

Puget Sound Marine Mammal Aerial Surveys

2013-2015



Puget Sound harbor porpoise, NMFS permit 15569

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Marine Mammal Working Group
PUGET SOUND ECOSYSTEM
MONITORING PROGRAM (PSEMP)
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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?



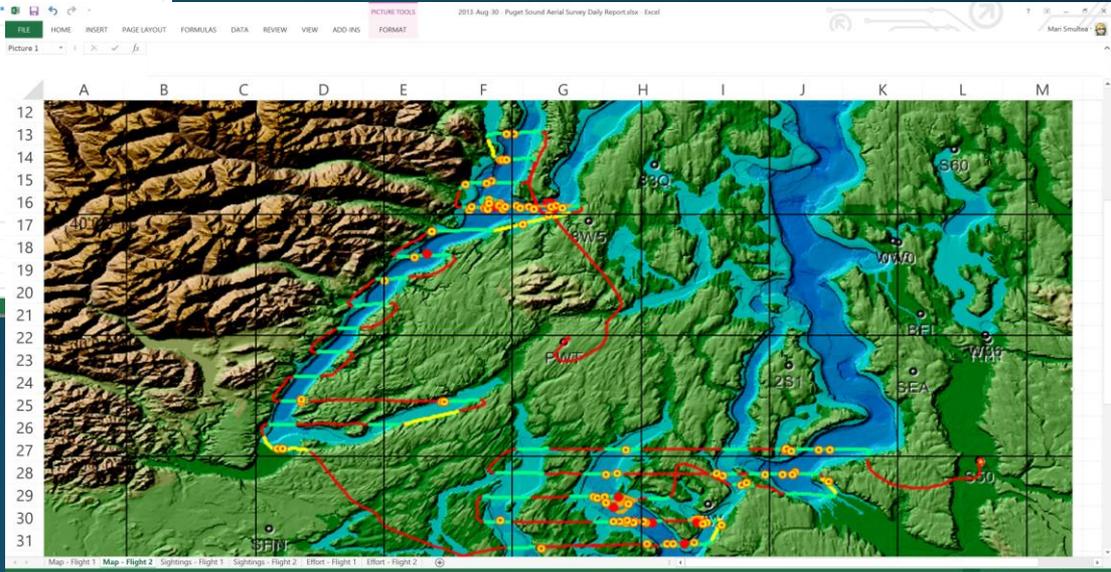
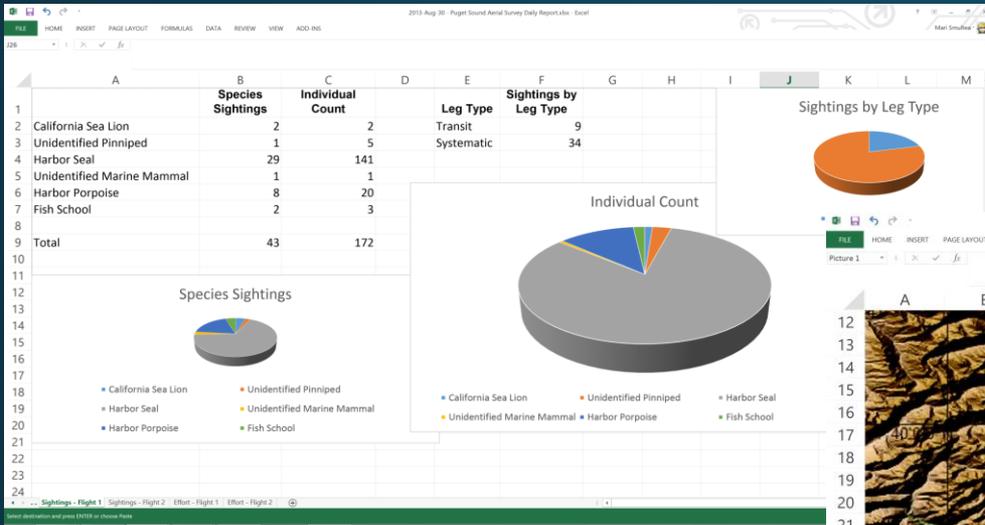
Methods

