



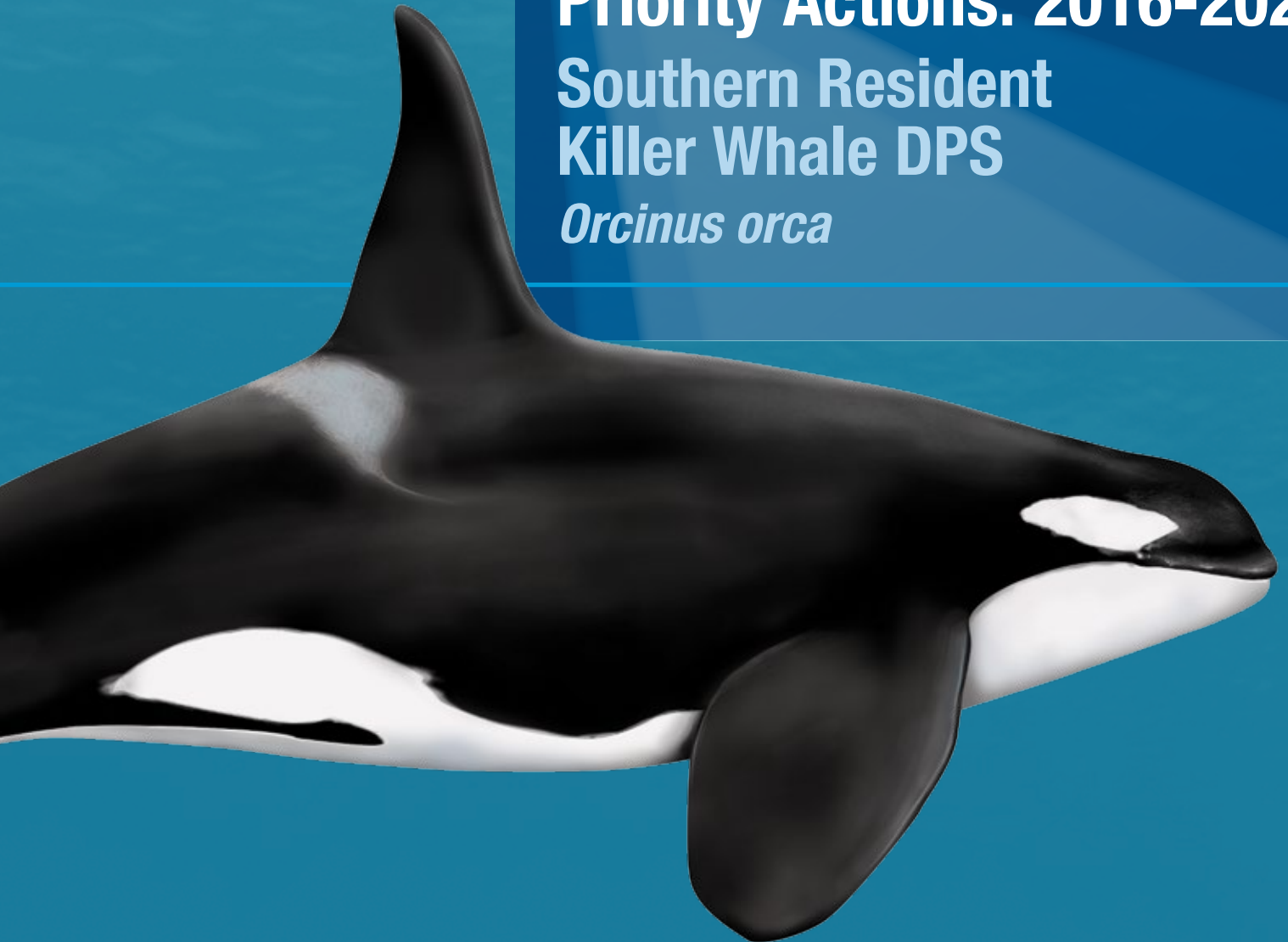
**NOAA
FISHERIES**

SPECIES *in the* SPOTLIGHT

Priority Actions: 2016-2020

**Southern Resident
Killer Whale DPS**

Orcinus orca



SPECIES SPOTLIGHT BACKGROUND

The 5-year action plan is part of a strategy to marshal resources on species listed under the Endangered Species Act of 1973 (ESA) for which immediate, targeted efforts are vital for stabilizing their populations and preventing their extinction. Eight species were identified by the National Marine Fisheries Service (NMFS) as among the most at-risk of extinction:

- Atlantic Salmon Gulf of Maine Distinct Population Segment (DPS)
- Central California Coast Coho Evolutionarily Significant Unit (ESU)
- Cook Inlet Beluga Whale DPS
- Hawaiian Monk Seal
- Pacific Leatherback Sea Turtle
- Sacramento River Winter-run Chinook ESU
- Southern Resident Killer Whale DPS
- White Abalone

These species were identified as among the most at-risk of extinction based on three criteria (1) endangered listing, (2) declining populations, and (3) are considered a recovery priority #1¹. We know the threats facing these species and understand the management actions we can take that will have a high probability of success. The 5-year action plan builds upon existing recovery or conservation plans and details the focused efforts needed over the next 5 years to reduce threats and stabilize population declines. We will engage our partners in the public and private sectors in actions they can take to support this important effort. We will report on our progress through the Biennial Report to Congress and post updates on our website: <http://www.nmfs.noaa.gov/pr/>.

This strategy will guide agency actions where we have the discretion to make critical investments to safeguard these most endangered species. The strategy will not divert resources away from the important and continued efforts to support all ESA-listed species under our authority. Many of our species have long-standing conservation programs supported by multiple partners. We remain committed to those programs. This action plan is designed to highlight the actions that can be taken by us, other federal and state resource agencies, environmental organizations, Native American Tribes and other partners to turn the trend around for this species from a declining trajectory to a trajectory towards recovery.

