BSAI Atka Mackerel
Model 16.0b

Changes in the Input Data

- Fishery catch data updated (2020, 2021=TAC)
- 2020 fishery age composition data added
  - 2012 year class \( \uparrow \) 4% (59% above ave.)
  - 2017 year class \( \uparrow \) 33% (≈ ave.)
- The est. average selectivity for 2016-2020 used for projections
- Assume 85% of the BSAI-wide ABC to be taken under revised SSL RPAs; % applied to 2022 (and 2023) maxABC for projections
BSAI Atka Mackerel

Key Results

- Tier 3b
  - $B_{100\%}$, $B_{40\%}$, and $B_{35\%} \approx$ last year’s estimates
  - 2022 spawning biomass (109,360 t) 1% higher, below $B_{40\%}$ ($B_{39\%}$), Tier 3b
  - 2022 projections:
    - Yield at $F_{40\% adj} = 0.54$
    - 2022 ABC = 78,510 t  
      2022 OFL = 91,870 t
      (7% higher than 2021 ABC & OFL)

Model 16.0b (last year’s accepted model)
2020-2021
Atka mackerel fishery locations

January - June 2020

July - December 2020

January - June 2021

July - October 2021

Observed catch (Tons)

- 1 - 5
- 6 - 10
- 11 - 20
- 21 - 40
- 41 - 80
- 81 - 100
- 101 - 200
- 201 - 400
- 401 - 800
- 801 - 3000
Atka mackerel fishery length-frequency data by area fished
2,111 otoliths aged
Mean age = 5.9 yrs

1,510 otoliths aged
Mean age = 6.1 yrs

2019 Aleutian Islands Fishery

2020 Aleutian Islands Fishery

2,111 otoliths aged
Mean age = 5.9 yrs
A total of 1,052 otoliths were aged from 2018 survey; mean age is 6 years
A total of 1,581 otoliths were aged from 2018 fishery; mean age is 5.8 years
Bottom trawl survey CPUE distributions of Atka mackerel catches

2016

2018

21% decrease, CV 30%
Fishery selectivity pattern from the BSAI Atka mackerel assessment Model 16.0b
Estimated fishery selectivity patterns in the current assessment with:
a) last year's average for projections (2015-2019),
b) the 2021 assessment average selectivity used for projections (2016-2020),
c) last year's assessment terminal year (2019), and
d) the 2021 assessment terminal year (2020) compared with the maturity-at-age estimates for BSAI Atka mackerel.
Time series of the current assessment (Model 16.0b) estimated Al Atka mackerel spawning biomass (t) with approximate 95% confidence bounds, compared to last year’s Model 16.0b estimates (2020 assessment). Changes include 2020 fishery age composition data in the current assessment.
Age 1 recruitment from the current assessment (2021) with the dashed line indicating average recruitment (569 million) from the 1977-2019 year classes, and age 1 recruitment as estimated from the 2020 assessment.
Observed and predicted survey proportions-at-age for BSAI Atka mackerel. Lines with “•” symbol are the model predictions and columns are the observed proportions at age.
Observed and predicted Atka mackerel fishery proportions-at-age for BSAI Atka mackerel. Lines with “•” symbol are the model predictions and columns are the observed proportions at age (with colors corresponding to cohorts).
Retrospective plots showing the spawning biomass over time (top) and the relative difference (bottom) over 10 different “peels”. Mohn’s rho was 0.062.
Projected Atka mackerel catch (assuming TAC taken in 2021 and reduced 2022 and 2023 catches; top) and spawning biomass (bottom) in thousands of metric tons under maximum permissible harvest control rule specifications after 2023.
BSAI Atka mackerel spawning biomass relative to $B_{35\%}$ and fishing mortality relative to $F_{OFL}$ (1977-2023)
BSAI Atka Mackerel
Overfishing Level and Maximum Permissible ABC

Catch assumptions:
- Total 2021 year end catch set = TAC (62,257 t) for ABC/OFL specification purposes
- For 2022 & 2023 assume that 85% of the BSAI-wide ABC would be taken
  - Due to revised SSL RPAs
  - Affects ABC and OFL values

