Chapter 13: Assessment of Pelagic Shelf Rockfish in the Gulf of Alaska (Executive Summary)

Chris R. Lunsford, S. Kalei Shotwell, Dana H. Hanselman, and David M. Clausen
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Introduction

Rockfish are assessed on a biennial stock assessment schedule to coincide with new survey data. Dark, widow, and yellowtail rockfish are managed as Tier 5 species with ABC determined by the average of exploitable biomass from the three most recent trawl surveys. For dusky rockfish, which is managed as a Tier 3 species, we use a separable age-structured model as the primary assessment tool. This consists of an assessment model which uses survey and fishery data to generate a historical time series of population estimates and a projection model which uses results from the assessment model to predict future population estimates and recommended harvest levels. For Gulf of Alaska rockfish in alternate (even) years we present an executive summary to recommend harvest levels for the next (odd) year.

For this off-cycle year, there is no new survey information for dark, widow, and yellowtail rockfish; therefore, the recommended ABC and OFL are identical to those presented in the 2007 assessment. For dusky rockfish, we only updated the 2007 projection model estimates with revised catch data from 2007 and a new catch estimate for 2008. Refer to last year's full stock assessment, which is available online, for further information about Tier 5 calculations and the assessment model (Lunsford et al. 2007, www.afsc.noaa.gov/REFM/docs/2007/GOApelshelf.pdf). A full stock assessment document with new estimates of exploitable biomass for dark, widow and yellowtail rockfish, and updated assessment and projection model results for dusky rockfish will be presented in next year's SAFE report.

Updated ABC, OFL, Catch and Projection

For dark, widow, and yellowtail rockfish, the 2007 stock assessment estimates are rolled over for this year, resulting in a recommended ABC of 508 t. For dusky rockfish, new information for this year's projection model is updated 2007 catch at 3,318 t and the best estimate of the 2008 catch at 3,527 t. Catch estimates used in last year's model were 3,245 t for 2007 and 4,719 t for 2008. This year's projection model for dusky rockfish results in a recommended ABC of 4,723 t which is similar to last year's dusky ABC of 4,719 t.

For the pelagic shelf rockfish complex, ABC and OFL for dark, widow, and yellowtail rockfish are combined with the ABC and OFL for dusky rockfish. For the 2009 fishery, we recommend the maximum allowable ABC for the pelagic shelf rockfish complex of 5,231 t. This ABC is similar to last year's ABC of 5,227 t. The corresponding reference values for pelagic shelf rockfish are summarized in the following table, with the recommended ABC and OFL values in bold. The stock is not overfished, and dusky rockfish is not approaching overfishing status.

Dark, Widow, and Yellowtail	2007 estimates:		2007 roll-over:	
	2008	2009	**2009**	2010
Tier 5				
Exploitable Biomass (t)	9,682	--	--	--
M	0.07	0.07	0.07	0.07
F_{ABC} (maximum allowable = *0.75**M)	0.0525	0.0525	0.0525	0.0525
F_{OFL} (M)	0.07	0.07	0.07	0.07
ABC (t, maximum allowable)	508	508	**508**	508
OFL (t)	678	678	**678**	678

Dusky rockfish	2007 projection: Not Updated		2007 projection: Updated catch*	
Projection Year	2008	2009	**2009**	2010
Tier 3a				
Exploitable Biomass	72,253	--	--	--
Total Biomass (Age 4+)	68,253	64,147	65,271	62,574
Female Spawning Biomass (t)	23,486	22,796	23,332	22,657
$B_{0\%}$ (t, female spawning biomass)	44,316	--	--	--
$B_{40\%}$ (t, female spawning biomass)	17,727	--	--	--
$B_{35\%}$ (t, female spawning biomass)	15,511	--	--	--
M	0.07	0.07	0.07	0.07
F_{ABC} (maximum allowable = $F_{40\%}$)	0.087	0.087	0.087	0.087
F_{OFL}	0.107	0.107	0.107	0.107
ABC (t, maximum allowable)	4,719	4,632	**4,723**	4,407
OFL (t)	5,722	5,616	**5,726**	5,343
Pelagic Shelf Rockfish Complex	2007 projection: Not Updated		2007 projection: Updated catch	
	2008	2009	**2009**	2010
Exploitable Biomass	81,935	--	--	--
ABC (t, maximum allowable)	5,227	5,140	**5,231**	4,915
OFL (t)	6,400	6,294	**6,404**	6,021

*Projected ABCs and OFLs for 2010 are derived using an expected catch value of 3,593 t for 2009 based on recent ratios of catch to ABC. This calculation is in response to management requests to obtain a more accurate one-year projection.