¹ Priority #1 is defined as a species whose extinction is almost certain in the immediate future because of a rapid population decline or habitat destruction, whose limiting factors and threats are well understood and the needed management actions are known and have a high probability of success, and is a species that is in conflict with construction or other developmental projects or other forms of economic activity. NMFS Endangered and Threatened Listing Recovery Guidelines (55 FR 24296, June 15, 1990).

SOUTHERN RESIDENT KILLER WHALE STATUS

The Southern Resident killer whale DPS was listed as endangered under the Endangered Species Act (ESA) in 2005 following an almost 20% decline in the population. The Southern Residents were chosen as one of the eight most at-risk species because the population has relatively high mortality and low reproduction and they are currently well below the population growth goals identified in the Recovery Plan (NMFS 2008). Unlike other North Pacific killer whale populations, which have generally been increasing since federal protection was initiated in the 1970s, the Southern Resident population remains small and vulnerable and has not had a net increase in abundance since the mid-1980s. The comprehensive recovery program requires engagement from vital partners and long-term support over a large range from California to Alaska.

SOUTHERN RESIDENT KILLER WHALE KEY CONSERVATION EFFORTS/CHALLENGES

The three primary threats identified for Southern Resident killer whales are insufficient prey, high levels of contaminants (contaminant sources may include contaminated prey, wastewater treatment plants, sewer outfalls, pesticides, etc.), and impacts from vessels and sound. Current management of the population is complex in part because one of their main sources of prey, Chinook salmon, is also important to tribal, commercial and recreational fisheries. In addition, many runs of Chinook salmon are themselves also listed as threatened or endangered under the ESA. Disturbance from vessels and sound can also impact the behavior and feeding of the whales, increasing their energy expenditure, possibly reducing the effectiveness of their hunting techniques, and reducing the time they spend foraging. During times of nutritional stress, the effects of the high levels of contaminants in this top predator may also compromise the health of the whales by impairing immune function and interfering with reproduction. The three main threats intersect to affect the whales' survival and reproduction. The Recovery Plan addresses each of the threats based on the best available science and links the management actions to an active research and monitoring program to fill data gaps and assess effectiveness in meeting the goals of the plan.



