Puget Sound Marine Mammal Aerial Surveys 2013-2015

Mari Smultea, Cathy Bacon, Dave Steckler, Mark Cotter
Smultea Environmental Sciences (SES)

Puget Sound harbor porpoise, NMFS permit 15569

Marine Mammal Working Group
PUGET SOUND ECOSYSTEM MONITORING PROGRAM (PSEMP)
15 Jan 2015, Olympia, WA
Introduction

- Seasonal systematic aerial surveys of Puget Sound
  - SUMMER (Aug 2013 & July 2014)
  - FALL (Sept 2014)
  - WINTER (Jan 2015)
  - SPRING (TBD March 2015)

- First
  - systematic aerial survey of Puget Sound (from Admiralty Inlet south)
  - comprehensive aerial survey in region since 1997 (Laake et al.)
Survey Goal

For waters on or adjacent to U.S. Naval installations in inland Puget Sound Region

- Marine mammal occurrence, distribution, numbers, habitat use, behavior
- Density/ abundance
  - 4 seasons
  - 8 subregions
    - Harbor porpoise
    - Harbor seal
    - Others?
Puget Sound Survey Area

8 subregions

459 nm systematic lines (850 km)

2 nm (3.7 km) line spacing
Methods

• Systematic lines
  • 750 ft altitude
  • 100 kt speed

• Partenavia airplane – 1 pilot
  • 2 wing observers – bubble window
  • 1 belly observer
  • 1 recorder – co-pilot seat
**Overall Length (km)**: 2.23

<table>
<thead>
<tr>
<th>Data</th>
<th>Restricted (permission required) - Everett Ship Yards</th>
<th>Prohibited - Naval Base Kitsap</th>
<th>Bainbridge</th>
<th>Southern Puget Sound</th>
<th>Vashon</th>
<th>South Whidbey</th>
<th>Hood Canal</th>
<th>Seattle</th>
<th>East Whidbey</th>
<th>Admiralty Inlet</th>
<th>Overall Totals</th>
</tr>
</thead>
<tbody>
<tr>
<td>2014-Sep-14 09:23:59.8 to 2014-Sep-21 12:04:53.2 PDT</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Overall Length (km)</strong></td>
<td>2.23</td>
<td></td>
<td>0</td>
<td>361.59</td>
<td>1177.84</td>
<td>918.82</td>
<td>571.66</td>
<td>917.84</td>
<td>459.06</td>
<td>1350.29</td>
<td>430.33</td>
</tr>
<tr>
<td>Engines On</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wheels Up (Taxiing to runway)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Overland</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Transit</td>
<td>2.23</td>
<td></td>
<td>161.74</td>
<td>511.49</td>
<td>216.49</td>
<td>65.96</td>
<td>313.08</td>
<td>49.94</td>
<td>418.32</td>
<td>80.12</td>
<td>2445.11</td>
</tr>
<tr>
<td>Systematic</td>
<td></td>
<td></td>
<td>86.58</td>
<td>280.41</td>
<td>387.98</td>
<td>147.64</td>
<td>265.25</td>
<td>228.34</td>
<td>291.71</td>
<td>75.3</td>
<td>2116.11</td>
</tr>
<tr>
<td>Circling</td>
<td></td>
<td></td>
<td>62.86</td>
<td>360.42</td>
<td>268.67</td>
<td>286.08</td>
<td>310.3</td>
<td>162.31</td>
<td>574.25</td>
<td>214.82</td>
<td>2532.55</td>
</tr>
<tr>
<td>Wheels Down (Taxiing after landing)</td>
<td></td>
<td></td>
<td>50.41</td>
<td>25.51</td>
<td>39.69</td>
<td>71.97</td>
<td>29.22</td>
<td>18.46</td>
<td>66.01</td>
<td>60.09</td>
<td>520.27</td>
</tr>
</tbody>
</table>

**Overall Totals**: 7724.27 km
Equipment

- PC
- Canon IS HD camera 100-400 zoom
- Clinometer
- 3 WAAS GPSs
DATA COLLECTION

• Group size
• # calf (< 1/2 adult)
• Behavior state (mill, travel, rest)
• Heading
• Max. spacing between individuals

CIRCLE – as needed

• Confirm sp.
• Grp size/calf
• Photograph

Harbor porpoise photographed in Admiralty Inlet under NMFS permit 15569.
2 Late Summer Surveys (2013, 2014)
1 Fall 2014
1 Winter 2015
1 Spring 2015 – planned

Harbor porpoise mother/calf pair photographed 1 September 2013 by M. Smultea under NMFS permit 15569.
Harbor Porpoise (*Phocoena phocoena*) Groups

**Aug-Sept 2013** - (5,785 km)

**Sept 2014** - (7,724 km)

**July 2014** - (5,278 km)

**Jan 2015** - (1,240 km)**

**fog; flew only Admiralty Inlet / Whidbey**
Aug-Sept
2013 -
(5,785 km)

July 2014 -
(5,278 km)
Harbor Porpoise Groups

Sept 2014 - (7,724 km)
Opportunistic survey N Olympic Peninsula coast / Juan de Fuca Strait

