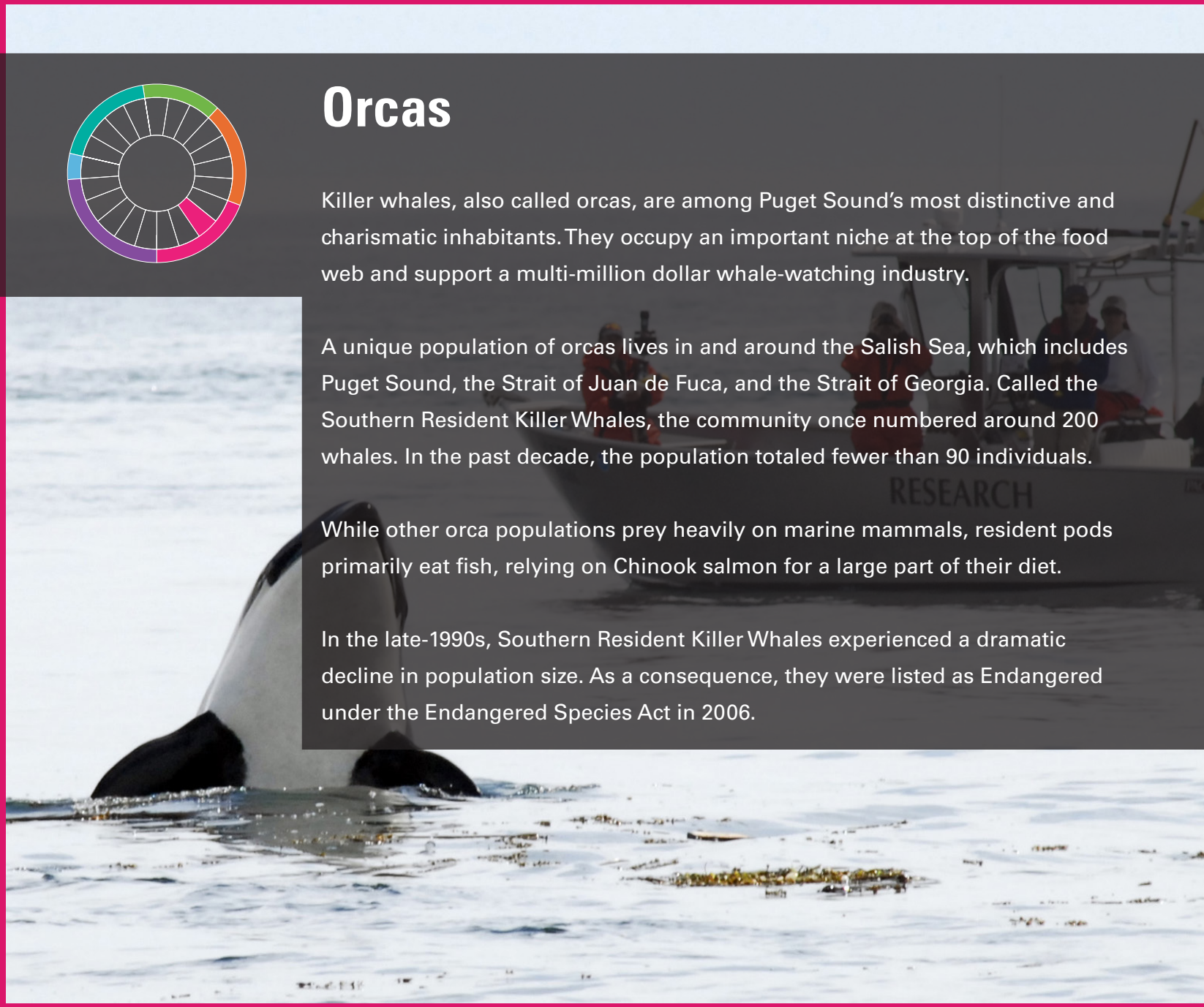


Orcas

Killer whales, also called orcas, are among Puget Sound's most distinctive and charismatic inhabitants. They occupy an important niche at the top of the food web and support a multi-million dollar whale-watching industry.

A unique population of orcas lives in and around the Salish Sea, which includes Puget Sound, the Strait of Juan de Fuca, and the Strait of Georgia. Called the Southern Resident Killer Whales, the community once numbered around 200 whales. In the past decade, the population totaled fewer than 90 individuals.

While other orca populations prey heavily on marine mammals, resident pods primarily eat fish, relying on Chinook salmon for a large part of their diet.

