



NFWF

Killer Whale Research and Conservation Fund

2020 Program Report

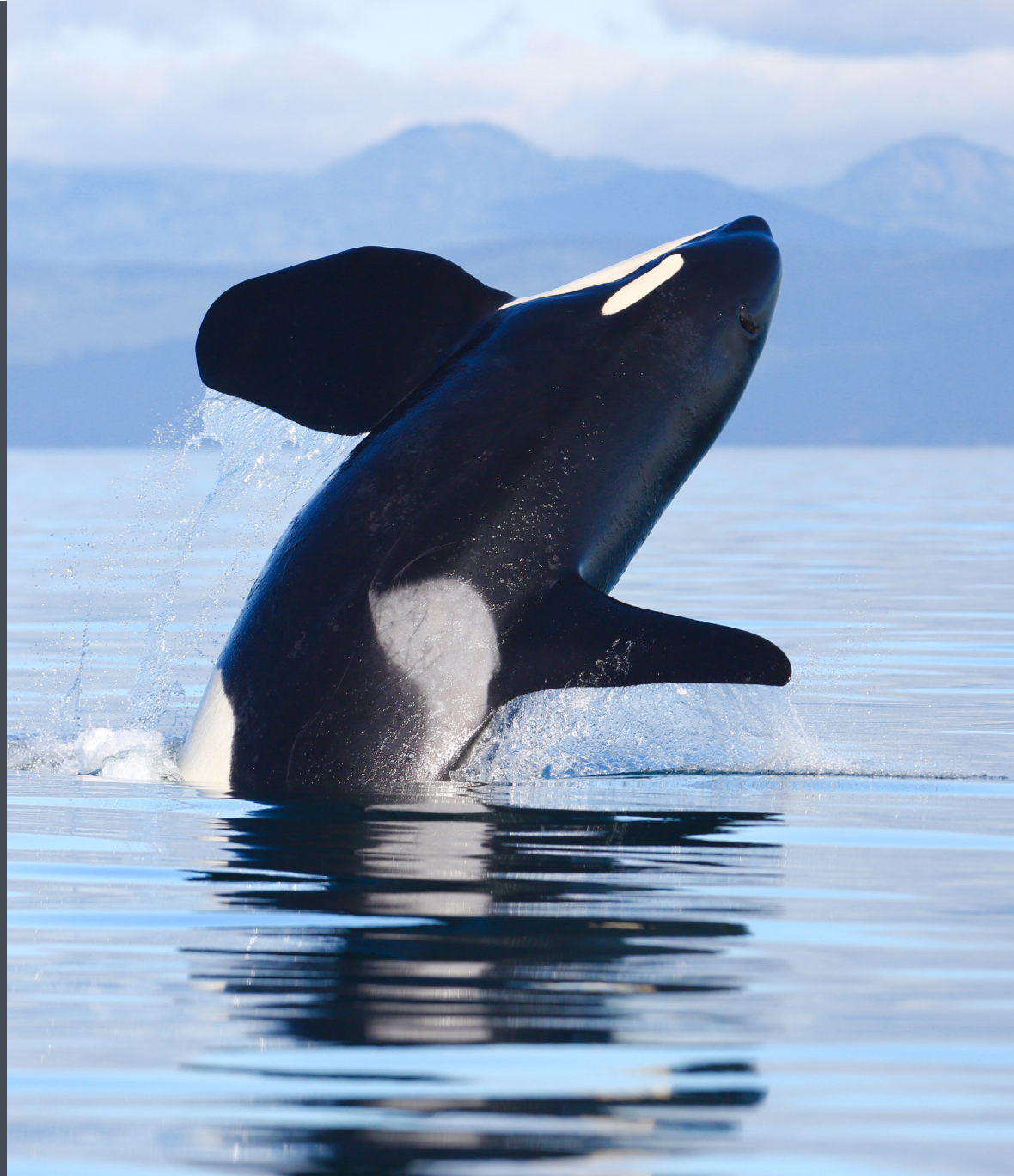


Killer Whale Research and Conservation Fund

KWRCF brings public and private dollars together to a common purpose – the stabilization and recovery of the endangered Southern Resident killer whale.