- 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



Mysticetus

Real-time map & Daily Report



Data	Restricted (permission required) - Everett Ship Yards	Prohibited - Naval Base Kitsap	Bainbridge	Southern Puget Sound	Vashon	South Whidbey	Hood Canal	Seattle	East Whidbey	Admiralty Inlet	Overall_Totals
2014-Sep-14 09:23:59.8 to 2014-Sep-21 12:04:53.2 PDT											
Overall Length (km)	2.23	0	361.59	1177.84	918.82	571.66	917.84	459.06	1350.29	430.33	7724.27
Engines On											14.62
Wheels Up (Taxiing to runway)					3.2						62.14
Overland			161.74	511.49	216.49	65.96	313.08	49.94	418.32	80.12	2445.11
Transit	2.23		86.58	280.41	387.98	147.64	265.25	228.34	291.71	75.3	2116.11
Systematic			62.86	360.42	268.67	286.08	310.3	162.31	574.25	214.82	2532.55
Circling			50.41	25.51	39.69	71.97	29.22	18.46	66.01	60.09	520.27
Wheels Down (Taxiing after landing)					2.79						33.07

Equipment

Harbor porpoise photographed 21 July 2014 by M. Deakos NMFS permit 15569.

- 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

PRELIMINARY Results



2 Late Summer Surveys (2013, 2014)

1 Fall 2014

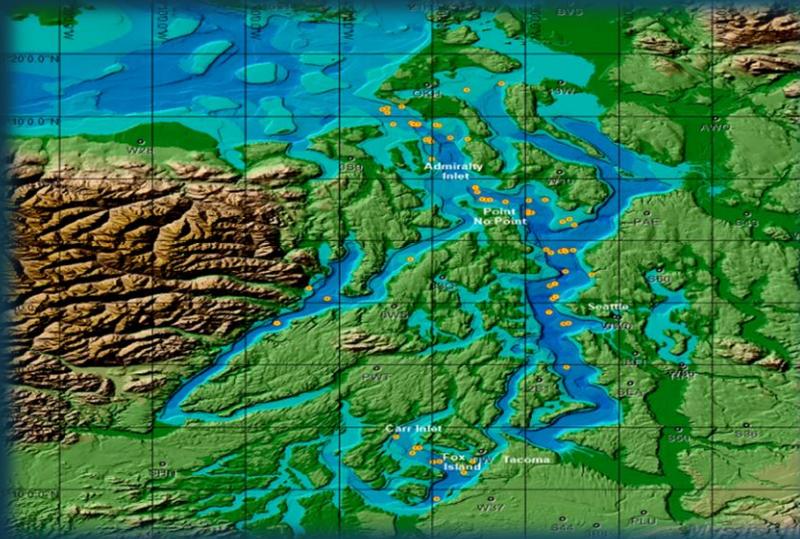
1 Winter 2015

1 Spring 2015 – *planned*

Harbor Porpoise (*Phocoena phocoena*) Groups

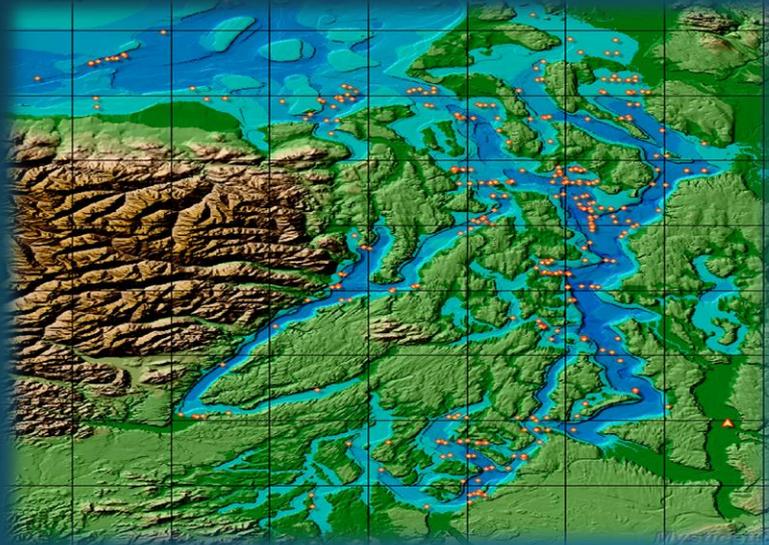
Aug-Sept 2013 - (5,785 km)

