Chapter 14

Assessment of Other rockfish stocks in the Bering Sea/Aleutian Islands

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14.0 Executive Summary

(a) 14.0.1 Summary of Major Changes

Changes in the input data

1. The 2007 landings have been revised and the 2008 landings through October 17, 2008 have been included in the assessment.
2. 2008 Eastern Bering Sea Slope survey data are included in this assessment.
3. Size composition data for Shortspine Thornyheads from the 2005-2007 EBS fishery and 2008 EBS slope survey are included in this assessment.
4. ABC/OFL recommendations with and without Dark rockfish biomass are presented.
5. Responses to SSC comments and Plan Team recommendations are included.

Changes in assessment results

6. Same as prior assessment

Other rockfish complex minus dark rockfish Tier 5 for 2009-2010:

Region	M	Exploitable biomass (mt)	F_{ABC}	ABC (mt)	F_{OFL}	OFL (mt)
BSAI $_{SST}$	**0.03**	**35,803**			**0.03**	1,074
BSAI $_{Orock}$	**0.09**	**3,412**			**0.09**	307
BSAI $_{Total}$						**1,381**
EBS $_{SST}$	0.03	20,898	0.0225	470		
EBS $_{Orock}$	0.09	162	0.0675	11		
EBS $_{Total}$				**481**		
AI $_{SST}$	0.03	14,905	0.0225	335		
AI $_{Orock}$	0.09	3,250	0.0675	219		
AI $_{Total}$				**554**		

Other rockfish complex Tier 5 (with dark rockfish) for 2009-2010:

Region	M	Exploitable biomass (mt)	F_{ABC}	ABC (mt)	F_{OFL}	OFL (mt)
BSAI $_{SST}$	**0.03**	**35,803**			**0.03**	1,074
BSAI $_{Orock}$	**0.09**	**3,860**			**0.09**	347
BSAI $_{Total}$						**1,421**
EBS $_{SST}$	0.03	20,898	0.0225	470		
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AI $_{SST}$	0.03	14,905	0.0225	335		
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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*), including those species in the other red rockfish complex (northern rockfish, *S. polyspinis*; rougheye rockfish, *S. aleutianus*; and shortraker rockfish, *S. borealis*), which 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 managed in this complex (Reuter and Spencer 2001, NOAA Fisheries 2002 Report to Congress April 2003). An identification of one of these species means it was observed at least once in the hauls of the BSAI surveys and/or has occurred in at least 1% of observed fishery hauls (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 biomass estimate of harlequin rockfish (*S. variegatus*) from the Aleutian Island (AI) survey was 4,000 mt, however this was based mainly on two large hauls thus yielding a very high CV of 0.99.

The distributions of other rockfish species, besides shortspine thornyheads, 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 -200 m (Reuter and Spencer 2001). Catches of shortspine thornyheads in the 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 was 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 in the region just north of Unalaska Island and Akutan Islan 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

Directed Fishery

There is no directed fishery for Other Rockfish in the BSAI at this time.

Summary of Historical Catch Distributions

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 1990-2008 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: In 2001 removals from the foreign fishery of other rockfish were revised using the current species complex definition (Reuter and Spencer 2001).

In recent years in both the AI and EBS, the other rockfish catch 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 catch of dusky rockfish and shortspine thornyhead in other target fisheries are described in Table 14.4. The target is defined by which species or species group had the greatest biomass in the haul. During 2006 and 2007 in the AI, 90% of the total dusky rockfish catch was caught during the Atka mackerel (*Pleurogrammus monopterygius*) trawl fishery and 31-36% of the total SST catch was caught using "other" gear in the sablefish (*Anoplopoma fimbria*). During the same years in the EBS, 35-49% of the dusky rockfish bycatch occurred in both trawl and other gear in the Pacific cod fishery (*Gadus macrocephalus*). In 2006 and 2007 in the EBS, 19-28% of the SST catches occurred in the Greenland turbot trawl fishery. In 2007, 51% of the SST catches in the EBS were from the pollock fishery.

A summary of the Other rockfish catch retained and discarded are shown in Table 14.5. Since 2003, discards and retention are reported for the entire BSAI region. From 2003-2007 the percent of Other Rockfish that were discarded has ranged from 29% (2005) to 46% (2007). Conversely, in both the Eastern Bering Sea and the Aleutian Islands, nearly 100% of shortspine thornyheads have been retained over 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).

