

**Special Sessions or Workshops Proposed for NWSA Annual Meeting 2018 Change in Top Predators of the Salish Sea**

**Dolphins in inland Washington State Waters: Are warmer water species expanding into our region?**

*Laurie Shuster, David Anderson, Jessie Huggins, Annie Douglas, Nathan Harrison, John Calambokidis and Susan Berta*

**Harbor porpoise return to the Puget Sound: A tale of the recovery of a sentinel species**

*David Anderson, Laurie Shuster, John Calambokidis, and Joseph Evenson*

**Changes in strandings of cetaceans in Puget Sound/Salish Sea**

*Jessie Huggins, Stephanie Norman, John Calambokidis, Jennifer Olson, Dyanna Lambourn, Amanda Warlick, Joe Gaydos*

**Occurrence, abundance, and trends in pinnipeds in the Salish Sea**

*Steve Jeffries, Dyanna Lambourn, Pat Gearin and Bob DeLong*

**Return of the Giants of the Salish Sea: Increased occurrence of humpback into the Salish Sea**

*Kirsten Flynn, Gretchen Steiger, Elana Dobson, John Calambokidis, Mark Malleson, Brian Gisborne, Ted Cheeseman, Susan Berta*

**Gray whale discovery and adoption of feeding grounds in northern Puget Sound in spring**

*Alie Perez and John Calambokidis*

**Deployment of suction-cup attached multi-sensor video tags reveal feeding habits of gray whales on ghost shrimp in northern Puget Sound**

*John Calambokidis, James Fahlbusch, Jack Burdett, Dave Cade, and Jeremy Goldbogen*

**DOLPHINS IN INLAND WASHINGTON STATE WATERS: ARE WARMER WATER SPECIES EXPANDING INTO OUR REGION?** Laurie Shuster, David Anderson, Jessie Huggins, Annie Douglas, Nathan Harrison, John Calambokidis, Cascadia Research Collective, 218½ W 4<sup>th</sup> Ave., Olympia WA 98501; Susan Berta, Orca Network, 485 Labella Vista Way, Freeland WA 98249; [laurie.shuster@gmail.com](mailto:laurie.shuster@gmail.com)

Historically, Pacific white-sided dolphins have been the only dolphin species commonly sighted in the inland waters of Washington. However, other dolphin species have been sighted frequently in recent years, with some animals displaying longer-term residency patterns. A pair of Risso's dolphins, normally found offshore, were regularly sighted in South Puget Sound 2011-12. Common dolphins and bottlenose dolphins typically inhabit warmer temperate and tropical waters and are not usually present north of California; however, sightings of live dolphins and dead stranded individuals have been increasing. Common dolphins were sighted in 2003, 2011-12, and 2016-17, with strandings occurring in inland waters in 2012 and 2017 and on the outer coast in 2006, 2010, and 2014-16. These sighting and stranding events are proximal to El Niño periods. Since June 2016, several long-beaked common dolphins have remained in Puget Sound (generally 5-20 individuals reported). Bottlenose dolphins have been sighted in 1998, 2008, 2009, 2010 and 2011, and strandings occurred in 1988, 2010, 2011. Beginning in September 2017, bottlenose dolphins were sighted regularly in inland waters of WA and BC, with timing and locations suggesting 5-6 animals. One animal was a well-known coastal bottlenose dolphin last seen in March 2017 in Sonoma County, California, and has been part of the northern expansion of the bottlenose dolphin range occurring since the El Niño event of 1982. These species feed on similar prey (small schooling fish and squid) therefore, continued patterns of long term warming trends may increase the occurrence of these and other warm-water species in the future.

**Harbor porpoise return to the Puget Sound: A tale of the recovery of a sentinel species.**

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Harbor porpoise were the most common cetacean throughout Washington State's inland marine waters in the 1940s. By the 1970s, they were rarely if ever sighted in the Puget Sound, with greatly reduced numbers in the Strait of Juan de Fuca as well. Annual winter aerial marine bird surveys conducted by WDFW documented their recovery in the northern inland waters throughout the 1990s, with animals regularly sighted south of Admiralty Inlet starting in 2000, reaching the southern end of Puget Sound by 2005. Harbor porpoise are once again the most common cetacean in our inland waters, with several thousand animals found within the Puget Sound year round. Small boat surveys in the South Puget Sound have revealed a harbor porpoise hotspot off Steilacoom, with large feeding aggregations regularly seen in Carr Inlet, and seasonally in Case Inlet. The absence of the larger Dall's porpoise from the waters of the Salish Sea was noted in several early papers, though by the 1970s sightings of Dall's porpoise were common, especially around the San Juan Islands. As the harbor porpoise population recovered, sightings of Dall's porpoise declined to the point where they are, once again, rarely seen in the inland waters. The return of large numbers of harbor porpoise, a high trophic level predator, is certain to have an impact on the Puget Sound ecosystem, however, it is difficult to speculate about potential changes at this time.

