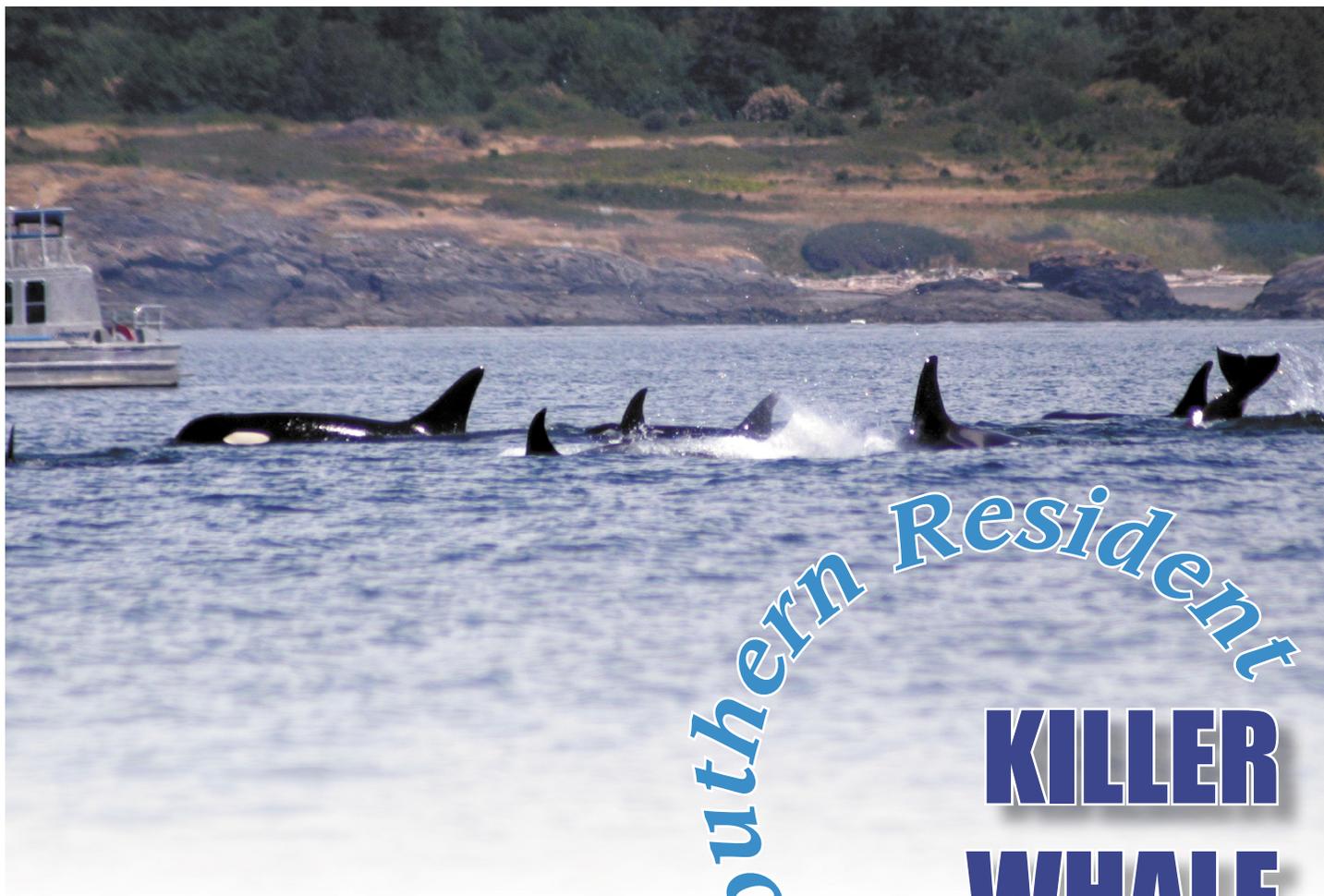




Northwest Fisheries Science Center

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Southern Resident KILLER WHALE RESEARCH

Killer whales residing in the Puget Sound region during late spring to early fall are beloved by residents and tourists alike. When information was released about the large and rapid decline of these Southern Resident killer whales (SRKW), many people in the general public and scientific community became concerned. In response to this concern, Congress provided \$750K to NOAA's Northwest Fisheries Science Center (NWFSC or Center) to support SRKW research. This research is being conducted collaboratively with local, national, and international experts and is designed to address possible causes for the SRKW decline, as well as to gain a better understanding of SRKW ecology, taxonomy, physiology, and behavior.