July 2014 - (5,278 km)



Sept 2014 - (7,724 km)

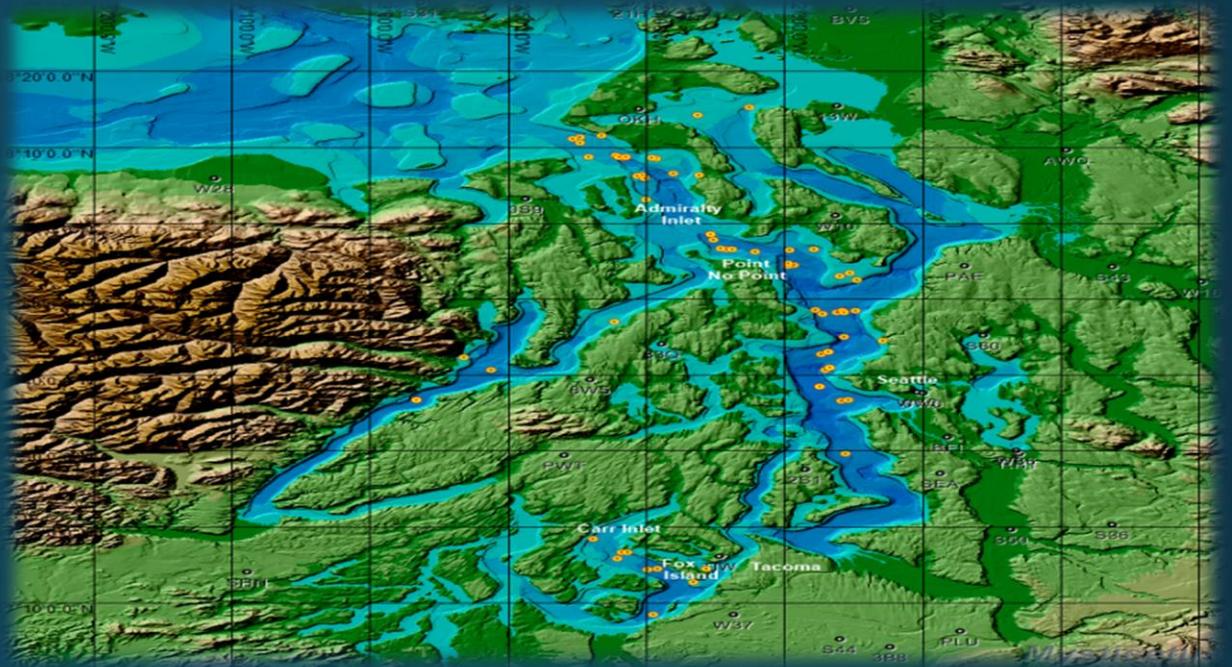
Jan 2015 - (1,240 km)**