In the late-1990s, Southern Resident Killer Whales experienced a dramatic decline in population size. As a consequence, they were listed as Endangered under the Endangered Species Act in 2006.

Photo Credit: NOAA Photo Library

Orcas

INDICATOR:

Number of Southern Resident Killer Whales

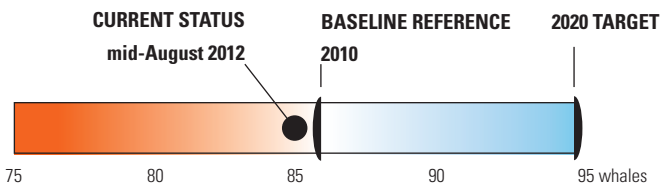
Indicator lead: Ken Balcomb, Center for Whale Research

TARGET:

By 2020, achieve an end of year census of Southern Resident Killer Whales of 95 individuals, which would represent a 1% annual average growth rate from 2010 to 2020.

PROGRESS:

IS THE TARGET MET?	NO	IS THERE PROGRESS?	NO



There were a total of 85 Southern Resident Killer Whales as of mid-August 2012. This was one less whale than the baseline reference of 86 whales.

Progress Towards 2020 Target

The 2020 target of reaching 95 whales has not been met, and in the short-term there has been no progress. Since 2010, the Southern Resident Killer Whale population has never been larger than 88 whales. Furthermore, as of August 2012, the size of the population was smaller by one whale relative to the 2010 baseline reference of 86 whales.

Although there has been no progress made since 2010, the population has been growing, albeit slowly at about 1% per year, over the longer term (1979 to 2010). This population growth trend is consistent with the 2020 target. However, trends could easily be reversed, as the Southern Resident Killer Whale population is very vulnerable to a variety of factors, making progress towards the 2020 target tenuous at best.

What Is This Indicator?

The Southern Resident Killer Whale population in Puget Sound is actually a large extended family, or clan, comprised of three pods: J, K, and L pods. Although they can be seen throughout the year in Puget Sound, they are most often seen during the summer, especially in Haro Strait west of San Juan Island, the Strait of Juan de Fuca, and in the Strait of Georgia near the Fraser River.

Threats to Southern Resident Killer Whales include contaminants, prey availability, vessels, and noise pollution. Additional human activities, such as underwater military activities, have been identified as a potential concern for killer whales, particularly on the outer coast. This issue has not been fully evaluated. Their small population size and social structure put them at risk for a catastrophic event, such as an oil spill, or a disease outbreak, that could impact the entire population.

Resident orcas were chosen as an indicator because they are top-level predators, spend a portion of the year in Puget Sound to feed and socialize, and are threatened by some of the pressures on the Sound, such as pollution and declining salmon and herring runs. Although a robust orca population is an important recovery goal both at the state and federal level, there may be limits to how much the orca indicator can tell us about the overall health of Puget Sound. The Southern Resident Killer Whale population migrates in and out of the area, and thus is not entirely dependent on Puget Sound and its resources.

Interpretation of Data

Current Status and Trend

The census of the Southern Resident Killer Whale population, conducted annually by the Center for Whale Research, is an important method by which to assess the status and trends of this endangered population. The entire population is counted with a high degree of certainty using photo identification techniques. Sighting networks throughout Puget Sound support the census. Two of these networks are showcased elsewhere in this report (please see "Volunteers Gather Important Data on Orcas" on page XX).

Other populations of whales, such as Transients and Northern Resident Killer Whales, also frequent the Salish Sea, but their numbers are not reported here because the indicator and target focus only on Southern Resident Killer Whales.

The population size of Southern Resident Killer Whales changes temporarily throughout the year as whales are born and die. For example, as of the end of 2011 there were 88 Southern Resident Killer Whales in total, with 26 in J pod, 20 in K pod and 42 in L pod (Figure 1). Since December 2011 four whales have gone missing (J30, K40, L5, L12) and are presumed dead. A fifth missing whale (L112), drifted ashore dead in February on the outer coast of Washington. However, two new calves (J49, L119) have been seen since the beginning of 2012 such that, at the time of publication, there were 85 Southern Resident Killer Whales in Puget Sound.

Thus, abundance did not change significantly in the last decade (Figure 1). However, although there has been no progress in the short term, analysis of historic data shows modest growth.

Historic Trends

Since data became available in 1973, the Southern Resident Killer Whale population has by turns declined and grown. Despite year-to-year variability, total population size grew over the past four decades by about 1% per year: there were fewer than 70 whales in the early 1970s, and an annual average of 85 whales in the 2000s (Figure 1). Yet, compared to the Northern Resident Killer Whale population living in the Strait of Georgia, the Southern Resident Killer Whale population is smaller and has been growing more slowly overall.