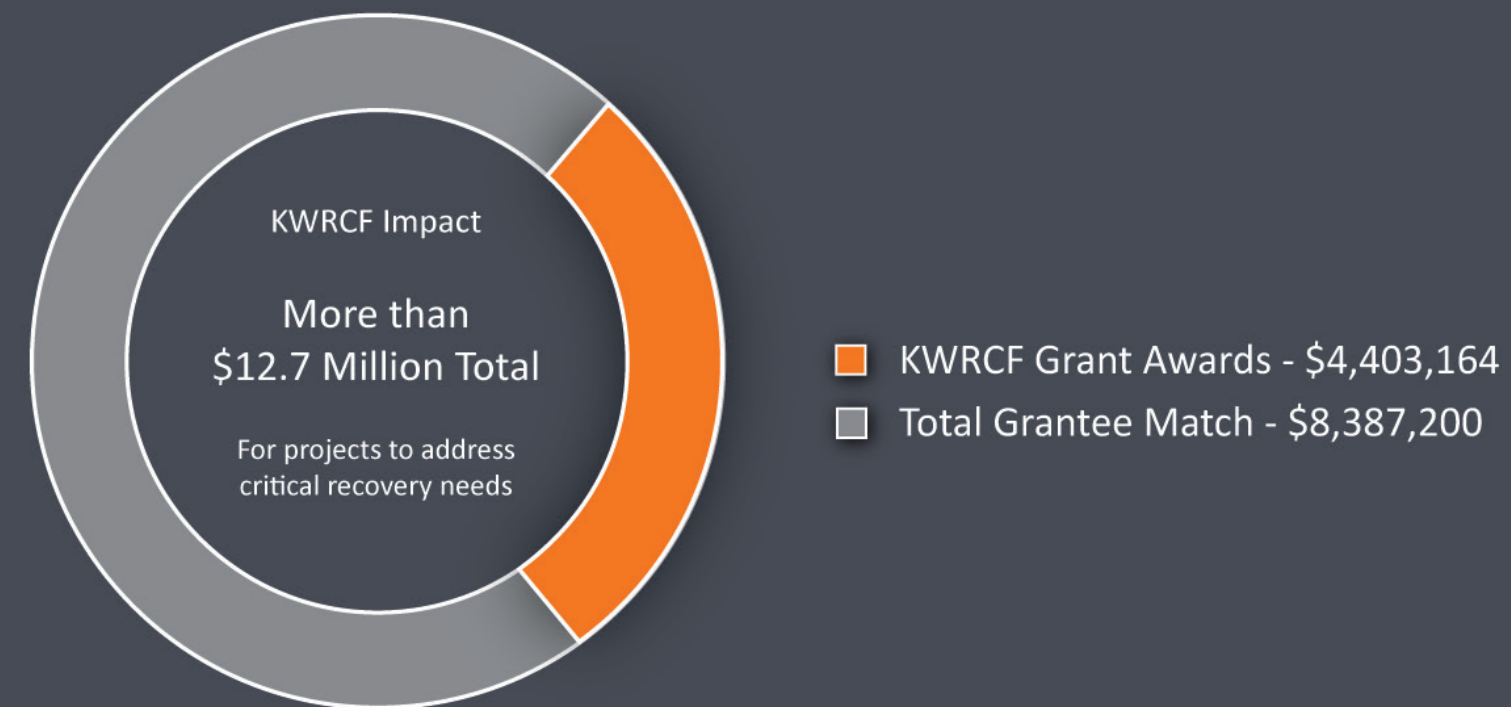
This population of whales is iconic to the people of the Pacific Northwest and an indicator of the health of the entire ecosystem of the Salish Sea (Puget Sound – Pacific Ocean).

KWRCF takes an ecosystem approach in fostering collaboration across scientific disciplines to address barriers to recovery.



Investing in Recovery | 2015-2020

Through this public-private partnership, the Killer Whale Research and Conservation Fund advances cost-effective and innovative recovery solutions



The first six years of the Killer Whale Conservation Fund were made possible with funding and support from our partners

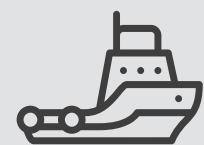


Our Strategy Aligns with Orca Task Force



Increase Salmon Abundance

2015-2017 KWRCF grants **directly informed** the Orca Task Force and were referenced in the recommendations.



Decrease Boating Impacts

The 2018 Orca Task Force recommended **36 actions** across the three threat reduction goals.

