



Puget Sound Marine Mammal Aerial Surveys 2013-2015: the Return of Harbor Porpoises

Report for the Puget Sound Marine Waters 2014 Overview Report

Submitted by:

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Harbor porpoise were historically common in Puget Sound in the 1940s but abundance declined considerably into the 1990s, with no harbor porpoise sighted in the region during aerial and vessel surveys in 1994 (Carretta et al 2014). However, increased numbers of strandings and sightings in 2009 and 2010 raised the question of potential return of harbor

porpoises to Puget Sound (Carretta et al 2014). New aerial surveys of harbor porpoise in Puget Sound were initiated in 2013 and are continuing into 2015, funded by the U.S. Navy.

Thus far, systematic aerial surveys of Puget Sound have been conducted in August 2013, July 2014, Sept 2014, Jan 2015, and April 2015. The purpose of the surveys is to estimate density and abundance of harbor porpoise during summer, fall, winter and spring in eight defined sub-regions of Puget Sound (Figure 1). Harbor seals are also counted during surveys to provide data to update their abundance and density estimates, as the latest surveys were conducted in 1999 (Jeffries et al 2003). Any other marine mammals observed during surveys are also noted.

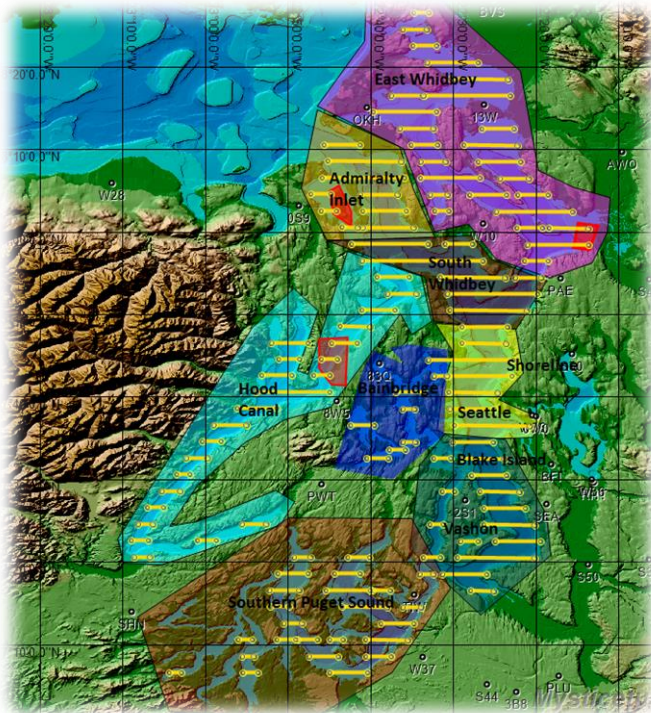


Figure 1. Eight color-coded sub-regions of Puget Sound with systematic aerial survey tracklines visible.

Through Jan 2015, 850 km of systematic transect lines spaced 3.7 km apart were surveyed multiple times throughout the eight Puget Sound sub-regions (Figure 1). These regions were chosen based on different habitat characteristics as well as comparability to prior surveys. Survey tracks will be consistent across our survey years. Surveys

are flown at an altitude of 229 m (750 ft) at a speed of 185 km/hr (100 kt). Observations are made and photographs taken from a twin-engine Partenavia airplane with two wing observers looking out bubble windows, one belly observer, and one data recorder (Figure 2). Mysticetus™ software is used to collect observation data, including environmental information, and to display sightings, tracklines and bathymetry in real-time on the PC screen. A Canon IS HD camera with 100-400 zoom is used to photograph marine mammals (Figure 2). Mysticetus™ uses clinometer angles and GPS readings to automatically calculate the position of marine mammals relative to the plane's location. Tests on stationary objects indicate these positions are generally accurate to within 10 m.

When harbor porpoise are observed from the airplane, group size, number of calves (individuals less than half an adult size), behavior state (mill, travel, rest), heading, and minimum and maximum spacing of individuals within groups (i.e. "cohesion", based on body lengths) are recorded. Photographs are used to confirm species, calf presence, and group size recorded during observations.



Figure 2. Crew and plane. Photography from plane.

