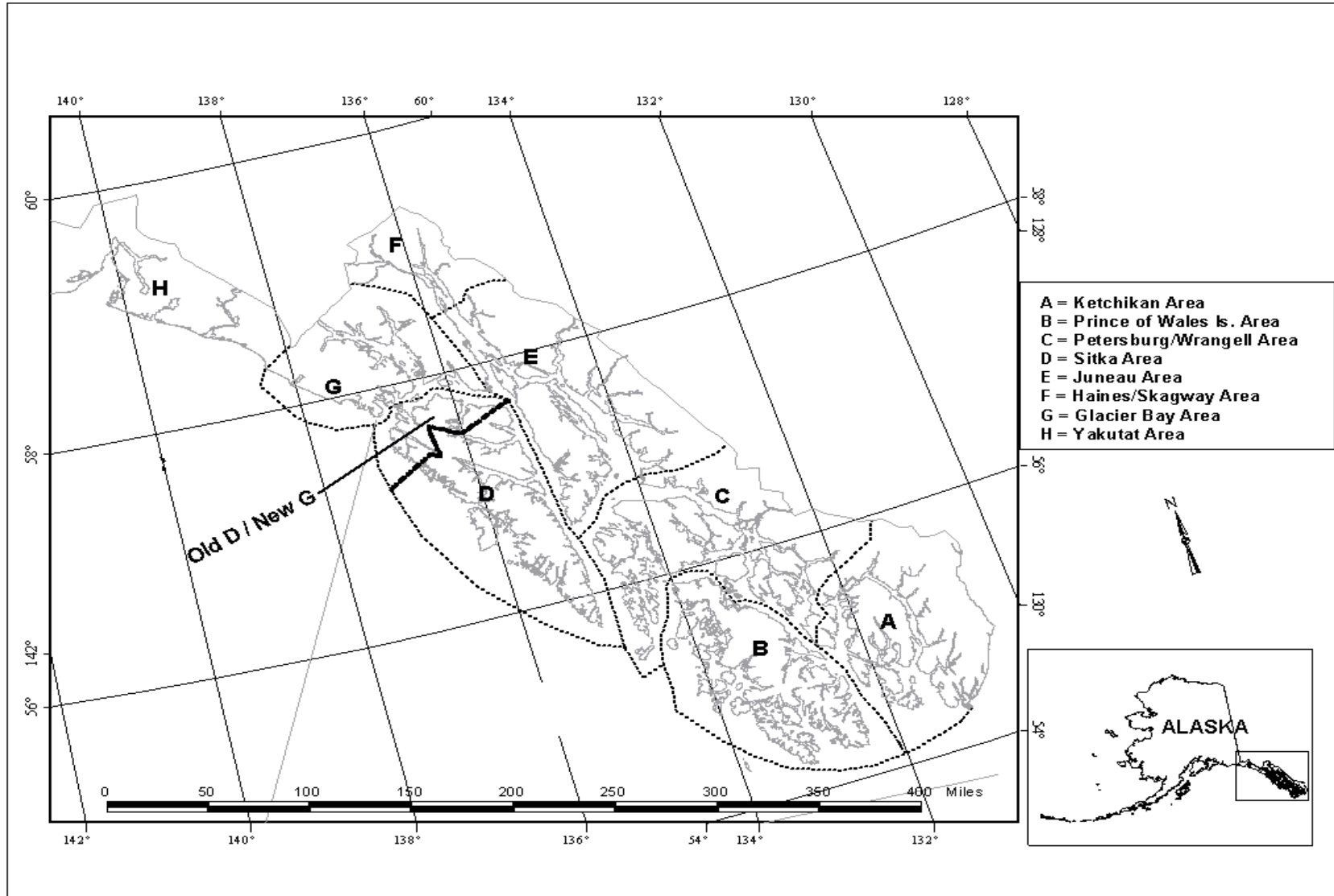


Figure 1.—Map of Southeast Alaska showing boundaries of the Statewide Harvest Survey areas.

filled out on a trip-by-trip basis. Requirements for returning completed logbooks to the Department have varied from weekly reporting to reporting at the end of the season. In 2008, daily logbook pages for the week (ending on Sunday) were required to be returned (or postmarked) within 8 days. Operators were required to provide the number of anglers fishing and their residency, license number or permanent license number, as well as the number of lingcod, pelagic rockfish, yelloweye rockfish and other non-pelagic rockfish harvested, and the number released.

Creel Surveys

Creel surveys of recreational fisheries collect data that provide estimates of fishing effort, catch and harvest, and biological characteristics such as species, age, size, and sex composition. Creel surveys occur in the major fishing ports in Southeast Alaska (including Ketchikan, Craig, Petersburg, Wrangell, Sitka, Elfin Cove, Gustavus, Juneau, Haines, and Yakutat). Sport anglers are surveyed at the completion of their fishing trip by Department creel technicians. The primary focus of the creel program is to collect data on salmon harvest, but catch and harvest information on rockfish and lingcod are also obtained. Creel estimates are obtained for charter and non-chartered anglers. Biological data collected on rockfish and lingcod are limited to species composition of harvested fish, length and weight (weight data was collected in the past to obtain length-weight relationships), and sex of lingcod.

A combination of the 3 monitoring techniques is often used to estimate harvest and/or total mortality (biomass removed in pounds or metric tons, mt) from the sport fishery by management area and species. For rockfish, the Department estimates the annual biomass of demersal shelf rockfish (DSR) removed by the sport fishery by summing the estimated biomass of both the harvest and fish caught and released (as a mortality rate of 100% is assumed for all released DSR) by area. Harvest biomass is estimated for DSR by multiplying the total number of all rockfish harvested (estimated from the Statewide Harvest Survey) by the percentage that are DSR species, and their average weight (both estimated from creel survey programs) by area. Released DSR biomass is estimated by multiplying the

estimated number of DSR species caught and released (estimated from creel survey programs and charter logbook data) by area, and their respective average weights by area (assumed to be the same as harvested fish, estimated from creel survey programs). The biomass of lingcod removed is estimated by multiplying the number of lingcod harvested (estimated from the Statewide Harvest Survey) by their average weight (estimated creel survey programs) by area.

ROCKFISH

Rockfish, genus *Sebastes*, are found in marine waters throughout Southeast Alaska. Rockfish are slow growing and long-lived (up to 120 years, O'Connell et al. 2006). They are believed to be very susceptible to overharvest and are slow to recover once overharvest occurs. Rockfish have closed swim bladders that expand with gas when brought to the surface from deep water. This gas reabsorbs into their tissue at a relatively slow rate, so they have difficulty swimming back to depth and are subject to mortality from both injuries sustained due to the rapid pressure change, and predation. As a result, the Department considers all demersal shelf rockfish (DSR) catch, including DSR that are not retained, to be fatally injured.

Rockfish are grouped into 3 assemblages for commercial management purposes in the eastern Gulf: Pelagic Shelf Rockfish, Demersal Shelf Rockfish (DSR), and Slope Rockfish. Pelagic Shelf Rockfish include dark (*S. ciliatus*), dusky (*S. variabilis*), widow (*S. entomelas*), yellowtail (*S. flavidus*), black (*S. melanops*), and blue (*S. mystinus*) rockfish. The DSR component contains yelloweye rockfish and 6 other species: canary (*S. pinniger*), china (*S. nebulosus*), copper (*S. caurinus*), quillback (*S. maliger*), rosethorn (*S. helvomaculatus*), and tiger (*S. nigrocinctus*) rockfish. Yelloweye rockfish generally make up over 96% of the commercial harvest (by weight) and from 65% to 79% of the annual sport catch of DSR (Hoffman et al. 2006). Slope rockfish are defined as any species of the genus *Sebastes* not specified as being in either of the other 2 assemblages.

DSR are managed by area (Figure 2). The East Yakutat section (EYKT), Northern Southeast Outside section (NSEO), Central Southeast Outside section (CSEO) and Southern Southeast Outside section (SSEO) areas make up the

Southeast Outside Subdistrict (SEO, Figure 2). For the Southeast Outside Subdistrict, a total allowable catch level (TAC) is set annually as part of the North Pacific Fisheries Management Council (NPFMC) stock assessment process (O'Connell et al. 2006). The Board has further allocated this TAC for DSR between sport and commercial fisheries.

Assemblages of rockfish species are defined slightly different for management of sport fisheries. The assemblage of "Pelagic Rockfish" contains the same species as defined in Pelagic Shelf Rockfish for commercial management purposes listed above. "Non-pelagic Rockfish" are

defined as all rockfish species in the genus *Sebastes* that are not defined as pelagic rockfish. Note that the assemblage of non-pelagic rockfish contains more species than the group of DSR, however the species of rockfish that contribute to the overall sport catch in Southeast Alaska in any significant manner (number of fish or overall biomass) between the 2 groups is basically the same. This allows the Department to modify sportfishing regulations (by emergency order using management measures defined by the Board) for non-pelagic rockfish to not exceed the sport fishery allocation for DSR established by the Board.