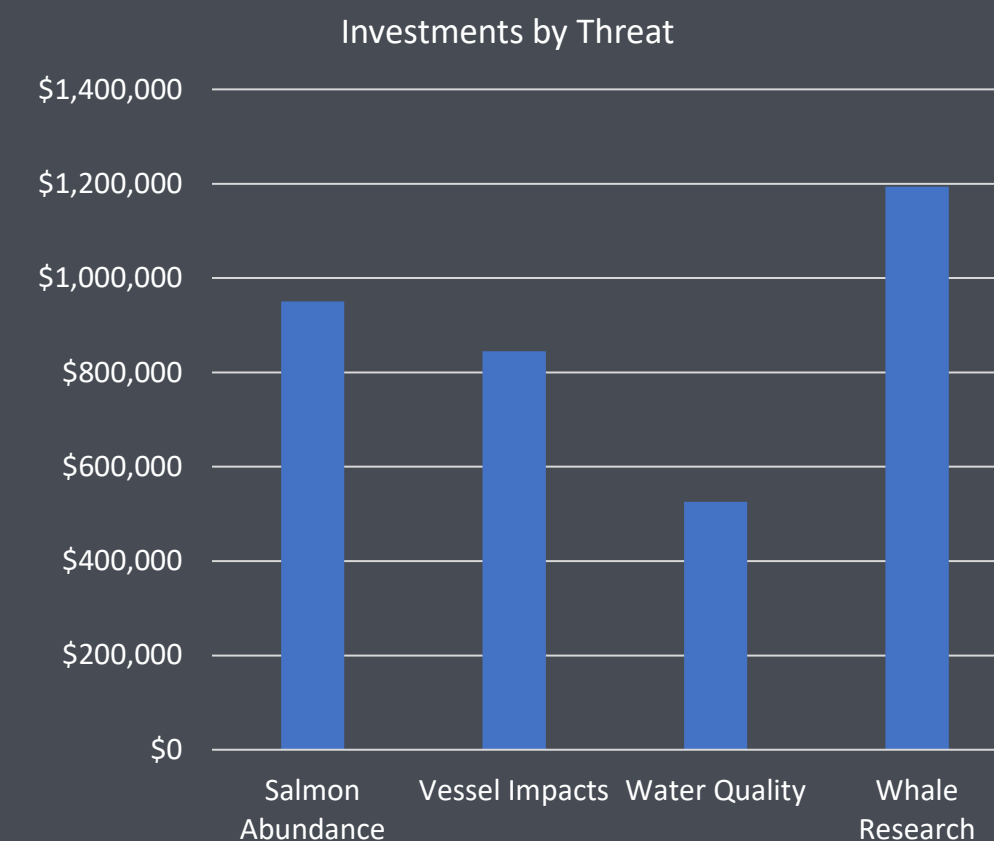


Decrease Contaminants

NFWF has identified activities within **14** of these recommendations where we are best suited to assist.

2018-2020 KWRCF grants are **directly implementing** recommendations.

Impact of Investments | 2015-2020



2.1 Miles

Riparian habitat restored for key salmon runs

40 Acres

Nearshore fish habitat restored

93 Studies

Addressing critical management needs

50 Acres

Under stormwater management best practices

4,855 Hours

Volunteers directly engaged in conservation

KWRCF Projects | A New Perspective on Whale Nutrition

Changing the way we look at whales and think about hatcheries has been a game changer for management.

SR3/NOAA
NMFS Permt # 19091

The KWRCF has supported grants to test, calibrate and institutionalize the use of photogrammetry to study whales. By viewing whales from above instead of from the side, scientists can study whale body proportions over time to identify when whales are pregnant, leaner or even showing signs of sickness. Most recently **SR3 SeaLife Response, Rehabilitation and Research** was able to successfully collect 80,586 high resolution vertical images of Southern Resident killer whales during 133 flights of their remotely-controlled octocopter drone between 2018 and 2020.

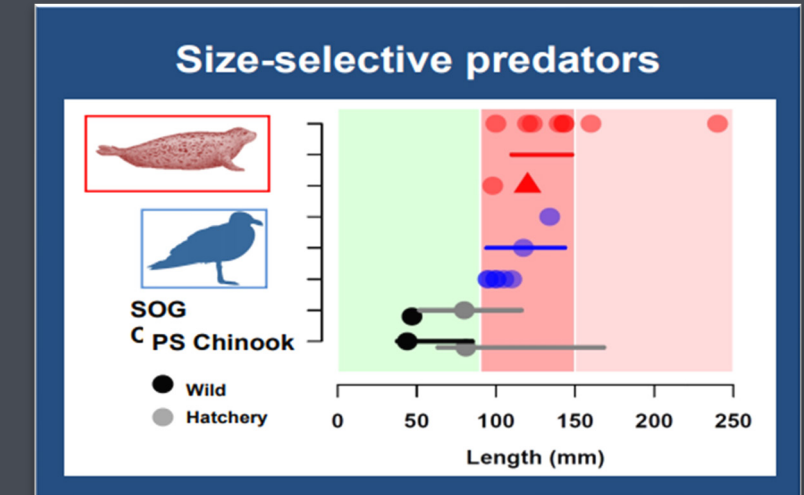
Photogrammetry measurements allow scientists to monitor the rate of individual growth, assess both seasonal and annual trends in body condition and update estimates of reproductive success. As part of this grant, regular communication on photogrammetry metrics were standardized and communicated to management agencies in both the United States and Canada to help inform key recovery actions.

