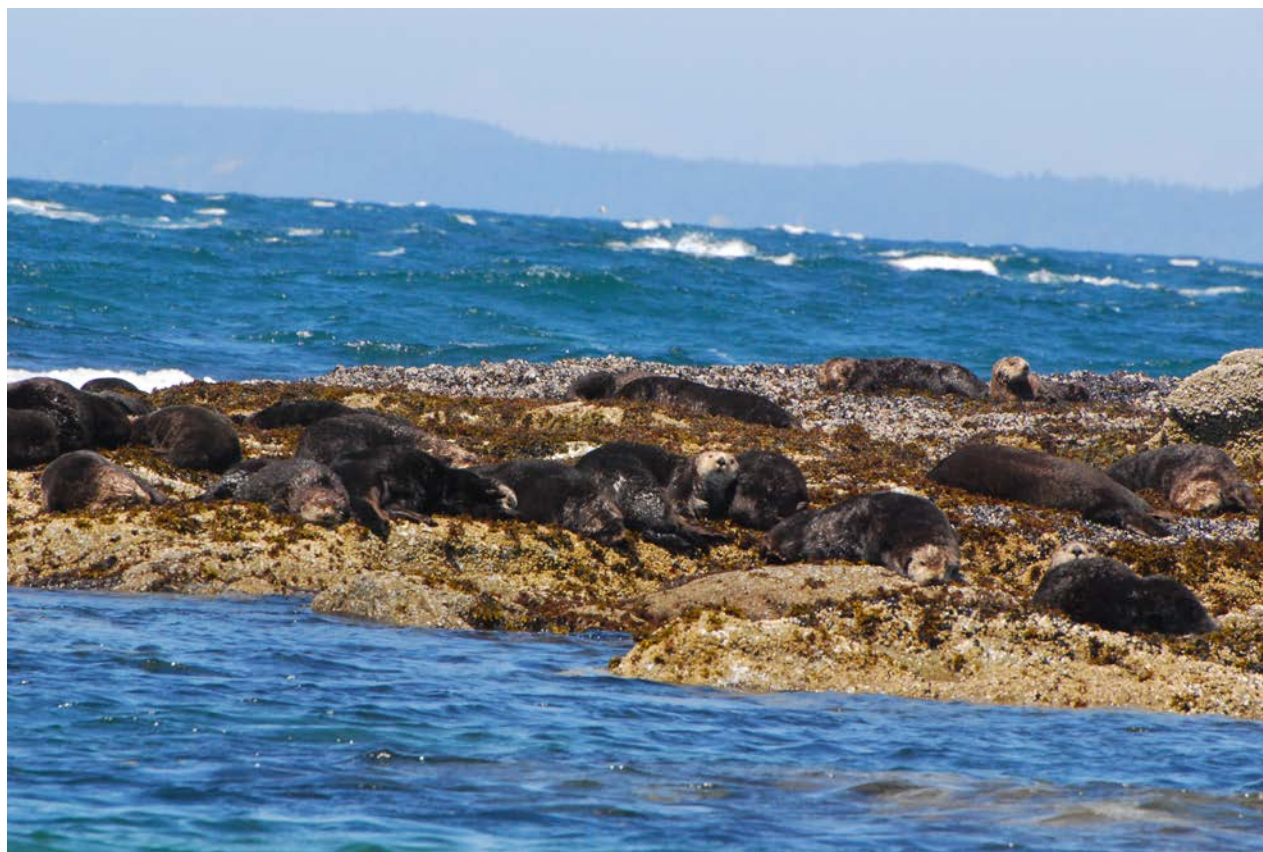


Results of the 2016 Survey of the Reintroduced  
Sea Otter Population in Washington State



Steven Jeffries<sup>1</sup>  
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Sue Thomas<sup>3</sup>

<sup>1</sup> Washington Department of Fish and Wildlife, Wildlife Science Program, Marine Mammal Investigations, 7801 Phillips Road SW, Lakewood WA 98498

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This year's survey was a collaborative effort between biologists and volunteers from the Washington Department of Fish and Wildlife, U.S. Fish and Wildlife Service, Olympic Coast National Marine Sanctuary, The Seattle Aquarium, and Point Defiance Zoo and Aquarium.

