

## CHAPTER 13

### Assessment of the Northern Rockfish Stock in the Eastern Bering Sea and Aleutian Islands

by

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#### **Introduction**

In 2005, BSAI rockfish were moved to a biennial assessment schedule to coincide with the frequency of trawl surveys in the Aleutian Islands (AI) and the eastern Bering Sea (EBS) slope. These surveys occur in even years and for these years a full assessment of northern rockfish in the BSAI area will be conducted. The 2012 full assessment can be found at <http://www.afsc.noaa.gov/REFM/docs/2012/BSAIinorthern.pdf>. In years without a scheduled Aleutian Islands survey, an “update” is produced by revising the recent catch data and re-running the projection model using the results from the previous full assessment as a starting point. Therefore, this update does not incorporate any changes to the 2012 assessment methodology or input data, but does include updated catch estimates for 2012-2014.

#### **Summary of results**

The new information for this update is replacing the estimated 2012 catch with the final catch value, and revising the 2013 catch estimate. The 2012 catch was 2,479 t, 23% smaller than the estimate of 3,223 t was used in the 2012 projection. The difference between the estimated and actual 2012 catch resulted from a sharp reduction in the Oct-Dec catch in 2011 and 2012. The 2013 catch through October 19<sup>th</sup> was 1,971 t. The estimated 2013 catch of 2,249 t was obtained by summing the reported 2013 catch through September (1,950 t) and the product of the remaining amount of catch under the ABC (7,900 t) and an estimate of the proportion of the remaining Oct-Dec ABC which has been caught in recent years (3.8%, based on 2011 and 2012 data). The 2014 catch was obtained from the projection model and was based on a fishing mortality rate equal to the average of the rates estimated for 2012 and 2013. A summary of the updated projection model results is shown below; the estimated projection for total biomass (ages 3+), spawning biomass, and OFL for 2014 are each within 1% of the values obtained from the 2012 projection model.

<b>Quantity</b>	As estimated or specified last year for:		As estimated or recommended this year for:	
	2013	2014	2014	2015
<i>M</i> (natural mortality rate)	0.0413	0.0413	0.0413	0.0413
Tier	3a	3a	3a	3a
Projected total (age 3+) biomass	195,446	195,779	196,519	197,541
Female spawning biomass (t)				
Projected	84,697	83,784	84,237	83,698
<i>B</i> <sub>100%</sub>	147,918	147,918	147,918	147,918
<i>B</i> <sub>40%</sub>	59,167	59,167	59,167	59,167
<i>B</i> <sub>35%</sub>	51,771	51,771	51,771	51,771
<i>F</i> <sub>OFL</sub>	0.079	0.079	0.079	0.079
<i>maxF</i> <sub>ABC</sub>	0.063	0.063	0.063	0.063
<i>F</i> <sub>ABC</sub>	0.063	0.063	0.063	0.063
OFL (t)	12,187	12,024	12,077	11,943
maxABC (t)	9,850	9,322	9,761	9,652
ABC (t)	9,850	9,322	9,761	9,652
<b>Status</b>	As determined last year for:		As determined this year for:	
	2011	2012	2012	2013
Overfishing	No	n/a	No	n/a
Overfished	n/a	No	n/a	No
Approaching overfished	n/a	No	n/a	No

BSAI northern rockfish was not subjected to overfishing in 2012, and is not overfished or approaching an overfished condition.

### Summary table for the Plan Team

Year	Biomass <sup>1</sup>	OFL	ABC	TAC	Catch
2012	202,173	10,500	8,610	4,700	2,479
2013	195,446	12,200	9,850	3,000	1,971 <sup>2</sup>
2014	196,519	12,100	9,760		
2015	197,541	11,940	9,650		

<sup>1</sup> Total biomass (ages 3+) from age-structured projection model.

<sup>2</sup> Catch as of October 19, 2013.

### ***Responses to SSC and Plan Team Comments on Assessments in General***

The minutes of the December, 2012, meeting of the SSC includes the following general requests for stock assessments.

*The SSC recommends that the authors consider whether it is possible to estimate  $M$  with at least two significant digits in all future stock assessments to increase validity of the estimated OFL.*

*AI Assessment Author recommendations: The SSC requests that all assessment authors of AI species evaluate AI survey information to ensure that the same standardized survey time series is used.*

The value of  $M$  for this update is computed to three significant digits.

Standardization the AI trawl survey will be considered in the 2014 full assessment.

### ***Responses to SSC and Plan Team Comments Specific to this Assessment***

The minutes of the December, 2012, meeting of the SSC includes the following requests pertaining specifically to BSAI northern rockfish.

*The SSC offers the following advice to assessment authors:*

- *Explore alternative selectivity patterns*
- *Evaluate alternative selectivity time periods*
- *Evaluate model sensitivity to  $Q$  and  $M$*

This advice on natural mortality, selectivity, and catchability also echo those made in the 2013 rockfish CIE review, and will be evaluated in the 2014 full assessment.

