14 Demersal Shelf Rockfishes (Executive Summary)

by

Cleo Brylinsky, Jennifer Stahl, Mike Jaenicke and David Carlile

14.0 Introduction

Funding for the assessment of demersal shelf rockfish (DSR) has been intermittent in recent years. This year we present an executive summary with updated catches and average weights only. Methods for estimating unreported mortality associated with the commercial halibut fishery and the recreational fisheries are presented. Last year's full stock assessment is on the web (Brylinsky et al. 2007) (http://www.afsc.noaa.gov/REFM/docs/2007/GOAdsr.pdf).

For DSR we continue to use a habitat-based stock assessment. Total yelloweye rockfish biomass is estimated for each management area in the Southeast Outside Subdistrict (SEO) as the product of density, mean fish weight, and area estimates of DSR habitat. Yelloweye rockfish density is derived using line transects conducted from an occupied submersible. In past years mean fish weight has been obtained from the directed DSR commercial fishery or from the IPHC survey when commercial fishery weights are not available. This year mean weights were obtained from the directed DSR commercial fishery and from yelloweye landed as incidental catch from the halibut fishery. Area estimates of DSR habitat are a combination of National Oceanic Survey (NOS) data, sidescan and multibeam data and fishermen logbook data. A harvest rate of F=M (0.02) is used to set ABC. The recommended ABC for yelloweye rockfish is increased 4 % to account for other species in the DSR assemblage.

14.1 Summary of Major Changes

The only new information available is updated catch information for SEO and average weights for all four management areas in SEO. No new surveys were conducted in 2008. The table below presents the 2001-2008 assessment information used to set the ABC and overfishing levels for 2009 with the only update to this table being the 2008 average weights. These changes to average weights (from 4.36 to 3.67 kg in EYKT, from 3.23 to 3.21 kg in CSEO, from 3.04 to 4.02 kg in NSEO and from 3.77 to 3.78 kg in SSEO) are the only factors influencing the change in biomass from last year and resulted in a 5% reduction (from 11,508 to 9,686 mt in EYKT, from 4,841 to 4,813 mt in CSEO, from 2,038 to 2,694 mt in NSEO and from 6,061 to 6,076 mt in SSEO).

Assessment information used to set the ABC and overfishing levels for 2009.

	EYKT	CSEO	NSEO	SSEO	Total
Survey year	2003	2007	2001	2005	
Density yelloweye/km^2	3557	1068	1420	2196	
CV(D)	0.172	0.1271	0.3144	0.1716	
Avg wt (kg)	3.67	3.21	4.02	3.78	
Habitat km^2	742	1404	472	732	3350
Biomass point estimate (mt)	9686	4813	2694	6076	23269
Biomass lower 90% CI (mt)	7300	3895	1623	4572	17390
Yelloweye ABC (F=0.02) (mt)	146	78	32	91	347
DSR ABC (yelloweye ABC/0.96)	152	82	33	95	362
Overfishing (F=0.032) adjusted for other species					580

We recommend a 2009 ABC of 362 mt which is 5% less than the 2008 ABC. The corresponding reference values for DSR are summarized below. The stock is not overfished, nor is it approaching overfishing status although total catch (including recreational harvest and unreported discards) may have approached the overfishing level in past years. The primary reference values are shown in the following table.

Summary of reference values for DSR.

M	0.020
2009 Biomass Estimate	17,390
F_{ofl} ($F_{35\%}$)	0.032
Max F ($F_{40\%}$)	0.026
F_{abc}	0.020
F ($_{avg\ 94\text{-}98}$)	0.020
F ($_{50\%\ F\ max}$)	0.013
Overfishing Level Includes 4.0% for other DSR	580 mt
Maximum Allowable ABC	471 mt
2009 ABC Includes 4.0 % for other DSR	362 mt
2008 ABC Includes 4.0% for other DSR	382 mt
2009 ABC (TAC)	362 mt
2009 OFL	580 mt

In 2006 the Board of Fisheries (BOF) allocated the SEO DSR Total Allowable Catch (TAC) in the following manner: 84% to the commercial fishery and 16% to the sportfish fishery. For 2009 this equates to a 58 mt TAC for sportfish fisheries and a 304 TAC for commercial fisheries.