KEY ACTIONS NEEDED 2016-2020

The list below includes a small number of targeted high priority actions that NMFS, partners, and the public can take in the next five years to promote recovery of the species. The partners identified below have indicated their interest in helping achieve the actions, but are not committed to a specific activity or commitment of resources. This list is not comprehensive of all potential partners, and we welcome partnering with others not identified within this plan. For more complete information on the comprehensive recovery program for Southern Resident killer whales, please see a Special Report on 10 years of Research and Conservation of Southern Residents available at: http://www.nwfsc.noaa.gov/news/features/killer_whale_report/index.cfm.

Protect Killer Whales from Harmful Vessel Impacts through Enforcement, Education, and Evaluation

Description and Background: NMFS announced new regulations to protect killer whales in Washington from vessel impacts in April 2011. The rule prohibits vessels from approaching any killer whale closer than 200 yards and prohibits vessels from intercepting or parking in the path

of the whales. These regulations were developed and informed by public input, scientific results from a variety of researchers, and data from the Soundwatch Boater Education Program, a program that monitors boat activity around the whales. NOAA's Office for Law Enforcement, Washington Department of Fish and Wildlife Enforcement, and Soundwatch provide information about the regulations to boaters and monitor compliance. Working with our partners, we'll continue to educate boaters and promote responsible whale watching. All boaters can protect the whales by learning about and following the regulations and guidelines. We now have 5 years of data from monitoring groups and several years of data from the NMFS Northwest Fisheries Science Center (NWFSC) acoustic tagging program to evaluate the effectiveness of the regulations.

Expected Benefits to the Species: Monitoring data from Soundwatch has shown increased compliance with the regulations and guidelines when enforcement is present (Soundwatch 2013, 2014). Continued enforcement and education/outreach presence on the water will reduce vessel impacts to the whales' behavior, foraging and communication, as well as reduce the risk of vessel strikes. A new paper from the acoustic tagging program revealed that vessel speed was an important factor contributing to the level of sound reaching the whales. Results from this study and other research projects evaluating ambient sound conditions provide valuable information on the contribution from vessels, as well as other sound sources, in the whales' habitat. Our evaluation of the vessel regulations will include a review of vessel activities, changes in impacts to the whales, enforcement, education and outreach, and economics and the conclusions will inform any potential revisions to existing guidelines and regulations or consideration of additional protections, such as a protected area. In addition, this review will provide valuable information to work with Canada to encourage consistent protections throughout the transboundary critical habitat. We are also working with Department of Fisheries and Oceans Canada (DFO) and other partners to evaluate the overall sound scape in the Southern Residents habitat to better understand the ambient sound conditions from all sources and identify mitigation measures to reduce potential impacts from a variety of sound sources.

Source: This effort will contribute to the following recovery plan actions:

- Management Measure - 1.3 Minimize disturbance of Southern Resident killer whales from vessels. (Priority 2-3)
- Management Measure- 2.3 Use agency coordination and Marine Mammal Protection Act mechanisms to minimize potential impacts from human activities involving sound sources. (Priority 2)
- Management Measure- 3.2.1 Expand the on-water educational efforts of Soundwatch and enforcement agencies (Priority 2)
- Management Measure- 5.3 Inter-jurisdictional enforcement cooperation and coordination (Priority 3)
- Research and Monitoring - B.6.2.1 Determine vessel characteristics that affect Southern Residents

- Research and Monitoring - B.6.2.2 Determine the extent that vessels disturb or harm the Southern Residents

Location: Inland marine waters of Washington, focused on core summer area of critical habitat

