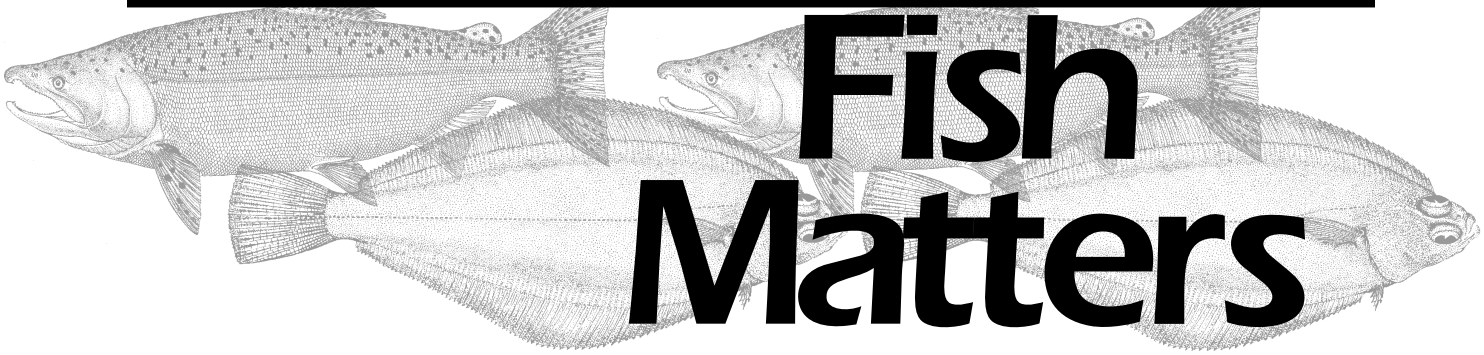
Northwest Fisheries Science Center



Fish Matters

Opening Day Edition

Northwest Fisheries Science Center

National Marine Fisheries Service

National Oceanic and Atmospheric Administration

U.S. Department of Commerce

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Good science is vital to salmon recovery;

Determining cost-effective solutions is the key to saving fish

Government policy-makers, scientists, and the public face hard choices as we work to improve the condition of salmon populations and their habitats in the Pacific Northwest. Saving salmon is a complex challenge, requiring the cooperation of each of you, as well as many local, state, and federal agencies, the fishing industry, environmentalists, tribal organizations, universities and research institutions. The availability of sound scientific data, coupled with rigorous analyses, are perhaps the two greatest assets we have in our effort to recover protected species.

Saving salmon

We often refer to the "4-Hs" to summarize the risks facing salmon populations:
Harvest–threats from overfishing;
Hatcheries–while offering many positive attributes like protecting some species from extinction and providing an abundance of harvestable fish, hatchery fish also pose threats to wild fish by competing for food, preying on them, and genetically weakening them by inbreeding;
Habitat–degradation and loss of habitat from urbanization, pollution, and land use change; and
Hydropower–navigating through and around dams.

It is impossible to talk about delisting a species (removing a recovered fish population from the Endangered Species list) without understanding how to promote recovery. This is the job of the Northwest Fisheries Science Center (NWFSC)–the Seattle Yacht Club's next door neighbor. NWFSC biologists conduct multi-disciplinary fisheries research science, incorporating marine biology and ecology, genetics, biochemistry, molecular biology, oceanography, and aquaculture. It is the mission of the NWFSC to provide the National Marine Fisheries Service (NMFS) with the scientific and technical support to carry out its goals to conserve Northwest anadromous species. (Anadromous species, like salmon, are fish who begin their lives in fresh water habitats, spend time maturing in the oceans, and then return to their home streams to spawn and die.)

Science provides the raw data upon which informed and cost-effective decisions can be made. Scientific research tells us whether fish stocks are threatened, endangered, or abundant, and it evaluates the effectiveness of recovery actions. For example, NWFSC research shows that some habitats are more crucial for salmon survival and recovery than others. By understanding which habitats are most

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Building Sustainable Fisheries

Identifying linkages between salmon productivity and oceanographic conditions. . .

The Center participates in the Northeast Pacific Global Ocean Ecosystem Dynamics Program (GLOBEC). Scientists have undertaken several studies aimed at identifying linkages between salmon productivity, ecosystem features, and oceanographic conditions. Among these are a study of marine survival of juvenile salmon in coastal waters off Oregon and California.

Developing culture techniques for marine fish species. . .

Members of the Marine Fish Enhancement Team include: (L to R) Eric Kroeger (PSMFC), Kate Guthrie (grad student), Dr. Mike Rust (NWFSC), Tom Scott (NWFSC). and Matthew Cook (UW)

The Center is leading collaborative projects with private, public and Tribal organizations to enhance the survival of lingcod and sable-fish. Center staff were successful in producing over 5,000 juvenile lingcod for early life history and habitat preference research and have initiated nutritional and husbandry studies with sablefish.

