

Chapter 14

2006 BSAI Other Rockfish

Rebecca F. Reuter and Paul D. Spencer

November 2006

14.0 Executive Summary

(a) 14.0.1 Summary of Major Changes

Changes in the input data

1. The 2005 landings have been revised and the 2006 landings through October 16th, 2006 have been included in the assessment.
2. Length frequency graphs from the fishery data have been updated for dusky rockfish, shortspine thornyheads and harlequin rockfish.
3. To avoid confusion biomass estimates have been simplified to Aleutian Islands and Eastern Bering Sea. Previous assessments mentioned a Southern Bering Sea biomass, this is now considered part of the Aleutian Islands ecosystem.
4. Responses to SSC comments and Plan Team recommendations are included.

Changes in assessment results

5. OFL calculations use separate natural mortality estimates for shortspine thornyheads and the remaining Other rockfish complex.
6. Author's recommendation for joint BSAI OFL for Other rockfish and separate ABC for AI and EBS for 2007 and 2008.

Other rockfish complex Tier 5 for 2007:

Region	M	Exploitable biomass (mt)	F_{ABC}	ABC (mt)	F_{OFL}	OFL (mt)
BSAI_{SST}	0.03	32,811			0.03	984
BSAI_{Orock}	0.09	3,859			0.09	347
BSAI_{Total}						1,331
EBS_{SST}	0.03	17,906	0.0225	403		
EBS_{Orock}	0.09	161	0.0675	11		
EBS_{Total}				414		
AI_{SST}	0.03	14,905	0.0225	335		
AI_{Orock}	0.09	3,698	0.0675	250		
AI_{Total}				585		

Other rockfish complex Tier 5 for 2008:

Region	M	Exploitable biomass (mt)	F _{ABC}	ABC (mt)	F _{OFL}	OFL (mt)
BSAI _{SST}	0.03	32,811			0.03	984
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BSAI _{Total}						1,331
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AI _{SST}	0.03	14,905	0.0225	335		
AI _{Orock}	0.09	3,698	0.0675	250		
AI _{Total}				585		

(b) 14.0.2 Responses to SSC Comments

There are no comments that require a response.

14.1 Introduction

The other rockfish complex includes all species of *Sebastes* and *Sebastolobus* spp. other than Pacific ocean perch (*Sebastes alutus*) and those species in the other red rockfish complex (northern rockfish, *S. polyspinis*; rougheye rockfish, *S. aleutianus*; and shortraker rockfish, *S. borealis*). This complex is one of the rockfish management groups in the Bering Sea and Aleutian Island (BSAI) regions. Eight out of twenty-eight species of “other rockfish” have been confirmed or tentatively identified in catches from the eastern Bering Sea and Aleutian Islands region, thus these are the only species stocks managed in this complex (Reuter and Spencer 2001, NOAA Fisheries 2002 Report to Congress April 2003). These species have been observed at least once in the hauls of the BSAI surveys and/or have occurred in at least 1% of the hauls where an species from the other rockfish category has been caught (Table 14.1). The two most abundant species for this complex are dusky rockfish (*Sebastes variabilis*) and shortspine thornyheads (*Sebastolobus alascancus*). In 2004 though, the Aleutian Island (AI) Survey estimated that there was a 4,000 mt biomass of Harlequin rockfish (*S. variegatus*), unfortunately this was based mainly on two large hauls of this species thus yielding a very high CV of 0.99.

The distributions of these other rockfishes are not well documented in the BSAI regions. Dusky rockfish are occasionally observed in AFSC research surveys throughout the Aleutian Islands. When observed dusky rockfish are typically captured between 125 -200m (Reuter and Spencer 2001). Catches of shortspine thornyheads in the Aleutian Island (AI) region are observed around the islands along the bathymetric contours between 200 m and 500 m (Reuter and Spencer 2001). In the Eastern Bering Sea (EBS) dusky rockfish are rarely encountered in the catches of either the survey or the fishery. Whereas, the shortspine thornyhead distribution is similar to that found in the AI with most encounters occurring in survey and fishery tows deeper than 200 m (Reuter and Spencer 2001).

Recently, in the Aleutian Islands, bycatch of dusky rockfish is highest near Seguam pass and Petrel Bank. This contrasts with the locations where the AFSC AI survey catch dusky rockfish where in 2002 and 2004 the highest catch was at the eastern tip of Amchitka Island (Figure 14.1).

Locations of dusky rockfish bycatch in the EBS fisheries are peppered along the slope, and in the region just north of Unalaska Island and Akutan Island in the southern part of the EBS and at the southern tip of

Zhemchug canyon in the northern part of the EBS (Reuter and Spencer 2002). In the 2004 Aleutian Island survey, locations of dusky rockfish catch were similar to fishery bycatch distributions for areas near Unalaska Island and Akutan Island.

In the past shortspine thornyheads (SST) have been grouped in the other rockfish category and make up approximately 90% of the other rockfish complex biomass. Due to conservation concerns for other rockfish species, the authors recommended splitting thornyhead from the other rockfish complex in 2003 and 2004 (Reuter and Spencer 2003, Reuter and Spencer 2004). Due to data limitations and management limitations for small TACs the recommendation was not accepted by the SSC.

Fishery

Since 1977, rockfish have been identified to the species level in fishery catches by U.S. observers, providing a means of estimating annual harvests of individual species. The dominant species in the “other rockfish” group are dusky rockfish (*S. variabilis*) and shortspine thornyheads (*Sebastolobus alascanus*).