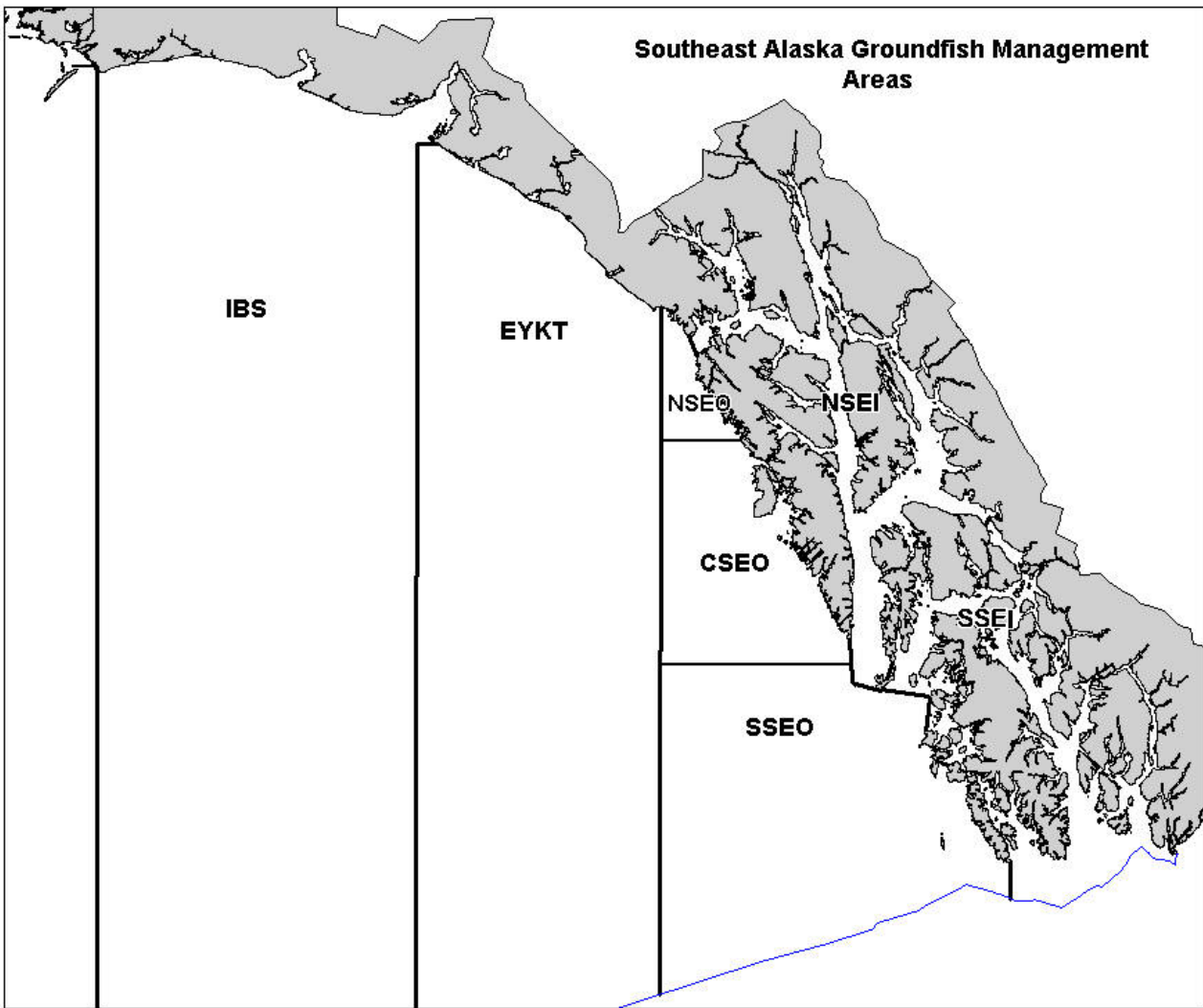


Figure 2.—Map of Southeast Alaska groundfish management areas (the Southeast Outside Subdistrict consist of management areas EYKT, NSEO, CSEO and SSEO).

REGULATION DEVELOPMENT IN THE SPORT FISHERY

Sportfishing regulations for rockfish in Southeast Alaska, south of Cape Fairweather, were first established in 1989 and consisted of harvest limits of 5 rockfish per day and 10 in possession, of which only 2 per day and 4 in possession could be yelloweye rockfish (Table 1). Prior to 1989, there were no bag or possession limits for rockfish in Southeast Alaska. Exceptions to the regionwide limits were enacted in 1989 for the Ketchikan and Sitka areas, where the bag and possession limits were set at 3 rockfish, of which only 1 could be a yelloweye rockfish.

In 1994, the southeast regionwide regulations for rockfish were modified by the Board to provide specific bag limits for “pelagic” rockfish species and for “non-pelagic” species (including yelloweye rockfish). Harvest limits for pelagic species were set at 5 per day and 10 in possession, and the limits for other species were also 5 per day and 10 in possession, of which only 2 per day and 4 in possession could be yelloweye rockfish. These southeast regionwide regulations were also extended to include the Yakutat area. The specific exceptions for the Ketchikan and Sitka areas were maintained and have remained in place since they were adopted in 1989 (however in recent years these regulations have been superseded by emergency orders containing more restrictive regulations).

In 2006, the Board allocated 16% of the annual allowable catch of DSR in the Southeast Outside District (CSEO, SSEO, NSEO, and EYKT) to the sport fishery. The Board outlined a series of management measures that the commissioner may implement by emergency order to modify existing sport fish regulations to keep the sport fishery within its allocation (5 AAC 47.065). These measures include:

1. reduced bag and possession limits for nonresident anglers;
2. retention of all demersal shelf rockfish caught by a nonresident angler is required until the nonresident bag limit is reached;
3. charter operators and crewmembers may not retain demersal shelf rockfish while clients are on board the vessel;

4. annual limits for demersal shelf rockfish for nonresident anglers;
5. reduce the bag and possession limits for resident anglers;
6. retention of all demersal shelf rockfish caught by a resident angler is required until the resident angler’s bag limit is reached;
7. annual limits for demersal shelf rockfish for resident anglers; and
8. time and area closures.

The Department has used these management measures 1-7 outlined by the Board annually since 2006 (Table 1) to modify the sportfishing regulations for non-pelagic rockfish so that the sport fishery allocation of DSR is not exceeded.

Estimates of rockfish harvest have been obtained via the SWHS since 1977 (Table 2). Total harvest of all rockfish (pelagic and non-pelagic combined) increased steadily from 1977 until they peaked at 57,000 in 1988. With the implementation of bag limits for rockfish in 1989, harvest declined and remained relatively constant at about 30,000 to 40,000 fish until 1999. In 1999, there was a rapid increase in rockfish harvest, followed by 4 years of declining harvest, and a large increase occurring again in 2004 (Figure 3). The 2007 harvest, 94,538 rockfish, was the highest harvest recorded for the sport fishery.

Since 1993, the SWHS has provided estimates of harvest for resident and nonresident anglers. During that time period, the proportion of the harvest taken by nonresidents has varied between 52% and 82%, with a large increase in the proportion harvested by nonresidents starting in 2004 (Figure 3). In the last 5 years, nonresidents have taken an average of 80% of the rockfish sport harvest in Southeast Alaska.

The charter logbook program provides more detailed information on harvest as well as catch-and-release estimates of pelagic and non-pelagic rockfish taken in the charter fishery. Rockfish harvest reported on logbooks has ranged from 31,000 in 1999 to 105,000 in 2008 (Figure 4). Prior to 2006, the non-pelagic component of the charter harvest was slightly larger than the harvest of pelagic rockfish, but since then the harvest of pelagic rockfish has nearly doubled while harvest of non-pelagic rockfish has remained constant.

Table 1.–Summary of sport fish regulations for rockfish in Southeast Alaska, 1989–2008.

Year	Southeast region sportfishing regulations	Exceptions to regional regulations
1989–1993	All rockfish: 5 per day, 10 in possession of which only 2 per day, 4 in possession can be yelloweye.	All rockfish: In Sitka and Ketchikan areas: 3 per day, 3 in possession of which only 1 can be a yelloweye.
1994–2005	Pelagic rockfish: 5 per day, 10 in possession Non-pelagic rockfish: 5 per day, 10 in possession of which only 2 per day, 4 in possession can be yelloweye.	All rockfish: In Sitka and Ketchikan areas: 3 per day, 3 in possession, of which only 1 can be a yelloweye.
2006	Pelagic rockfish: 5 per day, 10 in possession Non-pelagic rockfish (implemented by EO): 3 per day, only 1 of which may be a yelloweye; Possession limit of 6 of which only 2 may be a yelloweye. All fish must be retained until bag limit reached. Nonresident annual limit of 3 yelloweye. Charter operators and crew not allowed to retain rockfish	
2007–2008	Pelagic rockfish: 5 per day, 10 in possession Non-pelagic rockfish (implemented by EO): Resident bag limit of 3, only 1 of which may be a yelloweye; Possession limit of 6 of which only 2 may be a yelloweye. Nonresident limit of 2, of which only 1 may be a yelloweye; Possession limit of 4 of which only 2 may be a yelloweye. All fish must be retained until bag limit reached. Nonresident annual limit of 2 yelloweye. Charter operators and crew not allowed to retain non-pelagic rockfish	

Table 2.—Statewide Harvest Survey (SWHS) estimates of the number of rockfish harvested in Southeast Alaska, 1997–2007.