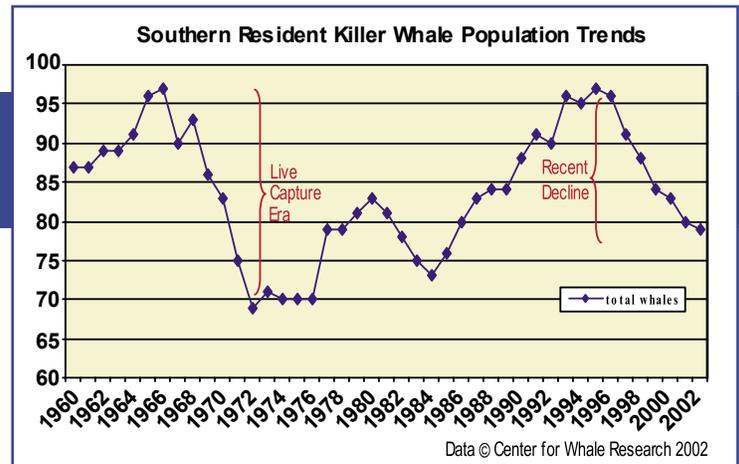
Dr. Usha Varanasi • Science and Research Director



Research Planning

After receiving the SRKW research funding in late March, the NWFSC's Marine Mammal Program worked quickly to develop a sound foundation for initiating research projects. To ensure that research projects focused on the most critical research needs and would provide the best information to support conservation of the SRKW population, the Center held two workshops with regional, national, and international experts. The first workshop focused on vessel interaction research and the second on prey resources of SRKWs. These workshops sparked lively discussions that eventually led to the development of a list of the most important research questions for vessel interaction and prey resources research. In addition, workshop participants identified the best methods to address these research questions. The Center used these questions and methods to generate open-bid contracts for new research projects, as well as to provide support for ongoing research projects. The Center also set-aside some funding to support studies on SRKW genetic relationships and winter distribution. In total, the Center funded over 20 research projects in 2003, in four primary areas:

- Evolutionary Relationships
- Noise/Vessel Interactions
- Prey/Health Assessment
- Winter Distribution



Through this research we can better determine why the population is currently at low levels and provide recommendations to conserve and rebuild the SRKW population.

Center Scientists

The Center's Marine Mammal Program conducts critical research on Southern Resident killer whales and is led by Dr. Linda Jones. Drs. Brad Hanson and Dawn Noren are the program's two marine mammal scientists. Brad is an expert on habitat and foraging ecology, while Dawn specializes in marine mammal physiology. The Center's program also includes scientists from the Center's Environmental Assessment program, which measures contaminant levels in marine mammal tissues and analyzes stable isotopes and fatty acids to understand marine mammal prey, and the Genetics program, which studies the genetic structure of living marine resources.

Evolutionary Relationships

Currently, there is only one recognized global species of killer whales, however, some recent data suggests that there may be more than one species of killer whale worldwide. To conserve and manage killer whales, we need to identify the number and distribution of distinct populations of the global killer whale species.

Three projects are currently underway to determine genetic relationships between SRKWs and other killer whales using existing archived biopsy, skull, and bone samples. Results will help scientists determine how genetically distinct different groups of killer whales are, whether the different groups are interbreeding, and the historical distribution of the SRKW population.

In addition, in April 2004, the Center will co-host an International Symposium and Workshop on Cetacean Taxonomy. This conference will bring together experts in cetacean genetics, morphology, and behavior who will discuss our current understanding of cetacean genetic relationships and identify data gaps. One workshop during the 5-day symposium will focus on killer whales.

Principal researchers include Dr. Russ Hoesel, University of Durham, Dr. Rick LeDuc, NOAA Fisheries (Southwest), Dr. William Perrin, NOAA Fisheries (Southwest), Dr. Barbara Taylor, NOAA Fisheries (Southwest), and Dr. Paul Wade, NOAA Fisheries (Alaska).

Noise/Vessel Interactions

There is a substantial amount of whale watching, commercial shipping, military exercises, and recreational and commercial fishing in Puget Sound. Killer whales have a highly developed acoustic sensory system that they use while navigating and foraging. Potential effects of vessel activities on SRKWs include masking of their communication calls, interference with echolocation and prey locating abilities, effects on prey themselves, and physical and social stress to the killer whales.

Five projects are currently underway to determine what kinds of noise and noise levels SRKWs are exposed to and how vessel activity affects SRKW habitat use, behavior, and energetics. Results will help scientists understand if there are changes in behavior (e.g., their ability to find prey and feed) and/or increased energetic costs associated with vessel interactions (e.g., avoidance behaviors or traveling farther to get prey), and whether there are differences in the responses to vessels between subgroups/individuals within SRKW pods. These studies will also help scientists understand whether noise or vessels have played a part in the decline of the population.

Principal researchers include Dr. David Bain, University of Washington, Dr. James Ha, University of Washington, Dr. John Hildebrand, Scripps Institution of Oceanography, Jennifer Marsh, University of Washington, Dr. Dawn Noren, NOAA Fisheries (Northwest), and Dr. Richard Osborne, Whale Museum.

