



Highlights 2001



Message from the Science Director



Northwest Fisheries
Science Center

National Marine Fisheries Service

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As 2001 closes, and we welcome in a new year, I would like to share with you some of the activities and accomplishments of the Northwest Fisheries Science Center (NWFSC).

The NWFSC conducts research to provide the scientific and technical information needed to effectively manage and conserve the Pacific Northwest's marine and anadromous fishery resources. The year was marked by several key events, including the groundbreaking of the Barry Fisher research building in Newport, Oregon; development and launching of a new West Coast Groundfish Observer Program; and the establishment of additional salmon technical recovery teams in the interior Columbia River basin and coastal Oregon.

It has been a challenging year, with an earthquake in Seattle, and global events touching our daily lives. I am extremely proud of what the NWFSC has

achieved in the face of these challenges. I would like to thank NWFSC scientists and staff for their dedication and hard work, as well as our partners in other federal, state, local and tribal organizations, universities, and other countries, for their valuable contributions.

In 2002 we will celebrate the 70th anniversary of the NWFSC. Although a lot has changed in 70 years, our mission, to provide the best scientific and technical information, has remained the same. I look forward to working with you as we continue to advance science and its application to fisheries management.

Regards,

Dr. Usha Varanasi
Science and Research Director
Northwest Fisheries Science Center

Building Sustainable Fisheries

Highlights include:

Extracting Clear Signals of Population Trends

The most basic information needed to manage fish populations is an assessment of their status and trends. This seemingly straightforward information, however, is remarkably difficult to obtain. The NWFSC published a paper in the *Proceedings of the National Academy of Sciences* that develops pioneering tools for extracting clear signals of population trends from data. These tools provide the foundation for salmon recovery analyses and will be broadly useful to all areas of conservation biology.

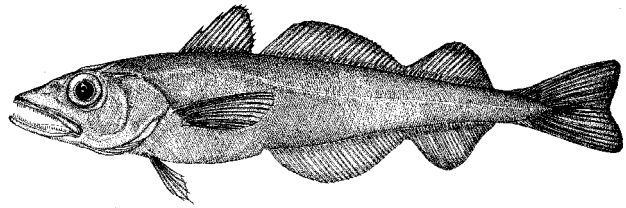
Starting New Studies to Enhance Marine Groundfish Species



Student guests and scientist Mike Rust observe sablefish (black cod) during nutrition trials in the Fish Enhancement Program's water recirculation facility at Montlake.

Many groundfish are overfished or overutilized. NWFSC scientists obtained funding for a major new enhancement study. Research will be conducted on broodstock development, reproduction, and larval rearing of lingcod, Canary rockfish, and sablefish. These studies will provide critical information necessary to develop viable enhancement projects.

Studying the Spawning Distribution of Pacific Whiting



The NWFSC partnered with the Canadian Department of Fisheries and Oceans to continue to study the winter spawning distribution of Pacific whiting. Scientists conducted hydroacoustic, midwater trawling, and oceanographic observations from Queen Charlotte Sound to San Diego. The survey found a large aggregation of pre-spawning whiting off San Diego and a high abundance of age 2 whiting distributed along the Oregon and northern California coasts. This information is critical to developing sound management practices for the whiting fishery.

Evaluating the Role of the Columbia River Estuary

NWFSC scientists completed a critical report evaluating the role of the Columbia River estuary as an important habitat for salmon. They also continued investigations in the Columbia River plume, focusing on the frontal regions created by fresh water interacting with oceanic waters, and their importance to the growth and survival of juvenile salmon. NWFSC scientists verified that juvenile chinook, coho, and chum salmon, and steelhead trout were preferentially using the frontal regions. They also found that prey resources were concentrated in the frontal regions. This study emphasizes the critical importance of estuaries and the mixing of fresh and oceanic waters, and is particularly important because of the low outflows from the Columbia River, which have resulted in the smallest plume on record. This study included cooperation by members of the NMFS, NOAA Corps, Oregon State University, and the U.S. Coast Guard.



The 2001 Observer class.

