17. Assessment of the Atka mackerel stock in the Gulf of Alaska

Executive Summary

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Gulf of Alaska (GOA) Atka mackerel has been moved to a biennial stock assessment schedule to coincide with the availability of new survey data from the biennial trawl survey. A full assessment was presented in 2011, which included data from the 2011 GOA bottom trawl survey. On alternate (even) years we present an executive summary with updated catch, last year's key assessment parameters, any significant new information available in the interim, and projections for this year. Although a survey was conducted in 2013, we only provided an expanded executive summary with updated catch and the 2013 survey information, due to the government shut-down in October 2013.

Gulf of Alaska Atka mackerel have been managed under Tier 6 specifications since 1996 due to the lack of reliable estimates of current biomass. In 2007, the assessment presented for consideration, Tier 5 calculations of ABC and OFL based on 2007 survey biomass estimates. However, the Plan Team and SSC agreed with the authors that reliable estimates of Atka mackerel biomass were not available and recommended continuing management under Tier 6. The 2012 and 2013 updates presented Tier 6 recommendations and did not present Tier 5 calculations given the large variances associated with the 2011 and 2013 survey biomass estimates, which were essentially based on one to two significant hauls encountered in the western Gulf of Alaska. The Council set the Gulf-wide 2014 (and 2015) OFL, ABC, and TAC for Atka mackerel at 6,200 t, 4,700 t, and 2,000 t, respectively. The 2011 full assessment is available on the web (Lowe *et al*. 2011, http://www.afsc.noaa.gov/refm/docs/2011/GOAatka.pdf). Last year's update with the 2013 survey information is available at http://www.afsc.noaa.gov/REFM/Docs/2013/GOAatka.pdf.

Summary of Changes in Assessment Inputs

New catch information includes updated 2013 catch (1,277 t), and 2014 catch (845 t) as of October 18, 2014 (http://alaskafisheries.noaa.gov/2014/car110_goa.pdf)

The 2014 GOA Atka mackerel catch through October 18 was 42% of the 2014 TAC; the 2013 GOA Atka mackerel catch was 64% of the TAC. Figure 17.1 shows the 2014 distributions of observed catches of Atka mackerel in the Gulf of Alaska summed over 20 km areas. Open circles represent observed catches greater than 1 t. Unlike previous years when large catches were taken in the Shumagin (610) Area and to some extent in the Chirikof (620) Area in the second half of the year, only minimal catches were taken in the Chirikof Area during July to October, 2014.

Since the 2011 assessment and 2013 update, ages from the 2013 GOA fisheries have become available. A total of 144 otoliths were collected from 36 hauls from the Shumagin and Chirikof areas. The data show the strong 2006 and 2007 year classes observed in the Aleutian Islands (Figure 17.2). The 2001 year class, which was very strong in the Aleutian Islands, is still observed in the GOA age distribution.

New survey age information is available from the 2013 summer bottom trawl survey. Similar to the GOA fishery data, the strong 2006 and 2007 year classes are predominant in the survey age composition (Figure 17.3). Also, the 2011 year class was evident in the 2013 GOA survey age composition.

Summary of changes in assessment methodology

There were no changes in assessment methodology since this was an off-cycle year.

Summary of Results

There is no new information incorporated into the projection. For the 2015 (and 2016) fishery, we recommend an ABC of 4,700 t. This ABC is equivalent to last year's ABC for 2014. The corresponding reference values for Atka mackerel are summarized below. Because abundance information for Atka mackerel is very limited, they are managed in Tier 6.

	As estimated or *specified last* year for:		As estimated or *recommended this* year for:	
Quantity	2014	2015	**2015**	2016
M (natural mortality)	0.3	0.3	**0.3**	0.3
Tier	6	6	**6**	6
OFL (t)	6,200	6,200	**6,200**	6,200
maxABC (t)	4,700	4,700	**4,700**	4,700
ABC (t)	4,700	4,700	**4,700**	4,700
	As determined *last* year for:		As determined *this* year for:	
Status	2012	2013	2013	2014
Overfishing	n/a	n/a	**n/a**	n/a
(for Tier 6 stocks, data are not available to determine whether the stock is in an overfished condition)				

Area apportionment

There is no area apportionment for GOA Atka mackerel. The Council manages GOA Atka mackerel on a Gulf-wide basis.

