

## **Estimation of current and future catches for stock assessment**

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The stock assessment cycle in Alaska takes place before complete estimates of catch for the current year are available. In addition, future catches are often much different (usually lower) than projected ABCs. In 2007, the NMFS Alaska Regional Office requested that stock assessment authors estimate current and future catches instead of using the October estimate for the current year, and TAC or maximum ABC for future years which has been the default. This was requested so that future ABCs and OFLs would deviate less from preliminary specifications as projections were updated, if no model changes occurred. Since that time, a variety of methods have been employed. At the November 2013 Plan Team meeting it was requested that the methods in use be compiled and presented in September 2014. This document is a result of that request.

This issue is generally only relevant to stocks with an age-structured model, which are stocks in Tier 3 or above (with the exception of GOA rex sole, which is an age-structured model in Tier 5). There are two different aspects of specifying these current and future catches:

- 1) Do authors estimate current year catch as the expected full year catch by the end of the year? If so, how is this quantity estimated?

Most stocks in the GOA (Table 1) and all stocks in the BSAI (Table 2) use some method to estimate catch for the full year. Some stocks had a method that was articulated and others used expert judgment to choose a reasonable value. However, some of the flatfish stocks and Pacific cod in the GOA appeared to use the catch up to a date in October with no estimate of full year catch, while the GOA pollock projection uses the TAC for the current year. Most methods that were documented were generally an expansion factor based on catches during the last few months of prior years.

- 2) Do the authors employ estimates of catch for the next two years that are different than maximum permissible ABC?

The methods for projecting catches into future years varied considerably in both the GOA and the BSAI (Tables 1, 2). Most methods that estimated future catches used either an average fishing mortality rate from prior years, or used a ratio of prior year Catch/TAC to the ABCs from the maximum permissible ABC projection scenario. Several others used average catch for a period, or repeated their current year estimate of catch. For BSAI Atka mackerel the projections were based on regulatory restrictions. Two years of future catch estimates are necessary if the spawning month for that stock is in a month later than January to account for a different amount of fishing mortality that occurs before spawning. Of the assessments that estimated a value different than maximum permissible ABC, only BSAI Atka mackerel, Alaska sablefish, and the four GOA rockfish assessments projected different values for each of the 2 years out.

### **Summary and recommendations:**

It is unlikely there is a simple way to evaluate any of the methods in use as superior. However, for stocks where the annual catches are very different than the ABC, current year and future catches should be estimated using some method that is closer to expected outcomes. Stocks that are very close to fully exploited are unlikely to see large changes using values different than full TAC or ABC. Conversely, stocks that are serially underharvested will routinely project ABCs that are too low. These underestimated ABCs have no impact if a stock is usually underharvested and is not apportioned to areas. However, some stocks' ABCs are subdivided among areas and are fully exploited in some of those areas. Specifying whole assessment catches for these stocks that are routinely too high would result in area ABCs that are lower than necessary (e.g., sablefish, GOA pollock).

**In general, it is recommended that authors establish their best available estimate of catch in the current year and the next two years. Authors should also document how those projected catches were determined in the *Harvest Recommendations* section (ideally Scenario 2).**

**Definitions:**

**Author's estimate (Expert judgment):** The authors expanded the catch for the current year, but not by a specified method.

**maxFABC:** The standard scenario 1 approach of harvest scenarios where the fishery is expected to take the full ABC in all projected years.

**Date total catch (e.g., Oct. 17 total catch):** Using some last estimate from the Regional Office/AKFIN that was not expanded to the end of the year.

Table 1. Methods of current and future year catch estimation for Gulf of Alaska stock assessments.

Gulf of Alaska	Current year	Next 2 years	2013 Catch/ABC	Notes
Pollock	Equal to current year TAC	Authors F_ABC (Dorn control rule)	W (61) 27% C (62) 103% C (63) 109% WYAK 87% Total 85%	
Pacific cod	Oct. 22 total	maxFABC	W 68% C 66% E 16% Total 65%	
Sablefish	Expansion factor of last 3 full years of catch between October 1 and December 31	Ratio of the last three years official catches to the last three TACs times ABC	W 79% C 94% WYAK 104% SEO 102% Total 95%	
Shallow-water Flatfish	Oct. 31 total	maxFABC	W 1% C 27% WYAK 0% SEO 0% Total 12%	N. and S. rock sole are in Tier 3
Deep-water flatfish	Oct. 19 total	maxFABC	W 11% C 9% WYAK 0% SEO 0% Total 5%	Dover sole are in Tier 3
Arrowtooth	Oct. 27 total plus 5 year average of November and December catch	5 year average F for one year	W 3% C 15% WYAK 0% SEO 0% Total 10%	

