CHAPTER 12

Assessment of Pacific ocean perch in the Bering Sea/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 Pacific ocean perch (POP) in the BSAI area is conducted. The 2012 full assessment can be found at http://www.afsc.noaa.gov/REFM/docs/2012/BSAIpop.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 includes replacing the estimated 2012 catch with the final catch value and revising the 2013 catch estimate. The 2012 catch was 24,143 t, 1.4% higher than the estimate of 23,813 t that was used in the 2012 projection. The 2013 catch through October 19th, 2013 was 27,331 t. The estimated 2013 catch of 34,324 t was obtained by summing the reported 2013 through September (26,932 t) and the product of the remaining amount of catch under the ABC (8,168 t) and an estimate of the proportion of the remaining Oct-Dec ABC which has been caught in recent years (91%, based on 2011 and 2012 data). The 2014 catch is assumed to be the ABC obtained from the projection model. A summary of the updated projection model results is shown below; the estimated projection for total biomass (ages 3+), spawning biomass, ABC, and OFL for 2014 are each within 1% of the values obtained from the 2012 projection model.

Quantity	As estimated or specified last year for: 2013	2014	As estimated or recommended this year for: 2014	2015
M (natural mortality rate)	0.062	0.062	0.062	0.062
Tier	3a	3a	3a	3a
Projected total (age 3+) biomass	662,559	638,991	639,505	620,270
Female spawning biomass (t)				
Projected	273,683	257,641	257,878	243,400
$B_{100\%}$	459,436	459,436	459,436	459,436
$B_{40\%}$	183,774	183,774	183,774	183,774
$B_{35\%}$	160,803	160,803	160,803	160,803
F_{OFL}	0.076	0.076	0.076	0.076
$maxF_{ABC}$	0.063	0.063	0.063	0.063
F_{ABC}	0.063	0.063	0.063	0.063
OFL (t)	41,909	39,549	39,585	37,817
maxABC (t)	35,068	33,091	33,122	31,641
ABC (t)	35,068	33,091	33,122	31,641
Status	As determined last year for: 2011	2012	As determined this year for: 2012	2013
Overfishing	No	n/a	No	n/a
Overfished	n/a		n/a	No
Approaching overfished	n/a		n/a	No

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

Area Apportionment

The ABC for BSAI Pacific ocean perch is currently apportioned among four areas: the western, central, and eastern Aleutian Islands, and the eastern Bering Sea, with the apportionments based upon the weighted averages of the most recent three surveys. Weights of 4, 6, and 9 are used, with higher weights being applied to the more recent surveys. The survey averaging workgroup is evaluating the use of the random walk random effects model to smooth survey time series for computing area apportionments. The estimated current biomass by subarea from the two methods are shown below.

	Area			
	WAI	CAI	EAI	EBS
Weighted average biomass (t)	309,281	212,452	297,914	247,579
Proportion of biomass	29.0%	19.9%	27.9%	23.2%
Estimated 2013 biomass (from random effects model)	290,991	220,701	304,932	241,897
Proportion of biomass	27.5%	20.8%	28.8%	22.9%

The two methods would lead to similar area apportionments. Because the survey averaging workgroup is interested in additional simulation testing before making a final recommendation on a methodology for using survey data to compute area apportionments, the recommend ABCs in this update are based upon the weighted average of the three most recent surveys.

Summaries for the Plan Team

The following table gives the current apportionments used in this assessment, the projected OFLs and apportioned ABCs for 2014 and 2015, and the recent OFLs, ABCs, TACs, and catches.

Area	Year	Age 3+ Biomass	OFL	ABC	TAC	Catch[1]
EBS	2012			5,710	5,710	5,590
Eastern AI	2012			5,620	5,620	5,519
Central AI	2012			4,990	4,990	4,799
Western AI	2012			8,380	8,380	8,236
BSAI	2012	594,000	35,000	24,700	24,700	24,144
EBS	2013			8,130	8,130	1,689
Eastern AI	2013			9,790	9,790	8,830
Central AI	2013			6,980	6,980	6,747
Western AI	2013			10,200	10,200	10,064
BSAI	2013	663,000	41,900	35,100	35,100	27,331
EBS	2014			7,684	n/a	n/a
Eastern AI	2014			9,246	n/a	n/a
Central AI	2014			6,594	n/a	n/a
Western AI	2014			9,598	n/a	n/a
BSAI	2014	639,505	39,585	33,122	n/a	n/a
EBS	2015			7,340	n/a	n/a
Eastern AI	2015			8,833	n/a	n/a
Central AI	2015			6,299	n/a	n/a
Western AI	2015			9,169	n/a	n/a
BSAI	2015	620,270	37,817	31,641	n/a	n/a

[1]2013 catch through October 19, 2013.P

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 for *M* in this update is computed to two 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 POP.

The SSC recommends that the author further investigate [the posterior distribution for *M* having a higher mean than the prior distribution] *by conducting a sensitivity study in which (1) the prior distribution is not used, and (2) the mean and variance of the prior are varied. In addition, there should be a section in the methods that describes how the prior distributions were chosen.*

The SSC offers the following advice to assessment authors:
- *Explore alternative selectivity patterns*
- *Evaluate alternative selectivity time periods*
- *Provide model sensitivity to Q and M*
- *Explore lack of fit to the plus age group*
- *Fit to the maturity data should be evaluated for potential bias from excess data consisting of 100% and 0% maturity because the logistic model cannot predict 0 and 1.*
- *Consider use of other parametric and non-parametric estimation of the uncertainties of unknown parameters such as bootstrapping and jackknife. This may result in different variance-covariance matrices although asymptotically the same.*

These issues will be address in upcoming full stock assessments. The advice on natural mortality, selectivity, and catchability also echo those made in the 2013 rockfish CIE review. We also note that some similar comments were made in the December, 2010 minutes of the SSC, and evaluation of new methodology was deferred in the 2012 full assessment due to the upcoming 2013 rockfish CIE review.

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 if 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.*

Much of the discussion concerning stock structure for BSAI stocks has focused on rockfish species. A comparison of stock structure information across Alaska rockfish stocks may help consistency in the application spatial management measures. The stock structure template has not been completed for BSAI POP, in part because this stock has the finest spatial partitioning of ABCs of any of the BSAI rockfish stocks or stock complexes. Completing the stock structure template for BSAI POP in 2015 seems feasible, as much of the effort in 2014 will be directed toward addressing the comments from the 2013 CIE review panel.

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. For BSAI POP, the CIE reviewers suggested dome-shaped fishery selectivity as a possible remedy to the poor fit to plus group in the survey age composition data, and this will be also be evaluated in the upcoming full assessment. Finally, 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.

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