At the pod level, the long-term population growth rate (from 1979 and 2010) is slightly lower for J and K pods combined (~2%) than for L pod (~1%). L pod is the largest of all pods. However, this pod has been in decline since the early 1990s.

The other two pods, J and K, are roughly the same size. Both J and K pods are growing, with J pod increasing more rapidly than K pod. This is likely due to the limited reproductive potential in K and L pods. Indeed, the sex ratio of K and L pods is skewed toward males. The lack of reproductive females, poor survival of calves, and factors associated with small population sizes such as inbreeding, along with human-caused threats, are a concern for the viability of this population.

Orcas

J pod is also the pod that spends the most time in Puget Sound compared to the other two. The fact that Southern Resident Killer Whales only spend part of their lives in Puget Sound, and that the pod that spends the least time in Puget Sound has the steepest decline, suggests that the whales are impacted by conditions outside of Puget Sound.

Although the Southern Resident Killer Whale population's long-term trend for population growth meets the growth rate target, the population growth rate does not meet the legal recovery criteria to delist the Southern Resident Killer Whales from the Endangered list (i.e., meeting an average growth rate of 2.3% per year for 28 years).

Restoration of this population of long-lived, slow-reproducing killer whales is a long-term effort that requires cooperation and coordination of West Coast communities from California to British Columbia. It will take many years to fill key data gaps and assess the effectiveness of ongoing recovery actions for the whales, salmon, and their habitat, and to observe significant increases in the Southern Resident population.

Number of Southern Resident Killer Whales in Puget Sound
Annual, 1972-2012

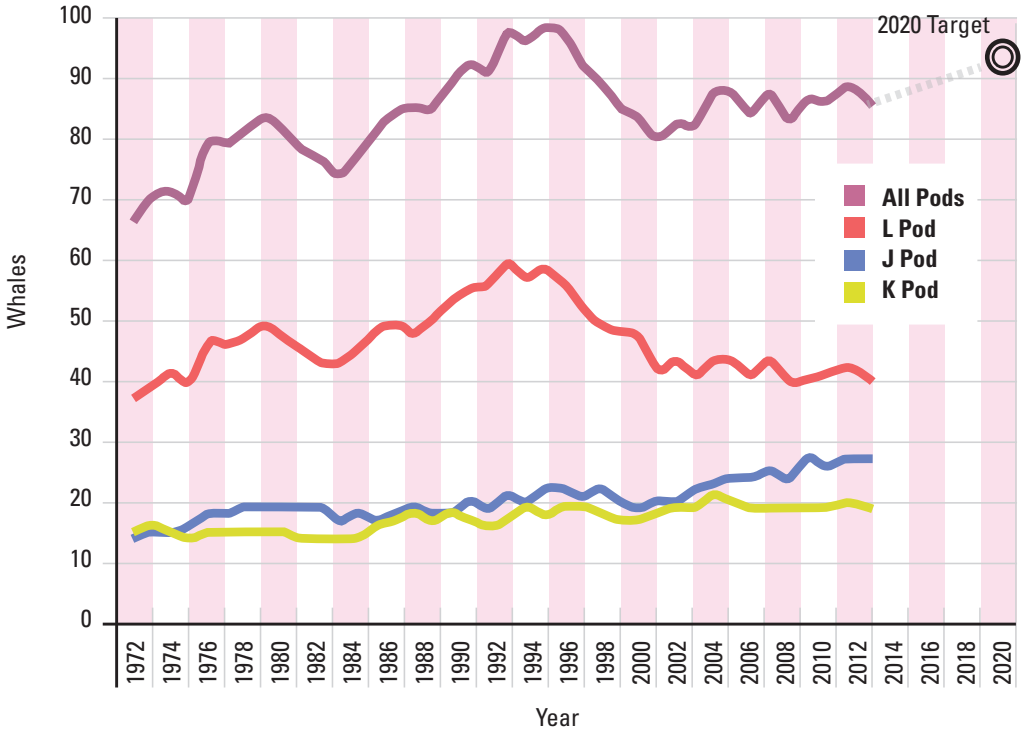


Figure 1. Number of Southern Resident Killer Whales in Puget Sound each year between 1972 and 2012.
Source: Center for Whale Research

Volunteers Gather Important Data on Orcas

Salish Sea Hydrophone Network and Orca Network

The Salish Sea Hydrophone Network and Orca Network are two citizen science projects dedicated to furthering our understanding of abundance, distribution, behavior, and habitat use by the endangered population of Southern Resident Killer Whales, also called orcas. The Hydrophone Network lets the public listen for orcas through their computers and phones, while the Orca Network gathers and disseminates sightings of orcas as they move between Puget Sound, the Fraser River, and the Pacific Ocean.