Data

Fishery Length frequency

Dusky rockfish:

Lengths were collected by fishery observers since 2002. Prior to 2002 few lengths of dusky rockfish were collected. Therefore, the length frequency graph from 2000 in Figure 14.2 may not represent the exploited population. The mean length of dusky caught in the fishery has changed very little since 2002 (42 cm).

Shortspine thornyheads:

Lengths of the exploited portion of the population of shortspine thornyhead in the AI portion of the BSAI region are adequately represented and Figure 14.3, which 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 2005-2007 from the EBS fisheries show that the SST have a similar range to the AI from 33cm to 57 cm (Figure 14.4).

Survey 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, cooperative surveys were also conducted in the AI from, 1980-1986. In these surveys, the majority of catches of other rockfish were taken by Japanese research trawlers working the slope regions at depths exceeding 200 m. The domestic surveys through 1986, however, were conducted entirely by trawlers that were not able to fish deeper than 500 m; consequently, species such as SST, that inhabit deep water, may not be adequately assessed in these years. U.S domestic trawl surveys were conducted in 1988, 1991, 2002, 2004 and 2008 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 14.6). The first official EBS slope survey was conducted in 2002 to depths of ~1200 m, subsequent surveys occurred in 2004 and 2008. Although these surveys were to be biennial, due to budget cuts it was not conducted in 2006. Biomass estimates from these surveys will be used for SST 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 14.6). The spatial coverage and survey methods used during 1980 -1986 and 1991 - 2006 were consistent within each time period. Since 1994, the AI groundfish trawl biomass estimates for other rockfish have been 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. The dusky rockfish 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). Over 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 14.7).

The only two species within the Other rockfish complex found in the EBS during 1997-2008 were SST and dusky rockfish (Table 14.8). SST were only caught during the 2002, 2004 and 2008 Bering Sea slope surveys, due to the deeper water that these surveys cover. This increased 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 because the EBS is on the fringe of the range for this species, and also because dusky are non-uniformly distributed throughout the EBS.

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 in bottom trawl gear (mean = 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). In 2004 the size range of survey caught fish was is smaller than those caught in the fishery, but in 2006 the size ranges very similar between the fishery and survey. Previous assessments show that SST as small as 6 cm have been measured in the EBS slope survey, with the majority of the samples ranging from 16 – 57 cm (Figure 14.5).

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.

Survey 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 Program at the AFSC will provide valuable information in the near future.

Survey Weight at Length

Weight (W) at length (L) was calculated for dusky rockfish and shortspine thornyhead rockfish using the formula $W=aL^b$, where W is 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

Estimates of natural mortality of SST have been variable due to the difficulty of ageing this species. In the GOA shortspine thornyhead assessment, Gaichas and Ianelli (2003), presented discussion of the natural mortality estimates from several studies. 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 maximum ages from 250-350 years. One reason for the different rates of natural mortality are based on the different techniques used. Miller (1985) used surface ageing and otolith 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 radiometric verification strongly supported the otolith ageing technique. Subsequent radiometric work by Kastelle 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 comprises well over 90% of the other rockfish biomass (as calculated by survey data).
A natural mortality value of 0.03 is used based on results from model runs, plan team and SSC reviews of the GOA Thornyhead Assessment (2003) using the value M=0.038 that was an alternative value given in Pearson and Gunderson 2003. Since this estimate of M has been rigorously discussed and to maintain consistency with the GOA Thornyhead assessment, the authors recommend that 0.03 M be used for only the portion of the Other rockfish biomass that is SST.

Other rockfish
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 have 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 a 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 the 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. Attempts have been made in the past to separate SST from the other rockfish category (Reuter and Spencer 2003, 2004), but were declined due to unreliable biomass estimates for the remaining rockfish species (SSC minutes http://www.fakr.noaa.gov/npfmc/minutes/SSC1204.pdf). 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 (1997-2008 surveys) of the AI (SST = 14,905 mt; Other rockfish = 3,250 mt)

with the average EBS slope survey (2002-2008) (SST = 20,898 mt, Other rockfish 16 mt) estimate and the EBS shelf survey (Other rockfish 146 mt).