Year	Ketchikan	PWI	Petersburg	Sitka	Juneau	Haines/Skagway	Glacier Bay	Yakutat	Total
1977	834	571	762	3,635	2,996	130	34	0	8,962
1978	6,898	2,504	2,106	2,784	2,169	362	63	0	16,886
1979	8,491	1,882	1,881	8,372	9,627	364	182	182	30,981
1980	18,415	4,968	2,841	8,481	6,724	319	43	0	41,791
1981	20,581	4,544	1,937	11,837	5,649	820	259	44	45,671
1982	21,023	8,027	1,581	13,027	6,141	1,583	168	52	51,602
1983	18,824	12,040	1,008	9,855	7,859	168	409	105	50,268
1984	16,295	5,197	2,265	6,375	5,978	558	85	146	36,899
1985	16,632	4,168	2,663	5,085	4,704	315	472	0	34,039
1986	17,861	9,841	2,106	5,997	4,847	794	78	44	41,568
1987	18,231	9,984	2,525	5,944	4,709	289	307	272	42,261
1988	26,378	8,692	480	9,319	10,224	854	801	91	56,839
1989	17,159	8,955	1,726	6,196	4,638	465	357	8	39,504
1990	9,043	9,062	1,150	3,948	1,881	488	306	81	25,959
1991	8,504	7,200	1,222	4,879	3,408	415	936	264	26,828
1992	9,927	7,968	1,838	6,852	3,532	181	501	414	31,213
1993	6,764	9,589	2,070	6,622	5,717	569	448	251	32,030
1994	11,741	12,122	2,298	13,446	3,271	157	881	490	44,406
1995	7,984	11,915	1,870	7,968	3,438	233	355	584	34,347
1996	7,092	9,446	1,085	10,728	3,008	329	599	599	32,886
1997	8,156	10,804	1,760	12,078	4,735	323	836	1,396	40,088
1998	5,133	11,759	2,678	16,281	5,570	214	1,283	1,224	44,142
1999	10,538	23,667	3,778	22,306	8,379	233	1,816	772	71,489
2000	12,318	17,152	4,103	18,439	9,685	117	6,477	858	69,149
2001	8,540	17,161	2,461	16,444	8,857	138	3,309	668	57,578
2002	7,077	15,189	2,531	15,856	5,768	19	2,572	737	49,749
2003	7,321	15,518	1,940	16,212	8,649	44	4,095	1,615	55,394
2004	13,805	27,027	3,712	30,239	6,753	566	4,148	1,413	87,663
2005	13,136	23,617	3,598	31,984	8,412	277	6,595	2,371	89,990
2006	13,473	23,425	2,437	34,160	3,913	291	4,986	2,800	85,485
2007	15,522	25,371	4,190	38,264	5,323	90	3,765	2,013	94,538

Over the previous 5 years charter clients (as estimated from logbooks) harvested an average of 81% of all rockfish taken in the Southeast Alaska sport fishery, ranging from 66% in 2004 to 90% in 2007. The majority of charter clients are nonresidents and this proportion of harvest is similar to the nonresident harvest figures obtained from the SWHS (Figure 3).

Prior to 2006, non-pelagic rockfish were retained at a higher rate by charter clients than pelagic rockfish (approximately 75% vs. 50%, Figure 4). The relatively large size of some non-pelagic rockfish (particularly yellow rockfish) may have made them more desirable to retain by anglers. Since 2006 the retention rate for non-pelagic rockfish has risen to an average of about 88%; this increase is probably due to regulations that require retention of non

pelagic species (until established bag limits are reached). Over the last 3 years the retention rate for pelagic rockfish has also increased, but at a more rapid pace, to the point that it almost equals the retention rate for non-pelagic rockfish (88% vs. 89% in 2008, Figure 4). The reasons for this are unclear as regulations for pelagic rockfish have not changed since 1994 (Table 1).

Since 2006 charter operators have been required to record the number of yelloweye rockfish harvested and released by clients separately from other non-pelagic rockfish on charter logbooks. Yelloweye rockfish have composed about half of all non-pelagic rockfish harvested by charter clients since 2006 (average = 51%, range 47% to 56%), and about 26% of all non-pelagic rockfish released (range 24% to 28%).

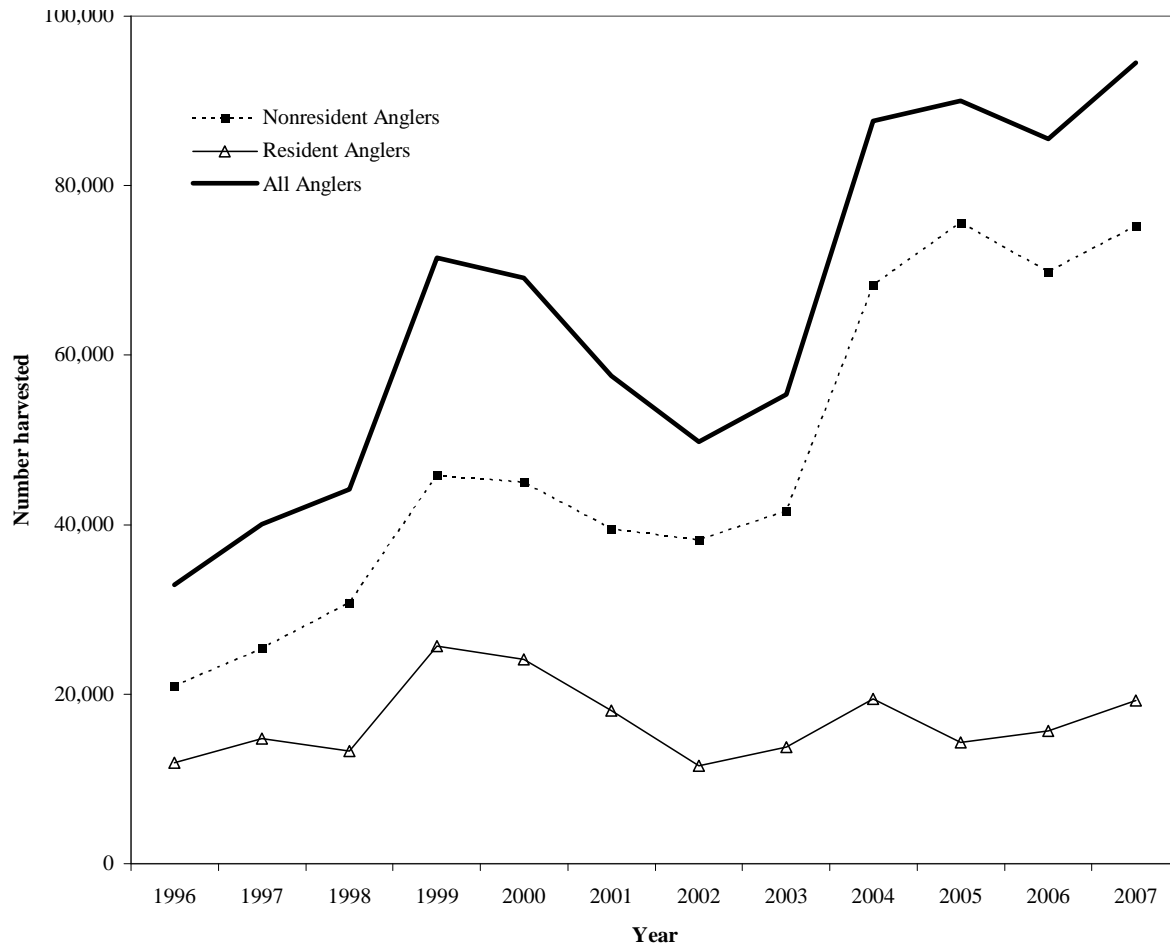


Figure 3.—Estimated harvest (from the Statewide Harvest Survey) of rockfish in sport fisheries in Southeast Alaska by angler residency for years 1996–2007.

The majority of rockfish harvest in Southeast Alaska, as well as the majority of the recent increase in rockfish harvest, have primarily come from 3 sport fish harvest areas on the outer coast: Prince of Wales Island (Area B), Sitka (Area D) and Glacier Bay (Area G). These 3 areas account for 70% of the average regional rockfish harvest for the last 5 years (Figure 5). These areas correspond roughly to the 3 commercial fisheries management areas: Southern Southeast Outside Section (SSEO), Central Southeast Outside Section (CSEO), and Northern Southeast Outside Section (NSEO), respectively.

FISHERY MANAGEMENT ISSUES

The Department manages fishery mortality of DSR in the SEO Subdistrict, described in 5 AAC 28.105(a)(4), to stay within the TAC. The Department uses fishery data, mortality estimates, growth parameters, age composition, and

abundance survey information to determine a sustainable harvest level. The TAC has varied between 330 and 960 mt between 1988 and 2008.

DSR are harvested in the directed commercial fishery, in the sport fishery, the subsistence fishery, and as bycatch and unreported mortality in the commercial groundfish and halibut fisheries (Figure 6). In most years the majority of the TAC is taken as bycatch and unreported mortality in the halibut and groundfish fisheries: averaging 62% since 2000 (Table 3). The Department estimates DSR mortality in the sport fishery by using a combination of SWHS estimates of harvest, creel and logbook estimates of catch and release, and creel sampling for species composition. The biomass of DSR removed in the sport fishery has grown from an average of 31.6 mt in the 1990s to a peak of 104 mt in 2004, and has declined since, with an average of 69 mt from 2006 through 2008.