Summaries for the Plan Team

Species	Year	Biomass	OFL	ABC	TAC	Catch
	2013	Unknown	6,200	4,700	2,000	1,277
Atka mackerel	2014	Unknown	6,200	4,700	2,000	845[1]
(Gulfwide)	2015	Unknown	6,200	4,700		
	2016	Unknown	6,200	4,700		

1/ Current as of October 18, 2014 (http://alaskafisheries.noaa.gov/2014/car110_goa.pdf).

Responses to SSC and Plan Team Comments on Assessments in General

From the December 2013 SSC minutes: *The SSC asks assessment authors to project the reference points for the future two years (e.g., 2014 and 2015) on the phase diagrams.*

GOA Atka mackerel are a Tier 6 species and phase diagrams are not applicable for this assessment.

From the September 2013 Joint Plan Team minutes:
Accounting for total catch removals: The Teams recommended that SAFE chapter authors continue to include "other" removals as an appendix. Optionally, authors could also calculate the impact of these removals on reference points and specifications, but are not required to include such calculations in final recommendations for OFL and ABC.

Other removals are reported in Appendix 17A.—Supplemental Catch Data in the 2011 full assessment, and will be updated and reported in the 2015 full assessment.

<u>Retrospective analyses</u>: In conformity with the main recommendations of the Retrospective Working Group, the Team recommended the following:

1. *Assessment authors should routinely do retrospective analyses extending back 10 years, plot spawning biomass estimates and error bars, plot relative differences, and report Mohn's rho (revised).*
2. *If a model exhibits a retrospective pattern, try to investigate possible causes.*
3. *Communicate the uncertainty implied by retrospective variability in biomass estimates.*
4. *For the time being, do not disqualify a model on the grounds of poor retrospective performance alone.*
5. *Do consider retrospective performance as one factor in model selection.*

GOA Atka mackerel are a Tier 6 species and retrospective analyses are not applicable for this assessment.

<u>Total Current Year Removals</u>: The Teams recommended that each stock assessment model incorporate the best possible estimate of the current year's removals.

GOA Atka mackerel are a Tier 6 species and projections (requiring total current year catch) are not conducted for this assessment.

Responses to SSC and Plan Team Comments Specific to this Assessment

***From the December 2013 SSC minutes**: Consideration should be given to doing a sablefish-like assessment in which a combined BSAI and Gulf of Alaska model is developed and used to partition Atka mackerel ABCs and OFLs between the BSAI and GOA. This would only work if the surveys can be effectively combined (perhaps with use of the random effects model) and the allocation proportions have reduced variance compared to those of the survey totals. However, given that there is no evidence for a genetic difference and that the GOA component is just the fringe end of the BSAI stock, it seems more biologically reasonable to do a combined assessment.*

GOA Atka mackerel are a Tier 6 species because reliable estimates of biomass are not available. The 2013 survey biomass estimate of GOA Atka mackerel is associated with a coefficient of variation (*CV*) of 67%, reflecting a variance of 4.96 billion. Most of the GOA survey Atka mackerel biomass (>90%) is distributed within the Shumagin Area of the western GOA, and the 2013 estimate of Shumagin Area biomass is associated with a *CV* of 94%, reflecting a variance of 4.6 billion. Directed fishing for GOA Atka mackerel is prohibited under Steller sea lion protection measures, and there are very limited fishery age data. Unlike the Aleutian Islands fishery age compositions, the GOA data only show 1 to 2 strong year classes in the bycatch which have also been observed in the Aleutian Islands. Unlike sablefish, which exhibit extremely high movement rates throughout their lives, adult Atka mackerel show limited movement and no evidence of migratory behavior. The lack of genetic differences in Alaska Atka mackerel is thought to be due to mixing occurring at the pelagic larval stage. Because Atka mackerel do not migrate and show little movement after settlement , CIE reviewers from the 2014 BSAI Atka mackerel stock assessment review suggested consideration of separate applications of the BSAI model to the 3 Aleutian Islands sub-areas to account for spatial variability in survey and fishery data. For these reasons we continue to recommend separate assessment and management of GOA Atka mackerel.