BSAI OFL equals ((SST BSAI biomass (35,803) x 0.03 = 1,074)+ (Other rockfish BSAI biomass (3,412 mt) x 0.09 = 307)) = 1,381. For calculation of the respective ABCs each of the biomass estimates were multiplied by 0.75of M (SST 0.03 x 0.75 = 0.0225 and Orock 0.75 x 0.09 = 0.0675), results for 2007 and 2008 are below:

Other rockfish complex minus dark rockfish Tier 5 for 2009-2010:

Region	M	Exploitable biomass (mt)	F_{ABC}	ABC (mt)	F_{OFL}	OFL (mt)
BSAI $_{SST}$	**0.03**	**35,803**			**0.03**	1,074
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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 effects of the ecosystem on the other rockfish complex.

14.5.2 Fishery Effects on the Ecosystem

Analysis of ecosystem considerations for those fisheries that affect 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 *Other Rockfish*			
Indicator	Observation	Interpretation	Evaluation
Prey availability or abundance trends			
Zooplankton	Stomach contents, ichthyoplankton surveys, changes mean wt-at-age	Data non-existent	Unknown
a. Predator population trends			
Marine mammals	Fur seals declining, Steller sea lions increasing slightly	No effect	Probably no concern
Birds	Stable, some increasing some decreasing	No effect	Probably no concern
Fish (Pollock, Pacific cod, halibut)	Stable to increasing	Effects not known	Probably no concern
b. Changes in habitat quality			
Temperature regime	None	Effects 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
***Targeted fisheries* effects on ecosystem (see relative chapters)**			

14.5.3 Data gaps and research priorities

Data on the life history, spatial distribution, and abundance would aid in development of alternative management strategies for non-target species, such as SST and Other rockfish. Specifically, 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; aging techniques for SST and biomass data for dusky rockfish in the AI.

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.

14.6 Summary

The other rockfish complex is assessed at the tier 5 level, because the combined biomass for this group is reasonable and there are reasonable estimates of 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 (1997-2008 surveys) of the AI (SST = 14,905 mt; Other rockfish = 3,250 mt) with the average EBS slope survey (2002-2008) (SST = 20,898 mt, Other rockfish 16 mt) estimate and the EBS shelf survey (Other rockfish 146 mt). BSAI OFL equals ((SST BSAI biomass (35,803) x 0.03 = 1,074) + (Other rockfish BSAI biomass (3,412 mt) x 0.09 = 307)) = 1,381. For calculation of the respective ABCs each of the biomass estimates were multiplied by 0.75of M (SST 0.03 x 0.75 = 0.0225 and Orock 0.75 x 0.09 = 0.0675), results for 2009 and 2010 are below:

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Table 14.1. The % catch of "other rockfish" in AFSC research surveys (where at least one fish was observed) and in observed fisheries hauls (where fish were observed in >1% of hauls) from 1991-2001. ~ denotes that no fish were observed.

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

	Eastern Bering Sea						Aleutian Islands					
	Domestic						Domestic					
Year	For.	JV	DAP	Total	ABC	OFL	For.	JV	DAP	Total	ABC	OFL
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					481	481		
1990			418	418					858	858		
1991			422	422					343	343		
1992			600	600					664	664		
1993			192	192					496	496		
1994			133	133					292	292		
1995			288	288					219	219		
1996			170	170					282	282		
1997			163	163					305	305		
1998			188	188					364	364		
1999			135	135					631	631		
2000			232	232	369	492			563	563	685	913
2001			295	295	361	482			592	592	676	901
2002			398	398	361	482			518	518	676	901
2003†			293	293	960	1,280			366	366	634	846
2004†			289	289	960	1,280			314	314	634	846
2005†			157	157	809	1,865			275	275	590	1,865
2006			156	156	809	1,865			433	433	590	1,865
2007			217	217	414	1,330			431	431	585	1,330
2008§			184	184	414	1,330			354	354	585	1,330

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 17^{h}, 2008.

Table 14.3. Total fishery catch (mt) of top species in other rockfish group in the Aleutian Islands and eastern Bering Sea from 2006-2008. *Source: Catch Accounting System, NMFS AK Regional Office.*

Aleutian Islands

2008*	Total
Dusky	**0**
Shortspine	**110**
Rockfish unid.	**37**
Harlequin	**32**
Total	**179**