NMFS Point of Contact: Lynne Barre, NMFS West Coast Region (WCR) Protected Resources Division, Lynne.Barre@noaa.gov, 206-526-4745

Lead Partners: WCR, NWFSC, NOAA's Office of Law Enforcement

Partners: Soundwatch, Straitwatch, Pacific Whale Watch Association, Industrial Economics, Inc., DFO, National Fish and Wildlife Foundation (NFWF)

Proposed Start Date: Regulations in place 2011

Expected Completion Date: Enforcement ongoing, regulation evaluation report expected 2016-2017

Current Status: Enforcement and boater education ongoing, review of regulations will incorporate post-regulation data through 2015 boating season

Updates: Updated annually end of each fiscal year

Resources:

Funding:

\$925,000 has already been invested through a 2013-2015 NMFS ESA Section 6 grant to Washington Department of Fish and Wildlife. Additional grants applications have been submitted for future enforcement funding totaling \$941,355. In addition, NMFS has contributed \$30,000 per year to support Soundwatch efforts. Resources needed for regulation evaluation include NMFS and partner staff time for data analysis and report writing. In 2015, NFWF established a Killer Whale Research & Conservation Program with contributions from SeaWorld Parks & Entertainment, U.S. Fish & Wildlife Service, and NMFS. In the first year, \$590,000 was granted to support 5 projects including a grant to understand noise exposure and behavior of Southern Resident killer whales (\$112,000).

Opportunities for Partners:

- We encourage sustained partnerships with Soundwatch, Straitwatch, Pacific Whale Watch Association, Industrial Economics, Inc., DFO, and NFWF and seek additional partners to educate all boaters to protect the whales by learning about and following the regulations and guidelines (see: <http://www.bewhalewise.org/>).

Target Recovery of Critical Prey

Description and Background: Southern Residents are fish-eating whales that rely on Pacific salmon as their most important prey. Research indicates that a single species -- Chinook salmon -- makes up most of their summer diet and remains an important component throughout the year, although the relative importance of specific stocks is still unknown. In the Pacific Northwest and California, many Chinook salmon populations are in decline and listed as threatened or

endangered under the ESA. Targeting salmon recovery actions that will specifically benefit the Southern Resident killer whales is therefore a high priority. NMFS works with many federal, state and local watershed partners to implement a variety of recovery actions for Chinook salmon, particularly those listed under the ESA. First we will continue efforts to identify the salmon stocks, runs, or geographic distribution that is most important to the whales. We will then target critical prey and prioritize salmon recovery actions with our partners which contribute the most to the prey base of the whales.

Drought conditions across most of the west coast in 2015, combined with unusually warm ocean conditions, may lead to a significant downturn in salmon abundance in the next several years, so rebuilding depleted populations of salmon and other prey to ensure an adequate food base for recovery and focusing on diet and health condition studies during this time period is particularly important. In addition, the NWFSC has developed models that correlate killer whale population measures to the abundance of Chinook salmon, and are currently developing a more advanced food web model that includes not only killer whales and salmon, but other salmon predators and fisheries as well. Priority actions include: completing and updating these models with annual Southern Resident census and salmon abundance information, estimating the ocean distributions of specific Chinook salmon stocks, conducting analyses to quantify the contribution of specific salmon hatchery programs to the Southern Resident killer whale prey base, and evaluating whether the whale's seasonal diet changes during a predicted time of low salmon abundance in the next several years. We will continue to work with a variety of partners to increase communication and coordination between the killer whale and salmon recovery communities.

Expected Benefits to the Species: Ensuring that salmon populations are healthy and sustainable is an important part of achieving recovery for the whales. The killer whale program currently provides broad support for coast wide salmon recovery and we will incorporate new information to refine and adapt our coordination with the salmon recovery community to directly support Southern Residents. Understanding the relative importance of specific wild or hatchery salmon stocks will support targeted salmon recovery actions to specifically benefit the Southern Resident population. Improved understanding of the food web is critical for us to make informed killer whale and salmon management and recovery decisions that affect the fishing industry, tribes and the overall health of the ecosystem.