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Gulf of Alaska	Current year	Next 2 years	2013 Catch/ABC	Notes
Flathead sole	Oct. 19 total	maxFABC	W 4% C 8% WYAK 0% SEO 0% Total 6%	
Rex Sole	Ratio of total catch in prior year to catch up to the catch date from prior year, multiplied by current year catch	Estimated catch for current year for one year	W 8% C 57% WYAK 0% SEO 0% Total 39%	Tier 5 using Tier 3 projections
Pacific ocean perch	Expansion factor of last 3 full years of catch between October 1 and December 31	Ratio of the last three years official catches to the last three TACs times ABC	W 22% C 103% WYAK 94% SEO 0% Total 80%	
Northern rockfish	Expansion factor of last 3 full years of catch between October 1 and December 31	Ratio of the last three years official catches to the last three TACs times ABC	W 108% C 87% E N/A Total 95%	
Dusky rockfish	Expansion factor of last 3 full years of catch between October 1 and December 31	Ratio of the last three years official catches to the last three TACs times ABC	W 57% C 83% WYAK 1% SEO 3% Total 67%	
Rougheye/BS	Expansion factor of last 3 full years of catch between October 1 and December 31	Ratio of the last three years official catches to the last three TACs times ABC	W 19% C 45% E 60% Total 47%	

Table 2. Methods of current and future year catch estimation for Bering Sea/Aleutian Islands stock assessments.

Bering/Aleutians	Current year	Next 2 years	2013 Catch/ABC	Notes
EBS Pollock	Author's estimate (expert judgment)	Five year average F	92%	
AI Pollock	Author's estimate (expert judgment)	Five year average F	8%	
EBS Pacific cod	1) Compute the average catch for that season in each of the last three years. 2) Use the greater of the estimate obtained in Step 1 and the current season-to-date catch (Oct. 12), unless the result would cause the current ABC to be exceeded, in which case use the current season-to-date catch.	maxFABC	80% (BSAI)	
AI Pacific cod	Same as EBS	maxFABC	80% (BSAI)	
Yellowfin Sole	Author's estimate (expert judgment)	1 year of author's estimate	80%	
Greenland turbot	Author's estimate (expert judgment)	maxFABC	BS = 90% AI = 68% Total = 85%	
Arrowtooth	October 27 plus average catch of prior 3 years from Nov-Dec	1 year catch at average of prior 3 complete years	13%	
Kamchatka	Author's estimate (expert judgment)	maxFABC	64%	
Flathead sole	Ratio of total catch in prior year to catch up to the catch date from prior year, multiplied by current year catch	Estimated catch for current year for one year	26%	
Northern rock sole	October 26 total +11%	October 26 +11% for one year	28%	
Alaska plaice	Author's estimate (expert judgment)	5 prior year average catch for one year	43%	
Pacific ocean perch	September total + remaining ABC multiplied by average proportion of remaining post-September ABC caught in prior 2 years	maxFABC	BS = 62% EAI = 97% CAI = 97% WAI = 99% Total = 89%	

Table 2. Methods of current and future year catch estimation for Bering Sea/Aleutian Islands stock assessments.

<b>Bering/Aleutians</b>	<b>Current year</b>	<b>Next 2 years</b>	<b>2013 Catch/ABC</b>	<b>Notes</b>
Northern rockfish	September total + remaining ABC multiplied by average proportion of remaining post-September ABC caught in prior 2 years	Fishing mortality from prior 2 complete years for one year	21%	
Rougheye/BS	AI September total + remaining BSAI ABC multiplied by average proportion of post-September BSAI ABC caught in prior 2 years and average proportion of the BSAI catch that occurred in the AI subarea in the prior 2 years	Fishing mortality from prior 2 complete years for one year	EBS/EAI = 105% CAI/WAI = 70% Total = 86%	
Atka mackerel	Full TAC (TAC usually lower than ABC)	Expected SSL reductions to full ABC for 2 years	EAI/BS = 93% CAI = 46% WAI = 1% Total = 46%	
Alaska skates	September 18 total	MaxFABC	70%	