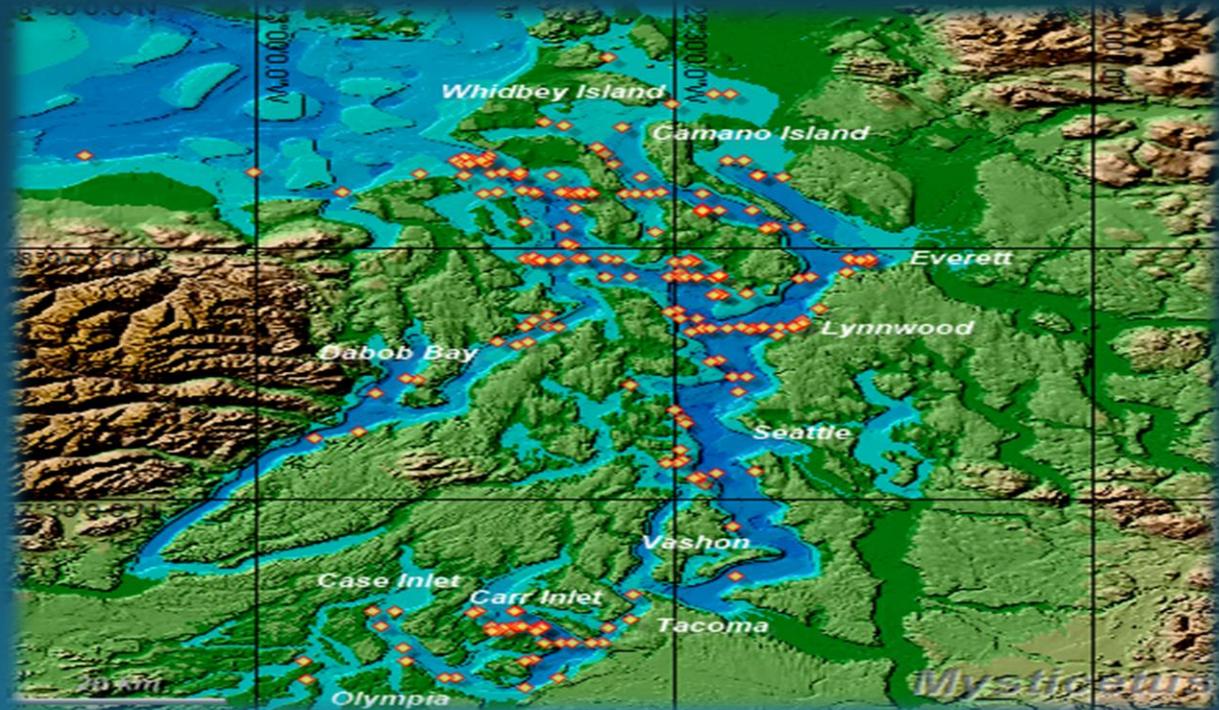
**fog;
flew only
Admiralty
Inlet /
Whidbey

Harbor Porpoise Groups

Aug-Sept
2013 -
(5,785 km)