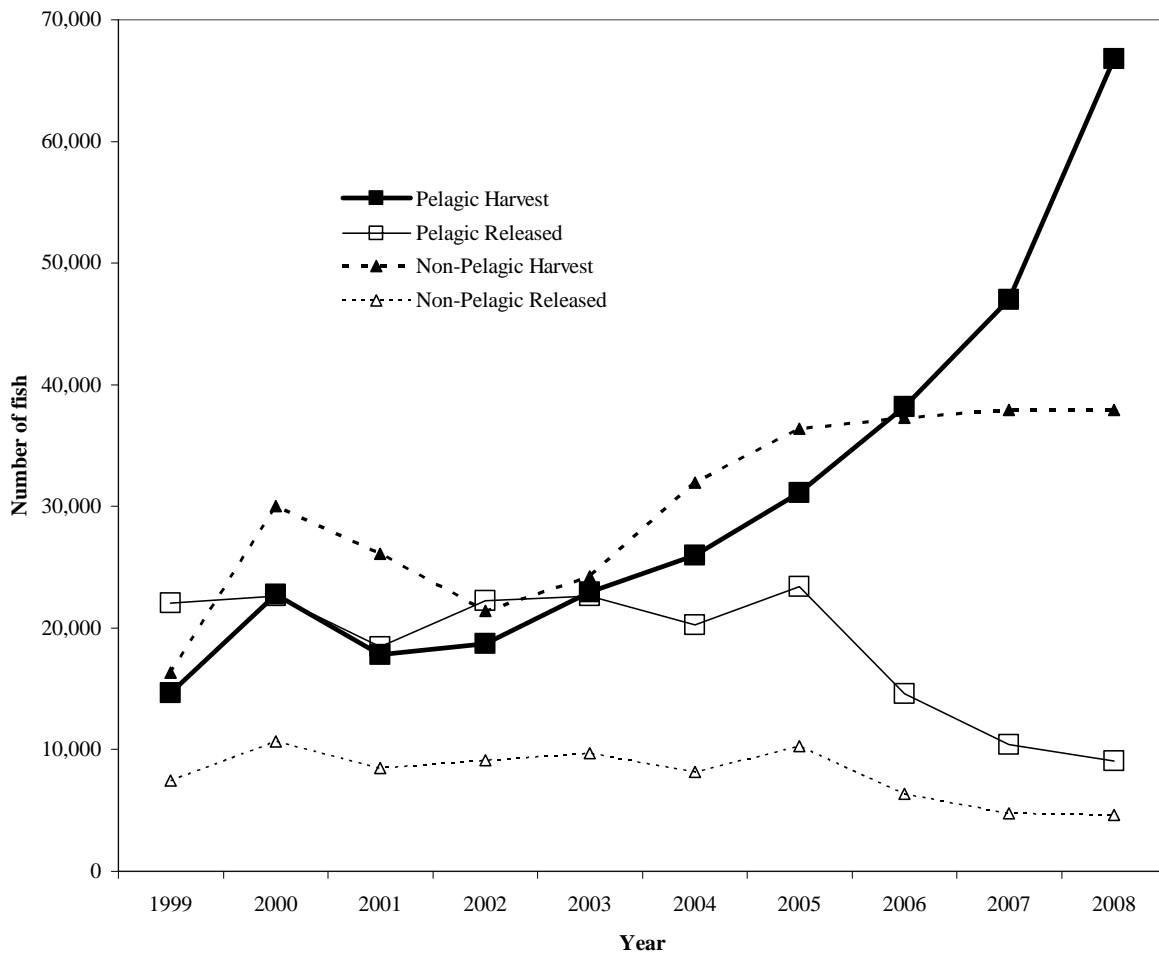


Figure 4.—Number of harvested and released pelagic and non-pelagic rockfish reported in charter logbooks in Southeast Alaska 1999–2008.

From 2006 through 2008, in an attempt to reduce mortality levels in the sport fishery, the Department implemented a series of fishery regulations by emergency order (Table 1), including bag limit reductions, annual limits for nonresidents, non retention by charter operators and crew, and requirements that all fish be retained until bag limits are reached. These regulations proved to be effective in reducing the total mortality in the sport fishery from the high levels of 2004 and 2005 (Table 3), but the sport fishery allocation of DSR in the Southeast Outside Subdistrict was exceeded in 2 out of the 3 years (Figure 7). In 2006 mortality in the sport fishery was estimated at 77 mt, exceeding the sport fishery allocation of 66 mt by 17%. In 2007, mortality in the sport fishery was an estimated 60 mt, 9%

below the allocation of 66 metric tons. In 2008 the TAC was reduced to 382 mt and the estimated mortality in the sport fishery (preliminary estimate) was 70 mt, or 15% above the sport fishery allocation of 61 mt. In 2009 the DSR sport fish allocation will be 58 mt.

2009 BOF PROPOSALS

Eight proposals dealing with rockfish management have been submitted to the Board. Five of the proposals would affect the sport fishery. Proposal 243 would allow the use of rod and reel to harvest rockfish and lingcod in subsistence fisheries. The Department is opposed to the use of rod and reel as subsistence gear on a statewide basis. Proposal 341 would change the allocation of DSR between sport and commercial

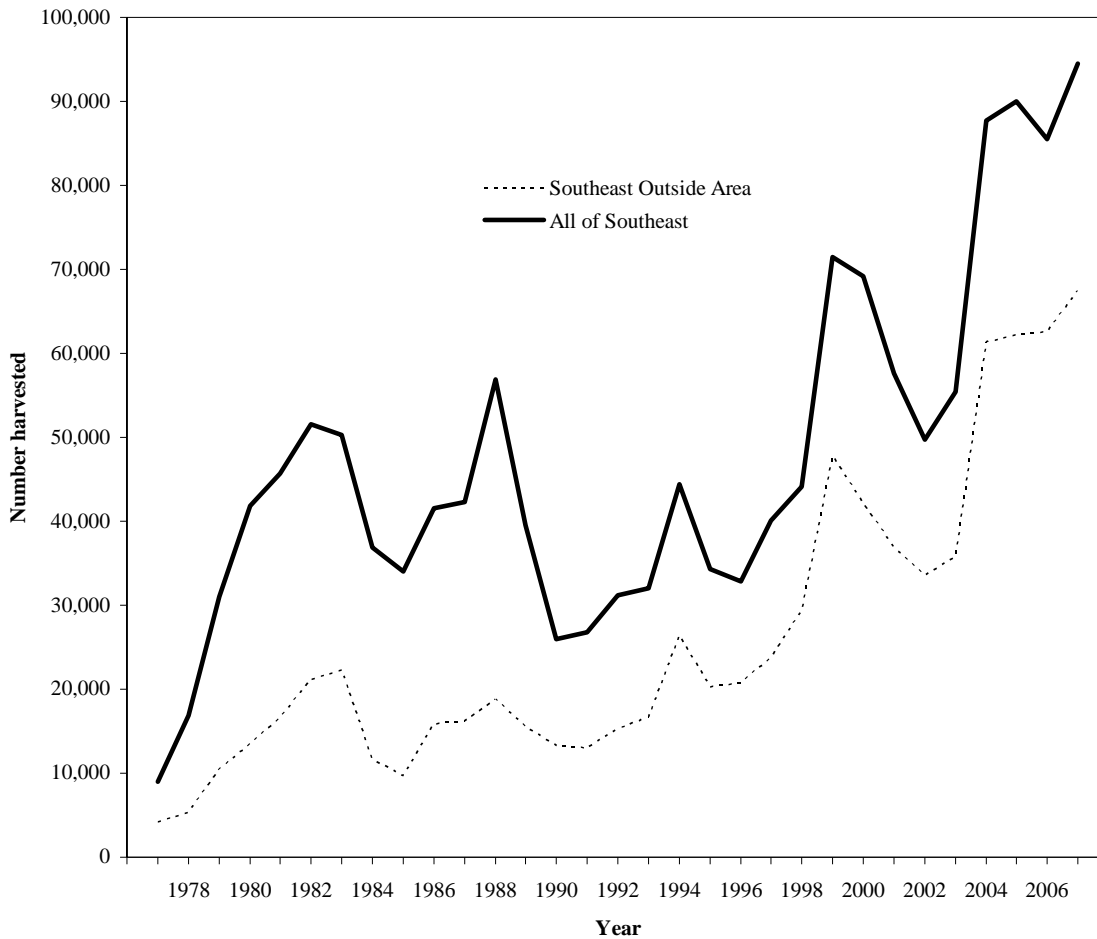


Figure 5.—Statewide harvest survey (SWHS) estimates of total rockfish harvest in sport fisheries in Southeast Alaska, as well as for the 3 SWHS outside areas of Prince of Wales Island (G), Sitka (D), and Glacier Bay (B) (these areas combined are basically equivalent to the Southeast Outside Subdistrict), 1977–2007.

fisheries. The Department is neutral on this proposal because it is an allocation issue. Proposals 349, 350 and 352 would require a decompression device and/or releasing sport-caught rockfish near the bottom in Southeast Alaska waters. Proposals 249 and 350 would change regional angler methods and means, while proposal 352 would alter emergency order authority for DSR. The Department is opposed to these proposals as research to date does not indicate that these methods and devices would increase survival of released fish, and they may lead to an increase in mortality if anglers alter their fishing patterns in the belief that these methods are effective in reducing mortality. The

Department is committed to current ADF&G research to limit rockfish mortality. Proposal 353 would add or amend a management action to emergency order authority for DSR that would require the retention of yelloweye rockfish in the sport fishery until the bag limit is obtained, and allow the release of other rockfish unless it does not submerge, when it would be counted towards the anglers bag limit. The proposal would also prevent the puncture of the swim bladder on fish that are released. The Department opposes this proposal because it assumes that rockfish that are able to submerge have not been injured and will survive.