## Methods

Aerial surveys covering the range of sea otters in Washington were conducted in a Cessna 206 and included the coastal waters from the mouth of the Columbia River, north to Cape Flattery then east into the Strait of Juan de Fuca to Freshwater Bay (just west of Port Angeles). All flights were flown at approximately 800' AGL with a lead observer in the front right seat and a backup observer/scribe in the back right seat. The primary observer was responsible for locating otters and directing the pilot; photographing otters with a digital camera equipped with an 85 – 200mm lens; counting (groups < 25 otters) or estimating (groups >25 otters); and recording counts on the map. The secondary observer in the back right seat looked for otters, especially individuals or small groups near large groups, and recorded counts, locations and photo numbers on a flight log. Both observers estimated the size of small groups of <25 otters and counted individuals. For larger groups of otters, the aircraft circled the group until observers were able to estimate numbers of otters and take digital photos. One reconnaissance flight was conducted on the day prior to the beginning of the survey. When weather conditions allow, up to two flights (passes) could be conducted each day for three days for a total of six passes.

Ground observers conducted surveys using binoculars and spotting scopes from locations near Giants Graveyard, Cedar Creek, Sand Point, and Duk Point (near Seafeld Creek). A full count of the viewable area was completed within approximately 30 minutes of the aerial observations of the same location. Observations of adults (independent) and large or small pups (dependent) were recorded on an aerial photo delineated with the viewable area during each count (noting visual obstructions and environmental conditions that limit visibility during the count). Observers also recorded

weather conditions, behaviors, their assessment of the accuracy of the count and any potential disturbance (boats, kayaks, response to aircraft, predators, etc.) that occurred during the count.

Pups observed by ground counters or within digital images were distinguished from adults and classified as dependent based on their small size, wooly light brown pelage, and close association/orientation (generally resting on the chest) with an adult.

Groups of otters in digital images were independently counted using ImageJ by the authors and Shelly Ament (WDFW). Counts were compared for consistency and photos were analyzed collectively to reconcile differences. These counts were then compared to ground counts of the same group to determine if otters were duplicated or missed by the aerial or ground observers. Once compared and differences reconciled to provide the most accurate count, this count was used for the location total. Counts of digital images were used when 1) ground counts were not available for a specific group of otters or 2) the count of digital images was deemed more accurate than the ground count (assessed by ground observers during the count). The final estimate for each flight consists of the most accurate aerial or ground count of larger groups; estimates of small groups or individuals made during the aerial survey and any individuals or small groups noted by ground observers but missed by aerial observers.

The annual estimate is the single high count from one pass of the survey area. When more than one flight/pass is available, the flight with the highest count and highest level of accuracy is used to represent the minimum population estimate. As a single count, this total does not have an associated variance or confidence limits. This estimate represents the minimum count over the potential range of this species in Washington because it is very difficult to account for individual animals or small groups off the flight path, outside of the survey area or those missed because they are underwater.

An average rate of population change and a 3-year running average were calculated for the period 1989 to 2016. The average rate of population change was calculated by finding the annual percent change using  $(\text{year2}-\text{year1})/\text{year 1}$  and then calculating the average annual percent change. The 3-year running average uses the following formula: example to calculate year 3:  $(\text{year 2}+\text{year 3}+\text{year 4})/3$ .

