HEALTH AND BODY CONDITION

Photogrammetry to monitor growth and body condition of SRKWs

Agenda Item B.3, May 23, 2019
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Aerial Photogrammetry
- Non-invasive health check
- 1cm pixel resolution from 100ft
- Length measurements <0.1% bias

*Durban et al. 2015. J. Unmanned Vehicle Systems*
Photogrammetry metrics

- September sampling in 2008, 2013, annually 2015-2018
- May sampling since 2016 to add seasonal component
- Imaged 98/103 whales living since 2008
- 77-100% of the population imaged each year
Linking to known individuals

Low reproductive success

- Increased width at mid body is reliable pregnancy indicator
- 68% loss of detected pregnancies
HEALTH AND BODY CONDITION

Center for Conservation Biology, University of Washington, Photo: Hogan
Changes in condition: example J36
Changes in condition (example J36)

Low measurement variability = power to resolve changes

Mortalities linked to condition

Still alive  1 month  1 Week
Time Prior to death

Fearnbach et al. 2018. Endangered Species Research
Growing to smaller sizes

- Adults <30 yrs in 2008 were typically smaller than older adults
- Smaller adults grew in 1990s with lower Chinook abundance

Fearnbach et al. 2011. Endangered Species Research
Mortalities linked to condition

**J-pod**

**K-pod**

**L-pod**

Average Body Condition Index

Pod Abundance

Year

2008 2010 2012 2014 2016 2018

2008 2010 2012 2014 2016 2018

2008 2010 2012 2014 2016 2018
<table>
<thead>
<tr>
<th>Field ID</th>
<th>Pod</th>
<th>Animal ID</th>
<th>Mother</th>
<th>Father</th>
<th>Year</th>
<th>Month</th>
<th>day</th>
<th>Sex</th>
<th>Ecotype</th>
<th>Age (years)</th>
<th>Age Class</th>
<th>Body Length (cm)</th>
<th>COD</th>
<th>Notes</th>
<th>Location Found</th>
</tr>
</thead>
<tbody>
<tr>
<td>J18</td>
<td>J</td>
<td>J18</td>
<td>J10</td>
<td>J10</td>
<td>2000</td>
<td>March</td>
<td>M</td>
<td>SRKW</td>
<td>23 adult</td>
<td>Infection - systemic</td>
<td>Septicemia, pneumonia</td>
<td>Tsawassen, Canada</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>L60</td>
<td>L</td>
<td>L60</td>
<td>L26?</td>
<td>Unsampled M2</td>
<td>2002</td>
<td>April</td>
<td>16F</td>
<td>SRKW</td>
<td>~30 adult</td>
<td>Trauma</td>
<td>Milk also present in mammary glands</td>
<td>Long Beach, WA</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>L98</td>
<td>L</td>
<td>L98</td>
<td>L67</td>
<td>Unsampled M3</td>
<td>2006</td>
<td>March</td>
<td>10M</td>
<td>SRKW</td>
<td>6.5 sub-adult</td>
<td>Trauma</td>
<td>Post-mortem condition was very poor. Sex was determined through genetic analysis. J11 (the mother) went missing in July 2006 as well.</td>
<td>Nootka Sound, Vancouver Island, BC</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SJ00035</td>
<td>J</td>
<td>20080726</td>
<td>J11</td>
<td>L57</td>
<td>2008</td>
<td>July</td>
<td>26M</td>
<td>SRKW</td>
<td>0 fetus</td>
<td>152.4 Abortion/Premature/Stillborn</td>
<td>J11 (the mother) went missing in July 2006 as well.</td>
<td>Open Bay, Henry Island, WA</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PSU 12-02-11 (L112)</td>
<td>L</td>
<td>L112</td>
<td>L86</td>
<td>L41</td>
<td>2012</td>
<td>February</td>
<td>11M</td>
<td>SRKW</td>
<td>3 sub-adult</td>
<td>375 Trauma</td>
<td>Trauma from unknown origin</td>
<td>Long Beach, WA</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MBH0107130c</td>
<td>J</td>
<td>20130107</td>
<td>J28</td>
<td>L41</td>
<td>2013</td>
<td>January</td>
<td>7M</td>
<td>SRKW</td>
<td>&lt;3 days estimated neonate</td>
<td>236 Perinatal/neonatal death</td>
<td>L95 also present in mammary glands</td>
<td>Dungeness Spit, WA</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>J32</td>
<td>J</td>
<td>J32</td>
<td>J20</td>
<td>J1</td>
<td>2014</td>
<td>December</td>
<td>6F</td>
<td>SRKW</td>
<td>18 adult</td>
<td>562 Other - reproductive</td>
<td>Other - reproductive</td>
<td>Bates Beach, BC</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>J32 fetus</td>
<td>J</td>
<td>J32 fetus</td>
<td>J32</td>
<td>L85</td>
<td>2014</td>
<td>December</td>
<td>6F</td>
<td>SRKW</td>
<td>0 fetus</td>
<td>220 In utero death</td>
<td>In utero death</td>
<td>Bates Beach, BC</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2016-1664 (field ID 16-0079)</td>
<td>?</td>
<td>20160323</td>
<td>UNK</td>
<td>K26</td>
<td>2016</td>
<td>March</td>
<td>23F</td>
<td>SRKW</td>
<td>&lt;2 weeks estimated neonate</td>
<td>218 Trauma (?)</td>
<td>Notes on gross necropsy stated that hematoma was superficial and there were no broken bones</td>
<td>Floating off Otter Point in Sooke, BC</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>16-0092 (L95)</td>
<td>L</td>
<td>L95</td>
<td>L43</td>
<td>L41</td>
<td>2016</td>
<td>April</td>
<td>1M</td>
<td>SRKW</td>
<td>20 adult</td>
<td>664.21 Infection - systemic</td>
<td>Tagged</td>
<td>Floating off Esperanza Inlet, BC, Nootka Island</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>16-6517 (J34)</td>
<td>J</td>
<td>J34</td>
<td>J22</td>
<td>L41</td>
<td>2016</td>
<td>December</td>
<td>21M</td>
<td>SRKW</td>
<td>18 adult</td>
<td>673 Trauma</td>
<td>Trauma likely from ship impact</td>
<td>Trial Island, BC</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Mortalities linked to condition

- **J-pod**
  - Average Body Condition Index over years 2008 to 2018.
  - Shows a gradual decline with some fluctuations.

- **K-pod**
  - Average Body Condition Index over years 2008 to 2018.
  - Stable with minor fluctuations.

- **L-pod**
  - Average Body Condition Index over years 2008 to 2018.
  - Shows a significant decline over the years.

**Pod Abundance**

- **J-pod**
  - Pod Abundance from 30 to 40.
  - Generally stable with some minor fluctuations.

- **K-pod**
  - Pod Abundance from 30 to 40.
  - Some fluctuations seen in recent years.

- **L-pod**
  - Pod Abundance from 30 to 40.
  - Significant decline with some fluctuations.
- 9/15 most recent deaths declined in condition before death
- all 6 since 2015 are J-pod
An early warning system (e.g. J17)

J17 of current concern
Declining condition since 2015
Rate of decline increasing