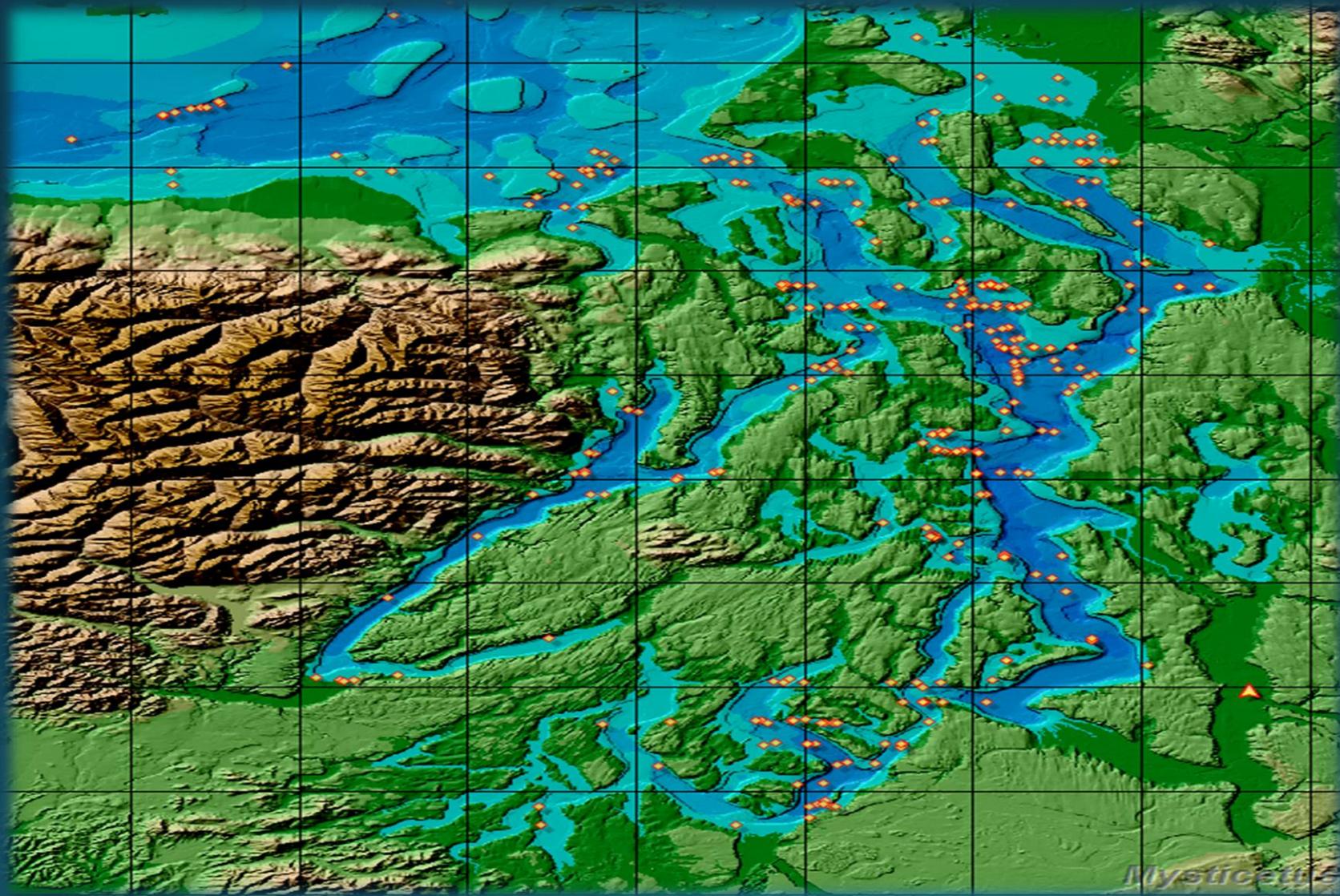


July 2014 -
(5,278 km)