Source: This effort will contribute to the following recovery plan actions. (Additional needs are identified in Hilborn et al. 2012).

- Management Measure - 1.1 Rebuild depleted populations of salmon and other prey to ensure an adequate food base for recovery (Priority 2)
- Research and Monitoring - B.2.1 Determine diet of the Southern Residents (Priority 1)
- Research and Monitoring - B.2.3 Determine the importance of specific prey populations to the diet (Priority 1)

- Research and Monitoring - B.6.1 Assess the effects of changes in prey populations (Priority 1)
- Research and Monitoring - B.6.1.3 Determine whether the Southern Residents are limited by critical periods of scarce food resources (Priority 1)

Location: Throughout range of Southern Resident killer whales (Alaska to California)

NMFS Point of Contact: Eric Ward, NWFSC, Eric.Ward@noaa.gov, 206-302-1745, Brad Hanson, NWFSC, Brad.Hanson@noaa.gov, 206-860-3220, and Lynne Barre, WCR Protected Resources Division, Lynne.Barre@noaa.gov, 206-526-4745

Lead Partners: NWFSC, WCR

Partners: States, Tribes, Puget Sound Partnership, DFO, Cascadia Research, Center for Whale Research, University of Washington, NFWF

Proposed Start Date: Science panel report with recommendations finalized 2012, series of salmon and killer whale recovery sessions initiated in 2014, ecosystem modeling project initiated in 2015

Expected Completion Date: Risk assessment report and food web results expected in 2017

Current Status: Coordination between salmon recovery and killer whale recovery is ongoing. Coordination with Canada is also underway to address the transboundary nature of both salmon and killer whale recovery. A risk assessment procedure for Southern Resident killer whales is in development based on the scientific models correlating killer whale population measures with coast wide Chinook salmon abundance. The NWFSC is currently developing an ecosystem model for predator impacts on Chinook with support from the Pacific Salmon Commission. Studies to evaluate the importance of hatchery stocks are also underway. Seasonal diet studies are ongoing, but will need to be intensified if salmon abundance is substantially reduced due to recent environmental conditions.

Updates: Updated annually end of each fiscal year

Resources:

Funding:

NMFS is currently conducting a multi-year study to model risk assessment with support from the Pacific Salmon Commission (current funding \$250,000). Additional resources are needed to intensify diet and tagging studies (\$50,000). In 2015, NFWF awarded grants for evaluation of hatchery practices on prey availability for Southern Resident killer whales (\$110,296) and to support efforts to determine why juvenile Chinook, coho and steelhead are dying in the combined marine waters of Puget Sound and the Strait of Georgia (\$49,788).

Opportunities for Partners:

- We encourage sustained partnerships with the States, Tribes, Puget Sound Partnership, DFO, Cascadia Research, Center for Whale Research, University of Washington, NFWF, and seek additional partners to support targeted salmon recovery actions that will benefit the Southern Resident killer whales.

Protect Important Habitat Areas from Anthropogenic Threats

Description and Background: The Southern Resident killer whales spend more than half of their time in coastal offshore waters, primarily in winter months, and learning more about how they are using this habitat has been a top priority since the listing when only a handful of sightings existed. In 2014 NMFS received a petition requesting an expansion of critical habitat to include offshore waters of the Pacific Ocean. In addition to the petition there is considerable interest in critical habitat protections from non-profit groups and concerned citizens. New information from ongoing research through passive acoustic monitoring, land-based sightings, coastal research cruises, and satellite-linked tagging will inform the critical habitat revision.