14.2 Responses to SSC Comments

Specific Comments to the Assessment Authors:

- ***If possible, obtain yelloweye length estimates for the video survey to develop length compositions and average weight as an alternative to using mean weight from samples collected from the IPHC survey.***

  In 2008 ADF&G was able to obtain updated average weight data for all four management areas in SEO from the directed commercial DSR fishery and yelloweye caught incidentally in the halibut fishery. These data were used to update the biomass estimate for this year. Methods to estimate yelloweye length will be investigated during the video survey to be conducted in spring of 2009.

- ***Evaluate potential bias resulting from current expansion methods and investigate other alternatives.***
  Prior to the 2009 SAFE cycle we will be examining potential sources of bias in our current expansion methods and investigating alternatives for expanding those biomass estimates.

Full Retention

The State of Alaska (SOA) implemented full retention of DSR in state waters of Southeast in June 2002. The National Marine Fisheries Service implemented full retention in federal waters of SEO in December 2004. Halibut fishermen are allowed to land and sell DSR incidental catch equivalent to 10% of the round weight of halibut sold. Overage above this 10% must be weighed and reported on a fish ticket. The overage may then be retained for personal consumption, donated, or, if the catch was taken in state waters, the overage may be sold with the proceeds of the sale given to the State of Alaska. Federal regulation prohibits overage DSR caught in federal waters from entering commerce. The landings of DSR incidental catch within the 10% saleable limit have risen since the implementation of full retention regulations. The landings of DSR overage have increased also with 36 mt landed in 2006 and 2007 compared to 13 mt landed in 2004. Since the implementation of the federal regulation, over 90% of the landed overages in the State and Federal waters are now retained for personal use rather than being donated or sold, and in 2007 67% (53,435 lbs) of the overages (79,497 lbs by total weight) were reported from federal waters. There appears to be increasing compliance with the full retention regulations and there continues to be an outreach campaign by Alaska Longline Fishermen's Association, Fishing Vessel Owner's Association, and Petersburg Vessel Owner's Association to their members to support full retention.

DSR incidental catch (mt) landed in the SEO commercial halibut fishery by year.

SEO	**2004**	**2005**	**2006**	**2007**	**2008**[1]
landed within incidental catch limits	134	163	161	154	108
landed overage (>10%)	13	23	36	36	29
Total	147	186	197	190	137

[1] Numbers through October 22, 2008.

Disposition of DSR incidental catch (round pounds) landed in the SEO commercial halibut fishery, by year.

Overage Description	2004	2005	2006	2007	2008[1]
Confiscated	0	0	328	0	0
Fed. Retained, not sold	144	33,445	50,996	53,435	43,520
Fed. Forfeiture	11,144	0	858	0	194
State Forfeiture	14,665	9,405	9,254	7,825	3,267
State Retained, not sold	3,569	8,314	18,061	18,523	16,548
Grand total	29,521	51,163	79,497	79,782	63,529

[1] Numbers through October 22, 2008.

In 2008 the portion of the TAC released to the directed DSR fishery in SEO was 120 mt. The 2008 directed DSR landings totaled 41 mt. In past years the directed fishery opened on January 1 and closed when the quota was reached well in advance of the closure date in regulation (which is the day before the opening day of IFQ season). The timing of the fishery announcement may have contributed to the reduced effort in 2008 compared with other years. ADF&G waited to announce

whether there was sufficient TAC for a directed DSR fishery until after the 2008 halibut catch limits were announced because halibut fishery incidental catch comprises a substantial proportion of the DSR TAC. The final halibut catch limits were announced on January 18th, the DSR announcement was made on January 18th, and the fishery opened in the EYKT and SSEO management areas on February 1, 2008 and remained open until March 7th (the day before the IFQ season opened). Fishermen may not have had adequate time to plan for the fishery.

Directed Commercial Landings of DSR in 2008.

Directed Fishery Landings 2008	Metric Tons
Landed within trip limit	40
Trip limit overages	1
Retained state water	0
Retained federal water	0
Grand Total	41

