7. Assessment of the arrowtooth flounder stock in the Gulf of Alaska

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Executive Summary

Summary of Changes in Assessment Inputs

1. Catch and retention data are updated with partial data for 2014.

The Gulf of Alaska arrowtooth flounder stock is assessed on a biennial basis to coincide with the annual GOA groundfish trawl survey. These surveys occur in odd years, and for these years a full assessment of arrowtooth flounder in the GOA area is conducted. On even years, parameter values from the previous year's assessment model (Spies and Turnock 2013) and total catch information for the current and previous year are used to make projections and to recommend ABC and OFL for the following two years.

Summary of Results

	As estimated or *specified last* year for:		*As estimated or *recommended this* year for:	
Quantity	2014	2015	2015	2016
M (natural mortality rate)	0.2 females, 0.35 males	0.2 females, 0.35 males	0.2 females, 0.35 males	0.2 females, 0.35 males
Tier	3a	3a	3a	3a
Projected total (age 3+) biomass (t)	1,978,340	1,949,990	1,957,970	1,915,170
Projected Female spawning biomass	1,205,440	1,176,280	1,189,120	1,147,450
$B_{100\%}$	1,155,170	1,155,170	1,155,170	1,155,170
$B_{40\%}$	462,067	462,067	462,067	462,067
$B_{35\%}$	404,309	404,309	404,309	404,309
F_{OFL}	0.204	0.204	0.204	0.204
$maxF_{ABC}$	0.172	0.172	0.172	0.172
F_{ABC}	0.172	0.172	0.172	0.172
OFL (t)	229,248	222,160	226,390	217,522
maxABC (t)	195,358	189,556	192,921	185,352
ABC (t)	195,358	189,556	192,921	185,352
	As determined *last* year for:		As determined *this* year for:	
Status	current year 2012	current year 2013	current year 2013	current year 2014
Overfishing		No		No
Overfished	No		No	
Approaching overfished	No		No	

*Projections are based on estimated catches of 39,744 t used in place of maximum permissible ABC for 2015 and 2016. This value was extrapolated from the proportion of the total 2013 catch caught by October 25 of that year, and the total catch through October 25, 2014.

Responses to SSC and Plan Team Comments on Assessments in General

December 2013 SSC Comments:
The SSC noted that different stock assessment scientists often use different methods for catch estimation to estimate catches between late October and December 31 of the current assessment year, as well as catches to be taken during the following two years for use in the catch specification process. The SSC understands that Dana Hanselman will compile the various methods in use. The SSC looks forward to Plan Team advice on the merits of the various alternatives.

Authors' response:
The catch estimation was based on the total catch in 2013. Justification is discussed in the document under Harvest Recommendations.

Responses to SSC and Plan Team Comments Specific to this Assessment

The November 2013 plan team recommended that the author consider examining how estimating catchability affects the model. In addition, the author is encouraged to examine inclusion of age 1+ fish in the model, versus using only ages 3+. This suggested change would incorporate additional data about size at age for these younger fish. The Team also recommended incorporating new maturity data into the model, following the methodology currently used in the northern and dusky rockfish assessments. The Team recommends completing an executive summary for 2014 rather than a full assessment, unless new maturity data becomes available or if substantial model changes are adopted. The Team also requested the author complete the stock structure template for review in September.

Author's response: The 2014 assessment represents an executive summary, as substantial model changes have not been adopted. The author would like to defer responses to these comments until September, 2015. The author presented work on standardization of the Bering Sea and Aleutian Islands (BSAI) and GOA models in September 2014, and will present recommended changes in 2015. The author completed and presented the stock structure template for arrowtooth flounder in September 2014.

Area Allocation of Harvests

The ABC by management area using $F_{40\%}$ was estimated by calculating the fraction of the survey biomass in each area and applying that fraction to the GOA-wide ABC. The recommended area apportionment percentages are identical to last year because there was no new survey information. The apportionments are estimated using the 2013 percent survey biomass by area.

Arrowtooth ABC by INPFC area

	Western	Central	West Yakutat	East Yakutat/SE	Total
2013 survey biomass percent by area	15.94	59.18	19.06	5.82	100
ABC (based on 2013 proportions and biomass estimates)					
ABC 2014	31,142	115,612	37,232	11,372	195,358
ABC 2015	30,752	114,171	36,771	11,228	192,921
ABC 2016	29,545	109,691	35,328	10,787	185,352

Harvest Recommendations

The projection model was used to estimate the 2015 ABC at 192,921 t, and the 2016 ABC at 185,352 t, using F_{ABC}=0.172. The stock is not overfished, and is not approaching a condition of being overfished. Catch as of October 25, 2014 was available and catch for the remainder of the year was projected for use in the projection model. Catch as of October 25, 2013 was 18,315 t, 85% of the total catch for the year. Therefore, the 2014 catch estimate of 39,744 t is based on the October 25, 2014 catch estimate of 33,782 t scaled up by 15%. The 2015 and 2016 catch estimates are also 39,744 t, based on the assumption that recent fishing trends will continue.

Arrowtooth flounder catch in the current year (2014) is the highest on record. This is partially due to recent changes to regulations (Amendment 95) of the halibut trawl prohibited species catch (PSC) limits. For the Amendment 80 fleet in the GOA, unused halibut PSC limits are now allowed to be rolled from one season to the next, which allows catcher processors to spend more time targeting arrowtooth flounder without constraints due to halibut PSC. In addition, new regulations have moved the deep-water flatfish fishery closure date later in the year for all trawl vessels. These changes will likely result in continued higher arrowtooth flounder catches than previous years, similar to the current year.

Data gaps and research priorities

Otoliths have been aged through the 2009 survey, but continued aging will allow monitoring of growth trends. A population genetic study on arrowtooth flounder would be useful for stock structure in this species.

Summary table for the Plan Team

Year	Age 3+ Biomass (t)[1]	Female spawning biomass (t)[1]	OFL	ABC	TAC	Catch[2]
2013	2,055,560	1,274,290	247,196	210,451	25,000	21,625
2014	1,978,340	1,205,440	229,248	195,358	25,000	33,782
2015	1,957,970	1,189,120	226,390	192,921		
2016	1,915,170	1,147,450	217,522	185,352		

[1] Results from age-structured projection model.
[2] Catch as of October 25, 2014.

Literature cited

Spies, I. and Turnock, J. 2013. Assessment of the arrowtooth flounder stock in the Gulf of Alaska. North Pacific Fishery Management Council, P. O. Box 103136, Anchorage, AK 99510.