Expected Benefits to the Species: Critical habitat identifies physical and biological features that are essential to the conservation of listed species. Revising critical habitat to include coastal portions of the whales' habitat will ensure that federal actions won't adversely modify, destroy, or otherwise reduce the conservation value of this habitat. Descriptions of critical habitat are also a powerful educational tool, illustrating important habitat features and specific areas where those features are found. Studies on coastal habitat use are also critical to our understanding of the key prey for the whales during the winter months, have provided information on reproduction, and help us understand potential threats in offshore waters.

Source: In addition to the petition received in 2014, the 2011 ESA 5-year review (NMFS 2011) recommended increasing knowledge of coastal distribution, habitat use and prey consumption to inform critical habitat determination. This effort will contribute to the following recovery plan actions:

- Research and Monitoring - B.1.1 Determine distribution and movements in outer coastal waters (Priority 1)
- Research and Monitoring - B.7 Identify important habitats for the Southern Residents (Priority 1)

Location: West Coast of U.S.

NMFS Point of Contact: Lynne Barre, WCR Protected Resources Division, Lynne.Barre@noaa.gov, 206-526-4745

Lead Partners: NWFSC, NMFS Southwest Fisheries Science Center (SWFSC)

Partners: Coordination with Tribes, States, Department of Defense

Proposed Start Date: Petition received in 2014

Expected Completion Date: Proposed rule revising critical habitat expected 2017

Current Status: 12-month finding (80 FR 9682; February, 24, 2015) identified next steps and timeline for gathering information, conducting analyses, and developing a proposed revision

Updates: Updated annually end of each fiscal year

Resources:*Funding:*

In 2015, the U.S. Navy provided \$358,000 to support acoustic recorders placed in coastal Southern Resident habitat. Resources are needed for economic analysis (cost to be determined), data analysis (NWFSC/SWFSC) and development of proposed critical habitat revision (WCR)

Opportunities for Partners:

- We encourage the public to become aware of the threats Southern Resident killer whales face, and simple actions people can take to protect the whales and their habitat and contribute to recovery. <http://www.seattleaquarium.org/orcas>.
- Proposed revisions to critical habitat will go out for public comment and we encourage interested groups and individuals to provide information and feedback.

<p style="text-align: center;">Improve Our Knowledge of Southern Resident Killer Whale Health to Advance Recovery</p>

Description and Background: Understanding killer whale health is essential to identifying the mechanisms for reduced survival and reproduction in Southern Residents compared to other populations of killer whales. Health studies include continuing photo-identification for the annual census, collecting expanded detailed observations of physical condition of individual whales, establishing photogrammetric monitoring (taking measurements from aerial photos), collecting contaminant and health biomarker samples (biopsies, feces, breath), expanding stranding investigations and disease testing, and developing a database to house all data on individual killer whale health profiles.

Expected Benefits to the Species: By assembling data from multiple research and monitoring projects and increasing the data collected to populate a whale health database, we can identify patterns of health and reproductive output of breeding age females and potential causes of mortality. Outcomes for Southern Resident killer whales can be compared with other killer whale populations to isolate the sources of reduced reproduction and increased mortality in order to identify and prioritize conservation actions. Contaminant levels are one of the key concerns for Southern Residents and additional information on direct links between contaminant levels and physiological impacts will support recovery actions to reduce contaminant inputs into Southern Resident killer whale habitat. Improving our knowledge of health and contaminants will inform consultations on actions impacting water quality and guide implementation of recommendations from a joint NMFS and Environmental Protection Agency (EPA) report regarding the effects of flame retardant chemicals on the whales (EPA and NMFS 2013, Gockel 2014).