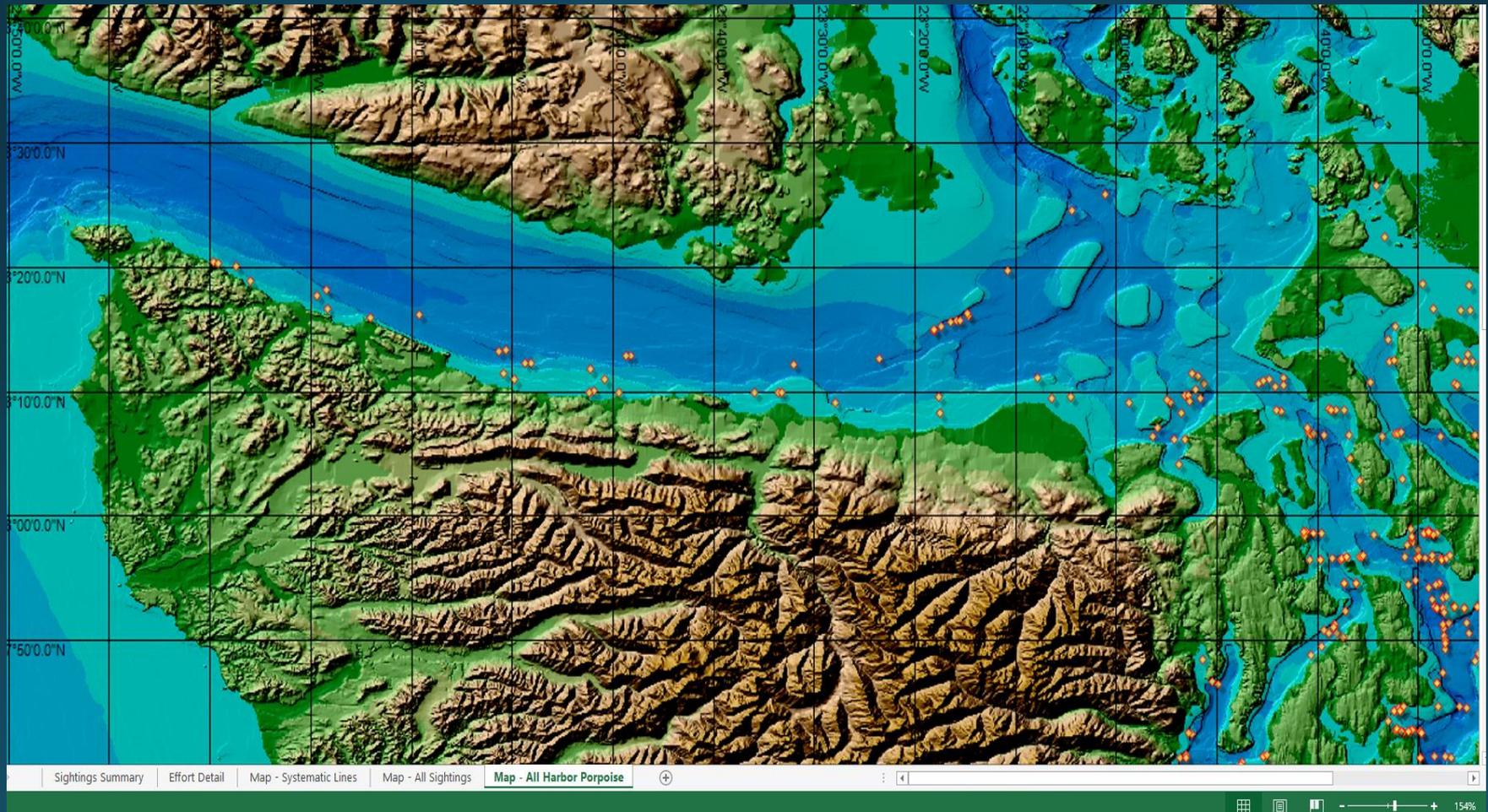
Harbor Porpoise Groups

Sept 2014 - (7,724 km)