2007	Total
Dusky	**231**
Shortspine	**129**
Rockfish unid.	**21**
Harlequin	**40**
Total	**421**

2006	Total
Dusky	**161**
Shortspine	**157**
Rockfish unid.	**71**
Harlequin	**25**
Total	**414**

Eastern Bering Sea

2008*	EBS
Shortspine thornyhead	158
Dusky	0
Rockfish unid.	3
Total	**161**

2007	EBS
Shortspine thornyhead	118
Dusky	28
Total	**146**

2006	EBS
Shortspine thornyhead	93
Dusky	47
Rockfish unid.	7
Total	**147**

*Total catch as of October 17, 2008

Table 14.4. Catch (mt) of dusky rockfish and Shortspine thornyhead by target fishery and gear type for 2006 and 2007. *Source: Catch Accounting System NMFS AK Regional Office. Note: Due to confidentiality rules, geartypes have been lumped into two categories Trawl (non-pelagic and pelagic trawl) and Other (jig, longline and pot).*

2007 Aleutian Islands

Dusky rockfish

	Geartype		
Target fishery	**Trawl**	**Other**	**Total**
Atka Mackerel	209	-	**209**
Pacific Cod	6	15	**21**
Rockfish	2	-	**2**
Total	**217**	**15**	**232**

Shortspine thornyhead

	Geartype		
Target fishery	**Trawl**	**Other**	**Total**
Sablefish	-	45	**45**
Rockfish	31	-	**31**
Greenland Turbot	-	23	**23**
Atka mackerel	1	-	**1**
Pacific cod	-	15	**15**
Arrowtooth flounder	-	7	**7**
Halibut	-	3	**3**
Total	**32**	**93**	**125**

2006 Aleutian Islands

Dusky rockfish

	Geartype		
Target fishery	**Trawl**	**Other**	**Total**
Atka Mackerel	144	-	**144**
Rockfish	2	-	**2**
Pacific Cod	5	9	**14**
Total	**151**	**9**	**160**

Shortspine thornyhead

	Geartype		
Target fishery	**Trawl**	**Other**	**Total**
Arrowtooth Flounder	-	49	**49**
Sablefish	-	38	**38**
Greenland Turbot	-	25	**25**
Rockfish	22	3	**25**
Halibut	-	14	**14**
Pacific cod	-	5	**5**
Atka mackerel	1	-	**1**

Total	**23**	**134**	**157**

2007 Eastern Bering Sea

Dusky rockfish

	Gear type		
Target fishery	**Trawl**	**Other**	**Total**
Pacific Cod	4	17	**21**
Atka mackerel	8	-	**8**
Flathead sole	7	-	**7**
Pollock	7	-	**7**
Total	**26**	**17**	**43**

Shortspine thornyhead

	Gear type		
Target fishery	**Trawl**	**Other**	**Total**
Pollock	82	-	**82**
Greenland Turbot	30	<1	**30**
Rockfish	12	1	**13**
Sablefish	1	12	**13**
Atka mackerel	-	10	**10**
Rock sole	6	-	**6**
Arrowtooth flounder	4	<1	**4**
Pacific Cod	<1	3	**3**
Total	**145**	**26**	**161**

2006 Eastern Bering Sea

Dusky rockfish

	Gear type		
Target fishery	**Trawl**	**Other**	**Total**
Rockfish	16	-	**16**
Pacific Cod	9	7	**16**
Pollock	11	-	**11**
Atka mackerel	2	-	**2**
Total	**38**	**7**	**45**

Shortspine thornyhead

	Gear type		
Target fishery	**Trawl**	**Other**	**Total**
Greenland Turbot	26	-	**26**
Pollock	22	-	**22**
Sablefish	-	14	**14**
Arrowtooth flounder	13	<1	**13**
Rockfish	10	<1	**10**
Halibut	-	3	**3**
Pacific Cod	1	1	**2**
Atka mackerel	1	-	**1**
Total	**73**	**18**	**91**

Table 14.5. Other rockfish retained and discarded (mt) in the BSAI for 2003-2007. *Source: NMFS AK Region website.*

Other Rockfish

AI	Retained	Discarded	Total	Percent Discarded
BSAI				
2003	451	275	726	38%
2004	374	255	629	40%
2005	330	133	463	29%
2006	366	213	579	37%
2007	351	295	646	46%

Table 14.6 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)
2008	26,908 (0.12)	

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

Table 14.7. 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 also noted. *Note: Biomass totals are slightly different than for Other rockfish category.*