Table 3.—Total Allowable Catch (TAC) and mortality by fishery of DSR in the Southeast Outside Subdistrict (SEO), 1982–2008.

Year	TAC (mt) ^a	Directed Fishery	Halibut Fishery ^b	Halibut Discard Mortality ^c	Sport Mortality ^d	Subsistence	Total SEO Mortality	Sport Percent of TAC
1982		106	14		28		148	
1983		161	15		29		205	
1984		543	20		15		578	
1985		395	100		13		512	
1986		451	43		20		514	
1987		803	52		18		873	
1988	660	515	37		21		573	3.20%
1989	420	356	119		15		490	3.60%
1990	470	207	136		17		360	3.60%
1991	425	386	119		18		523	4.20%
1992	550	364	189		16		569	2.90%
1993	800	345	272		20		637	2.50%
1994	960	283	154	175	34		646	3.50%
1995	580	177	112	108	25		422	4.30%
1996	945	345	85	179	28		637	3.00%
1997	945	267	87	217	38		609	4.00%
1998	560	241	117	190	47		595	8.40%
1999	560	235	112	174	73		594	13.00%
2000	340	183	94	148	80		505	23.50%
2001	330	172	147	122	71		512	21.50%
2002	350	136	153	140	87		516	24.90%
2003	360	102	174	107	74		457	20.60%
2004	450	173	155	179	104	23	611	23.10%
2005	410	42	195	162	90	16	489	22.00%
2006	410	0	205	21	77	24	303	18.80%
2007	410	0	198	20	60	21	278	14.60%
2008	382	42	148	15	70 ^e	21 ^e	275	18.30%

^a There was no TAC prior to 1988.

^b Halibut Fishery “Landings” for 2006–2008 also include landings from all other non DSR directed groundfish and test fisheries.

^c Estimated based on NMFS test fishing. For 2006–2008 it is assumed to be 10% of harvest.

^d Estimated using SWHS harvest estimates, creel species composition sampling, and catch estimates from creel sampling and logbooks.

^e Preliminary estimate

The Department has reviewed current scientific literature on survival of rockfish species released at depth (Table 4), and has initiated its own study that attempts to assess the effectiveness of using a release device (recompression device) on common non-pelagic rockfish species in a field setting, as anglers would most likely use the devices. The results, due in 2010, should allow the Department to estimate the survival of yelloweye, copper, and quillback rockfish released using this device. Staff will then be able to determine if a management application of the devices is possible in sport fisheries. Preliminary results of the 2008 field season are inconclusive, but few (5) fish have been recaptured, suggesting survival may not be high.

LINGCOD

Lingcod, the largest member of the greenling family, are unique to the west coast of North America and are found throughout the marine waters of Southeast Alaska. Lingcod are predatory and commonly grow to over 50 pounds in weight are also targeted by sport anglers. As with rockfish, lingcod are relatively sedentary, relatively easy to locate and catch, and are subject to overharvest. Unlike rockfish, lingcod have a lower rate of mortality after release because they have an open air bladder.

Prior to 2000, Southeast Alaska trends in catch per unit effort (CPUE) in the directed commercial

lingcod fishery indicated that stock abundance may have been declining; additionally there was little evidence of large-scale recruitment into the population. In light of these trends and substantial population declines in British Columbia, on the West Coast of the U.S., and in Resurrection Bay near Seward, the Department was concerned that existing levels of exploitation at that time in Southeast Alaska may have been too high to sustain lingcod abundance in some areas.

REGULATION DEVELOPMENT IN THE SPORT FISHERY

In February 2000, the Board substantially changed the management of lingcod fisheries in Southeast Alaska by adopting a new Southeast Alaska lingcod management plan for sport as well as commercial fisheries. In this plan, the Board established a guideline harvest level (GHL) management approach for sport and commercial fisheries in Southeast Alaska, and allocated the GHL among sport and commercial fisheries in the following 7 management areas: Icy Bay Subdistrict (IBS), East Yakutat Section (EYKT), Northern Southeast Outside Section (NSEO), Central Southeast Outside Section (CSEO), Southern Southeast Outer Coast Sector (SSEOC), Southern Southeast Internal Sector (SSEIW), and Northern Southeast Inside Subdistrict (NSEI) (Figure 2). The Department manages CSEO and NSEO for a combined allocation. The allowable harvests were reduced by setting the GHL lower than prior levels in each area, and the seasons for sport and directed commercial fisheries were also reduced in this plan.

Under this approach, the sport fishery was to be managed to maintain lingcod harvests at or below harvest guidelines (lbs.) in each management area. In addition to the normal authority to restrict time and area in the sport fishery, the Department uses additional authority granted from the Board to implement size limits and annual limits for guided and nonresident anglers to achieve the desired guideline harvest allocations for each area (Table 5). Note that the authority to place these additional restrictions on guided and nonresident anglers in the lingcod sport fishery differs from other management “plans” (i.e. king salmon and rockfish) whereby only nonresidents and residents are identified as a group of anglers where different restrictions might apply. Resident anglers could be

guided anglers, but in Southeast Alaska the vast majority of guided anglers are nonresidents.

Given the Department’s limited ability to assess harvest inseason, the Department informed the Board that changes to the sport fishery would not be made inseason. After each season, past harvest trends would be evaluated to determine whether management action would be necessary prior to the following season. If harvest substantially exceeded the GHL in an area, restrictions would be applied prior to the next season to reduce harvests below the GHL. Likewise, if harvests fell well below harvest guidelines, restrictions would be eased prior to the next season. Since 2000, Department staff has established regulations annually for the sport fishery by projecting a harvest for the coming season in each area, determining whether a reduction or increase relative to recent harvest levels was needed each area, and, if so, how much reduction or increase was needed.

FISHERY MANAGEMENT ISSUES

The SWHS provides lingcod harvest estimates, in number of fish, by SWHS area (areas roughly comparable to, but not identical to, groundfish management areas) since 1977. On-site creel surveys, conducted at major ports in Southeast Alaska, provide estimates of harvest and average length for lingcod taken by anglers returning to those ports. Since 1998, charter vessel logbooks have provided harvest estimates for guided anglers. Creel survey results become available before the next season, but SWHS results can take up to 1 year before they are available. The SWHS is the only source of complete harvest estimates because creel surveys are not conducted in every port, and charter vessel logbook reports are available only for guided anglers.

The GHL approach requires harvest estimates, in pounds of round weight, for each management area. At the 9 ports in Southeast Alaska with on-site sport fish creel survey programs, the length of harvested lingcod is measured to the nearest centimeter (cm), and the angler type (guided or non-guided) is recorded. The length data is then converted into round weight estimates, based upon the length-weight relationship utilized by the Department. The average round weight is then calculated for each angler type (guided and non-guided) for each port where on-site sampling occurs.

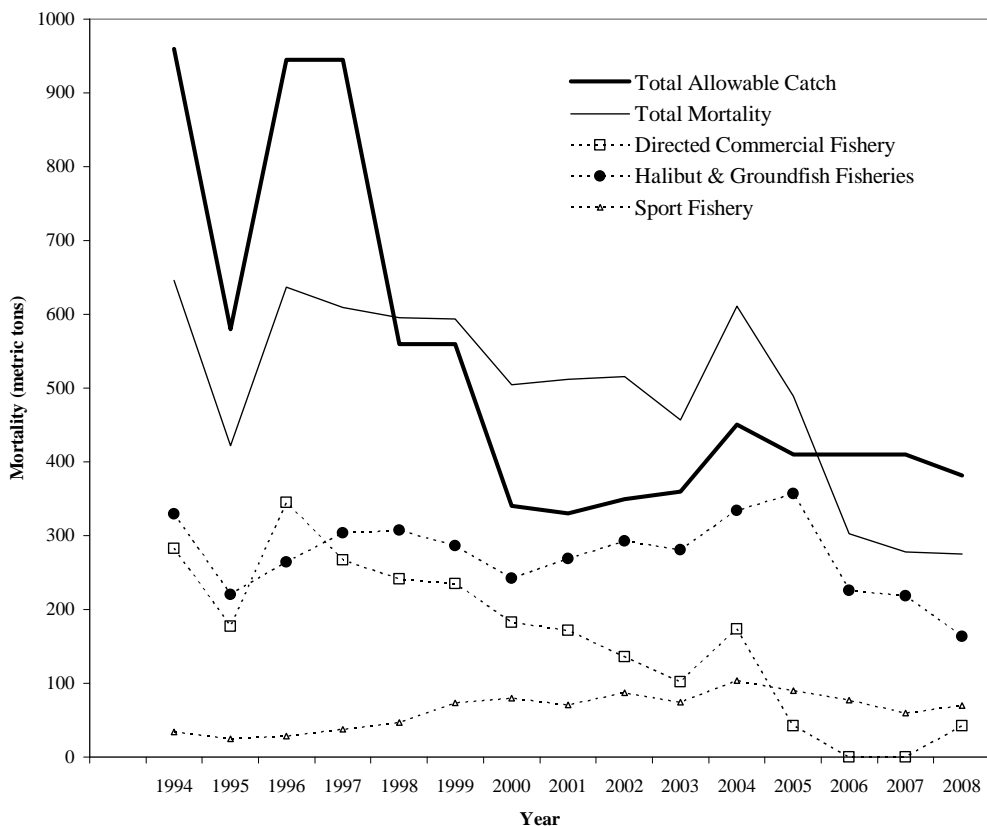


Figure 6.—Total allowable catch (TAC) and mortality by fishery and year of demersal shelf rockfish (DSR) in the Southeast Outside Subdistrict, 1994–2008.