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

Harbor Porpoise Groups



Preliminary

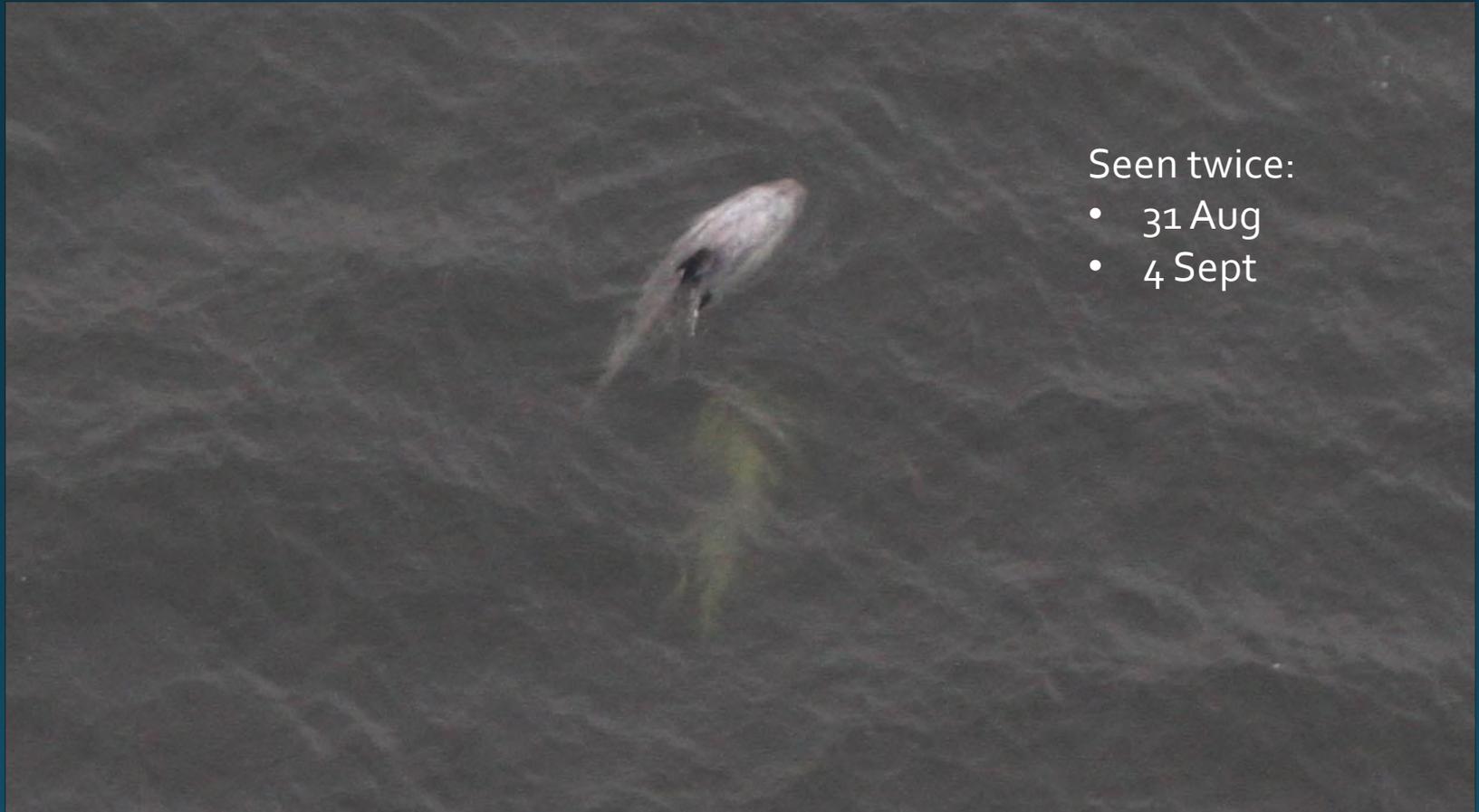
Groups (# Individuals)

	Aug-Sept 2013	July 2014	Sept 2014	Jan 2015	TOTAL
<i>Total km</i>	<i>5,785</i>	<i>5278</i>	<i>7,724</i>	<i>620</i>	19,407
Harbor Porpoise	68 (151)	292 (569)	367 (904)	17 (124)	744 (1,748)
Unid. Porpoise / Dolphin	3 (4)	1 (1)	1 (1)	-	5 (6)
Unid. Small MM	7 (8)	18 (20)	24 (27)	-	49 (55)

Preliminary
#Other Spp.Groups (# Individ)

	Aug-Sept 2013	July 2014	Sept 2014	Jan 2015	TOTAL
Harbor Seal	675 (1,512)	853 (1,890)	1,054 (2,044)	62 (69)	2,644 (5,515)
CA Sea Lion	15 (20)	-	27 (33)	-	42 (53)
Steller Sea Lion	-	-	62 (65)	-	62 (65)
Risso's Dolphin	2 (4) (same?)	-	-	-	2 (4)
Minke Whale	-	-	2 (2) (same?)	-	2 (2)

2 Risso's dolphins – 2013 only



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)