Source: This effort will contribute to the following recovery plan actions (as well as actions identified during a 2015 Southern Resident killer whale health workshop (NMFS 2015)):

- Management Measure- 1. Protect the Southern Resident population from factors that may be contributing to its decline or reducing its ability to recovery (Priority 1)
- Management Measure- 1.2 Minimize pollution and chemical contamination in Southern Resident Habitats (Priority 2)
- Research and Monitoring - B.3.3. Evaluate reproductive patterns (Priority 2)
- Research and Monitoring - B.4.1. Assess the health of population members (Priority 2)
- Research and Monitoring- B.6.3.4 Determine the effects of elevated contaminant levels on survival, physiology, and reproduction (Priority 1)
- Research and Monitoring - B.10. Improve research techniques and technology (Priority 3)
- Research and Monitoring - B.11. Research support and coordination. (Priority 2)

Location: Throughout the range of Southern Resident killer whales (Alaska to California) and reference populations of killer whales

NMFS Point of Contact: Lynne Barre, WCR Protected Resources Division, Lynne.Barre@noaa.gov, 206-526-4745 and Brad Hanson, NWFSC, Brad.Hanson@noaa.gov, 206-860-3220

Lead Partners: NWFSC, SWFSC, AFSC, WCR

Partners: UC Davis, Vancouver Aquarium, Center for Whale Research, DFO, NFWF, EPA, Puget Sound Partnership, killer whale researchers in Alaska, stranding network members

Proposed Start Date: Ongoing

Expected Completion Date: ongoing, multiple years of photogrammetry data during different seasons needed to track condition

Current Status: The Center for Whale Research is conducting an annual census, and NMFS and UC Davis are planning a health assessment workshop for 2016 and developing a database for health information. Photogrammetry studies on Southern and Northern Resident killer whales are in progress/ongoing by SWFSC and Vancouver Aquarium, and a stranding analysis is underway by UC Davis, SeaWorld, and Canada.

Updates: Updated annually end of each fiscal year

Resources:

Funding:

NMFS is currently funding the Center for Whale Research census at \$80,000 per year and providing funding for stranding support (\$15,000 per year). In 2015, NFWF awarded grants to develop standardized health protocols and health index (\$60,543) and conduct photogrammetry to assess impacts of seasonal prey availability on body condition (\$252,941). Additional funds are needed for database development (\$50,000), continuous observations of physical condition of individual whales (\$50,000), Health Assessment protocol development (\$50,000), additional photogrammetry effort and analysis

(\$100,000), contaminant and biomarkers collection and analysis (\$200,000), and stranding network response.

Opportunities for Partners:

- We encourage sustained partnerships with UC Davis, Vancouver Aquarium, Center for Whale Research, DFO, NFWF, killer whale researchers in Alaska, stranding network members, and seek additional partners to support efforts to better understand Southern Resident killer whale health.
- We encourage sustained partnerships with EPA and Puget Sound Partnership and seek additional partners to support efforts to monitor contaminant levels and minimize the input of contaminants into Southern Resident habitat.
- We encourage the public to report any dead, injured, or stranded whale: 1-877-767-9425.

Raise Awareness About the Recovery Needs of Southern Resident Killer Whales and Inspire Stewardship through Outreach and Education

Description and Background: Public attitudes are a major part of the success or failure of conservation efforts for endangered species, especially those occurring near major population centers. We work closely with museums and aquariums, non-profit groups, researchers, and schools to raise awareness and educate the public about the whales and how individuals and organizations can contribute to conservation.

Expected Benefits to the Species: Education and outreach about recovery of Southern Resident killer whales raises public awareness and knowledge about the whales, the threats they face, and actions people can take to support recovery. Education and outreach partners are inspiring students, families, and concerned citizens to contribute to recovery, and several have shown tangible results from changes in behavior that benefit the whales and their prey, such as hands on habitat restoration and reducing water, electricity and pesticide use. In recent years programs have started expanding to reach audiences throughout the range of the Southern Residents. New programs, new audiences, and inspiring a variety of actions add up to measurable benefits for the whales.