Historical catches of other rockfish since implementation of the MFCMA are shown in Table 14.2. Catches prior to 1990 are assumed to include discards; whereas, catches during the period 1990-2006 explicitly account for discards based on NMFS Regional Office and observer information. The peak catch of other rockfish in the EBS occurred in 1978 with a removal of 941 mt. In the Aleutian region, peak catch occurred in 1982 with a harvest of 2,114 mt. Note that in 2001 removals from the foreign fishery of other rockfish were revised using the current species complex (Reuter and Spencer 2001).

In recent years in both the AI and EBS, the other rockfish catch of was mainly comprised of dusky rockfish and shortspine thornyheads (Table 14.3). In the AI dusky rockfish account for 40% (1999) to 65% (2001) of the other rockfish total catch, whereas in the EBS, SST account for 55% (1998) to 78% (2002) of the other rockfish catch.

The target fisheries that catch these two species are described in Table 14.4. Target fisheries are defined by which species or species group occurred in the greatest abundance based on the total catch of the haul. During 2004 and 2005 in the AI, 73% to 78% of the total dusky rockfish catch was caught during the Atka mackerel (*Pleurogrammus monopterygius*) trawl fishery and 54% to 62% of the total SST catch was caught using longline gear in hauls whose target was sablefish (*Anoplopoma fimbria*). During the same years in the EBS, 63-34% of the dusky rockfish bycatch occurred in both bottom trawl and longline gear with the target of Pacific Cod (*Gadus macrocephalus*). In 2004 and 2005 in the EBS 23% to 31% of the SST catch occurred in hauls described as the Greenland Turbot bottom trawl and longline target.

Other rockfish retained and discarded catch are shown in Table 14.5. In the Aleutian Islands on average 48 % of those species in the other rockfish category were discarded. In the Eastern Bering Sea on average 37 % of those species in the other rockfish category were discarded. The difference in discard rates in these areas may be due to the difference in species composition.

In both the Eastern Bering Sea and the Aleutian Islands, shortspine thornyheads have been retained almost 100% for the last ten years. The high rates of retention are due to the high value of shortspine thornyheads. This is especially true if they are caught using fixed-gear which yields a higher quality product than trawl gear (Hiatt, Felthoven and Terry 2002).

Fishery Independent Surveys and Biomass Estimates

Several bottom trawl surveys provide biomass estimates for the EBS and AI regions. The 1979-86 cooperative U.S.-Japan trawl surveys in the EBS were conducted both on the continental shelf and slope. A majority of catches of other rockfish were taken by Japanese research trawlers working the slope regions at depths exceeding 200 m. In 1991 trawl surveys were conducted in both the EBS and Aleutian

regions. These surveys, however, were conducted entirely by domestic trawlers and did not include participation by the deeper-water Japanese research trawlers because of this the deeper water (>500 m) species such as SST may not be adequately assessed. The most recent trawl surveys occurred in 1997, 2000, 2002 and 2004 in the Aleutian Islands region. Biomass estimates for other rockfish were produced from cooperative U.S.-Japan trawl surveys from 1979-1985 on the eastern Bering Sea slope, and from 1980-1986 in the Aleutian Islands. U.S domestic trawl surveys were conducted in 1988, 1991, 2002 and 2004 on the eastern Bering Sea slope, and in 1991,1994, 1997, 2000, 2002, 2004 and 2006 in the Aleutian Islands but these surveys only sample depths shallower than 500 m (Table 14.7). The first official EBS slope survey was conducted in 2002 with sample station to depths of ~1200 m, a second survey occurred in 2004. Although these surveys were to be biennial, due to budget cuts it was not conducted in 2006. Biomass estimates from this survey will be used because it provides a better estimate of SST biomass for this region. Unlike other regions, longspine thornyheads (*Sebastolobus altivelus*) biomass is negligible or non-existent in the BSAI, thus SST are the only thornyheads being assessed.

In the AI region, the large change in biomass estimates from the 1980-1986 to the 1991-2006 surveys may be due to the differences in vessel type, gear type and survey methodology (Table 14.7). The spatial coverage and survey methods used during 1980 -1986 and 1991 - 2006 were consistent within a time period. Since 1994, the AI groundfish trawl biomass estimates for other rockfish have been stable and increasing. The AI groundfish trawl biomass estimates for other rockfish increased from 6,891 mt (CV = 0.22) in 1991 to 26,567 (0.22) in 2006. For the dusky rockfish the population in the AI has fluctuated in the last 10 years between 712 mt in 1997 to 6,687 mt (CV =0.80) in 2006 due mainly to 3 hauls with large catches (Table 14.8). In the last 10 years, the AI groundfish trawl biomass estimates for shortspine thornyhead have been increasing. The AI groundfish trawl biomass estimates for shortspine thornyhead increased from 10,447 mt (CV = 0.15) in 1997 to 18,844 mt (CV = 0.12) in 2006 (Table 14.8).

The only two species within the Other rockfish complex found in the EBS during 1997-2006 where SST and Dusky rockfish (Table 14.9). SST were found during the 2002 and 2004 Bering Sea slope survey, whose new biomass estimate brought the Other rockfish complex biomass estimate for the EBS up from near zero. Dusky rockfish have been found in both the shelf and the slope surveys although the high variance of the biomass estimates for dusky suggest that these surveys do not adequately assess this species. This could be due to this region being the fringe of the range for this species and/or the species is non-uniformly distributed throughout the EBS.

14.2 Data

Fishery

Length frequency

Dusky rockfish:

Prior to 2002 few length frequency data of dusky rockfish were collected. Therefore, the length frequency graphs that are shown in Figure 14.2 may not represent the exploited population. In 2002, observers measured dusky rockfish when they were encountered. The mean length of dusky caught in the fishery has changed very little since 2002. Currently the mean length of dusky rockfish in the AI fishery data is 42 cm.