### ***Responses to SSC and Plan Team Comments on Stock Structure in General***

Considerable discussion within the past year has been focused on the general issue of stock structure and what information and criteria should be applied when determining spatial management units. The December, 2012, minutes of the SSC recommend “*that additional members be added to the stock structure workgroup, comprising members with more management and implementation expertise. The enhanced workgroup would work to provide further enhancements to the template that might provide additional indicators relating to management and implementation issues.*” A stock structure workshop was held in April, 2013, and in discussing the workshop at the September 2013 Plan Team meeting, two options for the role of the Plan Team in future policy were identified: 1) “. . . have the Plan Team(s) alert the Council when either Team or both Teams identify a biological concern about a stock/assemblage; it then would await direction from the Council on next steps (i.e., the default policy would be triggered or specific direction to the Teams by the Council would be provided)”;

and 2) “. . . have the Team(s) consider economic and management issues when it identifies a biological concern for a particular stock/assemblage”, either from “*adding new members with in-season management and economic expertise to the stock structure working group (and possibly renaming the working group)*” or “*The Team(s) would discuss the biological, economic, and management implications at the full Plan Team meeting. If stock assessment authors identify biological concerns in their application of the stock structure template to their stock/assemblage, then they would initiate a request for economic and in-*

*season management effects when determining whether to raise concerns for a stock/assemblage.”*

In the minutes of the October, 2013, SSC meeting, the SSC stated that it “*does not support Option 2 in the joint Groundfish Plan Team report that suggests that the Plan Team should consider economic and management issues in identifying stock structure, which instead should only be based on best science.*” The SSC minutes also state that “*As soon as preliminary scientific information reveals that further stock separation may be indicated, the stock assessment authors, Plan Teams, and SSC should continue to advise the Council so that remedial actions can be considered to avert conservation problems.*”

The information in this assessment is intended to communicate to the SSC and Council the information available on “stock separation”.

### ***Responses to SSC and Plan Team Comments on Stock Structure pertaining to BSAI northern rockfish.***

The stock structure template was applied to BSAI northern rockfish in 2012, to which the BSAI Plan Team offered the following comments in the minutes of their September, 2012, meeting: 1) *We agree that there is evidence of stock structure, but we do not feel that there is an immediate conservation concern.* 2) *We feel that splitting ABC would not reduce mortality.* 3) *We are stepping back somewhat from the policy that we adopted together with the GOA Plan Team in September 2010, in part because there is now sufficient information for enough stocks that “default” measures no longer seem necessary; instead, we will proceed, at least for now, on a case-by-case basis, per SSC feedback on the 2010 policy.* 4) *We feel that recommendations regarding spatial allocation of harvest (either maintaining existing splits, creating new splits, or combining existing splits) should be undertaken in the context of a policy decision made in a larger forum (e.g., getting the SSC to re-engage with the stock structure working group, establishing a mechanism for Council/public involvement, etc.).* 5) *We would like to receive additional SSC feedback on these issues; in particular, a comparison of evidence and conclusions as they pertain to blackspotted/rougheye rockfish and northern rockfish, and a discussion of if/when it is appropriate to split when there is evidence of stock structure but no immediate conservation concern.* 6) *We would like to incorporate management considerations more explicitly in the process, to be able to weigh more effectively the costs and benefits of management outcomes.*

The assessment authors agree that “a comparison of evidence and conclusions” would be helpful, not just of BSAI blackspotted/rougheye and northern rockfish, but several other species for which the stock structure template have been applied (i.e., BSAI shortraker rockfish, and several GOA rockfish stocks). In particular, we note that isolation by distance has been found for BSAI northern rockfish (Gharrett et al. 2012) with estimated lifetime dispersal distances that do not exceed 250 km, and patterns of occasional disproportionate harvest have occurred within BSAI subareas. These characteristics have also been found in other BSAI rockfish stocks for which stock structure have been highlighted for Council attention (i.e., shortraker rockfish, blackspotted/rougheye rockfish). To assist the process in making these comparisons, we note that the application of the stock structure template to BSAI northern rockfish can be found in the final 2012 BSAI northern rockfish assessment, available online at <http://www.afsc.noaa.gov/REFM/docs/2012/BSAIinorthern.pdf>.

### **Data Gaps and Research Priorities**

The 2013 CIE review of Alaska rockfish assessments highlighted several areas which warrant further attention, including estimation of key model parameters such as natural mortality and maturity, the functional form and estimation of selectivity, and weighting of data (including reconstructed catch

data). These issues are similar to those made recently by the SSC, and will be evaluated in upcoming full stock assessments. In addition, a CIE comment that had high emphasis was whether trawl survey biomass estimates sufficiently accounted for aggregated spatial distributions, and several alternatives were proposed including zero-inflated statistical distributions and GAM or GLM modeling. The analysis of trawl survey data will likely be a subject of rockfish assessment scientists in the near future, and would ideally also involve scientists from the RACE survey division.

## **References**

Gharrett, A.J., R.J. Riley, and P.D. Spencer. 2012. Genetic analysis reveals restricted dispersal of northern rockfish along the continental margin of the Bering Sea and Aleutian Islands. *Trans. Am. Fish. Soc.* 141:370-382.

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