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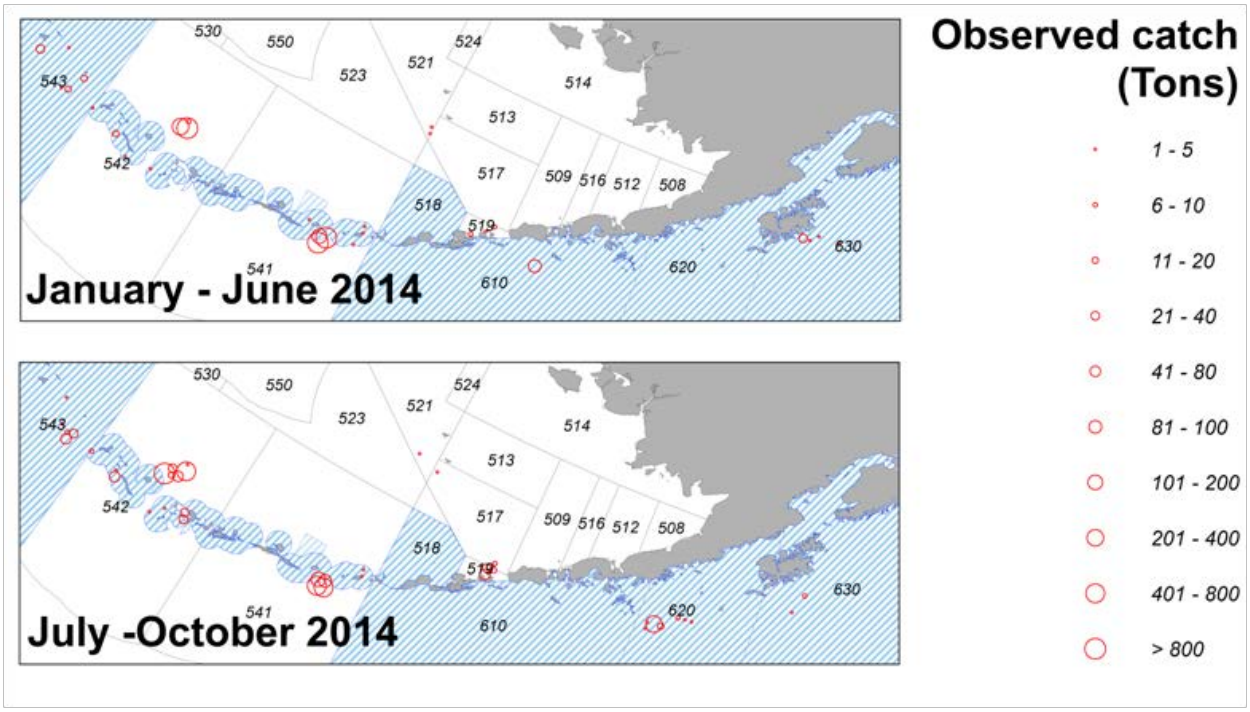

Figure 17.1. Observed catches of Atka mackerel summed for 20 km^2 cells for 2013 where observed catch per haul was greater than 1 t. Shaded areas represent areas closed to directed Atka mackerel fishing.