## **Results and Discussion**

The 2016 Washington sea otter survey was conducted from 27 June – 1 July 2016 including an initial reconnaissance flight on 27 June covering the area from the Columbia River to Port Angeles. Following this initial aerial survey, we were only able to fly a single afternoon survey of the south and north segments on 30 June and one mid-morning survey of the north and south segment on 1 July. Aerial surveys attempted to cover nearshore waters from Point Grenville north to Cape Flattery then east along the Strait of Juan de Fuca to Freshwater Bay. On 30 June, observation conditions were variable ranging from good to very good for both the aerial and ground components. On 1 July, observation conditions were very good for most of the aerial component but fog prevented surveying the area between Father and Son to Cape Flattery. On 1 July, ground observers had poor conditions due to fog and were not on-site during the aerial

component. Fog and low clouds prevented aerial surveys from being conducted on all other scheduled survey days.

The highest survey count for the 2016 Washington sea otter survey was 1,806 obtained on the 30 June survey and included 426 otters in the north segment and 1,380 otters in the south segment (Table 1). The count includes 104 pups, 61 in the north segment and 43 in the south segment (Table 1). The 3-year running average population estimate is 1,591 otters. For comparative purposes, the 3-year running average estimates for the Washington sea otter population in 2014 and 2015 were 1,316 and 1,413 otters respectively.

This year, the southernmost sea otters were observed near Cape Elizabeth (1) and Willoughby Rock (13 independents and 5 pups) and the northernmost were observed in Makah Bay near Bohobohosh Rocks. No otters were sighted at Tatoosh Island or recorded in the Strait of Juan de Fuca from Cape Flattery to Freshwater Bay.

Survey results for 2016 indicate growth of the Washington sea otter populations continues to remain positive (Figure 2). Overall, the average rate of growth for the Washington population is 9.4% ( $R^2 = 0.97$ ).

In 2016, the majority (76%) of Washington's sea otter population was in the survey segment south of LaPush (1,380 otters) (Figure 3). A total of 426 otters (24%) were counted in the survey segment north of LaPush. This distribution is similar to recent distribution patterns with the majority of the population in the south segment. While the overall average population growth rate is 9.4%, there is a significant difference in average population rates of growth between the areas north of La Push (5.6%) and areas south of La Push (21.8%) (Figure 2). The growth rate north of La Push has slowed and has remained below 10% since 2010, which may indicate this population is nearing its carrying capacity or some other factor or factors are inhibiting growth in this segment. For comparison, the sea otter population south of La Push has more than doubled since 2010.

An extremely large raft of over 600 otters (Figure 1) was observed near North Rock on both surveys days. This raft was also visible from shore but due to its large size and distance offshore was uncountable by ground observers. During this year's surveys, high numbers of otters were distributed in the area just offshore and outside the break from near the mouth of Queets River to the Destruction Island overlook. As with recent surveys, no otters were recorded in the Strait of Juan de Fuca east of Neah Bay to Freshwater Bay.

Our surveys did not cover waters east of Freshwater Bay, although we are aware of credible sightings of scattered individual sea otters in the San Juan Islands and Puget Sound in recent years. Most of these sightings have been of one or two animals, with the most recent reports from 2016 in south Puget Sound. The small number of sea otters frequenting the inland waters would not add significantly to the population total. Similarly, we did not cover waters in Oregon where credible sightings (1-2 animals) have been reported in the past.

## **Acknowledgements**

Without the help from the following individuals and agencies the 2016 Washington sea otter survey would not have been possible. Thanks to: Pilot Jeff Well from Rite Bros. Aviation in Port Angeles; Anita McMillan and Shelly Ament from the Washington Department of Fish and Wildlife; Liam Antrim with Olympic Coast National Marine Sanctuary; Shawn Larson, Caroline Hempstead and Amy Green from The Seattle Aquarium; Lisa Triggs from the Point Defiance Zoo and Aquarium; and volunteers Terre Zorman, Ed Bowlby, Mary Sue Brancato, and Pat McMahon.

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The Olympic National Park provided Scientific Research and Collecting Permit (OLYM-2016-SCI-0044) for access to ONP locations used by ground observers.

Cover photograph of sea otters hauled out at Destruction Island taken by Joseph Evenson, Washington Department of Fish and Wildlife.

Aerial photo of sea otter raft near North Rock taken by Steven Jeffries, Washington Department of Fish and Wildlife.