Source: This effort will contribute to the following recovery plan actions:

- Management Measure – 3.1 Enhance public awareness of Southern Resident status and threats (Priority 2-3)
- Management Measure – 3.3 Educate public on positive actions they can take to improve the current condition for Southern Residents killer whales (Priority 2)

Location: Throughout range of Southern Resident killer whales (Alaska to California)

NMFS Point of Contact: Lynne Barre, WCR Protected Resources Division, Lynne.Barre@noaa.gov, 206-526-4745

Lead Partners: NMFS Restoration Center (RC), NOAA National Marine Sanctuaries, Seattle Aquarium, The Whale Museum, Killer Whale Tales, Orca Network, The Whale Trail, Port Townsend Marine Science Center, Whale Scout, Pacific Whale Watch Association, and other education and outreach programs

Proposed Start Date: Ongoing

Expected Completion Date: Ongoing

Current Status: NOAA works with the partners along the West Coast range of the whales to raise awareness and inspire conservation through a variety of activities including exhibits, special events, brochures, web sites, lectures, curricula, classroom activities, and other programs.

Updates: Updated annually end of each fiscal year

Resources:

Funding:

NOAA is currently supporting this activity at \$50,000 per year through support for partner programs. Additional resources are needed to support a variety of partner programs along the West Coast.

Opportunities for Partners:

- We encourage sustained partnerships NOAA National Marine Sanctuaries, Seattle Aquarium, The Whale Museum, Killer Whale Tales, Orca Network, The Whale Trail, Port Townsend Marine Science Center, Whale Scout, Pacific Whale Watch Association, and seek additional partners to raise awareness about the whales, the threats they face, and actions people can take to support recovery.
- We encourage the public to become aware of the threats Southern Resident killer whales face, and simple actions people can take to protect the whales and their habitat and contribute to recovery. <http://www.seattleaquarium.org/orcas>.

REFERENCES

EPA and NMFS. 2013. Potential Effects of PBDEs on Puget Sound and Southern Resident Killer Whales A Report on the Technical Workgroups and Policy Forum. http://www.eopugetsound.org/sites/default/files/features/resources/PBDEs_Puget_Sound_Report.pdf

Hilborn, R., S.P. Cox, F.M.D. Gulland, D.G. Hankin, N.T Hobbs, D.E. Schindler, and A.W. Trites. 2012. The Effects of Salmon Fisheries on Southern Resident Killer Whales: Final Report of the Independent Science Panel. Prepared with the assistance of D.R. Marmorek and A.W. Hall, ESSA Technologies Ltd., Vancouver, B.C. for National Marine Fisheries Service (Seattle, WA) and Fisheries and Oceans Canada (Vancouver, BC).

Gockel, C. 2014. Recommendations on a Monitoring Scheme for Polybrominated Diphenyl Ethers (PBDEs) in Puget Sound. Report to Puget Sound Ecosystem Monitoring Program Toxics Workgroup and Birds and Mammals Workgroup). <http://www.eopugetsound.org/sites/default/files/PBDE%20Recommendations.pdf>

NMFS. 2008. Recovery plan for Southern Resident killer whales (*Orcinus orca*). National Marine Fisheries Service, Northwest Region, Seattle, Washington. http://www.westcoast.fisheries.noaa.gov/publications/protected_species/marine_mammals/killer_whales/esa_status/srkw-recov-plan.pdf

NMFS. 2011. Southern Resident killer whales (*Orcinus orca*) 5-Year Review: Summary and Evaluation. National Marine Fisheries Service, Northwest Region, Seattle, Washington. http://www.westcoast.fisheries.noaa.gov/publications/protected_species/marine_mammals/killer_whales/esa_status/kw-status_review-2011.pdf

NMFS. 2015. Priorities Report from a Workshop to Assess Causes of Decreased Survival and Reproduction in Southern Resident Killer Whales.

Soundwatch. 2013. 2013 Soundwatch Program Annual Contract Report. <http://whalemuseum.org/pages/soundwatch-boater-education-program>

Soundwatch. 2014. 2014 Soundwatch Program Annual Contract Report. <http://whalemuseum.org/pages/soundwatch-boater-education-program>



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