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

Table 14.8. 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**	**1999**	**2000**	**2001**	**2002***	**2003**	**2004***	**2005**	**2006**	**2008***	
Sebastolobus alascanus	Shortspine Thornyhead				16,932		18,881			26,880	0.12
S. macrochir	Broadfin T.									11	0.51
Sebastes variabilis	Dusky	306	0	0	25	55	13	36	357	10	1.0
S. babcocki	Redbanded									7	0.70
Total		**306**	**0**	**0**	**16,957**	**55**	**18,894**	**36**	**357**	**26,908**	**0.12**

* EBS slope survey conducted

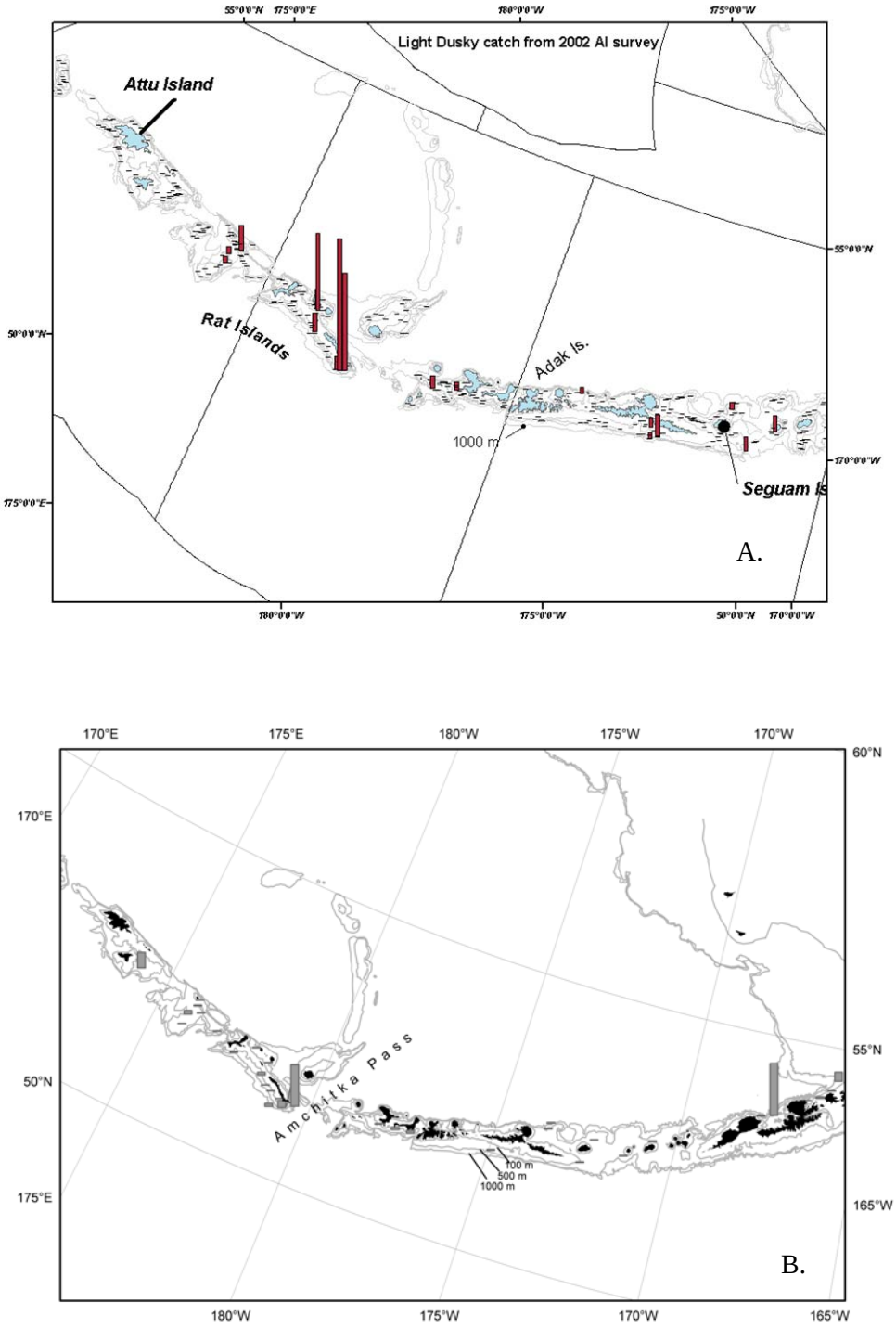

Figure 14.1. Dusky catch locations in the Aleutian Islands trawl survey. A. is datd from 2002 and B. is from 2004, (data source: AFSC RACE database). *Note: Bars from different years are proportional.*