The estimated average round weight of harvested lingcod for each angler type (guided and non-guided) are multiplied by the SWHS harvest estimates for each angler type to obtain estimated harvest, in pounds, for each angler type. The estimated harvest (lbs.) from each angler type (guided and non-guided) is then added together to come up with the overall harvest estimates for each management area. Harvest guidelines established by the Board in 2000 were 39% less than the 1997–1998 sport harvest estimates in CSEO/NSEO and NSEI, but similar (-1% to +14%) in other areas. In an attempt to reduce harvest by 39% in 2000, a series of bag limit reductions and minimum length limits regulations were implemented by emergency order (Table 5). These regulations proved to be ineffective in reducing the total weight of the sport harvest (Figure 8). The reason these regulations were ineffective was that, even though the number of fish harvested was reduced, the average size of the fish harvested increased substantially. From 2001 through 2005, the Department implemented various

regulations by emergency order including minimum length limits, slot limits, periods closed to fishing, and gear restrictions (Table 5). These regulations were generally effective in restricting the sport fishery harvest to below the GHL in 2001–2003. However, in 2004 and 2005, the GHL was exceeded in the CSEO/NSEO, SSEOC, SSEIW, and NSEI areas (Figure 8), and the amount of the overage appeared to be generally increasing. The increases in harvest appeared to be due to increased effort and efficiency as well as a trend for resident charter operators and crewmembers to retain larger lingcod.

From 2006 through 2008, the Department implemented additional regulations by emergency order including annual limits for nonresidents and guided anglers, and prohibitions on charter operators and crew from retaining lingcod while clients were on board. In addition, some slot limits were added or made more restrictive; seasons, and gear restrictions remained in place. These regulations were generally effective in restricting the sport fishery harvest to near the GHL in 2007 and 2008 in most of the management areas (Figure 8).

Table 4.–List of references for barotrauma studies on rockfish species that look at survival when released at depth.

Author/Citation	Species of rockfish studied	Depth of study	Location	Method summary	Survival rate examined	Survival rate reported	Species examined exists in Alaska sport fishery
Bosch et al. <i>in progress</i> .	Yelloweye, copper, quillback, <i>Sebastes</i> spp.	20 to 46 meters	Alaska	Released fish in environment directly as anglers would likely use recompression devices.	Yes	No conclusive survival result (preliminary)	Yes
Rogers et al. 2008, CJFAS 65:1245-1249	<i>Sebastes</i> spp.	18 to 220 meters	California	Released fish into cages first.	Yes	62–73% to 2 days; 690 day survival detected	Yes but sample sizes very small
Alós 2008. ICES Journal of Marine Science, 65: 1620–1625.	Painted comber	4 to 30 meters	Mallorca, Spain	Released fish in cages tested venting as cofactor.	Yes	86% to 10 days	No
Parker et al. 2006. TAFS 135:1213-1223	Black rockfish	up to 30 meters	Oregon	Used compression chamber in laboratory only. Used pressures up to 4 atmospheres equivalent to 30 meters depth.	Yes	97% to 9 days	Yes
St Johns and Syers 2005. Fisheries Research 76; 106–116	Australian dhufish	0 to 60 meters	Australia	Released fish into cages at surface first then submerged later and used venting as cofactor along with recompression.	Yes	49% to 1–3 days	No
Berry 2001. Report for Fisheries Renewal BC and Science Council of BC	Quillback	15 meters	British Columbia	Released fish with cages at 15 meters no information on depth of capture given.	Yes	49 to 86% to 5 weeks	Yes
Hannah and Matteson 2007. TAFS 136:24-33	<i>Sebastes</i> spp.	40–99 meters	Oregon	Observed behavior impairment after release.	No		Yes
Rummer 2007. American Fisheries Society Symposium 60:113–132	Many physoclistous spp.	N/A		Review paper of general topic	No		Yes
Rummer and Bennett 2005. Transactions of the American Fisheries Society 134:1457–1470	Red snapper	N/A		Summarized type of injury caused by air bladder inflation	No		No

Table 5.—Summary of sport fish regulations for lingcod in Southeast Alaska’s lingcod management areas by year.

Year	SSEI	SSEO	CSEO/NSEO/NSEI	EYKT
Before 2000	Season: May 1–Nov 30 2 fish per day, 4 in possession	Season: May 1–Nov 30 2 fish per day, 4 in possession	Season: May 1–Nov 30 2 fish per day, 4 in possession	Season: May 1–Nov 30 2 fish per day, 4 in possession
2000	Season: May 16–Nov 30 2 fish per day, 4 in possession No size limit	Season: May 16–Nov 30 2 fish per day, 4 in possession No size limit	Season: May 16–June 15, Aug 16–Nov 30 2 per day, 4 in possession prior to June 6, 2000 After June 6: 1 per day, 2 in possession and: Non-Guided residents: No size limit Guided and Nonresidents: 38 in minimum size	Season: May 16–Nov 30 2 fish per day, 4 in possession No size limit
2001	Season: May 16–Nov 30 1 per day, 2 in possession No size limit	Season: May 16–Nov 30 1 per day, 2 in possession Non-Guided residents: No size limit Guided and Nonresidents: 34 in minimum size	Season: May 16–June 15, Aug 16–Nov 30 1 per day, 2 in possession Non-Guided residents: No size limit Guided and Nonresidents: 39 in minimum size	Season: May 16 - June 15, Aug 16–Nov 30 1 per day, 2 in possession Non-Guided residents: No size limit Guided and Nonresidents: 39 in minimum size
2002	Season: May 16–Nov 30 1 per day, 2 in possession No size limit	Season: May 16–June 15, Aug 16–Nov 30 1 per day, 2 in possession Non-Guided residents: No size limit Guided and Nonresidents: 30 in-40 in slot limit	Season: May 16–June 15, Aug 16–Nov 30 1 per day, 2 in possession Non-Guided residents: No size limit Guided and Nonresidents: 30 in-40 in slot limit	Season: May 16–Nov 30 1 per day, 2 in possession Non-Guided residents: No size limit Guided and Nonresidents: 32 in-42 in slot limit
2003	Season: May 16–Nov 30 1 per day, 2 in possession Non-Guided residents: No size limit Guided and Nonresidents: 30 in-40 in slot limit	Season: May 16–June 15, August 16–Nov 30 1 per day, 2 in possession Non-Guided residents: No size limit Guided and Nonresidents: 30 in-40 in slot limit	Season: May 16–June 15, August 16–Nov 30 1 per day, 2 in possession Non-Guided residents: No size limit Guided and Nonresidents: 30 in-40 in slot limit	Season: May 16–Nov 30 1 per day, 2 in possession Non-Guided residents: No size limit Guided and Nonresidents: 32 in-42 in slot limit

-continued-

Table 5.–Page 2 of 2.

Year	SSEI	SSEO	CSEO/NSEO/NSEI	EYKT
2004–2005	Season: May 16–Nov 30 1 per day, 2 in possession No size limit	Season: May 16–Nov 30 1 per day, 2 in possession Non-Guided residents: No size limit Guided and Nonresidents: 30 in-40 in slot limit	Season: May 16–June 15, August 16–Nov 30 1 per day, 2 in possession Non-Guided residents: No size limit Guided and Nonresidents: 30 in-40 in slot limit	Season: May 16–Nov 30 1 per day, 2 in possession Non-Guided residents: No size limit Guided and Nonresidents: 32 in-42 in slot limit
2006	Season: May 16–Nov 30 1 per day, 2 in possession No size limit Guided and Nonresidents: annual limit of 2 No retention by charter operators/crew	Season: May 16–Nov 30 1 per day, 2 in possession Non-Guided residents: No size limit Guided and Nonresidents: 30 in-40 in slot limit Guided and Nonresidents: annual limit of 2 No retention by charter operators/crew	Season: May 16–June 15, August 16–Nov 30 1 per day, 2 in possession Non-Guided residents: No size limit Guided and Nonresidents: 30 in-40 in slot limit Guided and Nonresidents: annual limit of 2 No retention by charter operators/crew	Season: May 16–Nov 30 1 per day, 2 in possession Non-Guided residents: No size limit Guided and Nonresidents: 32 in-42 in slot limit No retention by charter operators/crew
2007–2008	Season: May 16–Nov 30 Non-Guided resident: 1 per day, 2 in possession Non-Guided residents: No size limit Guided and Nonresidents: 30 in-40 in slot limit Guided and Nonresidents: annual limit of 1 No retention by charter operators/crew	Season: May 16–Nov 30 Non-Guided resident: 1 per day, 2 in possession Non-Guided residents: No size limit Guided and Nonresidents: 30 in-35 in slot limit Guided and Nonresidents: annual limit of 1 No retention by charter operators/crew	Season: May 16–June 15, August 16–Nov 30 Non-Guided resident: 1 per day, 2 in possession Non-Guided residents: No size limit Guided and Nonresidents: 30 in-35 in slot limit Guided and Nonresidents: annual limit of one No retention by charter operators/crew	Season: May 16–Nov 30 1 per day, 2 in possession Non-Guided residents: No size limit Guided and Nonresidents: 32 in-42 in slot limit No retention by charter operators/crew

Note: Whenever an annual limit regulation is in place, a harvest record is required, and when a size limit or slot limit regulation is in place, all lingcod must be landed by hand or landing net.

