BSAI Shark Assessments

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Photo: IPHC
BSAI Sharks

- New for 2018:
  - Updated catch data for 2017 and 2018 (as of Oct 9, 2018)
  - Survey data updated
    - Biomass estimates from 2017-2018 AI and EBS shelf surveys
    - RPNs for IPHC longline survey
    - Length data
- No changes to assessment methodology
Responses to PT/SSC Comments

- Major comments (paraphrased):
  - Develop catch by numbers and examine potential bias in observed longline caught Pacific sleeper sharks (PSS)
    - Both are underway, preliminary results of an observer program special project are in Appendix 20.A
  - Bring forward options as discussed during [Nov] PT meeting
    - Included in Alternative Models
  - Examine ageing and data-limited assessment methods
    - In progress
BSAI Shark Complex Catch

- Pacific Sleeper Shark
- Spiny Dogfish
- Salmon Shark
- Other Sharks
Salmon Shark

Salmon Shark Catch in Observed Fisheries

2014

2015

2016

2017
Other/Unidentified Sharks

Unidentified Shark Catch in Observed Fisheries

2014

2015

2016

2017
IPHC - PSS

Pacific Sleeper Shark Catch
IPHC LL Survey

2014

2015

2016

2017
IPHC – Spiny Dogfish

Spiny Dogfish Catch
IPHC LL Survey

Catch (number)
### Assessment Methods

<table>
<thead>
<tr>
<th>Tier 6 Models</th>
<th>OFL</th>
<th>Equation</th>
</tr>
</thead>
<tbody>
<tr>
<td>16.0</td>
<td>Max complex catch 2003–2015</td>
<td>( OFL = \max(C_{2003-2015}) )</td>
</tr>
<tr>
<td>18.0</td>
<td>Mean catch 2003–2015</td>
<td>( OFL = \bar{C}_{2003-2015} )</td>
</tr>
<tr>
<td>18.1</td>
<td>99% upper confidence interval of the mean catch 2003–2015</td>
<td>( OFL = \bar{C}<em>{2003-2015} + t</em>{0.01,12} \times \text{stdev}(\bar{C}_{2003-2015}) )</td>
</tr>
<tr>
<td>18.2</td>
<td>95% upper confidence interval of the mean catch 2003–2015</td>
<td>( OFL = \bar{C}<em>{2003-2015} + t</em>{0.05,12} \times \text{stdev}(\bar{C}_{2003-2015}) )</td>
</tr>
</tbody>
</table>

Model 18.x are results of SSC request to see the “options discussed in the Plan Team (using the 2003-2015 time period)”
ABC and OFL Recommendations

- ABC/OFL set for complex as a whole, not the sum of individual species
- All species are currently Tier 6 (Model 16.0)
# ABC and OFL Recommendations

<table>
<thead>
<tr>
<th>Species</th>
<th>Spiny dogfish</th>
<th>Pacific sleeper shark</th>
<th>Salmon shark</th>
<th>Other/Unidentified shark</th>
<th>Total shark Complex</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum Catch</td>
<td>24</td>
<td>421</td>
<td>199</td>
<td>305</td>
<td>689*</td>
</tr>
<tr>
<td>Model 16.0 OFL</td>
<td>24</td>
<td>421</td>
<td>199</td>
<td>305</td>
<td>689</td>
</tr>
<tr>
<td>Model 16.0 ABC</td>
<td>18</td>
<td>315</td>
<td>149</td>
<td>229</td>
<td>517</td>
</tr>
<tr>
<td>Average Catch</td>
<td>14</td>
<td>166</td>
<td>53</td>
<td>38</td>
<td>270</td>
</tr>
<tr>
<td>Model 18.0 OFL</td>
<td>14</td>
<td>166</td>
<td>53</td>
<td>38</td>
<td>270</td>
</tr>
<tr>
<td>Model 18.0 ABC</td>
<td>10</td>
<td>125</td>
<td>40</td>
<td>28</td>
<td>203</td>
</tr>
<tr>
<td>99% Confidence Interval</td>
<td>32</td>
<td>604</td>
<td>196</td>
<td>289</td>
<td>1,122</td>
</tr>
<tr>
<td>Model 18.1 OFL</td>
<td>32</td>
<td>604</td>
<td>196</td>
<td>289</td>
<td>1,122</td>
</tr>
<tr>
<td>Model 18.1 ABC</td>
<td>24</td>
<td>453</td>
<td>147</td>
<td>216</td>
<td>842</td>
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<tr>
<td>95% Confidence Interval</td>
<td>27</td>
<td>479</td>
<td>155</td>
<td>217</td>
<td>878</td>
</tr>
<tr>
<td>Model 18.2 OFL</td>
<td>27</td>
<td>479</td>
<td>155</td>
<td>217</td>
<td>878</td>
</tr>
<tr>
<td>Model 18.2 ABC</td>
<td>20</td>
<td>359</td>
<td>116</td>
<td>163</td>
<td>658</td>
</tr>
</tbody>
</table>
Why stick with Status Quo?

- Distribution of catch data are skewed
- Violates assumption of normality, thus mean or any metric based on it is invalid
- Not worth the fuss at this time
  - Catch much lower than any of the alternatives
  - Not going to change behavior
    - Undesirable!!!!
  - DLMs for next assessment
# ABC and OFL Recommendations

<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>2018</td>
<td>2019</td>
</tr>
<tr>
<td>Tier</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>OFL (t)</td>
<td>689</td>
<td>689</td>
</tr>
<tr>
<td>maxABC (t)</td>
<td>517</td>
<td>517</td>
</tr>
<tr>
<td>ABC (t)</td>
<td>517</td>
<td>517</td>
</tr>
<tr>
<td>Status</td>
<td>As determined last year for:</td>
<td>As determined this year for:</td>
</tr>
<tr>
<td></td>
<td>2016</td>
<td>2017</td>
</tr>
<tr>
<td>Overfishing</td>
<td>No</td>
<td>n/a</td>
</tr>
</tbody>
</table>
Questions so far???
Outstanding Issues

- Genetic stock structure, close kin mark-recapture
  - Samples have been/are being run in new MiSeq
  - Planning for a PSS stock structure document Sept 2019

Hillary et al. 2018
Outstanding Issues

- Ageing
  - Pilot study underway
    - Samples prepped and ready to send, just waiting PO
  - Reaching out to find faculty with right expertise (bio-chem) to collaborate with
  - Drafting proposals for MS student
Outstanding Issues

- Discard mortality
  - Collaboration with UAF, ASLC and (hopefully) industry
    (I need to talk to you folks!)
- Drafting co-op research proposal
- MS student at UAF

https://60nscience.alaskasealife.org
Outstanding Issues

- Catch by numbers
  - Working with the AKRO staff to get numbers back to 2003
  - Should be available for next full assessment!!!

- Data-limited methods
  - Should be available for next full assessment
Outstanding Issues

- Unobserved catch in state fisheries
- Could be a significant source of removals