Shortspine thornyheads:

The exploited portion of the population of shortspine thornyhead in the BSAI region are adequately represented and Figure 14.2b shows that individuals between 30 cm and 60 cm are consistently caught by the fishery. The available data do not span a long enough time period to detect any strong year-classes for long-lived species such as shortspine thornyhead rockfish. Data from 2003-2004 from the EBS fisheries show that the SST caught are a bit smaller than those caught in the AI, mean length 35 cm (Figure 14.3).

Survey

Length frequency

Dusky rockfish:

Although infrequently encountered during the AI surveys, the length frequency histograms of dusky rockfish consistently show that mainly fish over 30 cm are captured with this gear type (mean length is 39 cm, Figure 14.2). In 2006 the mean length increased to about 42 cm and reflected the size distribution from those dusky measured from fishery hauls (Figure 14.2).

Shortspine thornyheads:

Length frequency from the AI trawl survey show that the majority of the specimens sampled were between 20 and 50 cm (Figure 14.3) a size range that is smaller than those caught in the fishery. Previous assessments show that, SST as small as 5 cm have been measured, with a bulk of the samples ranging from 16 – 52 cm from the EBS slope survey data (Reuter and Spencer 2004).

Harlequin rockfish:

During the 2004 AI survey, two large hauls of harlequin rockfish occurred. This allowed for sufficient measurements to be collected to create a length frequency graph (Reuter and Spencer 2004). Size range of the harlequin rockfish caught were between 26 cm –39 cm.

Length at Age

Dusky rockfish:

The only available age data for dusky rockfish are from the 2002 AI survey (n = 108). Analysis of these data using a von Bertalanffy growth function result in an L_{inf} of 41.6 cm, $K=0.32$ and a $t_o = 2.5$ (Reuter and Spencer 2003). Visual comparison of these results and those from the GOA suggest that dusky rockfish in the AI are smaller at age (Clausen and Heifetz 2002).

Shortspine Thornyheads:

No age data exist for SST because an ageing technique has yet to be satisfactorily determined. Current research within the Age and Growth group at the AFSC will provide valuable information in the next two years.

Weight at Length

Weight at length was calculated for dusky rockfish and shortspine thornyhead rockfish using the formula $W=aL^b$, where W is weight in grams and L is fork length in mm.

Species	Data source	Years sampled	Area	a	b	Sample size
Dusky	Survey	2002, 2004	AI	5×10^{-6}	3.2	283
SST	Survey and Fishery	1983, 1986, 1991, 1994, 1997, 1999, 2000, 2001, 2002, 2004	BSAI	2×10^{-6}	3.27	3,938

14.3 Analytical Approach

Parameters Estimated Independently

Natural mortality

SST

The natural mortality of SST is controversial and can be explained through the difficulty of ageing this species. In the GOA Thornyhead assessment, Gaichas and Ianelli (2003), presented a lengthy discussion of the various natural mortality estimates from several studies. The variability in natural mortality stems from the ongoing challenge to estimate ages of SST. Several studies have calculated natural mortality differently due to the age of their oldest sample. Miller (1985) estimated natural mortality to be 0.07 from a sample of SST in Southeast Alaska whose oldest age was 62 years old. Whereas, a study using west

coast SST estimated a natural mortality between 0.05-0.07 with the oldest age in the sample being 80 (Kline 1996). Pearson and Gunderson (2003) suggest that SST from Alaska have an $M = 0.013$, based on a study using the gonadosomatic index to estimate natural mortality. A natural mortality rate that low would suggest that these fish reach ages well over 100 years. The reason for the different rates of natural mortality are based on the different techniques used. Miller used surface ageing and break and burn technique, and found that precision and comparability was low. Kline (1996) on the other hand used a thin section technique that had better inter-reader ageing agreement, and the radiometric verification technique used strongly supported the otolith ageing technique. Subsequent radiometric work by Kestelle et al. (2000), corroborated Kline's results. Thus, Kline's methodology and results are presumed to be the most accurate given the uncertainty of ageing SST. Furthermore, the maximum age assumption for Pearson and Gunderson's (2003) methodology, doesn't fit life history patterns for any other known deep water fish species. Work is currently being done at the Alaska Fisheries Science Center to determine the best ageing technique to use for SST (personal communication Betty Goetz, Age and Growth group, REFM, AFSC). Historically, the value of M (0.07) has been used to assess the other rockfish stock, which represents an approximation based on knowledge of rockfish life histories from other areas. This value is based on the estimate for shortspine thornyheads (Ianelli and Ito 1994) since this species evidently comprises well over 90% of the other rockfish biomass (as calculated by survey data). With this and the information from the 2003 GOA SST SAFE chapter the authors recommend using the natural mortality value of 0.03 for BSAI SST. The authors recommend that 0.03 M be used for the portion of the Other rockfish biomass that is SST.

Other rockfish

The value of M for the other rockfish complex has been 0.07, which represents an approximation based on the knowledge of rockfish life history from other areas. The majority of the other rockfish biomass (minus SST) is from Dusky rockfish. The M for Dusky rockfish in the GOA is 0.09, and thus is currently the best estimate of M (Clausen and Heifetz 2002). For the 2007 assessment the authors recommend using M of 0.09 for the remaining group of Other rockfish biomass.

14.4 ABC and OFL recommendations

In the 2003 and 2004 assessment of Other rockfish, Reuter and Spencer (2003, 2004) recommended splitting SST from the other rockfish complex because this species biomass makes up over 90% of the Other rockfish biomass, it is also demographically different than the rest of the complex and the biomass estimates for this species has lower uncertainty (average CV of last 5 AI survey = 0.18) than those for the other rockfish species within the complex (average CV of last 5 AI survey = 0.42). Due to lack of information on stock structure, genetic and otherwise between the EBS and AI regions, it is recommended that there be a BSAI OFL for other rockfish complex and separate ABCs for each region. The authors recommend that the SST ABC and OFL use the $M = 0.03$ and the ABC and OFL of the remaining other rockfish biomass use an $M = 0.09$.