Commercial Halibut Fishery DSR Incidental Catch

Since 2006 the IPHC has provided depth and area-specific survey and commercial catch information that allows evaluation of distribution of catch by depth and the rate of incidental catch by depth.[1] Depth is an important component of incidental catch rates as DSR are more limited in their common depth distribution than are halibut. Halibut are often found in deep water in the early portion of the commercial fishing season and some halibut are landed in deeper water throughout the season when fishermen are targeting sablefish as well as halibut. Therefore we applied different incidental catch rates for yelloweye to the different depth zones where the halibut fishery occurs. Because there are very few survey stations in some management area/depth strata combinations, the data were analyzed by depth for the whole of SEO with only one area breakout. The three strata used were: 1) all waters of the EYKT subdistrict that were less than 100 fm except for the Fairweather Grounds, 2) all waters of the SEO less than 100 fm and not included in the previous category, and 3) all waters of SEO between 100 and 200 fm. Stratum-specific DSR incidental catch mortality was estimated by applying the ratio of yelloweye incidental catch (lbs) to legal halibut catch (lbs) estimated from the IPHC survey data, to the projected halibut catch from the relevant stratum (Schaeffer et al 1979). Results predicting the incidental catch for 2008 are shown in the table below. The point estimate is 149 mt (54-243 95% CI). To date (October 22, 2008), 137 mt of DSR incidental catch has been landed in the commercial halibut fishery with 95% of the 2C and 3A halibut quota landed.

[1] Unpublished data IPHC (contact Tom Kong for commercial data, Claude Dykstra for survey data).

Estimated DSR mortality (mt) associated with the 2008 SEO commercial halibut fishery by depth, using 2007 IPHC survey data (full hook counts) and the 2006 halibut commercial fishery depth and area distributions from logbook and fishticket data.

Depth strata	YE bycatch rate	# survey Stations	% catch from stratum	Est. YE mortality (mt)	Lower 95% CI	Upper 95% CI
<100 EYKT w/o Fairweather	0.033	41	5.6% 3A	20.47	7.85	33.09
<100 SEO + Fairweather	0.177	38	.05% 3A 17.3% 2C	95.45	43.52	147.38
100-200 SEO + EYKT	0.027	32	3.5% 3A 30.0% 2C	32.65	2.95	62.34
				148.57	**54.32**	**242.81**

Recreational Fishery

To manage the 2007 and 2008 sport fishery within the quota, the following regulations for the entire Southeast Alaska region were implemented:

1) The resident and nonresident daily bag limit was three non-pelagic rockfish only one of which could be a yelloweye; all non-pelagic rockfish caught were required to be retained until the bag limit was reached.
2) The nonresident annual limit was two yelloweye rockfish in 2007 and 2008.
3) Charter operators and crew members were not allowed to retain non-pelagic rockfish while clients were on board the vessel.

To evaluate the total number of DSR harvested and released in the 2007 and 2008 sport fishery in the SEO groundfish management areas, three sources of rockfish catch information (harvest and release) were available for examination:

1. Charter logbook data available from 1999-2007. Numbers of rockfish kept or released were reported as either pelagic or "Other" (i.e. non-pelagic) for 1999-2005, while in 2006 and 2007 the reporting categories were pelagic, yelloweye, and other non-pelagic besides yelloweye. This logbook data only represents charter (i.e., guided) harvest. Finalized charter logbook data for 2007 was utilized for this analysis.
2. Statewide Harvest Survey (SWHS) estimates of rockfish harvest from 1977-2007. Note that the SWHS does not break down rockfish catch by assemblage or species. The SWHS rockfish estimates for 2008 will not be available until August 2009.
3. Onsite creel survey estimates of harvest and release (charter, private, and combined) by species for Ketchikan, Sitka, Craig, Juneau, and Gustavus/Elfin Cove for 2001-2008.

Sport Fish Methods

1) The recent 5-year ratio of the SWHS rockfish harvest estimate versus the onsite creel survey rockfish harvest estimates was applied to the 2008 onsite creel rockfish harvest estimates at Craig and Klawock (SSEO), Sitka (CSEO), and Elfin Cove (NSEO) to estimate the 2008 SWHS rockfish harvest estimates. This initial projection of rockfish harvest by SWHS area essentially drives this DSR total removal estimation process, and it should be noted that in August 2009 the final 2008 SWHS rockfish harvest estimations will be available and used to finalize the 2008 DSR total removal estimation. Efforts to improve this initial projection step for estimating the current year's rockfish harvest in SSEO, CSEO, and NSEO are ongoing.

2) During the 2007 and 2008 seasons, the collection of species composition through creel surveys was improved from prior years to include all seven species of DSR (yelloweye, quillback, copper, China, tiger, canary, and rosethorn), as well as the major slope (silvergray, rougheye, shortraker, bocaccio, POP, redbanded) and pelagic (dusky and black) species. The percent of total rockfish harvest of each of the seven DSR rockfish was thus calculated for each sampled port.

3) Harvest of each DSR species was estimated by multiplying the species composition (percentage of total rockfish harvest) by the finalized 2007 and estimated 2008 SWHS total rockfish harvest.