In a similar way, a grant to **NOAA Fisheries** discovered unknown consequences of

hatchery management that may be impacting young salmon survival. Researchers found that over the past 65 years, hatcheries have shifted both the size and time at which juvenile salmon are released which resulted in reduced variability.

Other research suggests that predation on juvenile salmon by avian and marine mammal species could be size-dependent, with preference towards fish between 9-15 cm in length – the same size range that hatcheries have shifted too. Release times in the season have shifted earlier in the Strait of Georgia and later in Puget Sound providing an un-natural ‘pulse’ of juveniles within a much narrower window than wild stocks which could also be contributing to predator behavior.

A new working group has formed to develop experiments to maximize survival of hatchery origin Chinook which have been incorporated into hatchery guidance. Current KWCF grants are piloting these experiments and working to modify predator behavior while we learn the results of their efforts.



Left: Photo of whale pod from octocopter | SR3
Above: Chart depicting how changes in smolt size may increase Chinook predation | NOAA

KWRCF Projects | Visualizing Boater Sound

The soundscape that killer whales are living in is so loud it is hard to eat - but new boater laws are working to reduce these impacts.

One of the first KWRCF grants enabled [NOAA Fisheries](#) to explore the impacts of boating sound on whale behavior as the agency refined boating requirements around Southern Residents. This research used suction cup DTAGs to monitor dives and vocalizations or echolocation and movement patterns that are common during foraging and feeding. These whale sounds and behaviors were then analyzed against vessel received noise levels, vessel number, speeds, distance and the use of echo sounder signals to better understand the impacts that vessel presence and sound has on whale behavior.

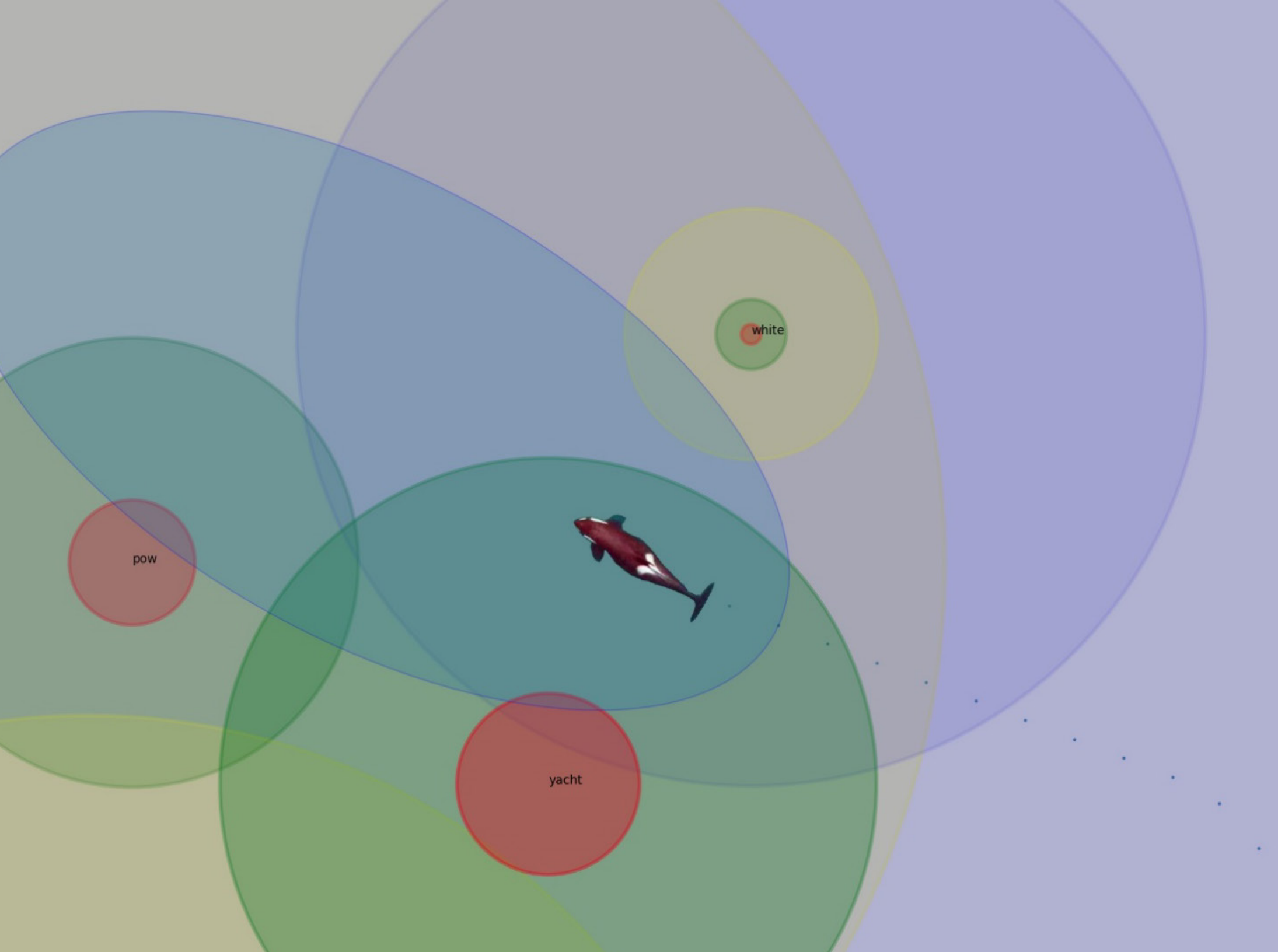
A grant to [Ocean's Initiative](#) allowed the team to translate this type of data on boat type, number, distance, and speed into predictions of the received noise level from the whale's perspective. Using real data examples the team established a model to estimate the reduction in the range over which echolocation clicks like those used to navigate and feed could be audible over the background noise level.