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

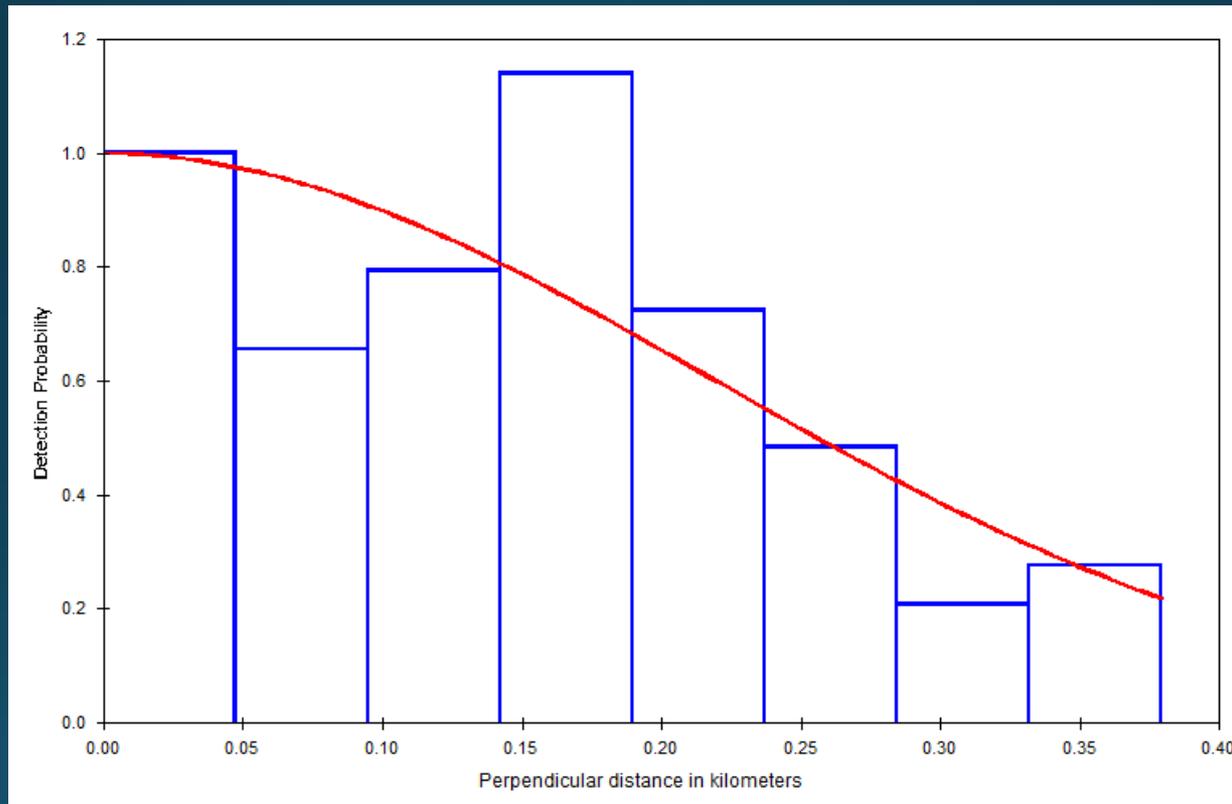
Density (D)	0.695 indivs/sq. km
Abundance (N)	1,832 harbor porpoises
95% Confidence Interval (CI)	1,312 - 2,558 indivs
Co-efficient of Variation (CV)	17%

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.

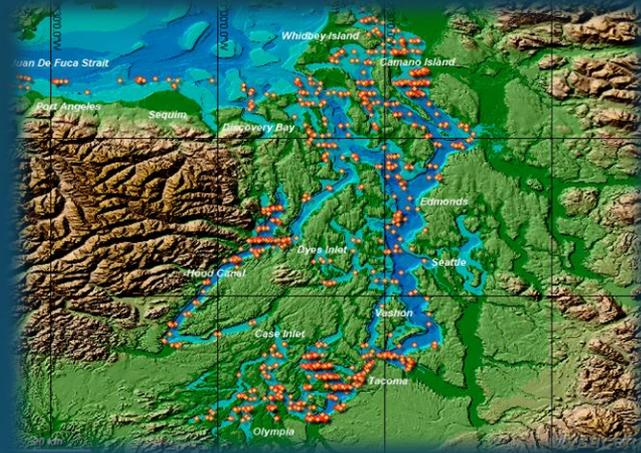


Harbor Seal (*Phoca vitulina*) Groups

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

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