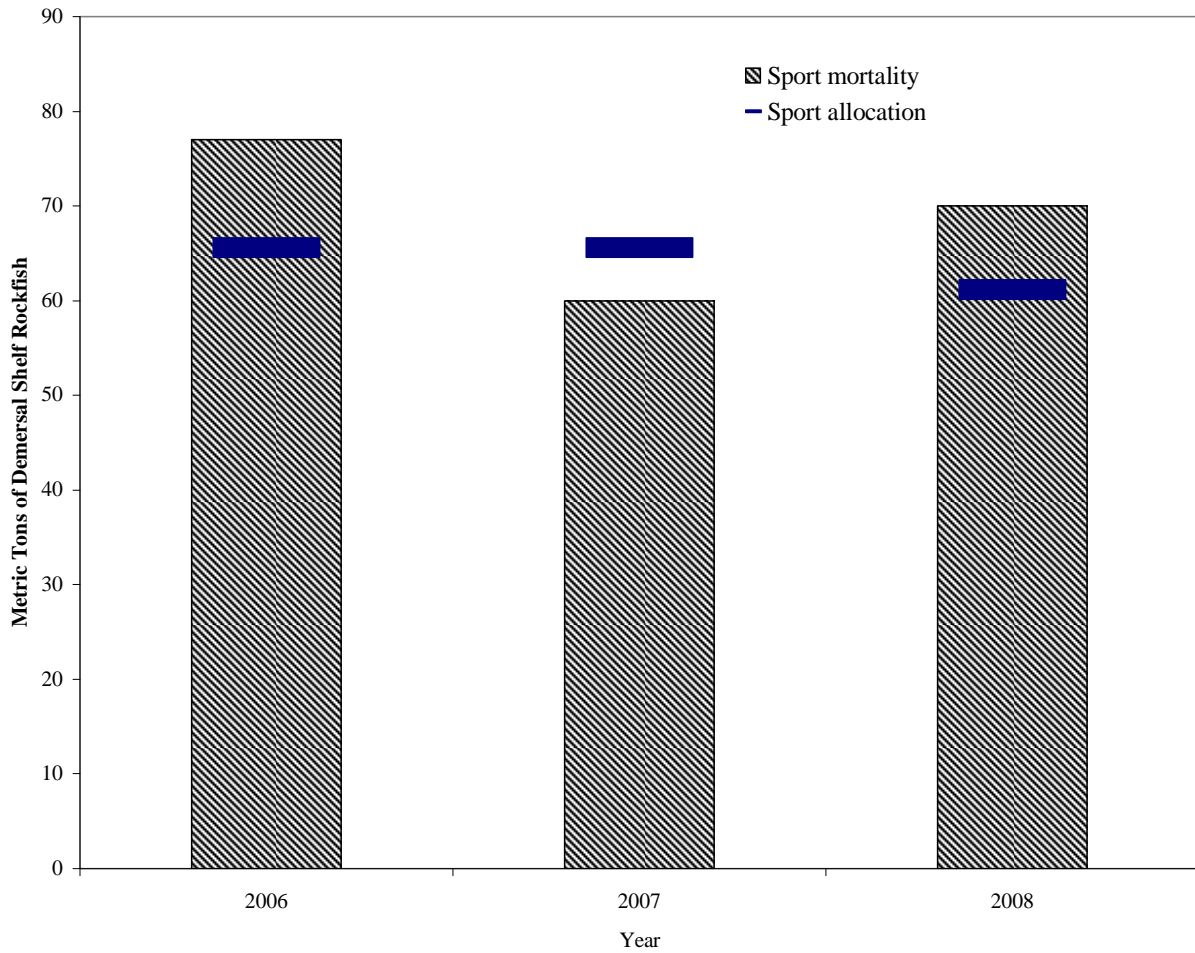


Figure 7.—Sport fishery mortality and allocation of demersal shelf rockfish in the Southeast Outside Subdistrict, 2006–2008.

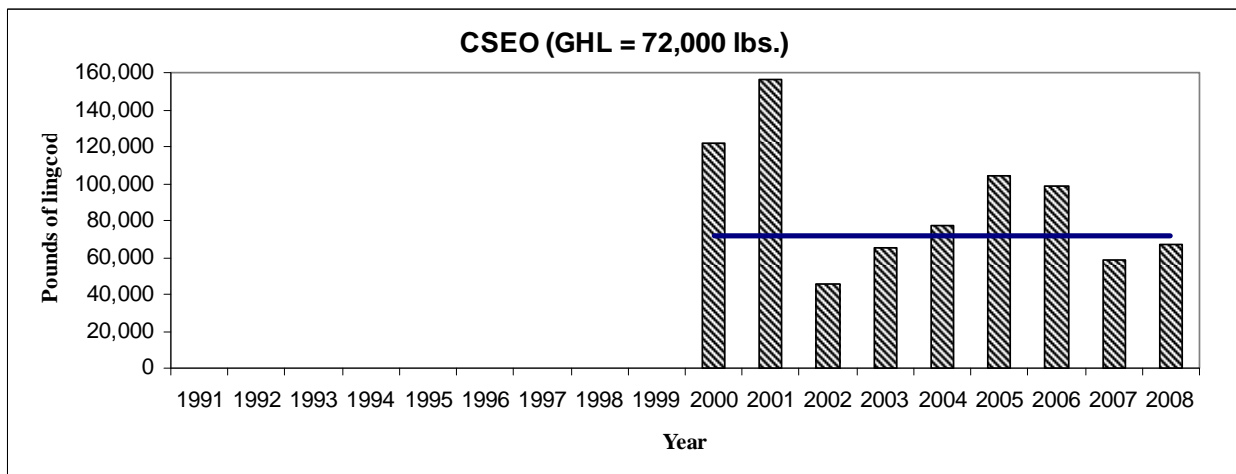
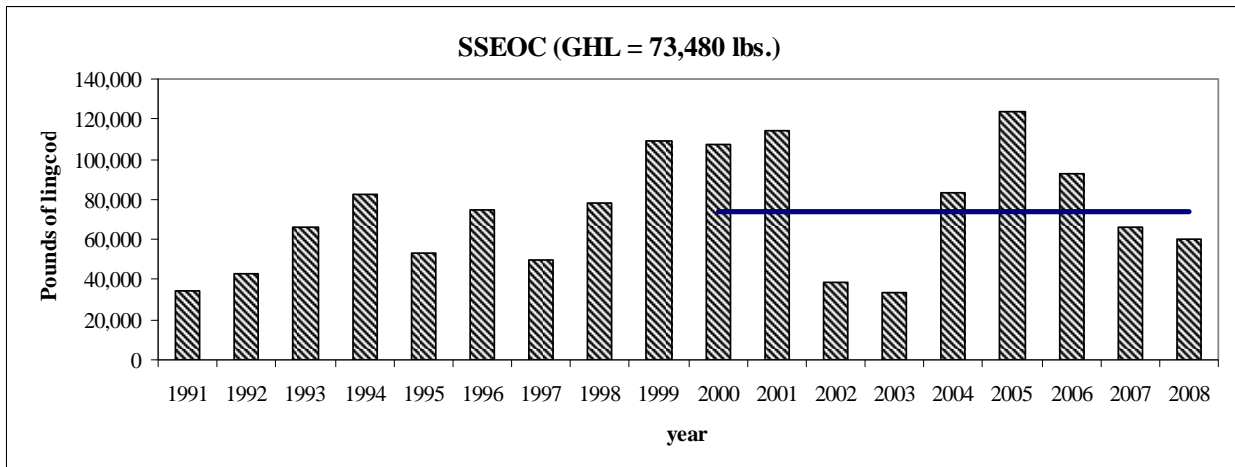
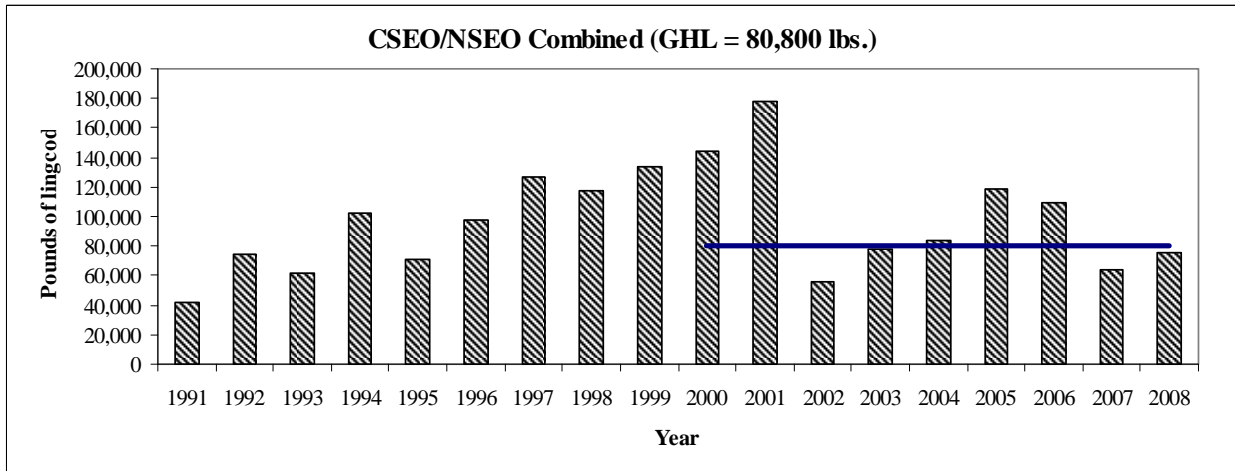
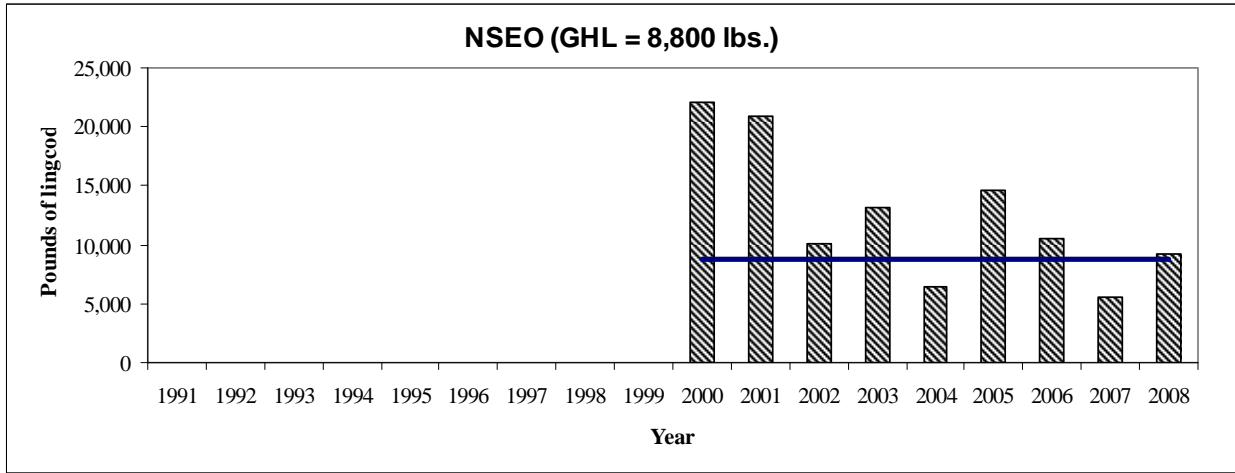