**Changes in strandings of cetaceans in Puget Sound/Salish Sea.** Jessie Huggins, Stephanie Norman John Calambokidis, Cascadia Research Collective, 218½ W 4<sup>th</sup> Ave., Olympia WA 98501; Jennifer Olson, The Whale Museum, PO Box 945 Friday Harbor, WA 98250; Dyanna Lambourn, Washington Department of Fish and Wildlife, 7801 Phillips County Rd. SW Tacoma WA 98498; Amanda Warlick, Northwest Fisheries Science Center, 2725 Montlake Blvd. E, Seattle, WA 98112; Joe Gaydos SeaDoc Society, 942 Deer Harbor Rd. Eastsound WA 98245; [JHuggins@CascadiaResearch.org](mailto:JHuggins@CascadiaResearch.org)

Cetacean strandings in the inland waters (Puget Sound/Salish Sea) of Washington State have been systematically recorded in since the early 1980s, providing an invaluable dataset with which to track spatiotemporal trends and changes in stranding patterns. Harbor porpoise and seasonally occurring gray whales are the two most commonly stranded species in inland waters. Strandings of other large rorquals such as blue, fin, and sei whales have been historically documented in the region, though were brought into inland waters wrapped on the bows of ships. Ship strike mortality in large whales has increased dramatically in recent years. Beginning in 2001, the percentage of cetacean strandings (particularly fin whales) showing evidence of ship strikes has risen from 4% (1991-2000) to over 20%. Extra-limital strandings of warm water cetacean species, such as bryde's whales and bottlenose and common (*Delphinus* spp.) dolphins have been observed, with sightings and strandings of the latter increasing since 2006. Drastic changes in stranding occurrence, characterized by unusual mortality events, or UMEs, have been documented in gray whales (UME in 1999-2000) and harbor porpoises (UME in 2006-2007) and continued high levels of post-UME strandings for both species have been noted. These changes likely reflect increased population sizes of these two species, and in the case of harbor porpoises, a return to areas within the Puget Sound where they had previously disappeared. Likewise, the return of humpback whales to Washington inside waters, which has been captured by sighting records, has also been confirmed by an increase in stranding events, with the first stranding ever recorded inside the Puget Sound in late 2015, and three additional strandings in the following years.

**Occurrence, abundance, and trends in pinnipeds in the Salish Sea.** Steven Jeffries, Dyanna Lambourn, Washington Department of Fish and Wildlife, 7801 Phillips County Rd. SW Tacoma WA 98498; Pat Gearin, and Robert DeLong, Marine Mammal Laboratory, 7600 Sand Point Way NE, Seattle WA 98115; *Steven.Jeffries@dfw.wa.gov*

Four species of pinnipeds, harbor seals, northern elephant seals, California sea lions and Steller sea lions, are common in the Salish Sea. All these species have increased following passage of the MMPA. For harbor seals, numbers increased to about 16,000 animals in inland water stocks but have declined in recent years. Northern elephant seal numbers in the Salish Sea have been stable in low numbers for several decades with pupping occurring in several locations. Steller sea lion populations continue to increase range wide including sites in Washington with pups now present on the Olympic Peninsula coast. The California sea lion population has increased from 50,000 animals to nearly 300,000 today. About 60,000 California sea lion males disperse annually from their rookeries in California into Oregon, Washington, British Columbia and SE Alaska. Several thousand occur in the Salish Sea from fall to late spring. Two other species, northern fur seals which are common off the Washington coast and ribbon seals which are an arctic ice seal, have both been recorded from the Salish Sea in recent years but occur in low numbers or rarely.