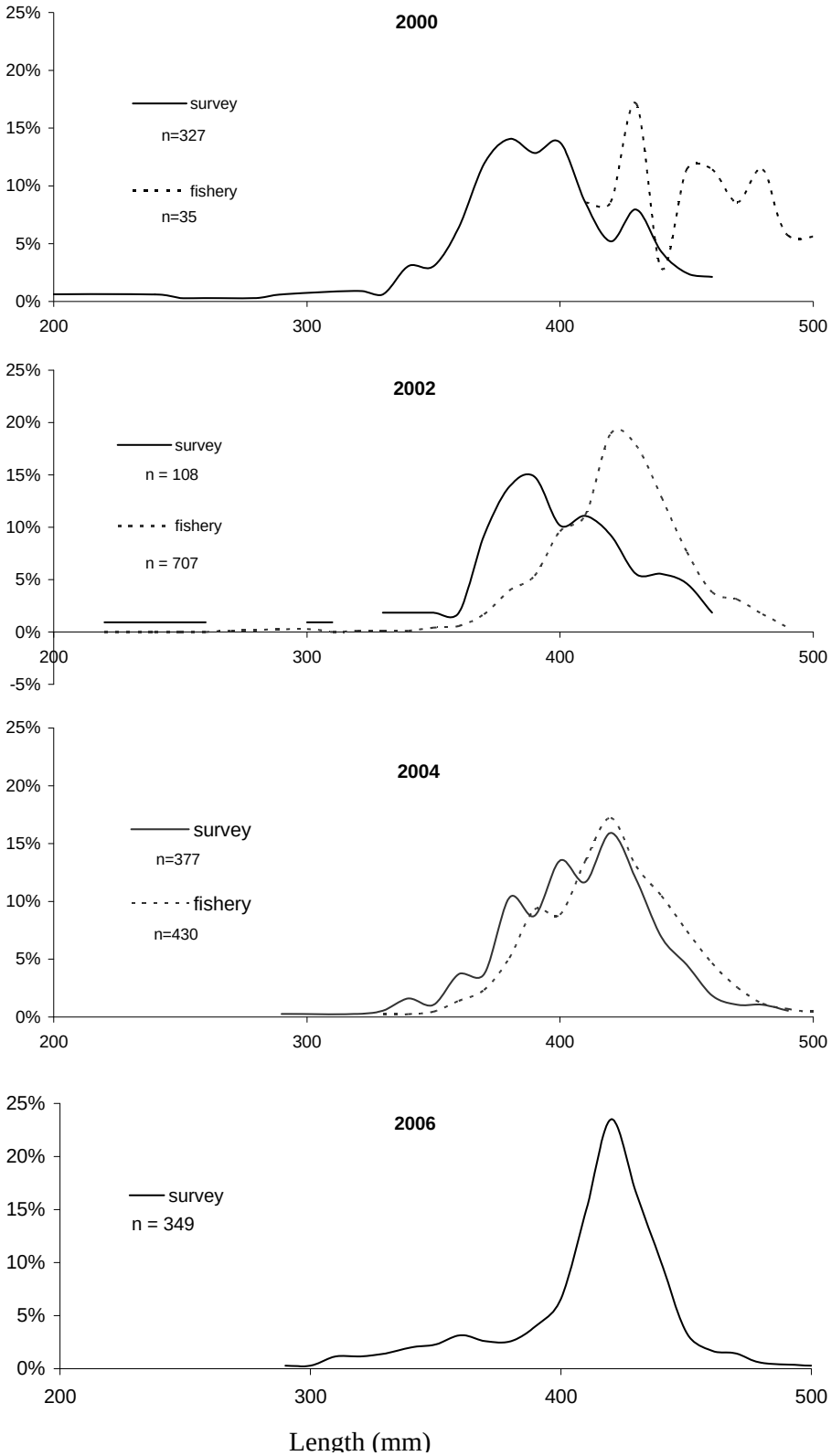

Figure 14.2. Length frequency (mm) for dusky rockfish from the Aleutian Islands research surveys and from fishery observers (except in 2006). *Source: Observer data and AFSC RACE survey data*.