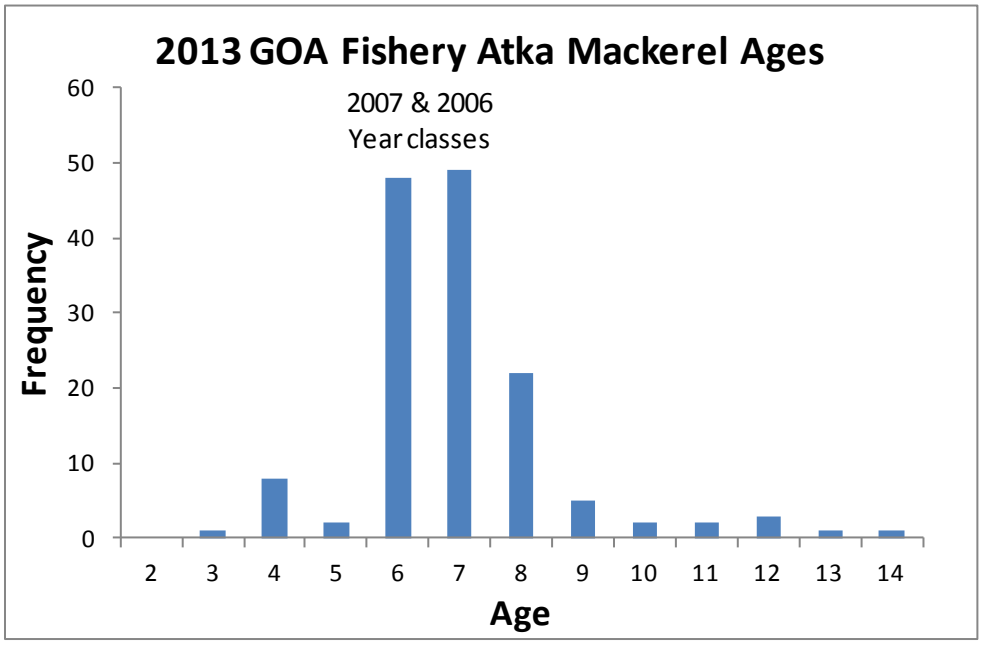

Figure 17.2. Age frequency distribution of Atka mackerel from the 2013 Gulf of Alaska fisheries. A total of 144 otoliths were collected and aged from the Shumagin (610) and Chirikof (620) areas.

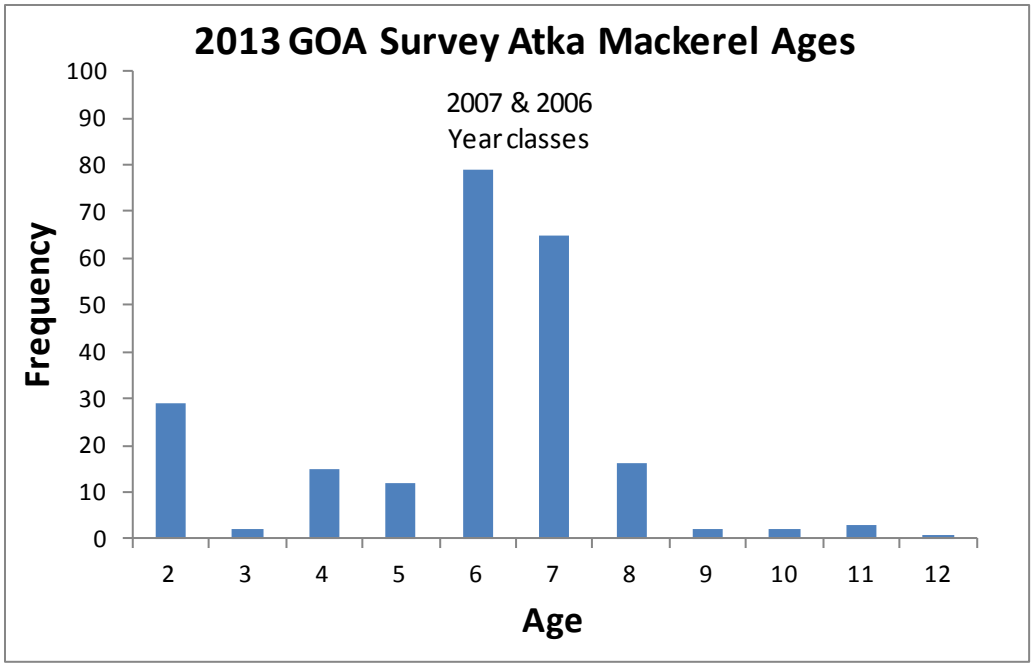

Figure 17.3. Age frequency distribution of Atka mackerel from the 2013 Gulf of Alaska bottom trawl survey. A total of 226 otoliths were collected and aged from the Shumagin (610) and Chirikof (620) areas.

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