Selectivity assumption for projections:
- Estimated ave. selectivity for 2016-2020
BSAI Atka Mackerel

<table>
<thead>
<tr>
<th>Quantity</th>
<th>As estimated or specified last year for:</th>
<th>As estimated or recommended this year for:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2021</td>
<td>2022</td>
</tr>
<tr>
<td>Tier</td>
<td>3b</td>
<td>3b</td>
</tr>
<tr>
<td>Projected total (age 1+) biomass (t)</td>
<td>560,360</td>
<td>599,690</td>
</tr>
<tr>
<td>Projected Female spawning biomass</td>
<td>107,830</td>
<td>102,950</td>
</tr>
<tr>
<td>$B_{40%}$</td>
<td>116,330</td>
<td>116,330</td>
</tr>
<tr>
<td>$B_{35%}$</td>
<td>101,790</td>
<td>101,790</td>
</tr>
<tr>
<td>$F_{OFL}$</td>
<td>0.51</td>
<td>0.49</td>
</tr>
<tr>
<td>$maxF_{ABC}$</td>
<td>0.43</td>
<td>0.41</td>
</tr>
<tr>
<td>$F_{ABC}$</td>
<td>0.43</td>
<td>0.41</td>
</tr>
<tr>
<td>OFL (t)</td>
<td>85,580</td>
<td>79,660</td>
</tr>
<tr>
<td>maxABC (t)</td>
<td>73,590</td>
<td>68,220</td>
</tr>
<tr>
<td>ABC (t)</td>
<td>73,590</td>
<td>68,220</td>
</tr>
</tbody>
</table>

*Projections are based on estimated total catch of 66,740 t and 61,320 t in place of maximum permissible ABC for 2022 and 2023, respectively.*
BSAI Atka Mackerel Apportionment

<table>
<thead>
<tr>
<th>2018 Random Effects Model</th>
<th>541(^1) 50%</th>
<th>542 10%</th>
<th>543 40%</th>
</tr>
</thead>
</table>
1Includes eastern Aleutian Islands and southern Bering Sea areas.

4-Survey Weighted Average (Recommended)

<table>
<thead>
<tr>
<th>Weighted Average</th>
<th>2012</th>
<th>2014</th>
<th>2016</th>
<th>2018</th>
<th>2022 Apportionment</th>
<th>2022</th>
<th>2023</th>
</tr>
</thead>
<tbody>
<tr>
<td>541+SBS</td>
<td>12%</td>
<td>42%</td>
<td>35%</td>
<td>38%</td>
<td>0.35</td>
<td>27,260</td>
<td>25,000</td>
</tr>
<tr>
<td>542</td>
<td>39%</td>
<td>28%</td>
<td>30%</td>
<td>7%</td>
<td>0.21</td>
<td>16,880</td>
<td>15,470</td>
</tr>
<tr>
<td>543</td>
<td>48%</td>
<td>30%</td>
<td>35%</td>
<td>55%</td>
<td>0.44</td>
<td>34,370</td>
<td>31,520</td>
</tr>
<tr>
<td>Weights</td>
<td>8</td>
<td>12</td>
<td>18</td>
<td>27</td>
<td>1.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>78,510</td>
<td>71,990</td>
</tr>
</tbody>
</table>
### Should the ABC be reduced below the maximum permissible ABC?

<table>
<thead>
<tr>
<th>Assessment-related considerations</th>
<th>Population dynamics considerations</th>
<th>Environmental/ecosystem considerations</th>
<th>Fishery Performance considerations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Level 1: Typical to moderately increased concerns</td>
<td>Level 1: Stock trends are typical for the stock; recent recruitment is within normal range.</td>
<td>Level 1: No apparent environmental/ecosystem concerns</td>
<td>Level 1: No apparent fishery/resource-use performance and/or behavior concerns</td>
</tr>
</tbody>
</table>

There are no changes to the risk table scores relative to last year, and the scores suggest that setting the ABC below the maximum permissible is not warranted.
Questions?

Thank you and best wishes Wayne!