4) The average round weights (in lb) of the seven DSR rockfish sampled in the 2007 onsite creel survey programs were multiplied by the respective estimated harvest of each species, to estimate the total harvested biomass by DSR species. Average weights of each of the seven DSR varied by area, for example, the average weight of yelloweye rockfish in 2007 was 7.98, 7.99, and 9.96 for SSEO, CSEO, and NSEO, respectively. For years prior to 2006, Sport Fish Division had utilized average weights of winter commercial fishery DSR (7.0 lb for yelloweye and 2.5 lb for all other DSR species) to calculate an estimated total biomass mortality of DSR for SSEO, CSEO, and NSEO.

Average round weights were estimated for 2008 from length data using length-weight relationships developed for six DSR species. The length-weight relationships were modeled assuming multiplicative error as:

$$ln(weight) = ln(a) + b\ ln(length),$$

where weight is in kilograms and length is measured in cm. Parameters were estimated using length-weight data from 2006 and 2007.

Summary of length-weight model parameters for six DSR species based on data collected during 2006 and 2007 in Southeast Alaska sport fisheries.

DSR Species	Sample size	Intercept Parameter ln(a)	Intercept SE	Slope Parameter (b)	Slope SE	R^2	Range of fork lengths for model
Canary	120	-8.57525	0.539925	2.33787	0.144025	0.691	29-60
China	165	-8.13254	0.613854	2.23404	0.170490	0.513	22-54
Copper	262	-11.4011	0.314182	3.13037	0.085279	0.834	22-56
Quillback	1,373	-9.93877	0.154202	2.71886	0.041879	0.755	14-73
Tiger	56	-9.50100	0.62838	2.591418	0.167826	0.815	27.5-63
Yelloweye	2,449	-10.2901	0.10479	2.820538	0.025759	0.831	23-94

The parameters of this length-weight model were similar in value to those generated for harvested DSR sampled in Southcentral Alaska during 1991-2007 (personal communication, Scott Meyer, ADFG&G, Div. of Sport Fish). Future evaluation of the models will include if there needs to be models developed by area (such as only using data from outside waters). For the present use, the model provides reasonable estimates of weight for this biomass estimation process.

5) The SWHS rockfish harvest estimates for the SWHS areas Prince of Wales Island, Sitka, and Glacier Bay include areas of NSEI and SSEI groundfish areas. Examination of logbook and SWHS data indicated that 65% of the rockfish harvest for the Prince of Wales Island and Glacier Bay SWHS areas occurs in the corresponding SSEO and NSEO groundfish areas, respectively. For the Sitka SWHS area, 90% of the rockfish harvest occurs in the CSEO groundfish area. These percentages were applied to the total harvest biomass of DSR for SWHS areas Prince of Wales Island, Sitka, and Glacier Bay to estimate the DSR harvest biomass in SSEO, CSEO, and NSEO, respectively. For years prior to 2006, Sport Fish Division had utilized a value of 75% to estimate the DSR harvest biomass in SWHS areas Prince of Wales Island, Sitka, and Glacier Bay.

6) The biomass of DSR release mortality was estimated for each outer coast groundfish area. Release rates for the 2007 and 2008 seasons were estimated from the onsite creel surveys (release rate by DSR species) and the charter logbook database for the 2007 season (release rate for yelloweye and then a release rate for the combined non-pelagic rockfish). Examination of the release rate by area for yelloweye and other DSR species generally agreed between the onsite creel survey and the logbook data. The release rates from the onsite creel survey for the seven DSR species were utilized to estimate the release mortality in numbers of fish and biomass by DSR species. In cases where the release rate for a particular DSR species was 0% for the creel data, the logbook data release rate was applied. The estimated release rates for the two main DSR species (yelloweye and quillback) tended to be higher based on the creel survey information than on logbook data. Future analysis of these 2 databases will be required to resolve these differences and to arrive at the best release rate values to use for SSEO, CSEO, and NSEO groundfish areas.

7) A mortality rate of 100% was assumed for all released DSR. This assumption may be too conservative, but release mortality has not been estimated for any DSR species. Hannah et al. (2008) documented successful re-submergence by quillback, copper, and canary rockfish caught at depths of up to 51 m, despite showing signs of barotrauma. Juveniles caught in shallow water

and released probably have substantially higher survival. The lack of data on depth of capture and sizes of released fish makes it difficult to select a lower mortality rate.

8) Total mortality (in terms of biomass removal from the DSR population) was estimated by adding the total DSR harvest and release mortality biomass estimates for each groundfish area.