The image on the facing page is taken from an animation that shows the acoustic environment around whale J11 on the afternoon of July 4th 2004, when she was 32 years old. A sensor was used to track her movements and the 18 boats that were observed within 1000m of her during that session. The blue ellipse around the whale represents the maximum zone of audibility of echolocation clicks under quiet conditions, and in this particularly noisy example, her actual foraging space is not visible on the plot because it was reduced to a range less than a body length.

This type of visualization of data in a time series can help show how whales change behavior (speed, direction, feeding, etc.) in response to noise and communicate the problem to both managers and the public. Other KWRCF awards are supporting outreach to boaters to make them aware of their impacts and how to both reduce them and comply with current regulations to protect whales.



Left: Screenshot from animation of whale soundscape
Above: Soundwatch conducting outreach to boaters



KWRCF Projects | Why Aren't there More Babies?

KWRCF grantees have used dogs to find whale scat, studied mucus and even milked whales at SeaWorld in their efforts to understand how contaminants are impacting whale health and reproductive success.

The 31 potentially reproductive females in the SRKW population should have had 48 births between 2008 and 2015, yet only 28 births were recorded during that period. KWRCF-supported researchers have learned that the whales are pregnant more often than scientists realized but are often not making it to term. And when a pregnancy is successful, the number and the time between pregnancies can affect the calf's chances of survival.

A grant to the [University of Washington](#) used hormone levels in scat sample data to determine that 69% of detectable pregnancies were unsuccessful. Low availability of Chinook salmon was shown to be an important stressor as well as a significant cause of late pregnancy failure.

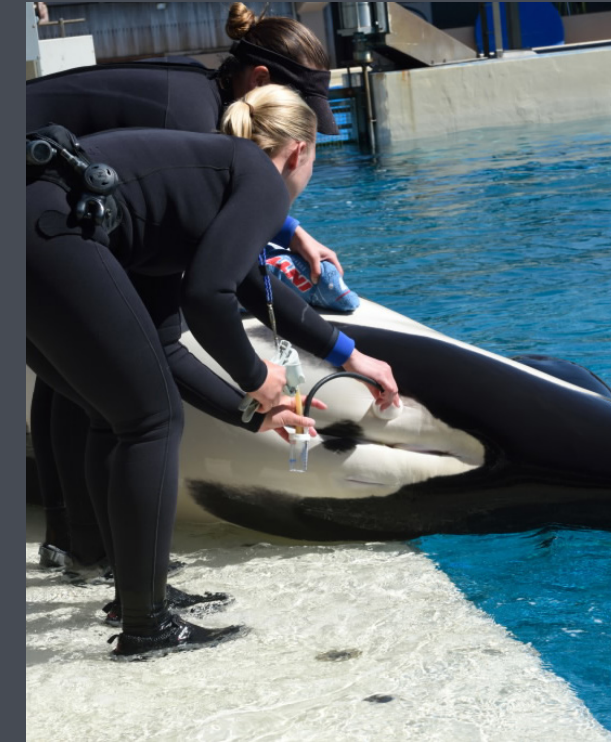
[Ocean Wise Conservation Association](#) found that, despite a 40-year ban on PCBs, they are still found in the Southern Resident population. Health analysis revealed PCB-associated effects on genes involved in stress response, growth, development and reproduction. Most individuals sampled were carrying loads above the thresholds known to impact marine mammal health.