Assessment of Other rockfish

The other rockfish complex is assessed at the tier 5 level, because it has a reasonable estimate of biomass and natural mortality. Calculation of the BSAI OFL is (BSAI SST OFL + BSAI Other rockfish OFL) and the ABC (SST ABC + Other rockfish ABC) for the EBS and AI. The respective BSAI biomass estimates are calculated by adding the average biomass (1997-2006 surveys) of the AI (SST = 14,905 mt; Other rockfish = 3,698 mt) with the average EBS slope survey (2002-2004) (SST = 17,906 mt, Other rockfish 19 mt) estimate and the EBS shelf survey (Other rockfish 142 mt). BSAI OFL equals ((SST BSAI biomass (32,811) \times 0.03 = 984) + (Other rockfish BSAI biomass (3,859 mt) \times 0.09 = 347)) = 1,331. For calculation of the respective ABCs each of the biomass estimates were multiplied by 0.75 of M (SST 0.03 \times 0.75 = 0.0225 and Orock 0.75 \times 0.09 = 0.0675), results for 2007 and 2008 are below:

Other rockfish complex Tier 5 for 2007:

Region	M	Exploitable biomass (mt)	F _{ABC}	ABC (mt)	F _{OFL}	OFL (mt)
BSAI_{SST}	0.03	32,811			0.03	984
BSAI_{Orock}	0.09	3,859			0.09	347
BSAI_{Total}						1,331
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14.5 Ecosystem Considerations

14.5.1 Ecosystem Effects on Stock

Little to no information is available that would help us understand the effects the ecosystem has on the other rockfish complex. The table below goes over the most probable affects of the ecosystem on the other rockfish complex.

14.5.2 Fishery Effects on the Ecosystem

Analysis of ecosystem considerations for those fisheries that effect the stocks within this complex (see Table 14.4) is given in the respective fisheries SAFE chapter. The other rockfish complex is not a targeted fishery, therefore reference on the effects of the fishery on the ecosystem will be described in those chapters of the fisheries that catch other rockfish incidentally.

Ecosystem effects on <i>Other Rockfish</i>			
Indicator	Observation	Interpretation	Evaluation
<i>Prey availability or abundance trends</i>			
Zooplankton	Stomach contents, ichthyoplankton surveys, changes mean wt-at-age	Data non-existent	Unknown
<i>a. Predator population trends</i>			
Marine mammals	Fur seals declining, Steller sea lions increasing slightly	No affect	Probably no concern
Birds	Stable, some increasing some decreasing	No affect	Probably no concern
Fish (Pollock, Pacific cod, halibut)	Stable to increasing	Affects not known	Probably no concern
<i>b. Changes in habitat quality</i>			
Temperature regime	None	Affects not known	Unknown
Winter-spring environmental conditions	None	Probably a number of factors	Unknown
Production	Fairly stable nutrient flow from upwelled BS Basin	Inter-annual variability low	No concern
<i>Targeted fisheries effects on ecosystem (see relative chapters)</i>			

14.5.3 Data gaps and research priorities

Data needed to better understand the life history characteristics, spatial distribution and abundance are those most important in deciding alternative management strategies for non-target species. These are the types of data missing for all the species within the other rockfish complex and for SST. These data types include but are not limited to: age data from the fishery for dusky rockfish; spatial and temporal length data from AI fishery for dusky rockfish; improved spatial distribution and abundance data of other rockfish; ageing techniques for SST.

Research priorities for the other rockfish complex and SST are analyses that utilize the above data to suggest stock health, potential fishery impacts and provide suggestions to mitigate concerns on conservation of the stock and localized depletion. Because the current AFSC surveys do not adequately assess most of the species within this complex, the author suggests that a rockfish-centric survey be developed to obtain specimens to calculate the various life history parameters. Ageing techniques for SST have been requested for the last 4 years by the authors. Due to other priorities the AFSC age and growth program has had little time to allocate towards determining an adequate ageing technique for SST.

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Table 14.1. The common and scientific names of rockfish in the “other rockfish” reporting category identified, 1990 - 2001, by AFSC research surveys (at least one observation) and U.S. fishery observers (greater than 1% of hauls) in the eastern Bering Sea and Aleutian Islands regions. (~ = none observed, percent of hauls where other rockfish occurred)

Common name	Scientific name	EBS		AI	
		Survey	Fishery	Survey	Fishery
Red banded rockfish	<i>Sebastes babcocki</i>	~	~	1%	<1%
Dark rockfish	<i>Sebastes ciliatus</i>	~	1%	4%	3%
Dusky rockfish	<i>Sebastes variabilis</i>	18%	39%	22%	45%
Redstripe rockfish	<i>Sebastes proriger</i>	~	1%	~	1%
Yelloweye rockfish	<i>Sebastes ruberrimus</i>	~	1%	<1%	1%
Harlequin rockfish	<i>Sebastes variegatus</i>	~	1%	9%	5%
Sharpchin rockfish	<i>Sebastes zacentrus</i>	~	<1%	<1%	<1%
Shortspine thornyhead	<i>Sebastolobus alascanus</i>	62%	43%	61%	34%

Table 14.2.--Summary of catches (mt) of other rockfish in the eastern Bering Sea and Aleutian Islands regions. Source: NMFS/AK regional website.