Electronic Fish Catch Logbook Project (EFCL). . .

In November and December the project team successfully demonstrated the Alpha level EFCL system to the states of California, Oregon and Washington and to fishers and fish processors. There was considerable support for a follow-up pilot program for electronic fish catch and logbook reporting for the West Coast groundfish fishery and for use in the new West Coast observer program. The Center recently received a grant to create a handheld version of the EFCL. Pilot implementation of the electronic logbook is a project of the Fishery Resource Analysis and Monitoring Division.

Understanding the importance of the Columbia River Plume. . .

Center ecologists and oceanographers are continuing their investigations of the Columbia River Plume as a critical habitat for juvenile salmon entering the ocean for the first time. Employing an ecosystems approach, scientists are focusing on ecological linkages among juvenile salmon growth, distribution and condition, food web interactions, and the physical dynamics of this dominant oceanographic feature of the California Current Ecosystem. Studying the relationships will help us to better understand the important transition period in the salmon life cycle.

Protecting marine fish from extinction. . .

In response to a petition to list several species of Puget Sound marine fishes as threatened or endangered under the federal Endangered Species Act, NWFSC staff completed a review of the status of Pacific cod, walleye pollock, and Pacific hake. The Biological Review Team conducting the review includes scientists from the Alaska Fisheries Science Center as well as the Northwest Fisheries Science Center. The review document is available from the U.S. Department of Commerce as a NOAA Technical Memorandum, and is also available as an Adobe Acrobat file from the Center's website http://www.nwfsc.noaa.gov/pubs/nwfscpubs.html. Center scientists are conducting a status review for Puget Sound herring next; publication is expected later this Spring.

Recovering Protected Species

Captive-rearing program for ESA-listed Snake River salmon. . .

Captive broodstock technology is making the difference between survival and extinction for some of the Northwest region's ESA-listed salmon stocks. By the time sockeye salmon from Redfish Lake, ID, were listed as endangered in 1991, natural returns had dwindled to a few fish each year. Extinction was imminent, with a total of only15 fish returning between 1991 and 1999. The Northwest Fisheries Science Center, in a cooperative program with the Idaho Department of Fish and Game, took the remaining fish into a captive-rearing program to stabilize and increase the population. For the last few years, eggs from fish reared to adulthood in the Center's captive broodstock program have been returned to Idaho and juveniles have been released into their historic habitats, including Redfish Lake, to aid recovery. In 1999, the first adults (6 males and 1 female) from these releases returned to the lake. Last year marked a turning point for survival of the stock, with over230 fish completing the 950-mile journey from the ocean to the lake.

Evaluation of habitat restoration strategies for Pacific salmon. . .

Habitat restoration is essential if we are to recover Pacific salmon. Enthusiasm for community-based restoration activities is high in the Northwest but funding for these activities is limited. It is essential that we find the techniques that work best to increase salmon productivity. Thirty streams in western Washington and Oregon were sampled to determine the responses of juvenile salmon populations to artificial large woody debris placement, a common stream restoration technique that had not been thoroughly tested. This study demonstrated that placement of large woody debris in small streams can lead to increased production of juvenile coho during summer and winter, and of cutthroat and steelhead during winter.

Current-use pesticide effects on juvenile salmon behavior. . .

Center scientists completed a study of the effects of commonly used yard pesticides, like diazinon, on the nervous system of juvenile salmon. The study showed that levels of diazinon found in the environment can significantly impair the anti-predator response and homing behavior of juvenile salmon. Research is continuing to assess the implications of pesticide exposure to the fitness of salmon and salmon recovery efforts.

Genetic techniques to identify salmon remains in marine mammal scat

Marine mammals may have significant impacts on endangered or threatened salmon stocks in some areas. In many cases, it is impossible to determine which salmon species are being eaten because salmon remains are quite degraded after passing through a marine mammal's digestive tract. In collaboration with the National Marine Mammal Laboratory, the NWFSC has developed of a method to genetically identify specific salmon remains. The technique can reliably be applied to small salmon bone fragments to accurately determine the impact of marine mammal predation on specific salmon populations.

Sustaining Healthy Coasts

Examining features of bottom habitat and fish associations with those habitats. . .

Center scientists conducted studies using advanced undersea technology to examine detailed features of bottom habitat and fish associations with those habitats. The accumulated data will be used to improve designations of essential fish habitat and resource survey designs.

Implementing a collaborative monitoring project for Harmful Algal Blooms. . .