These contaminants in the blubber may be released

in times of low nutrition and are passed on from females to their calves. A study by [NOAA Fisheries](#) in partnership with SeaWorld quantified the high doses of contaminants that are passed from females to nursing calves. In this first ever study on contaminant transfer from females to their calves during gestation and lactation for any whale or dolphin species they proved what other studies seemed to be suggesting. Keeping contaminants out of the water and out of the food chain is needed to reduce the contaminant loads to future fat stores and to increase the second, third and fourth calves' chances of survival.

Unfortunately, toxins are not the only pollutants that are impacting killer whales. Research support to [NOAA Fisheries](#) examined the microbiome of Southern Residents and found disturbing results. Detection of indicator bacteria in tissues, including mucus from the upper respiratory tract, suggest that whales are being exposed anthropogenic biological pollution in sufficiently high volumes, and sewage is likely a major contributor.

Current KWRCF projects and NFWF-leveraged projects are working to both identify sources of toxicants in the nearshore environments and reduce toxins and sewage from entering killer whale habitat.



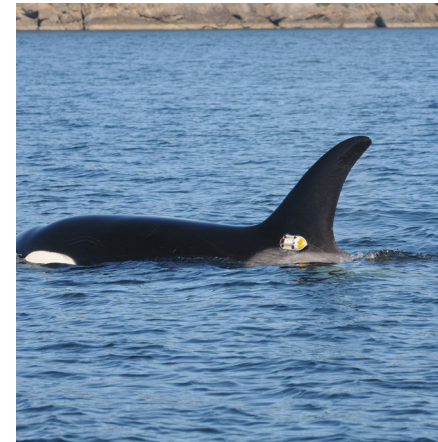
Left: Photo of mother and calf | SR3
Above: Sample collection at SeaWorld | NOAA



SR3/NOAA
NMFS Permit # 19091

A Comprehensive Approach

The Killer Whale Research and Conservation Fund is working to achieve the shared goals of the Orca Task Force on issues critical to sustained recovery success.



Established a new method to study nutrition and health

Analyze historical data to understand impact of vessels on feeding behavior

Mid-term: Work to reduce disturbance from boats

Long-term: Restore forage fish and juvenile salmon habitat in priority runs

KWRCF is helping whales find food **today** while working to fix the food chain and feed whales long into the future

Skagit County Public Works

Restoring Habitat for Chinook Salmon in the South Fork of the Skagit River (WA)
Complete construction and restoration of 5 acres of off-channel pool habitat along the South Fork of the Skagit River in Washington. Project will create vital rearing habitat for juvenile Chinook salmon, ultimately increasing prey availability for Southern Resident killer whales.

Grant Amount: \$200,000

The Nature Conservancy

Restoring Habitat for Chinook Salmon in Port Susan Bay Estuary (WA)
Restore 150 acres of rearing habitat and monitor the effect of restored hydrologic connectivity on salmonids and marsh habitats at Port Susan Bay, Washington. Project will improve habitat connectivity, lower site salinity, and support vegetation growth for Chinook salmon, a vital source of food for Southern Resident killer whales.

Grant Amount: \$200,000

Friends of the San Juans

Bolster Protection of Forage Fish Habitat to Increase Survival of Juvenile Chinook Salmon (WA)
Foster relationships with public and private landowners to prevent further loss of forage fish and juvenile Chinook salmon habitat from shoreline hardening in San Juan County, Washington. Project will engage landowners through site visits, feasibility studies and preliminary design to protect and restore vital rearing and feeding habitat for out-migrating Chinook salmon.

Grant Amount: \$84,797

Long Live the Kings

Protecting Chinook and Steelhead Salmon from Harbor Seal Predation (WA)
Test an innovative seal deterrent technology, the GenusWave acoustic startle device, in the Nisqually Estuary, Washington. Project will test the effectiveness of the acoustic startle device, reducing predation-related mortality of juvenile

Chinook and providing a nonlethal option to address predation.