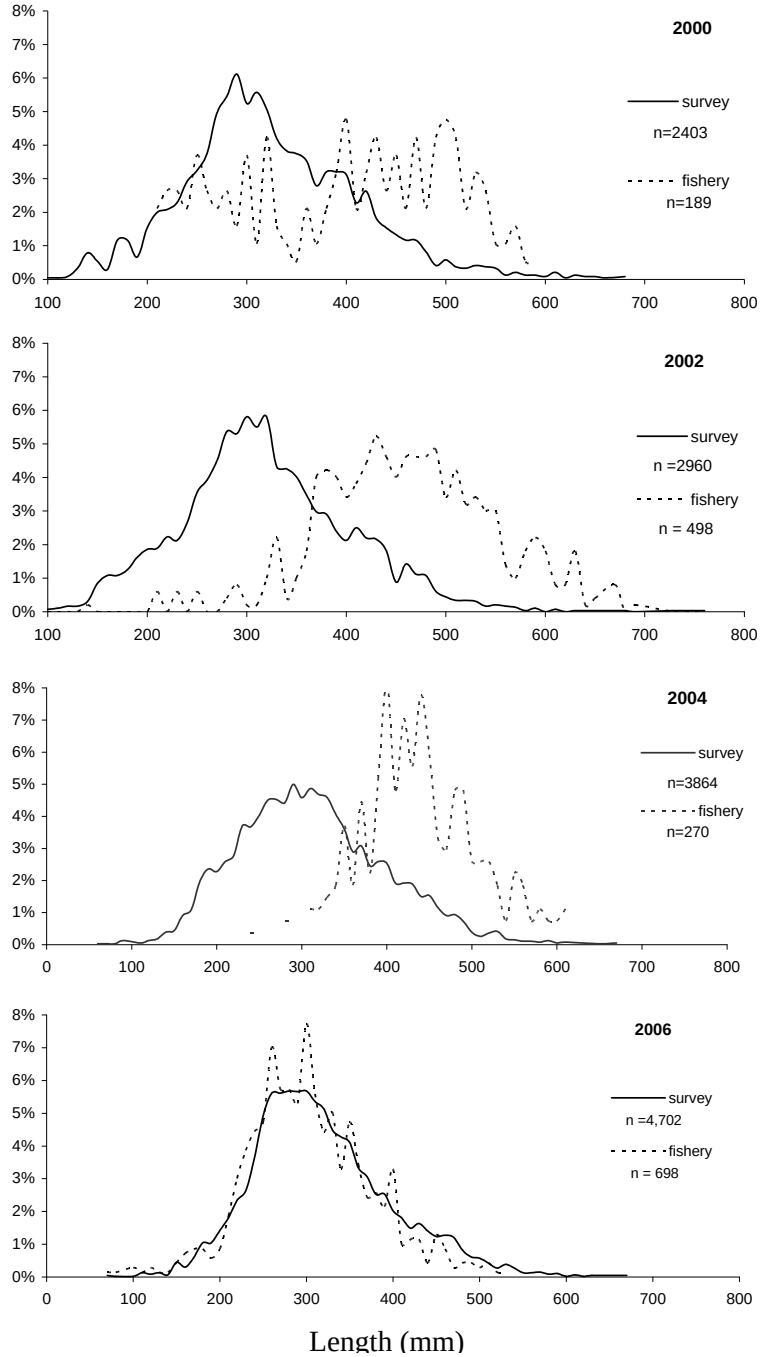

Figure 14.3. Length frequency (mm) for shortspine thornyhead from the Aleutian Islands research surveys and from fishery observers. *Source: Observer data and AFSC RACE survey data.*