Area Apportionment

The apportionment percentages are identical to last year, because there is no new survey information. The following table shows the recommended apportionment for 2009.

Area Apportionment	Western 20%	Central 69%	Eastern 11%	Total 100%
Area ABC (t)	**1,004**	**3,628**	**599**	**5,231**
OFL (t)				**6,404**

Amendment 41 prohibited trawling in the Eastern area east of 140° W longitude. The ratio of biomass still obtainable in the W. Yakutat area (between 147° W and 140° W) is the same as last year at 0.42. This results in the following apportionment to the W. Yakutat area:

	W. Yakutat	E. Yakutat/Southeast
Area ABC (t)	251	348

Responses to Council, SSC, and Plan Team Comments

The SSC December 2007 minutes included the following comments concerning all stock assessments:

"The SSC notes that the approach for calculating ABC and other biological reference points is not fully described in the SAFE's. It would be desirable to have a general description in the introduction of the SAFE. In each SAFE chapter, specific details could be provided, if the calculation is done differently. For example, the range of years that is used to calculate average recruitment for converting SPR to B40 should be given."

We continue to assume that the equilibrium level of recruitment is equal to the average of age 4 recruits from 1981-2005 (year classes between 1977 and 2001) for dusky rockfish as detailed in the *Amendment 56 Reference Points* section of the *Projections and Harvest Alternatives* of last year's full stock assessment.

The SSC December 2007 minutes included the following comments concerning all rockfish:

"For all of the rockfish assessments, the SSC recognizes the efforts of the stock assessment authors to respond fully to the 2006 CIE review comments. The SSC requests that the draft response to the CIE review be finalized and made available."

The response to the 2006 CIE rockfish review is available online at the following web address: ftp://ftp.afsc.noaa.gov/afsc/public/rockfish/RWG%20response%20to%20CIE%20review.pdf

The GOA Plan Team 2007 minutes included the following comments concerning all rockfish:

"Area apportionments for rockfish ABC are a weighted average of previous years' percent exploitable biomass distributions. The Plan Team discussed the merit of exploring the difference that weighting the apportionments by biomass rather than percentages could have on the resultant apportionments. Assessment authors agreed to compare the approaches under different scenarios of biomass distribution."

Please see Appendix A of the Gulf of Alaska Pacific ocean Perch SAFE for a comparison of the effects of weighting proportion or biomass by survey year for determining area apportionment. Simple scenarios assuming no survey error and how that affects bias between the two methods are first presented. This is followed by simulations exploring varying levels of survey error and results on stability.

The SSC December 2007 minutes included the following comments concerning Pacific ocean perch which we determined also concern pelagic shelf rockfish:

"The SSC requests that the authors include plots of the spatial distribution of the catch in future assessments. The SSC also requests that the tables of commercial catch should include estimates of discard as well as retained catch."

Historical maps of dusky and dark rockfish observed catch (kg) for all gear types are provided from 1993 through 2007 (Figures 13.1 – 13.5). Data are available online from Fisheries Monitoring and Analysis Division (FMA, Observer program) at www.afsc.noaa.gov/FMA/spatial_data.htm. Catches are aggregated in 10 km x 10 km (100 km^2) cell blocks and cells representing less than three vessels for a given gear type and year are not provided due to confidentiality issues. Description and appropriate usage of data are available on the webpage given above. Spatial distribution of dusky and dark rockfish catch is consistently concentrated in the central GOA region with large catches often occurring in the Portlock Bank region. In 2006 and 2007, the distribution of catch has spread somewhat to the western GOA.

Gulf wide discard rates (% discarded) are provided in a separate table embedded in the main text of the stock assessment (please see *Discards* of the *Fishery* section in the *Introduction* of last year's full stock assessment, www.afsc.noaa.gov/REFM/docs/2007/GOApelshelf.pdf). We intend to also include these estimates of discard rate in the catch table for the full assessment next year.

Dark Amendment

In March, 2007, the North Pacific Fishery Management Council took final action to remove dark rockfish from both the GOA FMP (PSR Complex) and BSAI FMP (other rockfish complex). Removing the species from the Federal FMP serves to turn full management authority of the stock over to the State of Alaska in both regions. At this time, the rules to implement these FMP amendments have not yet been finalized and are currently in the Secretarial review stage. Thus it is unlikely the effective date for Amendments 77/73 will occur before January, 2009. However, it may be approved by the time the final specifications are published. 2009 ABC's and OFLs presented in this executive summary are for the PSR complex including dark rockfish. However, Appendix A is provided with this document and includes ABC and OFL recommendations for the PSR complex not including dark rockfish. If the FMP amendment to remove dark rockfish is finalized for 2009 the appropriate numbers for the PSR complex without dark rockfish are provided in Appendix A.