<u>Year</u>	<u>Eastern Bering Sea</u>						<u>Aleutian Islands</u>					
	<u>For.</u>	<u>JV</u>	<u>DAP</u>	<u>Total</u>	<u>ABC</u>	<u>OFL</u>	<u>For.</u>	<u>JV</u>	<u>DAP</u>	<u>Total</u>	<u>ABC</u>	<u>OFL</u>
1977*	112	--	--	112			700	--	--	700		
1978*	941	--	--	941			212	--	--	212		
1979*	759	--	--	759			1,039	--	--	1,039		
1980	456	3	--	459			420	--	--	420		
1981	331	--	25	356			328	--	--	328		
1982	262	11	3	276			2,114	--	--	2,114		
1983	212	8	--	220			1,041	4	--	1,045		
1984	121	8	47	176			42	14	--	56		
1985	33	3	56	92			2	14	83	99		
1986	4	12	86	102			Tr	15	154	169		
1987	3	4	467	474			0	6	141	147		
1988	0	8	333	341			0	68	210	278		
1989	0	4	188	192			0	0	481	481		
1990	0	0	418	418			0	0	858	858		
1991	0	0	422	422			0	0	343	343		
1992	0	0	600	600			0	0	664	664		
1993	0	0	192	192			0	0	496	496		
1994	0	0	133	133			0	0	292	292		
1995	0	0	288	288			0	0	219	219		
1996	0	0	170	170			0	0	282	282		
1997	0	0	163	163			0	0	305	305		
1998	0	0	188	188			0	0	364	364		
1999	0	0	135	135			0	0	631	631		
2000	0	0	232	232	369	492	0	0	563	563	685	913
2001	0	0	295	295	361	482	0	0	592	592	676	901
2002	0	0	398	398	361	482	0	0	518	518	676	901
2003†	0	0	293	293	960	1,280	0	0	366	366	634	846
2004†	0	0	289	289	960	1,280	0	0	314	314	634	846
2005†	0	0	157	157	809	1,865	0	0	275	275	590	1,865
2006§	0	0	139	139	809	1,865			389	389	590	1,865

These biomass estimates were revised (2001) to show the catch of those species currently in the other rockfish category.

† Catch estimates updated 2006

§ Estimated removals through October 16th, 2006.

Table 14.3. Total fishery catch (mt) of top species in other rockfish group in the Aleutian Islands and eastern Bering Sea from 2003-2006. *Source: Catch Accounting System, NMFS AK Regional Office.*

Aleutian Islands

2006*	541	542	543	Total
Dusky	101	48	9	158
Shortspine	35	96	15	146
Rockfish unid.	7	54	>1	61
Harlequin	4	9	10	23
Total	147	207	34	388
2005	541	542	543	Total
Dusky	66	53	14	133
Shortspine	40	46	27	113
Rockfish unid.	1	4	9	14
Harlequin	1	8	5	14
Total	108	111	55	274
2004	541	542	543	Total
Dusky	33	81	18	132
Shortspine	42	36	18	96
Harlequin	1	17	18	36
Rockfish unid.	>1	26	21	47
Total	76	160	75	311
2003	541	542	543	Total
Dusky	62	73	17	152
Shortspine	67	69	41	177
Harlequin	1	22	11	34
Rockfish unid.	1	1	1	3
Total	130	165	70	366

*Total catch as of October 16, 2006

Eastern Bering Sea

2006*	EBS
Shortspine thornyhead	92
Dusky	40
Rockfish unid.	6
Total	139

2005	EBS
Shortspine thornyhead	119
Dusky	36
Rockfish unid.	1.5
Total	157

2004	EBS
Shortspine thornyhead	242
Dusky	32
Rockfish unid.	15
Total	289

2003	EBS
Shortspine thornyhead	256
Dusky	23
Rockfish unid.	13
Total	293

*Total catch as of October 16, 2006

Table 14.4. Catch (mt) of dusky rockfish and Shortspine thornyhead by target fishery and gear type for 2004 and 2005. *Source: Catch Accounting System NMFS AK Regional Office.*

2005 Aleutian Islands

Dusky rockfish

Target fishery	Geartype			Total
	Trawl	Pot	Longline	
Atka Mackerel	117	-	-	110
Rockfish	3	-	-	14
Pacific Cod	4	-	10	9
Total	135		3	138

Shortspine thornyhead

Target fishery	Geartype			Total
	Trawl	Pot	Longline	
Other Fish	-	-	<1	<1
Rockfish	16	-	<1	16
Greenland Turbot	-	-	10	10
Atka mackerel	6	-	-	6
Halibut			19	19
Pacific cod	<1	-	<1	<1
Sablefish	-	<1	60	60
Total	22	<1	89	111

*Other fish target made up mainly of grenadiers and/or skates

2004 Aleutian Islands

Dusky rockfish

Target fishery	Geartype			Total
	Trawl	Pot	Longline	
Atka Mackerel	97	-	-	97
Halibut	-	-	<1	<1
Pacific Cod	6	-	10	16
Rockfish	19	-	-	19
Sablefish	-	-	<1	<1
Total	122	-	10	132

Shortspine thornyhead

Target fishery	Geartype			Total
	Trawl	Pot	Longline	
Other Fish	-	-	<1	<1
Rockfish	14	-	-	14
Greenland Turbot	-	-	4	4
Atka mackerel	3	-	-	3
Halibut			14	14
Pacific cod	<1	-	1	1
Sablefish	-	<1	59	59
Total	17	<1	78	95

2005 Eastern Bering Sea

Target fishery	Gear type				Total
	Bottom trawl	Pelagic trawl	Pot	Longline	
Pollock	-	8	-	-	8
Arrowtooth	2				2
Atka mackerel	3				<1
Flathead sole	<1				<1
Halibut				<1	<1
Other flatfish	<1				<1
Pacific Cod	8	-	-	14	22
Rockfish				<1	<1
Yellowfin sole	<1				<1
Total	13	8		14	35