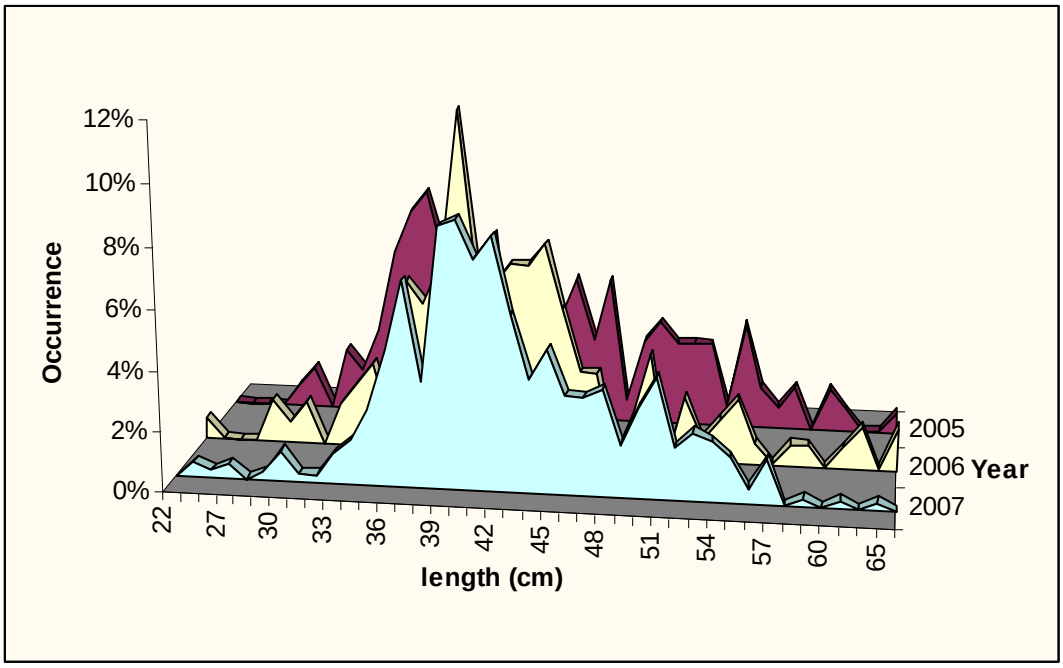

Figure 14.4 Length frequency of Shortspine Thornyheads from EBS fishery observer data for 2005-2007. Source: AFSC observer database.

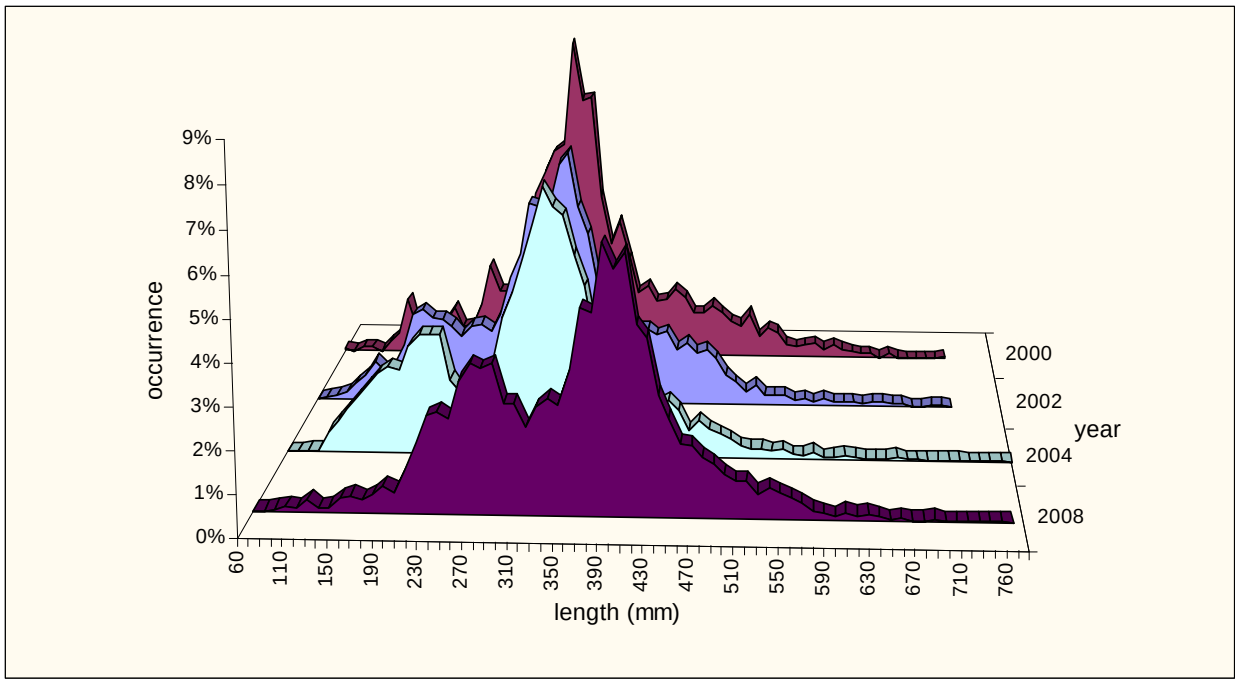

Figure 14.5 Length frequency of Shortspine Thornyhead from EBS slope survey 2000-2008. Source: AFSC RACE bottom trawl survey.

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