Grant Amount: \$152,538

Ocean Wise Conservation Association

Reducing Disturbance of Southern Resident Killer Whales from Vessel Traffic (WA)
Reduce physical and acoustic disturbance of southern resident killer whales caused by vessel traffic in Washington State waters. Project will increase the use and functionality of the WhaleReport Alert System in British Columbia and Washington State to employ voluntary measures to benefit killer whales.

Grant Amount: \$100,000



KWRCF Projects | 2020 Grants

San Juan County WA Public Works

Improving Recreational Boater Behavior and Compliance Around Southern Resident Killer Whales (WA)

Improve recreational boater regulatory compliance around Southern Resident killer whales in the Salish Sea. Project will expand the whale warning flag program to additional critical habitat areas and develop new and innovative outreach campaigns to increase awareness of regulations with targeted audiences known to have high non-compliance.

Grant Amount: \$52,812

Salmon-Safe

Engaging Puget Sound Developers to Increase Water Quality to Benefit Killer Whale Populations (WA)

Implement best management practices for stormwater runoff on 25 high priority development sites in the Puget Sound region. Project will expand the "Clean Water for Salmon, Clean Water for Killer Whales" campaign to reduce water quality impacts on the Puget Sound via strategic application of certification, developer incentives, and other market-based tools.

Grant Amount: \$75,000

Pacific Marine Mammal Center

Developing Standards for Early Indicators of Change in Killer Whale Health (WA)

Evaluate the feasibility of remotely assessing early indicators of change in Southern Resident killer whale health while in the Salish Sea. Project will enhance the early identification of declining or improving health of whales and understand relationships in body condition, fecundity and survivorship.

Grant Amount: \$53,566

Left: Community members research forage fish available to migrating Chinook salmon | Kwiaht: Center for the Historical Ecology of the Salish Sea

Leveraging NFWF Resources | 2015-2020

By having a focused program on killer whales, NFWF can look across funding opportunities and partnerships to drive funding that will benefit the population.



When research conducted by NOAA Fisheries identified pathogens associated with sewage could be impacting killer whale health, NFWF directed over **\$760,000** from the Impact Directed Environmental Accounts program to five ports to prevent pollutants at their locations and **increase their capacity to service pump-out needs** for the large number of boaters that traverse killer whale habitat. Funding will remove creosote pilings, install floating sewer pump-out stations, furnish pump out boats to service a broad area and establish a waterfront marine spill response and training facility in critical killer whale habitat to greatly reduce response time to localized spills.

Salmon habitat restoration, even for just the runs prioritized for killer whales, is a job well beyond what the Killer Whale Research and Conservation Fund can do on its own. Fortunately, a National Coastal Resilience Fund was established in 2018 that had overlapping goals of restoring large tracks of green infrastructure. In the first three years of this program, **\$4.5 million** in funding has been directed to restore nearshore and riparian habitats to reduce flooding for coastal communities while increasing quality habitat for chinook salmon populations. In just three years, investments under this program will **restore 1,375 acres of important estuary habitat** for juvenile salmon and prepare the designs for another 290 acres.

Quileute Tribe

Lower Quillayute River Restoration (WA)
Implement restoration actions on the Quillayute River, through a combination of riverbank stabilization, construction of a boat launch serving the dual purposes of better access for tribal fishermen while reducing bank erosion, and excavation of side channels with placement of woody material to provide off-channel habitat for salmonids and other fish species. Project will restore floodplain connectivity, improve habitat, address erosion, and protect regionally vital infrastructure.

Grant Amount \$1,500,000

Whidbey Camano Land Trust

Conducting a Feasibility Study and Creating a Restoration Design for Livingston Bay (WA)
Determine the feasibility of estuary and wetland restoration, with the goal of acquiring and subsequently restoring critical habitat on approximately 292 acres of diked farmland in Livingston Bay on Camano Island in the

Puget Sound of Washington State. Project will determine feasibility of restoring diked farmland to its former tidal estuary and wetland condition to increase available critical habitat and improve community resilience of this regionally identified critical nearshore habitat.

Grant Amount \$155,000

Port of Friday Harbor

Port of Friday Harbor Marine Pollution Prevention (WA)
The Port of Friday Harbor plans construction of a waterfront marine spill response facility, to effectively and quickly respond to oil spills and mitigate impacts from dumping along 300 miles of shorelines of diverse and vital marine habitat. The port will also purchase and construct holding facilities and equipment for human effluent waste collection to facilitate the timed release of waste products into the municipal treatment system, allowing for additional collection of effluent from boaters.