Shortspine thornyhead

Target fishery	Gear type				Total
	Bottom Trawl	Pelagic trawl	Pot	Longline	
Arrowtooth	19	-	-	<1	19
Atka mackerel	1				1
Flathead sole	19				19
Greenland Turbot	2			34	36
Halibut	-	-	-	2	2
Other flatfish	24	-	<1	-	24
Pacific cod	3			2	5
Pollock		5			5
Rockfish				<1	<1
Sablefish	-	-	<1	5	5
Total	68	5	<1	43	116

2004 Eastern Bering Sea

Target fishery	Gear type				Total
	Bottom trawl	Pelagic trawl	Pot	Longline	
Pollock	-	9	-	-	9
Arrowtooth	<1				<1
Atka mackerel	<1				<1
Flathead sole	1				1
Greenland Turbot				<1	<1
Halibut				<1	<1
Other flatfish	<1				<1
Pacific Cod	8	-	<1	12	20
Rock sole	<1				<1
Rockfish	<1			<1	<1
Sablefish	<1				<1
Yellowfin sole	<1				<1

Total	9	9	<1	12	31
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Shortspine thornyhead

Target fishery	Gear type				Total
	Bottom Trawl	Pelagic trawl	Pot	Longline	
Pollock	-	4	-	-	4
Arrowtooth	46				46
Atka mackerel	3				3
Flathead sole	47				47
Greenland Turbot	21		<1	35	56
Halibut				6	6
Other flatfish	17				17
Other species	<1			<1	<1
Pacific Cod	35	-	-	2	37
Rock sole	<1				<1
Rockfish	9			1	10
Sablefish	2		1	12	15
Yellowfin sole	<1				<1
Total	181	4	<1	56	241

*Other fish target made up mainly of grenadiers and/or skates

Table 14.5. Other rockfish retained and discarded catch (mt) for the Aleutian Islands and the Eastern Bering Sea 1995-2002 and the BSAI for 2003-2005. *Source: NMFS AK Region website.*

Other Rockfish				
AI	Retained	Discarded	Total	Percent Discarded
1995	144	75	219	34
1996	155	127	282	45
1997	153	152	305	50
1998	127	237	364	65
1999	250	381	631	60
2000	340	223	563	40
2001	319	272	591	46
2002	267	250	517	48
EBS				
1995	126	162	288	56
1996	97	73	170	43
1997	107	56	163	34
1998	120	67	187	36
1999	78	57	135	42
2000	167	65	232	28
2001	237	57	294	19
2002	286	113	399	28
BSAI				
2003	451	275	726	38
2004	374	255	629	40
2005	330	133	463	29

Table 14.7. Estimated biomass (mt) of “other rockfish” from the NMFS bottom trawl surveys. Coefficient of variation in parenthesis.

	EBS Slope biomass	Aleutian Islands biomass
1979	3,251	
1980		966 (0.18)
1981	4,975	
1982	4,381	
1983		4,774 (0.15)
1985	5,127	
1986		9,803 (0.31)
1988	8,759	
1991	4,529	6,891 (0.22)
1994		7,311 (0.15)
1997		11,747 (0.17)
2000	--*	13,130 (0.16)
2002	16,932 (0.11)	16,208 (0.18)
2004	18,908 (0.09)	25,359 (0.22)
2006		26,567 (0.22)

*Biomass estimates from the 2000 EBS slope survey were not used in stock assessment.

Table 14.8. Biomass estimates (mt) of the main species from the other rockfish group caught during the most recent Aleutian Islands surveys; by species, year and management area. CVs noted in parentheses. *Note: Biomass totals are slightly different than for Other rockfish category.*

Aleutian Islands		Biomass					CV
Rockfish species	common	1997	2000	2002	2004	2006	2006
<i>Sebastolobus alascanus</i>	Shortspine Thornyhead	10,447	11,700	15,255	18,280	18,844	0.12
<i>Sebastes variabilis</i>	Dusky	712	1,306	612	2,089	6,687	0.80
<i>S. variegatus</i>	Harlequin	68	25	24	4,663	48	0.54
<i>S. ciliatus</i>	Dark	524	99	315	320	982	0.47
<i>S. babcocki</i>	Redbanded	2	0	1	5	5	0.87
<i>S. proriger</i>	Redstripe	0	0	0	0	0	
<i>S. zacentrus</i>	Sharpchin	0	0	0	3	0	
<i>S. ruberrimus</i>	Yelloweye	0	0	0	0	0	
Total		11,753	13,130	16,207	25,360	26,566	0.22

Table 14.9. Biomass estimates from Eastern Bering Sea for the two species within the Other rockfish complex found in either the EBS shelf survey and/or slope survey.

Eastern Bering Sea		Biomass										CV
Rockfish species	common	1997	1998	1999	2000	2001	2002*	2003	2004*	2005	2006	
<i>Sebastolobus alascanus</i>	Shortspine Thorny.						16,932		18,881			0.09
<i>Sebastes variabilis</i>	Dusky	126	538	306	0	0	25	55	13	36	357	0.85
Total		126	538	306	0	0	16,957	55	18,894	36	357	0.85