Research Priorities

It is critically important to rockfish stock assessments that the GOA trawl surveys continue and that they extend into deeper waters (>300m) to cover the range of primary habitat for rockfish. There is little information on larval, post-larval, or early juvenile stages of rockfish. Habitat requirements for these stages are mostly unknown. Research on early life history parameters and essential habitat for these early life stages is vital to effective management of rockfish.

Summaries for Plan Team

Species	Year	Biomass[1]	OFL	ABC	TAC	Catch
Pelagic Shelf Rockfish	2007	99,829	6,458	5,542	5,542	3,318
	2008	70,823	6,400	5,227	5,227	3,527
	2009	67,841	6,404	5,231		
	2010	65,144	6,021	4,915		

[1]Total biomass estimates for pelagic shelf rockfish, including: dark, widow and yellowtail rockfish from trawl survey estimates and age-structured model for dusky rockfish

Stock/		2008				2009		2010	
Assemblage	Area	OFL	ABC	TAC	Catch[2]	OFL	ABC	OFL	ABC
Pelagic Shelf Rockfish	W		1,003	1,003	560		1,004		943
	C		3,626	3,626	2,831		3,628		3,410
	WYAK		251	251	195		251		236
	EYAK/SEO		347	347	1		348		326
	Total	6,400	5,227	5,227	3,527	6,404	5,231	6,021	4,915

[2]Current as of October 14, 2008 (http://www.fakr.noaa.gov)

