

PROJECT CROOS

Collaborative Research on Oregon Ocean Salmon

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Media Release

Scientists Team with Fishermen and Use Genetics to Trace Origins of Ocean Chinook

NEWPORT, Ore. – Oregon State University scientists are teaming with commercial fishermen on a new research effort to rapidly identify the home river basin of Chinook salmon found in the Pacific Ocean using genetic testing.

Their goal is to learn more about offshore schooling behavior and stock composition of salmon and ultimately to prevent coast-wide fishing closures. The closures aim to protect weak stocks like those of the Klamath River basin that may constrain an otherwise healthy fishery.

Funded by the Oregon Watershed Enhancement Board, and managed by the Oregon Salmon Commission, the pilot project is called the Cooperative Research for Oregon's Ocean Salmon, or CROOS. Already it is paying dividends.

During the June 4 opener, fishermen caught Chinook salmon off the Oregon coast between Newport and Florence and OSU scientists were able to positively match the DNA from the fins of 71 of the fish to establish their origin from river systems in California, Oregon, British Columbia and Alaska.

An ongoing project coordinated and funded by the National Oceanic and Atmospheric Administration involving 10 labs from California to Alaska – including OSU's Hatfield Marine Science Center in Newport – has identified unique genetic profiles for 110 different salmon populations based on their home river basin. Scientists and resource managers previously were unable to identify stock composition of both wild and hatchery fish originating from the Pacific Northwest, Canada and Alaska.

Project leaders say that this new technology allows scientists to assess the origin of an individual fish with remarkable accuracy.

"This was the key for us to utilize the technology," said Michael Banks, an OSU geneticist and director of the Cooperative Institute for Marine Resources Studies, a joint Oregon State-NOAA research collaborative. "Having a bank of DNA profiles allows us to approach 'real-time' identification of fish. What

used to take months, or even years, we've been able to pare down to about 48 hours."

During the June field testing, participating fishermen caught Chinook salmon off the Oregon coast between Newport and Florence and collected a fin-clip from each fish for DNA analysis. OSU scientists were able to match genetic profiles of fish from river systems as far south as Battle Creek in California, and from as far north as the Babine River in Alaska.

Traditional efforts to identify the origin of ocean-caught salmon came from coded wire tags inserted into the snouts of a small percentage of hatchery fish. Those tags were useful for determining broad-scale distributions of stocks caught in fisheries, but revealed only the origin of select tagged fish. The time and location of these tagged fish also have been too general – reported by week and catch area.

The coded wire tag data weren't usually available until several months after the season ends.

Using DNA testing, however, will allow the scientists to rapidly assess the origin of any Chinook salmon caught off the West Coast – not just coded wire-tagged hatchery fish – and identify with about 95 percent accuracy its home river system. In theory, researchers say, they could test several salmon in schools from different locations to see what percentage of them originate from a weak run.

"This could lead to the introduction of some degree of in-season harvest management," said Gil Sylvia, an OSU economist and superintendent of the Coastal Oregon Marine Experiment Station. "Having accurate information could lead to reducing access to some stocks in certain areas at certain times. But it is just as likely that it could result in decisions to open areas of the coast where higher concentrations of harvestable fish populations are."

The researchers will compare their genetic assessment with coded wire-tagged fish to test the efficacy of the project.

Many of Oregon's commercial fishermen, who have been shut down from pursuing their livelihood this summer, say they are excited by the research.

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"I started fishing in 1970 and this is the most optimistic I've been about any kind of research relating to salmon," said Paul Merz, who fishes out of Charleston. "I'm still a cynic when it comes to management decisions. But this is the science that has been missing in all of the policy arguments – and it's something where you can see the immediate results."

Jeff Feldner, a fisherman from Logsdon, Ore., said that seasons are designed to minimize the impact on the weakest runs.

"The problem," he pointed out, "is that we haven't known enough about the fish that are out there. Using information gathered over the summer to help predict where the fish will be next year doesn't help the fishermen. We haven't had a way of knowing in 'real time' where the fish are and where they've come from. Now we do."

The Oregon Watershed Enhancement Board has funded this pilot study for one year with a \$586,391 grant, which will allow 50 Oregon commercial vessels to make a total of 200 fishing trips, and allow the scientists to run 2,000 DNA samples. As many as 90 vessel owners have expressed an interest in participating.

"We need additional funding to continue the research," said Nancy Fitzpatrick, lead administrator of Project CROOS and an employee of the Oregon Salmon Commission. "One year just begins to give you information, but it isn't enough to determine all you need to know about salmon. Fish have fins, as they say, and they tend to move from one location to another.

"Where you find them one year isn't necessarily where you'll find them the next."

Fitzpatrick says any changes in how the oceans are managed for salmon would come from the Pacific Fishery Management Council, a regional council with members from Oregon, Washington, Idaho and California, that recommends fishery management measures to the National Marine Fisheries Service.

The OSU researchers are keeping track of the salmon through an onboard electronic traceability system developed by the university over the past several years. This innovative barcode system allows commercial fishermen to log the location, date and time of the capture, as well as onboard handling techniques, for every fish captured. Each fish harvested by a participant receives a metal tag with a unique number and bar-code. A website under construction will eventually allow a

consumer to access basic information about the salmon: where and when it was harvested, by whom, and from which river it originated.

Eventually, such a tool may play a major role in marketing, according to Michael Morrissey, director of the OSU Seafood Laboratory in Astoria, and a principal investigator in the CROOS project.

"By identifying the river system through genetics, and being able to accurately label a fish as 'wild,' the potential exists for fishermen to brand their product and increase the value to consumers," Morrissey said. "One such example is Copper River salmon, which often command twice the market price of similar fish, because of the attributes attached to it."

As part of the study, local salmon processors and buyers are returning some of the heads from the specially marked fish to the OSU Hatfield Marine Science Center, where scientists will conduct tests on their otoliths. Otoliths are crystalline structures located in the inner ear and act like growth rings in trees, recording not only age, but chemical elements that provide clues to the environment in which the fish lived.

Some of the fish stomachs will be retained by participating fishermen and given to scientists to reveal clues about the salmon's diet, including how the proportion of baitfish consumed might vary by season and between areas. The fishermen involved in the project will contribute data on oceanographic conditions where the fish were caught, including depth and temperature. Some of the fishermen participating in the project say they are fascinated by the science and hope it will help them locate fish more effectively, as well as keep the season opened.

"Every year, it seems like the challenges for commercial fishermen keep getting worse with restricted limits followed by complete closures," Merz said. "A lot of fishermen have packed it in. But this project gives me some hope. If it works the way it seems like it can, and if management is adjusted accordingly – and that's a big if – then it might be enough to keep me going. If not, I'll be looking for a new line of work and get on with my life."

More information on this project is available at www.projectCROOS.com