Responses to PT/SSC Comments

- Major comments (paraphrased):
  - **Stock structure and genetics**
    - Ongoing, >400 samples collected in prep for genomics
    - Stock structure doc pending genetics work
  - **Catch by numbers**
    - Updated 2010 - 2019, unlikely to get back to 2003
    - Analyses ongoing
  - **Projects to estimate age and improve catch estimation**
    - Pilot ageing study ongoing, proposal submitted to NPRB
  - **Data-limited** - ongoing
Changes to input data:

- Updated catch data for 2019 and 2020 (as of Oct 13, 2020)
- Survey data updated
  - Biomass estimates from 2019 EBS shelf surveys
  - RPNs for 2019 IPHC longline survey

No changes to assessment methodology
BSAI Shark Complex Catch

- Large salmon shark year
- Nearly all from PTR pollock fisheries
- PSS also from PTR pollock fisheries
Catch by Target Group

Pacific Sleeper Shark

Salmon Shark

Other Sharks

Spiny Dogfish

Target Fishery:
- Atka Mackerel
- Flatfish
- Halibut
- Other
- Pacific Cod
- Pollock
- Rockfish
- Sablefish

Year

Catch (t)
Catch by Area

Pacific Sleeper Shark

Salmon Shark

Other Sharks

Spiny Dogfish

Catch (t)

Year

FMP Subarea
BS
AI
IPHC RPNs

Relative Population Numbers

Year

Al

BS

Pacific Sleeper Shark

Spiny Dogfish
IPHC Coastwide

Pacific Sleeper Shark

Spiny Dogfish
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>Quantity</th>
<th>As estimated or specified last year for:</th>
<th>As estimated or recommended this year for:</th>
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<tbody>
<tr>
<td></td>
<td>2020</td>
<td>2021</td>
</tr>
<tr>
<td>Tier</td>
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<td>6</td>
</tr>
<tr>
<td>OFL (t)</td>
<td>689</td>
<td>689</td>
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<tr>
<td>maxABC (t)</td>
<td>517</td>
<td>517</td>
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<td>517</td>
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<tr>
<td></td>
<td>2018</td>
<td>2019</td>
</tr>
<tr>
<td>Overfishing</td>
<td>No</td>
<td>n/a</td>
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</tbody>
</table>
## Risk Table

- **Assessment – related considerations**
  - Tier 6 model does not incorporate any biology or trend information
  - Sharks are low productivity species, potentially highly vulnerable
  - Catch scalar methods are high risk

<table>
<thead>
<tr>
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<td><strong>Level 2:</strong></td>
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<td>Substantially increased concerns</td>
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Risk Table

- Population dynamics considerations
  - Pacific sleeper shark indices trending downward, or remaining at low levels
  - Unclear if current levels are “low”, or if the peaks in the early years were unusual

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Why are we worried about these trends?

1) Pupping
   - Coastal/Shelf?
   - Timing unknown
   - <<50% ♂/yr
   - Habitat?
   - Cannibalism
   - Predation

2) Nursery
   - Coastal/Shelf?
   - Neonate-small juv
   - Habitat?
   - Cannibalism
   - Predation

3) Adult/Lg Juv
   - Loners?
   - Generally deep
   - Generally unknown

4) Mating
   - Aggregations
   - Or Lucky Chance?
   - Location Unknown
   - Timing Unknown
   - <<50% ♂/yr

Why are we worried about these trends?
Risk Table

- Environmental/Ecosystem considerations (Bridget Ferris, Ivonne Ortiz and Ellen Martinson)

- Foraging conditions considered average
- Prey availability may shift as a result of climate, however, sharks can prey switch easily
- All species are highly mobile and can move to and avoid temperatures as needed
- No clear linkages

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Risk Table

- Fishery performance considerations
  - Non-targeted, discarded species
  - Mean catch per trip
    - Pacific sleeper shark generally flat, declining in NPT pollock since 2016
    - Salmon shark increasing since 2010 in PTR pollock fisheries
  - Shark catch has not limited other fisheries

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Risk Table

- Unclear how to score a complex when different species score differently
- Do not recommend any ABC reductions at this time
- A number of projects ongoing to inform on these categories and improve assessments
  - Ageing, improving catch estimates, genetics and stock structure, tagging, data-limited methods

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Questions so far???