The Center's Marine Biotoxin program has established the first project to monitor outbreaks of Harmful Algal Blooms (HABs), often called *red tide*. These persistent, naturally occurring biotoxins can harm humans and marine mammals by infecting shellfish and finfish, and often force temporary closure of fisheries which can devastate the economy of coastal communities. This project will help determine the factors that promote HABs and identify new monitoring techniques

Dr. Vera Trainer and Bernadita Anulacion preparing a CTD (conductivity, temperature, depth) rosette for HAB sampling in the Olympic Coast National Marine Sanctuary (off the Washington coast); and in the lower photo, Jon Buzitis (left) and Larry Hufnagle extracting Stellar sea lion blubber samples for analysis.

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beneficial and what conditions reduce extinction risks, science helps us to understand how various risk factors contribute to the survival and long-term future of specific fish stocks.

The Cumulative Risk Initiative

For conservation and recovery to be successful, fishery management actions must achieve the greatest biological benefit. In 1999, the NWFSC established the Cumulative Risk Initiative (CRI) to make sure we do just that. The CRI is an on-going project that assesses salmon population trends, and the impact of actions taken on those trends, to create scientifically-grounded recovery plans for Pacific Northwest salmon. This project evaluates the "4-Hs" to identify extinction risks to specific salmon population groups and evaluates which actions, or combination of actions, fishery managers can take to ward off extinction in the short-run and promote full recovery in the long-run. The CRI approach provides not only definitive technical advice, but also furnishes decision trees to help reach desired outcomes by synthesizing knowledge to provide clear, consistent, and scientifically rigorous decision-support for salmon conservation.

The public wants to know that we are spending our research dollars wisely. The CRI not only employs statistical methods to provide biological assessments of fish health, it also measures the economic impact of alternative actions to improve their status, and applies those results to real-world actions and federal expenditures available for recovery. In this way, we are developing statistical tools that meld economic costs with biological benefits, so that conservation planning is not blind to economic considerations as it tries to respond to biological needs.

Technical Recovery Teams

Coupled with this effort is the establishment of an innovative approach to recovery planning. Technical Recovery Teams (TRTs), each composed of six to nine recognized scientists from inside and outside the agency, assess the factors responsible for the decline of each of the 26 distinct salmon populations that are identified as "at risk" of extinction. The TRTs are assigned to geographic regions. The teams make selections from among various scenarios for recovering the fish, ask questions about risk, qualify their answers to create ranges of acceptable and unacceptable risks, and provide science-based, short-term indicators to test whether recovery actions are producing the desired result. So far, two teams are hard at work, reviewing data and setting recovery standards. One is working on Puget Sound, and the other on the Willamette and Lower Columbia Rivers and Southwest Washington Coast. TRTs will soon be underway in six other areas in Washington, Idaho, Montana, and Oregon. Similar programs will be established in California as well.

The Cumulative Risk Initiative and the Technical Recovery Teams provide planners, managers, scientists and the general public with sound tools to examine threats to salmon and to determine what combinations of responses are needed to aid recovery. We will continue to work to thoroughly identify the problems facing Northwest salmon, assemble the available information to shed light on them, identify the information gaps that need to be filled, and furnish the results of our research to others who need it in ways they can use and understand. We are committed to providing scientific options and the information necessary to develop win-win scenarios among the stakeholders who have an interest in seeing salmon recovered.

For recovery to occur, decision-makers need to know the cumulative impacts of their decisions on recovery efforts. The CRI and the TRTs are looking for solutions that get the biggest bang for the buck while staying true to the biological facts.

Opening Day is an appropriate time to share our optimism about the work we are doing at the Center. As you know, we are involved in a wide array of issues beyond salmon recovery. This newsletter will tell you about some of the numerous efforts in which we are involved in addition to salmon recovery.

Science Director receives Presidiential recognition

The Northwest Fisheries Science Center's Director, Dr. Usha Varanasi, was awarded the prestigious 2000 Presidential Rank Award for Meritorious Service. The award recognizes the ability of government senior executives to deliver outstanding service, direct innovative and significant research efforts, and foster partnerships and community relations to achieve results. Less than five percent of the thousands of eligible executives throughout the country are honored in this way each year.

Following the *Exxon Valdez* oil spill, Dr. Varanasi developed technologies to reduce pollution impacts and assure that seafood was safe for human consumption. She has also been instrumental in developing scientific methodologies that provide economic benefits to fishers by allowing scientists to conduct research off private charter vessels. Under Dr. Varanasi's direction, the Center has made major strides in building a research program for marine groundfish in the Pacific Northwest and has instituted several highly-successful multi-disciplinary research programs.