* EBS slope survey conducted

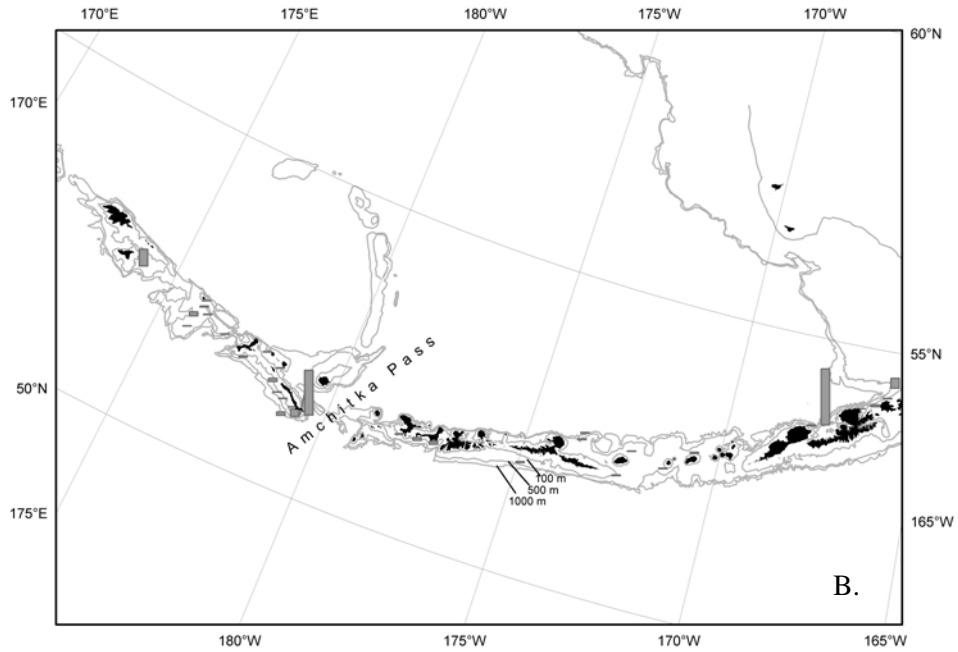
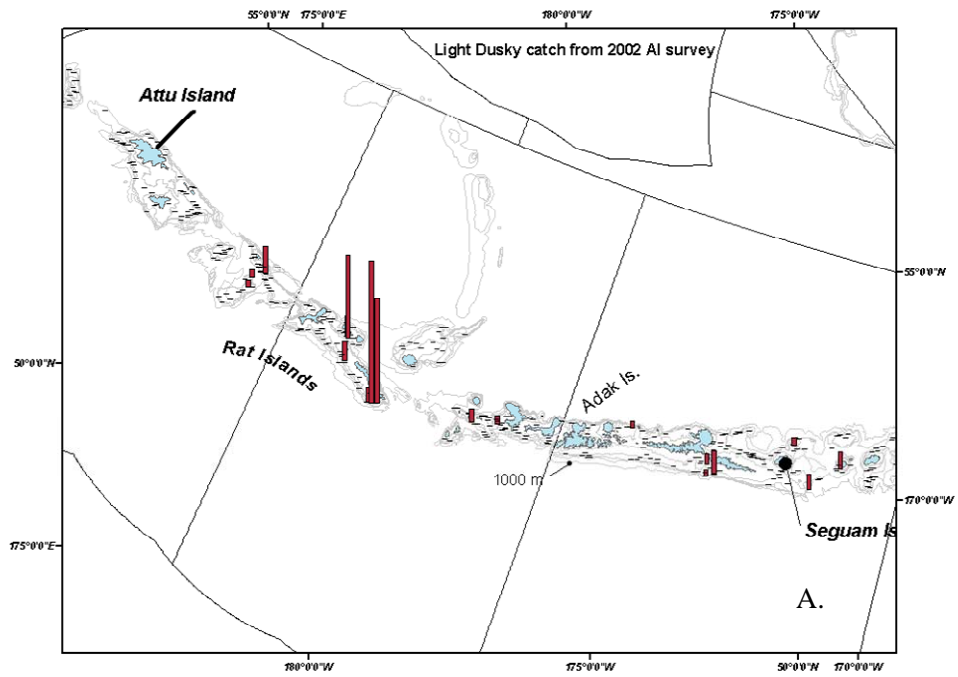


Figure 14.1. Dusky catch locations in the Aleutian Islands from survey data A. 2002 and B. 2004, (data source: AFSC RACE database). *Note: Bars from different years are proportional.*