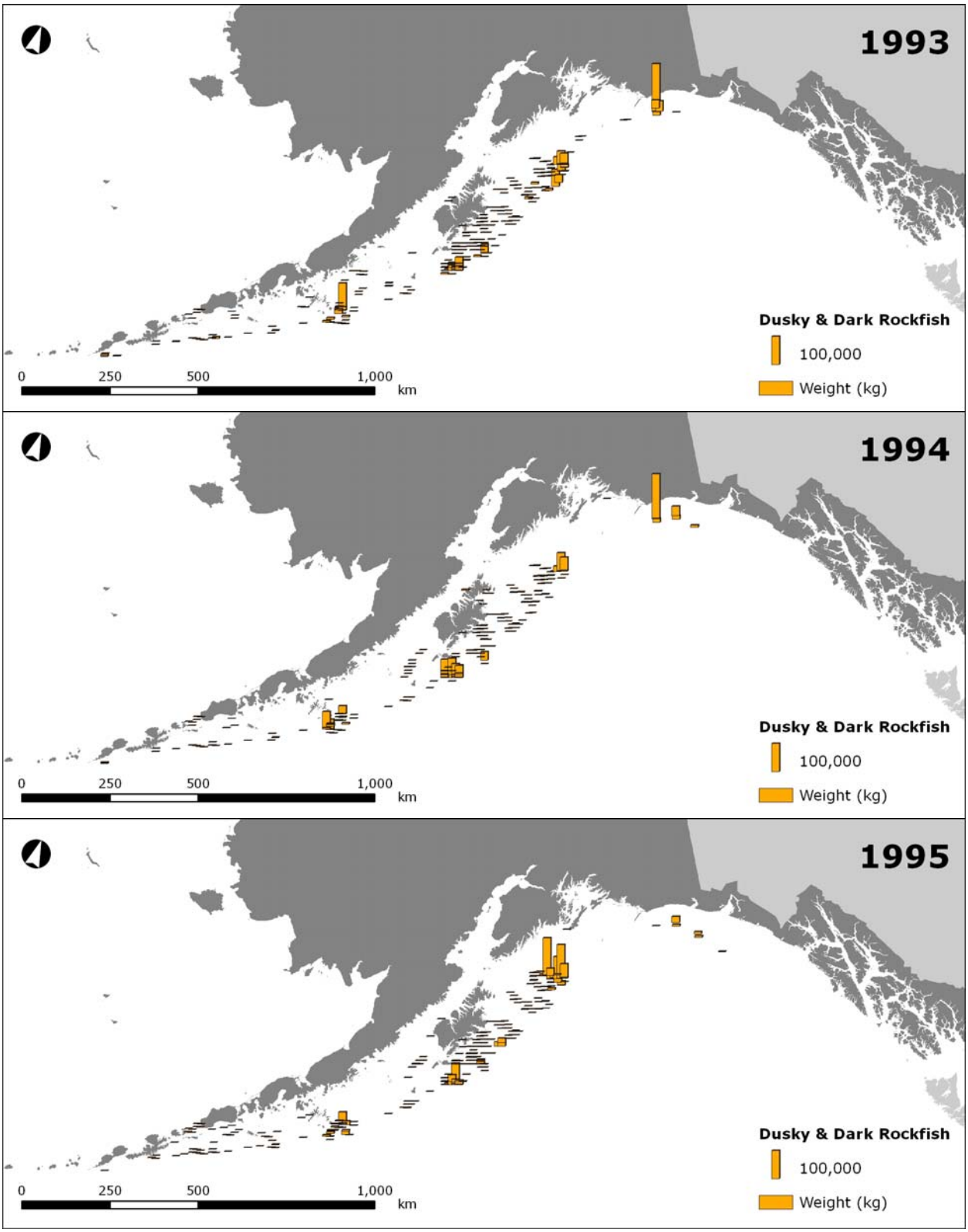

Figure 13.1: Maps of fishery catch based on observer data by 100 km^2 blocks for dusky & dark rockfish from 1993-1995.

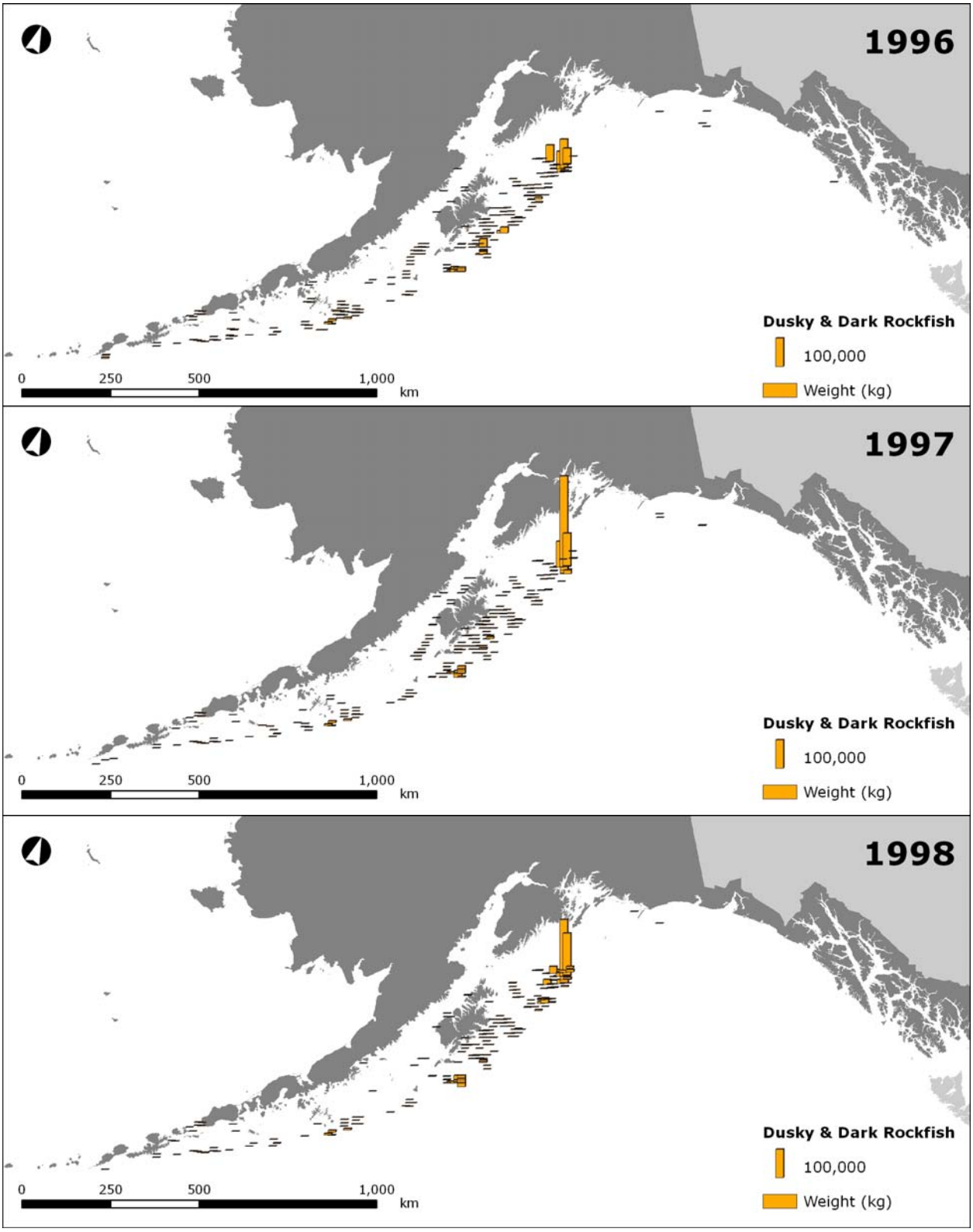

Figure 13.2: Maps of fishery catch based on observer data by 100 km^2 blocks for dusky & dark rockfish from 1996-1998.