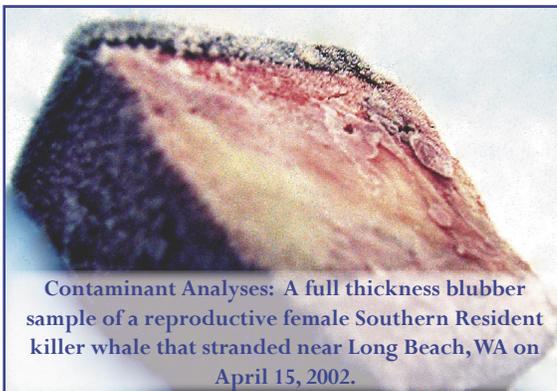


National Oceanic and Atmospheric Administration (NOAA) scientists recently evaluated the status of the SRKW population under the Endangered Species Act and in 2003 NOAA listed the population as depleted under the Marine Mammal Protection Act.

Prey/Health Assessment

SRKW diet is thought to consist largely of salmon, however, there are few data on what these killer whales actually eat. With declines in salmon populations in the Pacific Northwest over the last decade or so, prey availability may have changed for the SRKWs. In addition, prey quality may be affected by exposure to PCBs, DDTs, and other persistent toxic chemicals in the aquatic environment. These toxic chemicals are then passed on to the killer whales when they consume prey. Potential effects of decreased prey quantity and quality on SRKWs include nutritional stress/starvation, suppression of the immune system, and delayed or unsuccessful reproduction.

Nine projects are currently underway to characterize SRKW prey, how diet selection varies seasonally, how contaminant concentrations and patterns vary among prey species, and whether recent SRKW population trends are consistent with nutritional limitation, stress, or both. Results will help scientists determine if killer whale growth rates have changed since the 1970s, the identity and relative quantity of prey species that SRKWs consume, and prey quality and contaminant concentrations.



Contaminant Analyses: A full thickness blubber sample of a reproductive female Southern Resident killer whale that stranded near Long Beach, WA on April 15, 2002.

Principal researchers include Dr. Robin Baird, Cascadia Research Collective, Dr. Aleta Hohn, NOAA Fisheries (Southeast), Dr. Eli Homes, NOAA Fisheries (Northwest), Dr. Peggy Krahn, NOAA Fisheries (Northwest), Shannon McCluskey, University of Washington, Daniel Monson, University of California, Santa Cruz, Dr. Richard Osborne, Whale Museum, Dr. Glenn VanBlaricom, University of Washington, and Dr. Terrie Williams, University of California, Santa Cruz.

Key Differences between Resident and Transient Killer Whales

- Residents are believed to prey on fish and cephalopods (e.g., squid and octopus), while transients appear to feed on marine mammals and birds.
- Residents travel in large, stable pods their entire life, while transients travel in smaller, less cohesive pods.
- Residents tend to vocalize often, while transients generally do not. Residents also have different "dialects."
- Residents and transients are genetically isolated (they do not interbreed).



Winter Distribution

Very little is known about where SRKWs go when they leave Puget Sound, particularly from November to May. Without this basic information we cannot understand SRKW habitat and prey relationships and what other risk factors may be affecting the population when they are outside Puget Sound.

Five research projects were funded to identify the full range and habitat-use of SRKWs, potential critical foraging areas used by SRKWs during the winter, and possible anthropogenic threats to the population during the winter. In addition, NOAA Fisheries provided additional funding to support ship time on a NOAA research vessel to conduct studies during the winter. Results will help scientists determine what areas SRKW pods frequent in the late fall through early spring and when the addition or loss of individuals occur in this population.



Principal researchers include Kenneth Balcomb, Center for Whale Research, Dr. Richard Osborne, Whale Museum, and the NWFSC's Marine Mammal Program.



We need your help!

We have limited information on killer whales when they are outside of the Puget Sound area. If you see killer whales outside Puget Sound:

- Note the time, date, location (and latitude and longitude if possible), number of whales, and direction the whale(s) is traveling. If you see adult males with the distinguishing tall dorsal fin, please note how many are present. Also note any unusual marks (scars, deformities in fin, etc.).
- Take photographs. Individual whales can be identified by their unique markings on their dorsal fin and saddle patch (the gray area immediately behind the dorsal fin).
- Report your observations. Call the toll free Whale Sighting Hotline at 1-888-840-0309 or email the Center for Whale Research (orcaSurv@rockisland.com) or the NWFSC (Dawn.Noren@noaa.gov).



Clear photographs of killer whales, especially animals with distinguishing marks, can be used by photo-identification experts to determine which animal(s) you sighted. Please stay at least 100 meters away from the animal(s) during your observations.

For more information on the Center's killer whale research, please contact Dr. Linda Jones (Linda.Jones@noaa.gov) or visit our website at <http://www.nwfsc.noaa.gov/features/KWsightings.cfm>.