

Scientists call for improved technologies to save imperiled California salmon

December 13 2017



Delta Juvenile Fish Monitoring Program biologists count, measure, and collect tissue samples from juvenile salmon outmigrating from the San Francisco Bay-Delta. The tissue sample will be analyzed in a genetic laboratory to determine whether juveniles are winter, spring or fall/late-fall Chinook salmon. Credit: US Fish and Wildlife Service

Scientists working to protect California's most endangered salmon say in a new report that key improvements in tracking Sacramento River winter-run Chinook through California's complex water delivery system would help recover the species while the water continues to flow.

They recommend upgrades in tracking technology from tiny transmitters implanted into juvenile fish to wider use of genetic fingerprinting to unravel how the fish travel through rivers and canals in California's Central Valley to the ocean and why many disappear along the way. The same rivers and canals carry water to much of California's population and farmland.

The answers will help inform water management decisions and promote fish recovery, the 16 scientists from NOAA Fisheries, U.S. Fish and Wildlife Service, California Department of Water Resources, California Department of Fish and Wildlife, U.S. Geological Survey, and U.S. Bureau of Reclamation, write in the journal *San Francisco Estuary & Watershed Science*. The agencies work together with other agency partners through the Interagency Ecological Program.

Currently scientists lose track of the fish through much of their migration. Once young winter-run salmon leave spawning beds in the upper Sacramento River they effectively disappear and scientists cannot tell them from other salmon as they descend rivers into the Sacramento-San Joaquin Delta, and the ocean. Researchers trying to help the endangered fish survive do not know how many make it through the Golden Gate to the ocean, a critical threshold in their life cycle.

Fewer wild winter-run Chinook returned as adults this year than any other year on record, yet scientists do not have enough information to forecast how many adults will return each year or identify the reasons why some years more return than others.

"These fish would have experienced extremely warm conditions during all stages of their life cycle in the rivers, Delta and ocean," said Rachel Johnson, a research fisheries biologist at NOAA Fisheries' Southwest Fisheries Science Center and lead author of the new report. "Today's technology offers new insight into the lives of these fish that will help us track the number and condition of juveniles as they leave freshwater and return as adults from the ocean each year, which will tell us which stressors and combinations of stressors in which habitats may be causing low returns in a given year."

The scientists point as a model to the Pacific Northwest, where researchers use the latest technology to track imperiled salmon and steelhead through the Columbia River system. Publicly available online data reveals precisely when [juvenile fish](#) pass individual dams and how many return as adults.

The team of California biologists outline six specific recommendations for modernizing and upgrading the tracking of Sacramento River winter-run Chinook, including:

- Employ genetic methods to distinguish winter-run Chinook from other salmon at key locations through the Sacramento River watershed.
- Better estimate the numbers of salmon throughout their freshwater migration to the sea, revealing where losses occur.
- Expand real-time tracking of fish movements and survival through the Central Valley.
- Improve monitoring of the genetic and behavioral diversity of winter-run Chinook through their life cycle.
- Trace the condition of fish - including disease, energy reserves and growth rates - as they migrate.
- Share monitoring data across agencies and with the public to improve transparency and data accessibility to inform

management and research.

The actions together would provide scientists and decision-makers with a much clearer picture of threats affecting winter-run Chinook, and how best to address them, the scientists say.

"The more we know about where we're losing fish and what's affecting them, the better chance we have to turn that around," said Maria Rea, Assistant Regional Administrator for NOAA Fisheries' West Coast Region.

Some of the recommendations are already taking hold, as scientists are increasingly using DNA identification through a coordinated genetic monitoring plan to distinguish winter-run Chinook salmon from other chinook salmon that are not protected by the Endangered Species Act and are subject to fishing. US Bureau of Reclamation's Bay-Delta Office is facilitating technology transfer to make California salmon monitoring data available in a real-time through an open database called [SacPas](#), modeled after the Pacific Northwest. The framework and many of the recommendations are integrated into the Salmon Resiliency Strategy, and the Adaptive Management Plan for California WaterFix.

"We have already begun incorporating tissue collection for DNA analysis into the monitoring work we do in the Bay-Delta," said Kim Webb, Project Leader for the U.S. Fish and Wildlife Service's Lodi Office. "This is another great example of the benefits of interagency collaboration and working together to fill critical knowledge gaps."

"The recommended monitoring will be a critical component of a salmon-focused adaptive management program. When combined with appropriate models, we will better understand the problems facing salmon populations and be able to predict their response to management actions," said Steve Lindley, Director of the Fisheries Ecology Division

at NOAA Fisheries' Southwest Fisheries Science Center in Santa Cruz.

The advancements will improve the value of monitoring data used in long-term planning to adaptively manage California's water supply while promoting the resilience of winter-run Chinook salmon. The improved data will also provide more accurate measures of [fish](#) recovery and track the fate of [salmon](#) at particular life stages and in particular areas to better protect them, the scientists predicted.

"We live in a more and more data-intensive society, and the recommended actions highlight immediate opportunities to improve data accessibility and use new technologies to move forward scientific understanding and the management of winter-run Chinook," said John Callaway, lead scientist for the Delta Stewardship Council's Delta Science Program.

More information: et al, Science Advancements Key to Increasing Management Value of Life Stage Monitoring Networks for Endangered Sacramento River Winter-Run Chinook Salmon in California, *San Francisco Estuary and Watershed Science* (2017). [DOI: 10.15447/sfews.2017v15iss3art1](#)

Provided by NOAA Headquarters

Citation: Scientists call for improved technologies to save imperiled California salmon (2017, December 13) retrieved 4 October 2025 from <https://phys.org/news/2017-12-scientists-technologies-imperiled-california-salmon.html>

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.
--