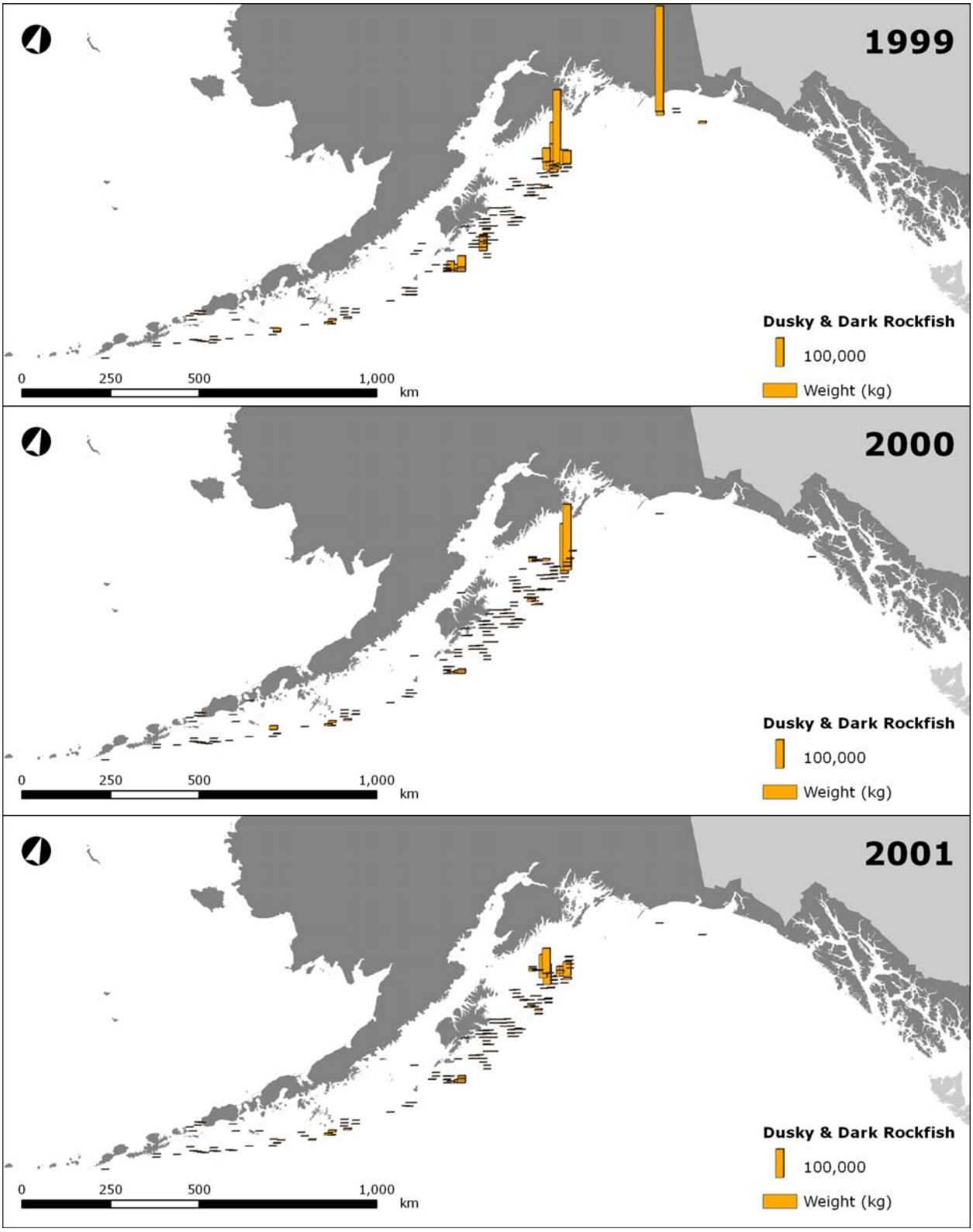

Figure 13.3: Maps of fishery catch based on observer data by 100 km^2 blocks for dusky & dark rockfish from 1999-2001.