Figure 8.—Number of pounds of lingcod harvested (bars) and guideline harvest levels (lines) in the sport fishery by groundfish management area, 1991–2008. (Page 1 of 3).

Figure 8.-Page 2 of 3.



-continued-

Figure 8.–Page 3 of 3.

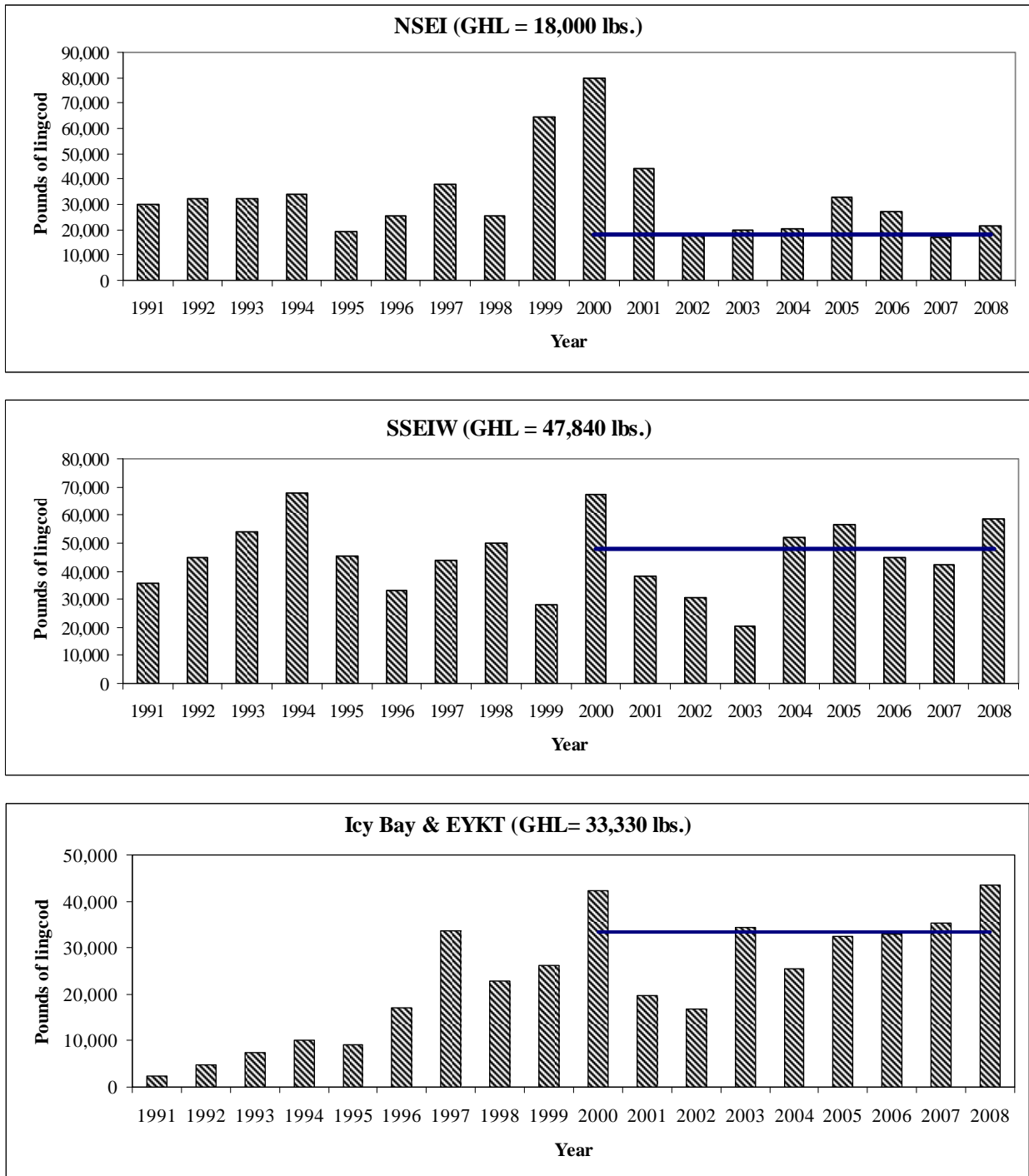


Figure 8.–Number of pounds of lingcod harvested (bars) and guideline harvest levels (lines) in the sport fishery by groundfish management area, 1991–2008.

2009 BOF PROPOSALS

Eight proposals dealing with lingcod management have been submitted to the Board. Five of the proposals would affect the sport fishery. Proposal 333 would potentially change the guideline harvest level for all fisheries in the central outside waters by requiring the Department to collect new stock assessment information. Proposal 334 and 335 would change the allocation of lingcod between sport and commercial fisheries. The Department is neutral on these 2 allocation issues. Proposal 339 would allow for the retention of trophy lingcod 55 inches or greater in length in the sport fishery. Few lingcod achieve a length equal to or greater than 55 inches and if this regulation is adopted, it is expected to have almost no effect on harvest. Proposal 340 would modify the boundaries between 2 sportfishing management areas that have different lingcod regulations. The Department is neutral on this proposal as it could result in a reallocation of the sport harvest between areas.

REFERENCES CITED

- Alós, J. 2008. Influence of anatomical hooking depth, capture depth, and venting on mortality of painted comber (*Serranus scriba*) released by recreational anglers. *ICES Journal of Marine Science*, 65: 1620–1625.
- Berry, M. D. 2001. Area 12 (inside) rockfish selective fishery study, final report. Science Council of British Columbia Project No. FS00-05. Inner Coast Natural Resource Centre, Alert Bay, B.C.
- Hannah, R. W., and K. M. Matteson. 2007. Behavior of nine species of Pacific rockfish after hook-and-line capture, recompression and release. *Transactions of the American Fisheries Society*. 136:24–33.
- O'Connell, V., E. Coonradt, M. Vaughn, D. Holum, C. Brylinsky, and K. Carroll. 2006. 2002-2004 Report to the Alaska Board of Fisheries, Groundfish Fisheries Region 1: Southeast Alaska-Yakutat. Alaska Department of Fish and Game, Fishery Management Report No. 06-02, Anchorage. <http://www.sf.adfg.state.ak.us/FedAidPDFs/fmr06-02.pdf>
- Parker, S. J., H. I. McElderry, P. S. Rankin, and R. W. Hannah. 2006. Buoyancy regulation and barotrauma in two species of nearshore rockfish. *Transactions of the American Fisheries Society* 135:1213-1223.
- Rogers, B. L., C. G. Lowe, E. Fernández-Juricic, and L. R. Frank. 2008. Utilizing magnetic resonance imaging (MRI) to assess the effects of angling-induced barotrauma on rockfish (*Sebastes*). *Canadian Journal of Fisheries and Aquatic Sciences*, Volume 65, Number 7, 1 July 2008 , pp. 1245-1249(5).
- Rummer, J. L. 2007. Factors affecting catch and release (CAR) mortality in fish: Insight into CAR mortality in red snapper and the influence of catastrophic decompression. *Transactions of the American Fisheries Society Symposium* 60:113–132.
- Rummer, J. L., and W. A. Bennett. 2005. Physiological effects of swim bladder overexpansion and catastrophic decompression on red snapper. *Transactions of the American Fisheries Society* 134:1457–1470.
- St Johns, J., and C. J. Syers. 2005. Mortality of the demersal West Australian dhufish, *Glaucosoma hebraicum* (Richardson 1845) following catch and release: The influence of capture depth, venting and hook type. *Fisheries Research* 76; 106–116.