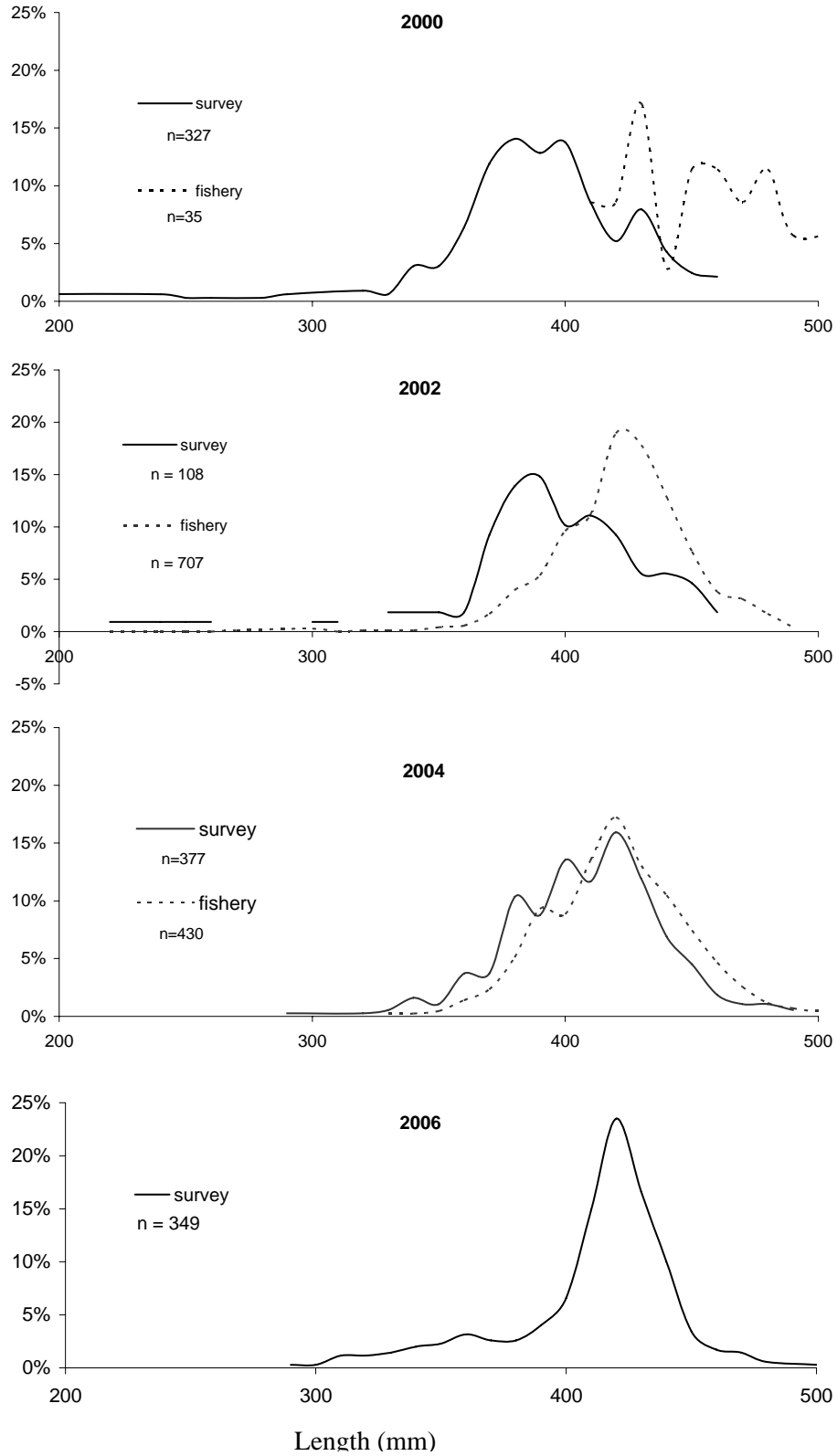


Figure 14.2. Length frequency (mm) for dusky rockfish from the Aleutian Islands research surveys. Fishery data included when available. *Source: AFSC RACE survey data.*

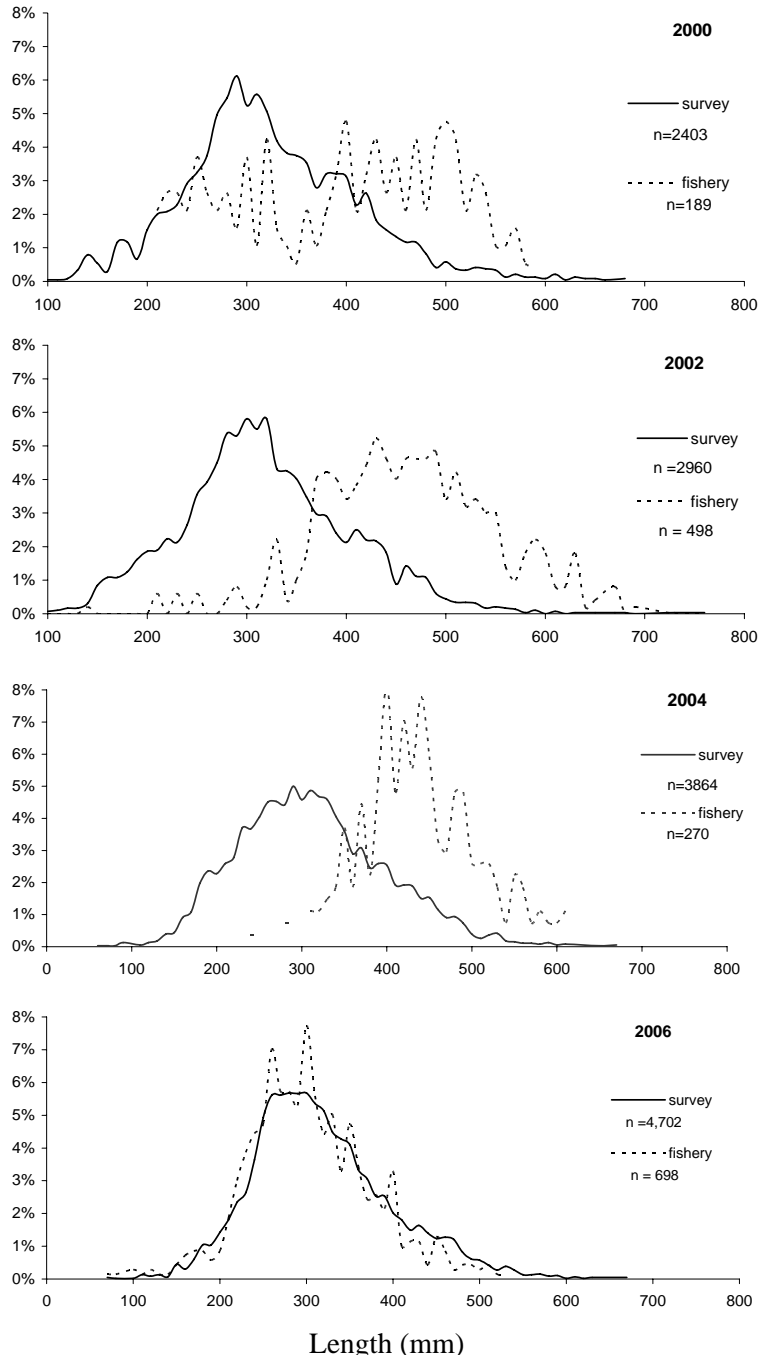


Figure 14.3. Length frequency (mm) for shortspine thornyhead from the Aleutian Islands research surveys. Fishery data included when available. *Source: AFSC RACE survey data.*