*Sept 2014 - (7,724 km)*

Harbor Porpoise Groups
### Preliminary

**# Groups (# Individuals)**

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Total km</strong></td>
<td>5,785</td>
<td>5,278</td>
<td>7,724</td>
<td>620</td>
<td>19,407</td>
</tr>
<tr>
<td>Harbor Porpoise</td>
<td>68 (151)</td>
<td>292 (569)</td>
<td>367 (904)</td>
<td>17 (124)</td>
<td>744 (1,748)</td>
</tr>
<tr>
<td>Unid. Porpoise /</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dolphin</td>
<td>3 (4)</td>
<td>1 (1)</td>
<td>1 (1)</td>
<td>-</td>
<td>5 (6)</td>
</tr>
<tr>
<td>Unid. Small MM</td>
<td>7 (8)</td>
<td>18 (20)</td>
<td>24 (27)</td>
<td>-</td>
<td>49 (55)</td>
</tr>
</tbody>
</table>
### Preliminary

#Other Spp. Groups (# Indiv)

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Harbor Seal</td>
<td>675 (1,512)</td>
<td>853 (1,890)</td>
<td>1,054 (2,044)</td>
<td>62 (69)</td>
<td>2,644 (5,515)</td>
</tr>
<tr>
<td>CA Sea Lion</td>
<td>15 (20)</td>
<td>-</td>
<td>27 (33)</td>
<td>-</td>
<td>42 (53)</td>
</tr>
<tr>
<td>Steller Sea Lion</td>
<td>-</td>
<td>-</td>
<td>62 (65)</td>
<td>-</td>
<td>62 (65)</td>
</tr>
<tr>
<td>Risso’s Dolphin</td>
<td>2 (4)</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>2 (4)</td>
</tr>
<tr>
<td>Minke Whale</td>
<td>-</td>
<td>-</td>
<td>2 (2)</td>
<td>-</td>
<td>2 (2)</td>
</tr>
</tbody>
</table>
2 Risso’s dolphins – 2013 only

Seen twice:
- 31 Aug
- 4 Sept

Risso’s dolphin pair photographed ~ 4 km west of Shoreline, WA, 4 September 2013 by V. James under NMFS permit 14451.
Minke Whale – circling = feeding?

Near Protection Isld, NW of Pt. Townsend

NMFS permit 14451
**Preliminary Abundance / Density Estimate**

**Harbor Porpoises – Puget Sound**

From combined *late summer* surveys:

- 30 Aug - 4 Sep 2013
- 21-27 July 2014
- Beaufort 0–2
  - (per Calambokidis et al. 1992, Laake et al. 1997)

<table>
<thead>
<tr>
<th>Metric</th>
<th>Estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Density (D)</td>
<td>0.695 indivs/sq. km</td>
</tr>
<tr>
<td>Abundance (N)</td>
<td>1,832 harbor porpoises</td>
</tr>
<tr>
<td>95% Confidence Interval (CI)</td>
<td>1,312 - 2,558 indivs</td>
</tr>
<tr>
<td>Co-efficient of Variation (CV)</td>
<td>17%</td>
</tr>
</tbody>
</table>

Harbor porpoise photographed by M. Smultea under NMFS permit 15569.

*incorporates g(o) trackline detection factor, correcting for animals missed on trackline*
Preliminary

Harbor Porpoise – Puget Sound
Late summer 2013 & 2014 aerial survey data

Harbor porpoise Perpendicular Sighting Distance histogram and fitted detection function for late summer.
Harbor Seal (*Phoca vitulina*) Groups

Aug-Sept 2013

July 2014

Jan 2015

Harbor seals hauled-out photographed 25 July 2014 by T. Hanks under NMFS permit 15569.
Summary –
They’re Baaaaack!!!

*Harbor porpoises back in Puget Sound*

**Preliminary analyses**

- *recovering* in Puget Sound
- multiple *seasons*
- *most areas* (even S of Tacoma)
- *large numbers* (up to 1,800 animals)...
This is hope for a recovery success story (and we don't have a lot of these anymore).

ACKNOWLEDGMENTS
Funded by Commander, U.S. Pacific Fleet. We are grateful to U.S. Navy personnel Andrea Balla-Holden (Naval Facilities Engineering Command Northwest), for her support, coordination, and facilitation in implementing these surveys. Thanks to field personnel Mark Deakos, Terra Hanks, Vanessa James, Thomas Jefferson, Kate Lomac-MacNair, Meggie Moore, and Dave Steckler. Thank you to Dr. Brad Hanson for providing input into survey planning. Special thanks to our excellent and safe Aspen pilot, Barry Hansen, and Aspen’s manager, Rick Throckmorton. A special thanks to Kristen Ampela for her assistance during the survey period. Photographs were taken under NMFS Permits 14451 and 15569.