Preliminary results of analyses of Aug 2013 through Jan 2015 survey data suggest harbor porpoise have repopulated Puget Sound. A total of 19,407 km of trackline was surveyed, resulting in 744 harbor porpoise groups totaling an estimated 1,748 individuals (Figure 3; Table 1). Other species observed included harbor seals, California sea lions, Steller sea

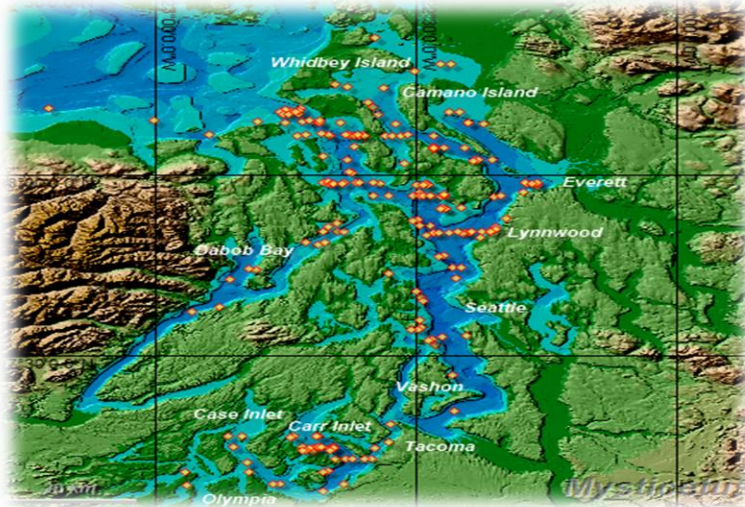


Figure 3. Example map showing harbor porpoise groups seen during July 2014 Puget Sound aerial surveys.

lions, Risso’s dolphins, and minke whales (Table 2). Initial abundance and density estimates from late summer surveys (Aug/Sept 2013 and July 2014) result in an estimated density of 0.70 individuals/km² and an abundance of 1,832 (95% CI 1,312-2,558, CV 0.17) individual harbor porpoises in the Puget Sound sub-regions. These estimates are corrected for missed animals using $g(0)$ estimated by Laake et al (1997). An exploratory flight into the Juan de Fuca Strait in Sept 2014 resulted in harbor porpoise sightings as well (Figure 4). Systematic surveys of this area

are planned for April 2015.

Table 1. Harbor porpoise survey results 2013-2015 in Puget Sound.

	Aug-Sept 2013	July 2014	Sept 2014	Jan 2015	TOTAL
Total km	5,785	5278	7,724	620	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)

Table 2. Survey results 2013-2015 for other marine mammals in Puget Sound.

	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)

In summary, harbor porpoises are back in Puget Sound! Preliminary analyses are indicating that harbor porpoises are present in all seasons, most areas (even south of Tacoma), and in relatively large numbers (approximately 1,800 animals). Several other marine mammal species were also observed during our surveys, including harbor seals for which abundance and density estimates have not been calculated since 1999. No Dall's porpoise have been observed during our surveys, but a pair of Risso's dolphins was noted on two occasions. Risso's are considered rare to Puget Sound but this pair was photo-identified and seen regularly in the region for about 1.5 years by other researchers and observers.

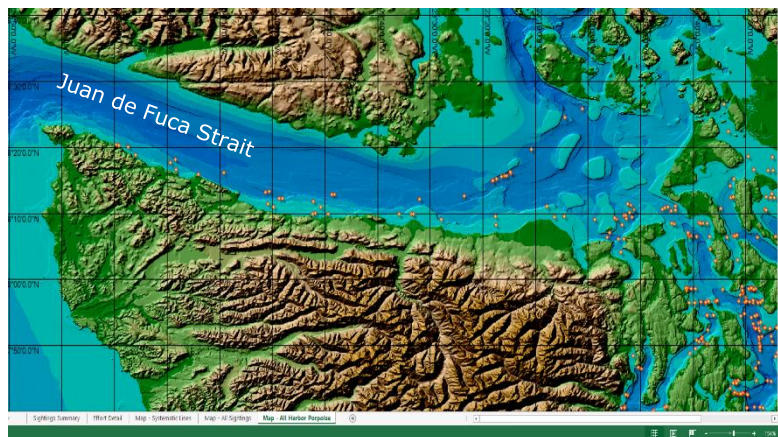


Figure 4. Map showing harbor porpoise groups seen in the area of Juan de Fuca Strait and Admiralty Inlet (lower right) in Sept 2014.



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

They're Baaaaack!

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