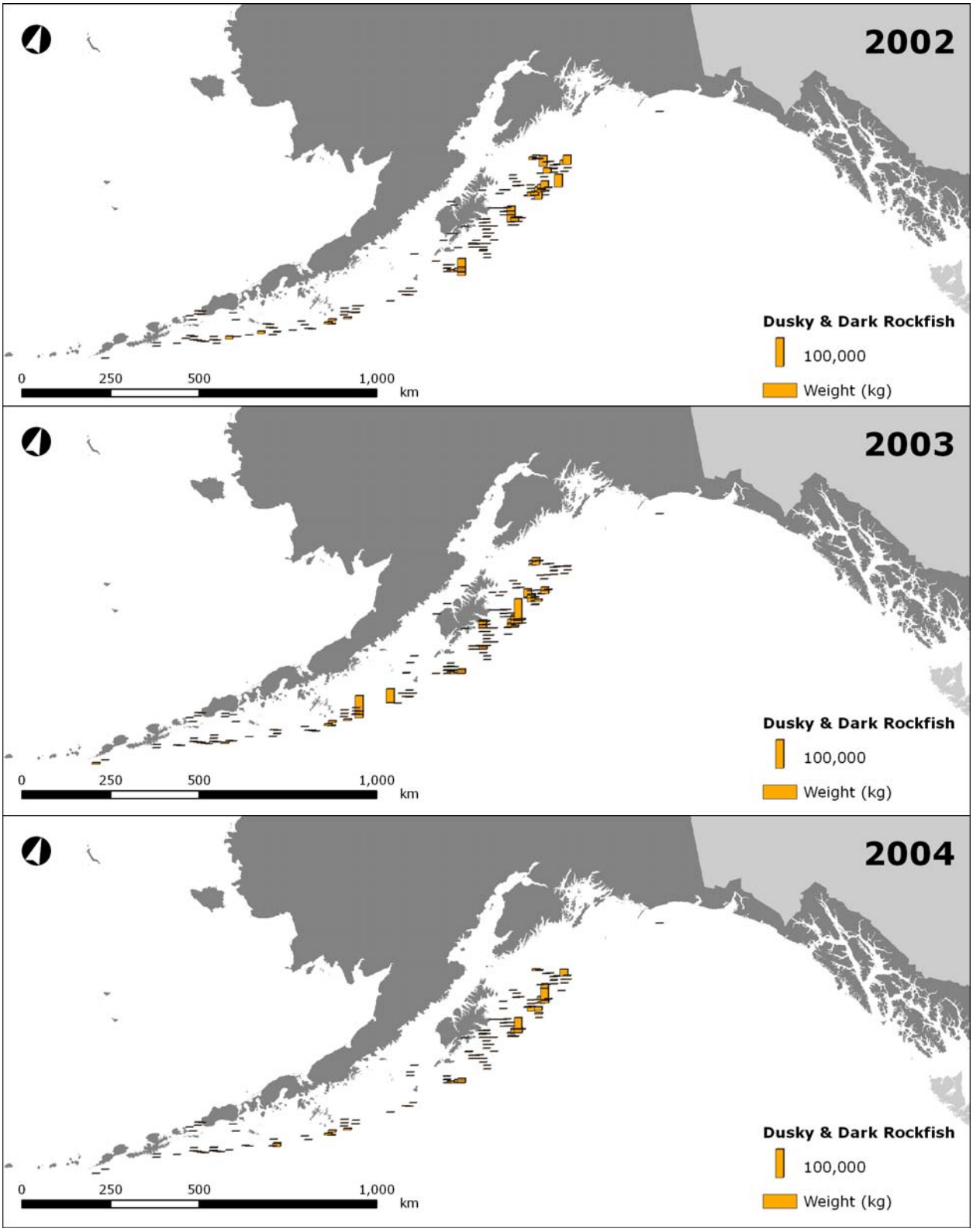

Figure 13.4: Maps of fishery catch based on observer data by 100 km^2 blocks for dusky & dark rockfish from 2002-2004.