**Return of the Giants of the Salish Sea: Increased occurrence of humpback into the Salish Sea.** Kiirsten Flynn, Gretchen Steiger, Elana Dobson, John Calambokidis, Cascadia Research Collective, 218½ W 4th Ave., Olympia WA 98501; Mark Malleon, Center for Whale Research P.O. Box 1577, Friday Harbor WA 98250; Brian Gisborne, Juan de Fuca Express, Victoria, BC V8V 2G5; Ted Cheeseman, Happywhale, 904 Columbia St, Santa Cruz CA95060; Susan Berta, Orca Network, 485 Labella Vista Way, Freeland WA 98249; *KFlynn@CascadiaResearch.org*

Humpback whales were once common in the Salish Sea and were reported to over winter in these waters. A whaling station based in southern Vancouver Island from 1907 to 1910 hunted these whales through the winter months killing several hundred and largely eliminating them from these waters. Cascadia Research has conducted long-term studies of humpback whales along the US West Coast since the 1980s and documented their steady recovery from whaling; population increased at about 7-8% per year through about 2010 and then stabilize suggesting they may have finally recovered to pre-whaling numbers. In the late 2000s, we documented increased sighting reports of humpback whales in inside waters and extending into Puget Sound. Some of these whales were also documented staying through the winter months. These whales have now become common in the Salish Sea and become a focus of some whale watch operations on both the Washington and British Columbia side of the border (especially when killer whales are absent). We used photographic identification to investigate humpback whale movements and matches of identification photographs to other areas reveals that these whales travel to a mix of breeding areas primarily Hawaii and Mexico in winter months. Matches also show many of these whales using inside waters represent whales that had been using outside offshore waters, suggesting a shift over time into inside waters. We speculate that humpback whales, which show site fidelity to specific regions, only returned to these former feeding areas when their recovering population size forced their expansion into inside waters.

**Gray whale discovery and adoption of feeding grounds in northern Puget Sound in spring.**  
**Alie Perez** and John Calambokidis, Cascadia Research Collective, 218½ W 4th Ave., Olympia  
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Every spring, a regular group of identified gray whales (termed the Sounders) return to the waters around Whidbey Island to feed. The first two individuals adopting this strategy were identified in 1990, with four more animals joining them in 1991. Those animals have returned almost every year from March through May to these same waters. In 1999 and 2000, another half-dozen whales joined this group bringing the total to almost a dozen that return annually. Most have been determined to be males though a few females also regularly return though typically with gaps in their occurrence every 3-4 years that may be the years they have a calf, since none of them have been seen with a calf in northern Puget Sound. These animals are not part of the Pacific Coast Feeding Group that spends the spring, summer, and fall in the Pacific Northwest, they instead appear to continue their migration north to more Arctic feeding areas after the spring-feeding. At least one individual has been extending its stay past the spring in recent years. The years when this core group of whales discovered and adopted these areas were during periods of apparent food stress with higher number of strandings of emaciated gray whales and also more apparently unhealthy whales wandering through the Salish Sea. We speculate that the Sounders represent some of these whales that were in poor condition that motivated them to travel off the migration and seek alternate prey before continuing their migration north and that now choose to return to annually given the abundant prey.

**Deployment of suction-cup attached multi-sensor video tags reveal feeding habits of gray whales on ghost shrimp in northern Puget Sound.** John Calambokidis, James Fahlbusch, Jack Burdett, Cascadia Research Collective, 218½ W 4th Ave., Olympia WA 98501; Dave Cade and Jeremy Goldbogen, Stanford University, 120 Oceanview Boulevard, Pacific Grove CA 93950; *JCalambokidis@CascadiaResearch.org*

As part of a project conducted with the Washington Department of Natural Resources, we examined the feeding behavior of a group of a dozen gray whales that return annually (some for over 25 years) to northern Puget Sound for 2-3 months each spring. This location is >200 km off the migration route for gray whales. We examined gray whale feeding and social behavior from 11 deployments of suction-cup attached multi-sensor video tags in spring of 2015-16. The tags gathered 132 hours of data (including one >67h attachment). Video and kinematic data revealed gray whales fed almost exclusively on intertidal ghost shrimp during high tide periods. Dive depths during feeding were 2.5-3 m (barely enough waters to swim) and some areas were over 2 km from deeper water. Feeding periods ranged from <1h to >6h skewed towards the incoming period around the high tide. Gray whales spent extensive periods milling in several other areas during other portions of the tide cycle but the tags revealed they were not engaged in feeding and showed a high degree of social interaction among whales including frequent body contact with other whales. Prey density data indicates that despite the limited time these areas are accessible, the prey density and feeding rate would make this a very advantageous strategy despite the riskiness. This small number of whales may be removing 100 metric tons or more of ghost shrimp each spring in an area where a human harvest for ghost shrimp also occurs.