Listening in on Orcas

The **Salish Sea Hydrophone Network** started in 2007 and now includes five hydrophones (underwater microphones): two on San Juan Island, and one each at Port Townsend Marine Science Center, the Seattle Aquarium, and Neah Bay. By monitoring the sounds streaming live on orcasound.net, scientists, educators, and the public can help detect loud calls and clicks made by orcas as they communicate and hunt. Listeners can also help detect noise pollution caused by Naval sonar and vessel traffic.

For orcas and other whales, the underwater sound environment is critical to their sensory experience and behavior. Orcas communicate with each other over short and long distances with a variety of clicks, chirps, squeaks, and whistles. They also use echolocation to locate prey and to navigate.

Hydrophone Network volunteers log their observations on a collaborative Google spreadsheet online or report detections via email. Volunteer observations help to direct field research, including prey sampling studies that revealed the orcas strong preference for Chinook salmon and fecal sampling studies that show orcas may be prey-limited. In addition, the hydrophone network enabled early detection of a new orca calf in 2009.

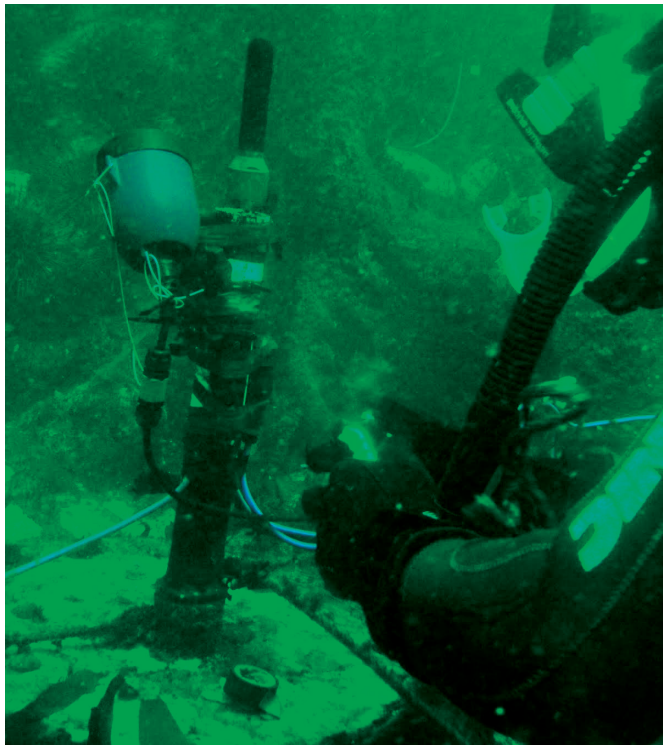
The Network allows friendly competition and collaboration between volunteer listeners and computers. In detecting when orcas passed by a proposed tidal turbine site near Port Townsend, human listeners heard the orcas 10 of the 22 times they passed by (45%) while auto-detection software detected them 14 times (64%). When both approaches were combined orcas were detected 17 times (77%).

The number of orcasound.net visitors per day rises from a mid-winter low of about ten to a summertime average of approximately 100, with occasional spikes to 200-350. Listeners are predominantly from the U.S. (75%) and Canada (13%), so observers from distant time zones are sought to boost nighttime detection rates.

Watching for Orcas

Given the wide-ranging travels of the Southern Resident Killer Whales and other whales in the Salish Sea, it is impossible for the few whale researchers to track all the individuals on a regular basis.

Orca Network's Whale Sighting Network was started in 2001 to provide more information on Southern Resident Killer Whale travels in inland and coastal waters. In addition, the network also raises awareness, educates the public, and provides a networking and communication system for researchers, educators, and the public. There are currently more than 7,000 participants on the Sighting Network email list, and more than 14,000 subscribers to the Facebook page.



