GOA Rex Sole Partial Assessment
(Full assessment planned for 2021)

Carey McGilliard
### Western-Central and Eastern combined

- Projections are done separately for the Western-Central region and the Eastern region.
- This table sums the results of the separate projections for the entire GOA.

<table>
<thead>
<tr>
<th>Quantity</th>
<th>As estimated or specified this 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>M (natural mortality rate)</td>
<td>0.17</td>
<td>0.17</td>
</tr>
<tr>
<td>Tier</td>
<td>3a</td>
<td>3a</td>
</tr>
<tr>
<td>Projected total (3+) biomass (t)</td>
<td>97,982</td>
<td>97,967</td>
</tr>
<tr>
<td>Female spawning biomass (t)</td>
<td>45,750</td>
<td>43,575</td>
</tr>
<tr>
<td>$B_{100%}$</td>
<td>See area-specific tables below</td>
<td>See area-specific tables below</td>
</tr>
<tr>
<td>$B_{40%}$</td>
<td></td>
<td></td>
</tr>
<tr>
<td>$B_{35%}$</td>
<td></td>
<td></td>
</tr>
<tr>
<td>$F_{OFL}$</td>
<td></td>
<td></td>
</tr>
<tr>
<td>$maxF_{ABC}$</td>
<td></td>
<td></td>
</tr>
<tr>
<td>$F_{ABC}$</td>
<td></td>
<td></td>
</tr>
<tr>
<td>OFL (t)</td>
<td>18,706</td>
<td>17,692</td>
</tr>
<tr>
<td>maxABC (t)</td>
<td>15,373</td>
<td>14,529</td>
</tr>
<tr>
<td>ABC (t)</td>
<td>15,373</td>
<td>14,529</td>
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<tr>
<td>Status</td>
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<td>As determined this year for:</td>
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<tr>
<td></td>
<td>2016</td>
<td>2017</td>
</tr>
<tr>
<td>Overfishing</td>
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</tr>
<tr>
<td>Overfished</td>
<td>n/a</td>
<td>no</td>
</tr>
<tr>
<td>Approaching overfished</td>
<td>n/a</td>
<td>no</td>
</tr>
</tbody>
</table>
Western-Central Only

- Projection model uses output from age-structured model
- Used age 3 recruits
- 2018 catch estimated as 2018 current catch up to Oct 6 + 5-yr average Oct 6-Dec 31 catch

<table>
<thead>
<tr>
<th>Quantity: (Western-Central GOA)</th>
<th>As estimated or specified this year for:</th>
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<tbody>
<tr>
<td></td>
<td>2018</td>
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<td>$M$ (natural mortality rate)</td>
<td>0.17</td>
<td>0.17</td>
</tr>
<tr>
<td>Tier</td>
<td>3a</td>
<td>3a</td>
</tr>
<tr>
<td>Projected total (3+) biomass (t)</td>
<td>76,644</td>
<td>76,631</td>
</tr>
<tr>
<td>Female spawning biomass (t)</td>
<td>36,374</td>
<td>34,569</td>
</tr>
<tr>
<td>$B_{100%}$</td>
<td>48,138</td>
<td>48,138</td>
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<tr>
<td>$B_{40%}$</td>
<td>19,255</td>
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<tr>
<td>$B_{35%}$</td>
<td>16,848</td>
<td>16,848</td>
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<tr>
<td>$F_{OFL}$</td>
<td>0.29</td>
<td>0.29</td>
</tr>
<tr>
<td>$maxF_{ABC}$</td>
<td>0.23</td>
<td>0.23</td>
</tr>
<tr>
<td>$F_{ABC}$</td>
<td>0.23</td>
<td>0.23</td>
</tr>
<tr>
<td>OFL (t)</td>
<td>14,375</td>
<td>13,558</td>
</tr>
<tr>
<td>$maxABC$ (t)</td>
<td>11,825</td>
<td>11,145</td>
</tr>
<tr>
<td>ABC (t)</td>
<td>11,825</td>
<td>11,145</td>
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</table>

<table>
<thead>
<tr>
<th>Status</th>
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<tbody>
<tr>
<td></td>
<td>2016</td>
<td>2017</td>
</tr>
<tr>
<td>Overfishing</td>
<td>no</td>
<td>n/a</td>
</tr>
<tr>
<td>Overfished</td>
<td>n/a</td>
<td>no</td>
</tr>
<tr>
<td>Approaching overfished</td>
<td>n/a</td>
<td>no</td>
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</table>
## Eastern Only

- Same methods, but for Eastern area
- There is no trawling in the Eastern GOA

### Quantity: (Eastern GOA)

<table>
<thead>
<tr>
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</tr>
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<td>Tier</td>
<td>3a</td>
<td>3a</td>
</tr>
<tr>
<td>Projected total (3+) biomass (t)</td>
<td>21,338</td>
<td>21,336</td>
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<tr>
<td>Female spawning biomass (t)</td>
<td>9,376</td>
<td>9,006</td>
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<tr>
<td>$B_{100%}$</td>
<td>9,597</td>
<td>9,597</td>
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<tr>
<td>$B_{40%}$</td>
<td>3,839</td>
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<tr>
<td>$B_{35%}$</td>
<td>3,359</td>
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<tr>
<td>$F_{OFL}$</td>
<td>0.31</td>
<td>0.31</td>
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<tr>
<td>$maxF_{ABC}$</td>
<td>0.25</td>
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</tr>
<tr>
<td>$F_{ABC}$</td>
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<td>0.25</td>
</tr>
<tr>
<td>OFL (t)</td>
<td>4,331</td>
<td>4,134</td>
</tr>
<tr>
<td>maxABC (t)</td>
<td>3,548</td>
<td>3,384</td>
</tr>
<tr>
<td>ABC (t)</td>
<td>3,548</td>
<td>3,384</td>
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### Status

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<th>2017</th>
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<th>2018</th>
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<tbody>
<tr>
<td>Overfishing</td>
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<td>n/a</td>
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<tr>
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<td>n/a</td>
<td>no</td>
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<td>no</td>
<td>n/a</td>
<td>no</td>
</tr>
</tbody>
</table>
Area Apportionment

- Random effects model used to smooth survey biomass by area
- ABC is distributed to the Western and Central areas using the relative proportion of Western-Central biomass in those two areas
- ABC is distributed to West Yak and SE using the relative proportion of Eastern biomass in those two areas

<table>
<thead>
<tr>
<th>Quantity</th>
<th>Western</th>
<th>Central</th>
<th>Total Western-Central</th>
<th>West Yakutat</th>
<th>Southeast</th>
<th>Total Eastern</th>
</tr>
</thead>
<tbody>
<tr>
<td>Area Apportionment</td>
<td>26.10%</td>
<td>73.90%</td>
<td>100.00%</td>
<td>48.96%</td>
<td>51.04%</td>
<td>100.00%</td>
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<tr>
<td>2019 ABC (t)</td>
<td>2,951</td>
<td>8,357</td>
<td>11,308</td>
<td>1,657</td>
<td>1,727</td>
<td>3,384</td>
</tr>
<tr>
<td>2020 ABC (t)</td>
<td>2,956</td>
<td>8,371</td>
<td>11,327</td>
<td>1,664</td>
<td>1,734</td>
<td>3,398</td>
</tr>
</tbody>
</table>
• Survey biomass in 2017 was 97,720 t, up ~12% from 2015