Table 1. Results of the 30 June 2016 survey of the Washington sea otter population.

<i>Location</i>	<i>Independent</i>	<i>Dependent</i>	<i>Total</i>
<b><u>SOUTH SURVEY SEGMENT</u></b>			
Cape Elizabeth	1	0	1
Willoughby Rock	13	5	18
Queets Area	35	0	35
Kalaloch Area	427	5	432
Destruction Island	147	22	169
Abbey Island	6	0	6
Hoh River/Hoh Head Area	3	0	3
Diamond Rock	44	0	44
North Rock	645	7	652
Alexander Island	1	0	1
Goodman Creek	2	0	2
Toleak Point	1	0	1
Giants Graveyard*	11	4	15
Teawhit Head	1	0	1
<b><u>NORTH SURVEY SEGMENT</u></b>			
Hole in the Wall	1	0	1
S. of Cape Johnson	1	0	1
Bluff Pt	28	4	32
Sandy Island	24	3	27
Cedar Creek/Norwegian Memorial*	113	13	126
Yellowbanks	51	13	64
Sandpoint*	25	5	30
Inshore of White Rock	7	4	11
Ozette Island	2	0	2
Ozette/Cape Alava/Bodelteh	55	10	65
S. of Ozette River	1	0	1
Duk Point*	41	6	47
Inshore of Father and Son	15	3	18
Bohobohosh	1	0	1
Total	1702	104	1806

\* = locations where ground observers were stationed during survey flights.



Figure 1. Sea otter raft with over 600 animals near North Rock on 30 June 2016.

Figure 2. Growth patterns for Washington's sea otter population between 1989 and 2016.