Grant Amount \$400,000

Port of Lopez

Port of Lopez Mobile Marine Pumpout Vessel (WA)

The Port of Lopez is interested in helping to preserve the integrity of the marine environment in Fisherman Bay and surrounding waters by providing a mobile marine pump out vessel that will operate during the boating season, from roughly May until late September. A Marine mobile pump out vessel will help reduce the amount of illegal dumping of marine sewage holding tanks and help to keep the waters of the Salish Sea free of pollution and nutrient loading.

Grant Amount \$100,000

Left: Recreational boats in Fishermen Bay, San Juan Islands

Next Page: Salmon habitat restoration site at Leque Island



Our Goals for 2021

1

Increase collaboration amongst **salmon restoration** efforts to set mid and long-term goals for NFWF to pursue in coordination with federal, state, tribal and regional NGO efforts.

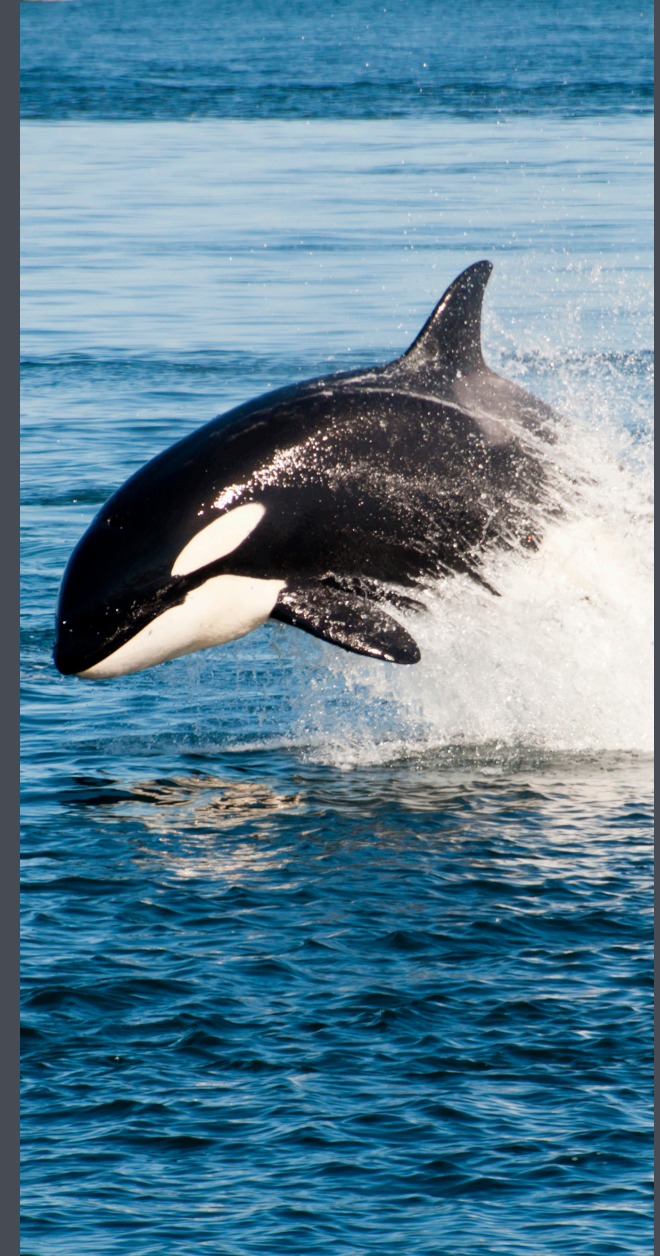
2

Explore new partnerships to increase **water quality** focused projects and broader reduction of **marine sound** throughout the Salish Sea.

3

Coordinate funding with other NFWF efforts around the **Columbia River Basin** and restoration for coastal community resiliency in Washington and Oregon to further restoration goals.

We're Just Getting Started!





FOR ADDITIONAL INFORMATION ABOUT THE KILLER WHALE RESEARCH AND CONSERVATION FUND, PLEASE CALL: 202-857-0166 OR VISIT: WWW.NFWF.ORG/KILLERWHALES

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PHOTOGRAPHY: Ocean's Initiative (P.8), The Whale Museum (P.9), Port of Lopez (P.16), Washington Department of Fish and Wildlife (p. 18); All other images are as referenced or by iStock.

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