Lime Kiln Hydrophone. Photo Courtesy of Dave Howitt

Volunteers Gather Important Data on Orcas

LOCAL STORY

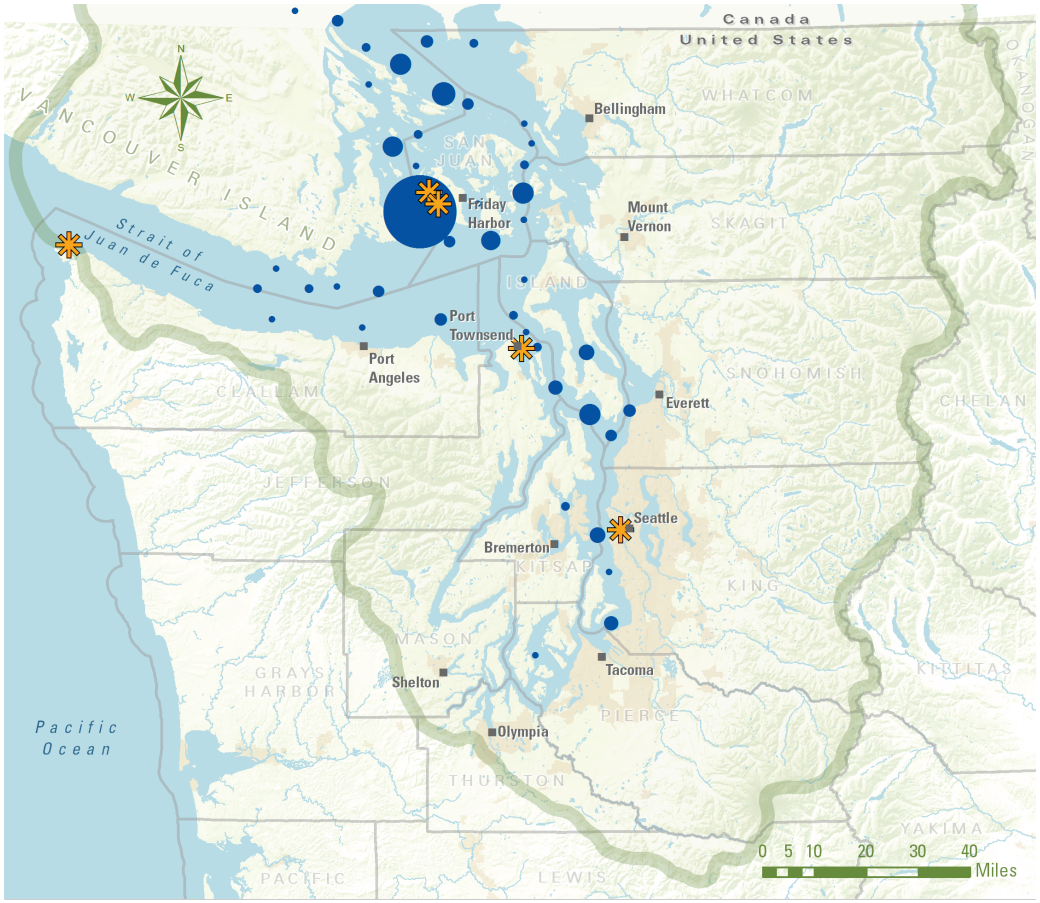
With more than 15,000 sightings reported to date by the hundreds of participants in the Sighting Network, Orca Network harnesses broad public interest in whales to provide researchers with critical information for tracking these endangered whales.

Through the Sighting Network, volunteers report sightings of whales, which provide valuable information on habitat use, social and foraging patterns, and behaviors for researchers managing the recovery of Southern Resident Killer Whales. Reports are compiled and sent to researchers, natural resource managers, and educators and are available on the Orca Network website, Facebook page, and Twitter feed.

The Sighting Network also provides an important communication and tracking tool during emergency situations such as oil spills and entangled whales. It also helps identify orcas out of their usual habitat, such as Springer, the Northern Resident orca calf who was reported through the Sighting Network in Swinomish Channel, then off Edmonds, before showing up off Vashon Island. She was relocated to her home in Canadian waters in 2002.

More information about the Salish Sea Hydrophone Network and the the Orca Network's Whale Sighting Network can be found at:

www.orcasound.net | www.orcanetwork.org



Whale Sightings Networks

Salish Sea Hydrophone Network

2011 Orca Sightings

1 5 10 50 100

County border

Salish Sea Basin boundary

Cities and Urban Growth Areas

Figure 1. Salish Sea Hydrophone Network locations and 2011 orca sightings from the Orca Network Whale Sightings Network. Orca sightings data were compiled from monthly sighting maps and include only orca (resident or unknown) reports and only one report per location per day (although it is possible that the Network received more than one report per location per day).
Source: Salish Sea Hydrophone Network and Orca Network