9) Confidence intervals for these biomass removal estimates are still in the process of being developed, but will be provided in the 2009 fall summary for the 2007 and 2008 biomass estimates.

Sport Fish Conclusions

The revised 2007 sport fishery removal of DSR, based on using the finalized 2007 SWHS rockfish harvest estimates for the various areas in Southeast Alaska, indicated that the 2007 total sport DSR removals was 9.4% below the quota of 66 mt. The estimated 2008 sport fishery removals of DSR of 69.50 mt is 14% above the 2008 quota of 61 mt.

Revised 2007 DSR removals in outside waters of SE Alaska

Groundfish area	Harvest biomass (mt)	Release biomass (mt)	Total Biomass (mt)
SSEO	17.54	2.07	19.61
CSEO	34.84	2.08	36.92
NSEO	3.08	0.18	3.26
Total	55.46	4.33	59.79

Estimated 2008 DSR removals in outside waters of SE Alaska

Groundfish area	Harvest biomass (mt)	Release biomass (mt)	Total Biomass (mt)
SSEO	23.80	2.29	26.08
CSEO	30.73	7.01	37.74
NSEO	4.80	0.87	5.68
Total	59.33	10.17	69.50

During the 2008 season, there was one key sport fish management action which may have caused the increase in the DSR removals, especially in SSEO and NSEO. During July 16 to September 30, 2008, nonresident anglers in Southeast Alaska were allowed to only harvest Chinook salmon that were 48 inches or greater in total length. This essentially closed the Chinook salmon fishery to nonresident anglers, and 2008 onsite creel survey data indicates that there was a significant increase in harvest of rockfish (DSR as well as pelagic rockfish)-especially in SSEO and NSEO. In addition, the release rates increased for DSR at CSEO and NSEO, perhaps due to the increase in bottom fishing effort by the non-residents anglers who were no longer expending effort on Chinook salmon. The saltwater charter logbook data for the entire 2008 season is not yet available, and the 2008 release rates from this logbook data may change the release biomass estimates.

The above estimates are based on the best available data at this time, but may be subject to change as new information becomes available. Further, the final biomass removal estimate will be generated from the 2008 SWHS rockfish harvest estimates, available in August 2009. Finally, with each passing year of more specific rockfish fishery data from the logbook and onsite creel programs, the accuracy of the rockfish biomass removal estimates should improve.

14.3 Updated Catch Table

2008 DSR Catch SEO (mt)	Directed Commercial	Incidental Commercial (to Oct. 22, 2008)	Sport fish Fisheries	Total
Landed	41	137	59	237
Estimated discard	0	14	10	24
Total	41	151	69	261

14.4 Research Priorities

Full funding for this research was secured again in FY09 and a submersible survey is planned for the EYKT area in May or June 2009 to update the density estimate there. Investigations into the determination of habitat estimates using directed DSR commercial fishing logbook data has been completed and will be used to design all future density surveys. This work has revealed the immediate need to conduct research using remote sensing for the purpose of further delineation of rocky habitat in the SSEO area in particular. Comparatively little is known about the geology of this area and the areal extents of rocky habitat. It would be ideal if further remote sensing work could be completed prior to the next density survey in that area.

14.5 Summaries for Plan Team

DSR biomass, fishing limits and catch in metric tons.

Year	Biomass	OFL	ABC	TAC	Catch (total commercial and sport)
2007	19,558	650	410	410	250
2008	18,329	611	382	382	261
2009	17,390	580	362	362	
2010	17,390	580	362	362	

Catch data as reported landed catch in e-Landings. Actual catch may be slightly higher.

Acknowledgements

The authors would like to thank Kamala Carroll and Allison Sayer for their help with data summaries, and Scott Meyer and Sarah Power for input and edits.

References

Brylinsky, C., J. Stahl and D. Carlile. 2007. Assessment of the demersal shelf rockfish stock for 2007 in the southeast outside district of the Gulf of Alaska. Chapter 14 IN 2007 Stock Assessment and Fishery Evaluation Report for 2008. North Pacific Fishery Management Council, Anchorage, AK.

Hannah, R. W., S. J. Parker, and K. M. Matteson. 2008. Escaping the surface: the effect of capture depth on submergence success of surface-released Pacific rockfish. North Amer. J. Fish. Mgmt. 28:694-700.

Schaeffer, R.L., W. Mendenhall and L. Ott. 1979. Elementary survey sampling. Duxbury Press. North Scituate, MA.