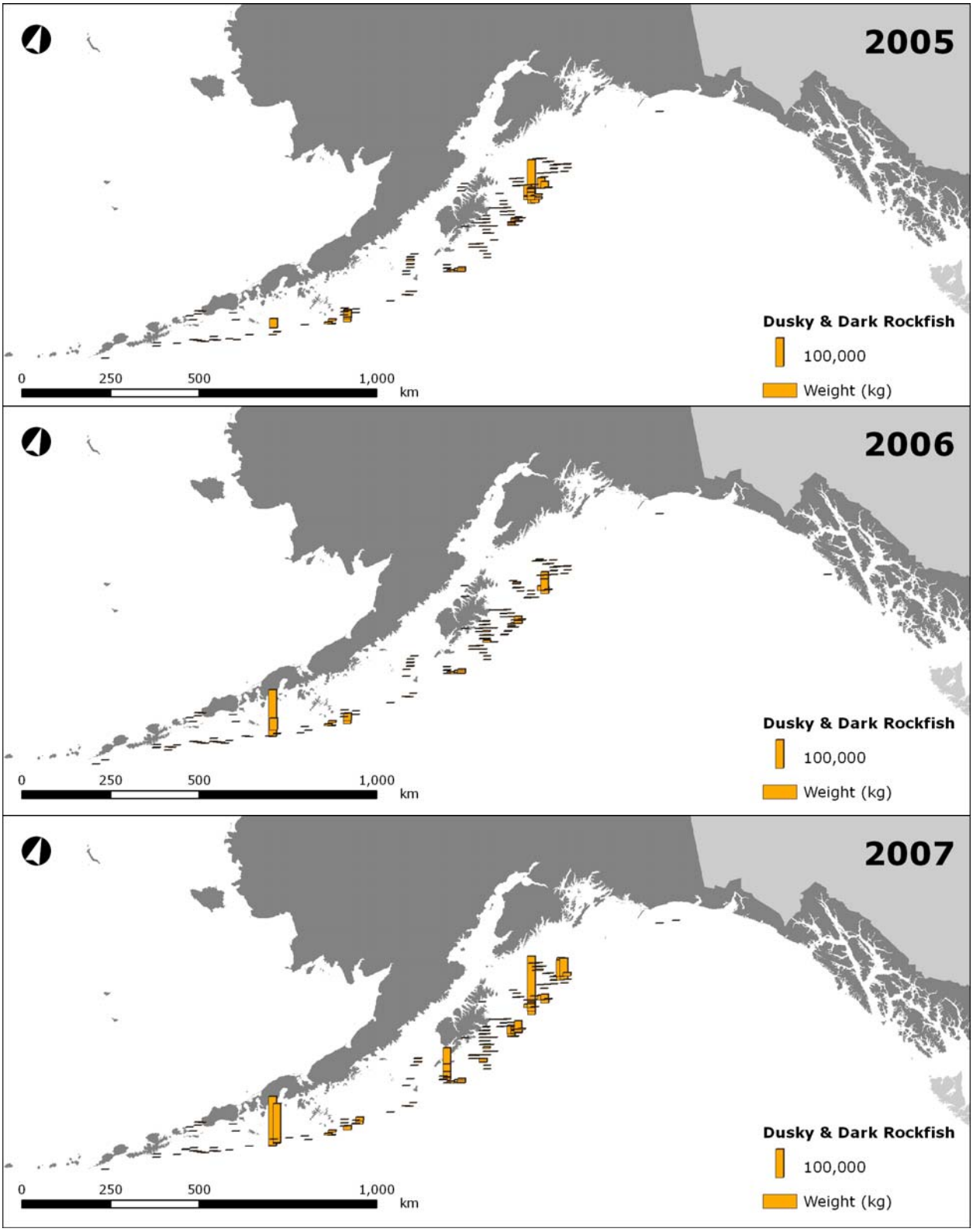

Figure 13.5: Maps of fishery catch based on observer data by 100 km^2 blocks for dusky & dark rockfish from 2005-2007.

Appendix 13A: Assessment of Pelagic Shelf Rockfish without Dark Rockfish in the Gulf of Alaska

Chris R. Lunsford, S. Kalei Shotwell, Dana H. Hanselman, and David M. Clausen
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Introduction

We use last year's biomass estimates for Gulf of Alaska widow and yellowtail rockfish combined with the updated projection model estimates for dusky rockfish to generate the recommended ABC for pelagic shelf rockfish without dark rockfish. In the 2007 full stock assessment, the average of exploitable biomass from the three most recent trawl surveys was used to determined the recommended ABC's for widow and yellowtail rockfish, while an age-structured model was used for dusky rockfish. The average exploitable biomass from the 2003, 2005, and 2007 surveys was 1,106 t (132 t for widow rockfish and 974 t for yellowtail rockfish). This results in a recommended ABC of 58 t for widow and yellowtail rockfish combined based on Tier 5 calculations (F=0.75M) and an OFL (F=M=0.07) of 77 t. For dusky rockfish, a Tier 3 species, this year's projection model using updated 2007 catch at 3,318 t and the best estimate of the 2008 catch at 3,527 t results in a recommended ABC of 4,723 t.

For the pelagic shelf rockfish assemblage without dark rockfish, ABC and OFL for widow, and yellowtail rockfish are combined with the ABC and OFL for dusky rockfish. The maximum allowable ABC for the pelagic shelf rockfish complex without dark rockfish is 4,781 t. The corresponding reference values for pelagic shelf rockfish without dark rockfish are summarized below, with the recommended ABC and OFL values in bold. The stock is not overfished, and dusky rockfish is not approaching overfishing status.