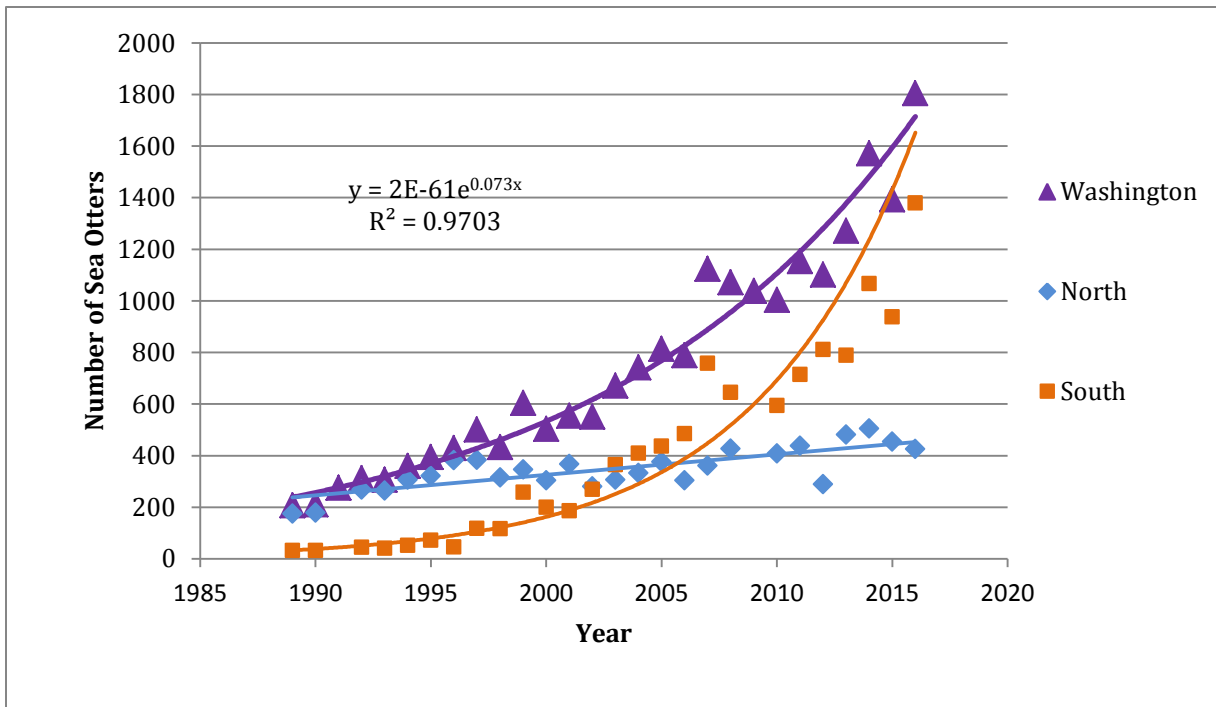
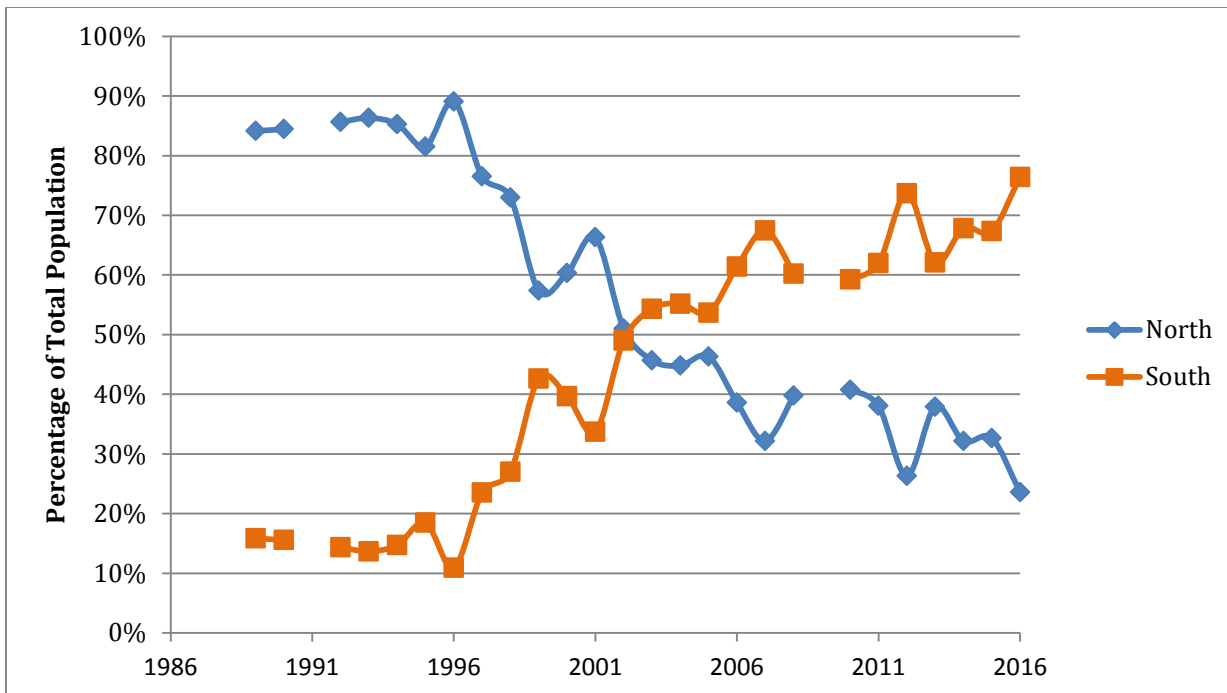


Figure 3. Comparative percentage of Washington sea otter population between the north and south survey segments, 1989-2016.





**Cooperative Agreement Interim Progress Report:**

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**Cooperative Agreement Numbers:**

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**Submitted by:**

Steven Jeffries

Washington Department of Fish and Wildlife  
Marine Mammal Investigations  
7801 Phillips Rd. SW  
Lakewood WA 98498

**Submitted to:**

Deanna Lynch  
U.S. Fish and Wildlife Service  
510 Desmond Drive SE, Suite 102  
Lacey WA 98503

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