Widow and Yellowtail	2007 estimates:*		2007 roll-over:	
	2008	2009	**2009**	2010
Tier 5				
Exploitable Biomass (t)	1,106	--	--	--
M	0.07	0.07	0.07	0.07
F_{ABC} (maximum allowable = *0.75**M)	0.0525	0.0525	0.0525	0.0525
F_{OFL} (M)	0.07	0.07	0.07	0.07
ABC (t, maximum allowable)	58	58	**58**	58
OFL (t)	77	77	**77**	77
Dusky rockfish	2007 projection: Not Updated		2007 projection: Updated catch**	
	2008	2009	**2009**	2010
Tier 3a				
Exploitable Biomass	72,253	--	--	--
Total Biomass (Age 4+)	68,253	64,147	65,271	62,574
Female Spawning Biomass (t)	23,486	22,796	23,332	22,657
$B_{0\%}$ (t, female spawning biomass)	44,316	--	--	--
$B_{40\%}$ (t, female spawning biomass)	17,727	--	--	--
$B_{35\%}$ (t, female spawning biomass)	15,511	--	--	--
M	0.07	0.07	0.07	0.07
F_{ABC} (maximum allowable = $F_{40\%}$)	0.087	0.087	0.087	0.087
F_{OFL}	0.107	0.107	0.107	0.107
ABC (t, maximum allowable)	4,719	4,632	**4,723**	4,407
OFL (t)	5,722	5,616	**5,726**	5,343

Pelagic Shelf Rockfish Complex	2007 projection: Not Updated*		2007 projection: Updated catch	
	2008	2009	**2009**	2010
Exploitable Biomass	73,359	--	--	--
ABC (t, maximum allowable)	4,777	4,690	**4,781**	4,465
OFL (t)	5,799	5,693	**5,803**	5,420

*Numbers here represent what values would have been without dark rockfish included. Actual numbers used in last year's SAFE included dark rockfish and are provided in Executive Summary.
**Projected ABCs and OFLs for 2010 are derived using an expected catch value of 3,593 t for 2009 based on recent ratios of catch to ABC. This calculation is in response to management requests to obtain a more accurate one-year projection.

Area Apportionment

In all previous years, annual allocation of the Gulf-wide ABC for pelagic shelf rockfish amongst the three regulatory areas in the Gulf has been based on the geographic distribution of pelagic shelf rockfish biomass in the trawl surveys. Since the 1996 SAFE report, this distribution has been computed as a weighted average of the percent biomass distribution for each area in the three most recent trawl surveys. In the computations, each successive survey is given a progressively heavier weighting using factors of 4, 6, and 9, respectively. The apportionment percentages here are slightly different than last year's, because dark rockfish are removed from the calculations. The following table shows the recommended apportionment for 2009.

	Western	Central	Eastern	Total
Area Apportionment	17%	71%	11%	100%
Area ABC (t)	**819**	**3404**	**558**	**4,781**
OFL (t)				**5,803**

Amendment 41 prohibited trawling in the Eastern area east of 140° W longitude. The ratio of biomass still obtainable in the W. Yakutat area (between 147° W and 140° W) is the same as last year at 0.4197. This results in the following apportionment to the W. Yakutat area:

	W. Yakutat	E. Yakutat/Southeast
Area ABC (t)	234	324

Summaries for Plan Team

Species	Year	Biomass	OFL	ABC	TAC	Catch
Pelagic Shelf Rockfish	2007	99,829[1]	6,458	5,542	5,542	3,318
	2008	70,823[1]	6,400	5,227	5,227	3,527
	2009	66,603[2]	5,803	4,781		
	2010	63,906[2]	5,420	4,465		

[1]Total biomass estimates for pelagic shelf rockfish, including: dark, widow, yellowtail rockfish from 2007 trawl survey and age-structured model for dusky rockfish. Average exploitable biomass is not used.
[2]Total biomass estimates for pelagic shelf rockfish, including: widow, yellowtail rockfish (not dark) from 2007 trawl survey and age-structured model for dusky rockfish. Average exploitable biomass is not used.

Stock/ Assemblage	Area	2008[1] OFL	ABC	TAC	Catch[2]	2009[1] OFL	ABC	2010[1] OFL	ABC
Pelagic Shelf Rockfish	W		1,003	1,003	560		819		765
	C		3,626	3,626	2,831		3,404		3,179
	WYAK		251	251	195		234		219
	EYAK/SEO		347	347	1		324		302
	Total	6,400	5,227	5,227	3,527	5,803	4,781	5,420	4,465

[1] 2008 numbers include dark rockfish. Estimated 2009 and 2010 numbers do not include dark rockfish.
[2]Current as of October 14, 2008 (http://www.fakr.noaa.gov)