Developing and Implementing the New West Coast Observer Program

The NWFSC developed a new West Coast observer program to gather critical data on groundfish discard rates to better meet management and conservation needs. Twenty observers and five alternates were trained in late July. Observers are now at sea on both fixed gear and trawl vessels. Observers are transmitting their catch data electronically via the Observer Module of the Electronic Fish Catch Logbook (EFCL) Project, developed by the NWFSC to simplify the entry and increase the amount of commercial fishing data. These data will provide accurate, fleet-wide information on total catch and bycatch (and discards) associated with different fisheries and fish stocks.

Developing PIT-tag Detection Systems for Adult Salmonids

NWFSC scientists made significant progress toward expanding implantable passive integrated transponder (PIT) tag technology for the detection of adult salmon at major hydroelectric dams and other sites in the Columbia River Basin. As a result, it will be possible to install adult salmonid PIT tag detection systems in all fish ladders at

Bonneville Dam by 2002. This system will enable scientists to make precise estimates of ocean survival of salmon and steelhead and will provide critical, new information regarding migration behavior, passage, and survival of adult, ESA-listed salmonids to resource managers.

Creating a Prototype Electronic Fish Catch Logbook (EFCL)

Since 1998, the NWFSC has led development of an electronic system for collecting and maintaining fishery-dependent data. The EFCL uses a PC-based software application to replace paper logbooks. The system is designed to be used by fishers, processors, observers, port-samplers, and scientists, among others. This year, the EFCL was successfully tested by the West Coast Observer Program.

Recovering Protected Species

Highlights include:

Recovering Endangered Redfish Lake Sockeye

Four NWFS scientists received the Commerce Department's Gold Medal for their efforts to save endangered Redfish Lake Sockeye salmon. A combination of habitat challenges had so reduced their numbers that no more than 16 fish returned to the Lake during the decade of the 1990s. The remaining fish were removed as part of a captive broodstock program. Since 2000, over 290 of the fish have returned to the Lake because of this recovery effort – a dramatic increase from what was once a point of near extinction.



NWFS's Gold Medal recipients (left to right): Michael Wastel, Deborah Frost, Tom Flagg, and Carlin McCauley.

Establishing Technical Recovery Teams

The NWFS has established three technical recovery teams (TRTs) for threatened and endangered salmon species in Puget Sound, the Willamette/Lower Columbia River, and the interior Columbia basin. These teams, chaired by NWFS scientists, are responsible for developing biological criteria for delisting salmon populations and for assisting in the development of recovery plans. A fourth TRT, for southern Oregon and northern California, was formed jointly by the NWFS and the Southwest

Fisheries Science Center.

Recovery teams and fishery managers use and depend on the Viable Salmonid Populations guidance document developed by NWFS scientists, who received the NOAA Bronze Medal for this important work. The NWFS has been successful in making recovery teams a collaboration of co-managers and stakeholders and an important ingredient in recovery success. To ensure the quality of these endeavors, the Center has recruited a distinguished panel of leaders in ecology and conservation to provide peer review.

Evaluating Mating Success of Naturally Spawning Hatchery and Native Fish

In the largest studies of their kind, NWFS scientists used state-of-the-art genetic and statistical techniques to obtain accurate estimates of the relative mating success of hatchery and natural salmon spawning in two natural river systems. Accurately estimating the relative mating success of naturally spawning hatchery fish is essential for solving three critical problems facing managers: 1) evaluating the viability of natural populations that contain stray hatchery fish; 2) evaluating the long-term genetic risks of stray hatchery fish; and 3) evaluating the benefits of conservation hatchery programs.

Leading a Biological Review Team for Killer Whales

The NWFS is leading the biological review of a petition to list the Eastern North Pacific's "Southern Resident" stock of killer whales as endangered or threatened under the Endangered Species Act. The NWFS established a Biological Review Team and is gathering and analyzing pertinent data. Exposure to toxic chemicals is a prominent risk factor identified in the petition. NWFS scientists recently published an in-depth study of how contaminant burdens are related to age, sex, reproductive status, and birth order. This peer-reviewed study will help evaluate the risk that contaminants pose to the reproductive success of killer whales.



NWFSC members of the Killer Whale Biological Review Team (left to right): Gina Ylitalo, John Stein, Peggy Krahn, and Robin Waples.

Controlling Microbial Pathogens

NWFSC scientists are developing new technologies to proactively control microbial pathogens responsible for infectious diseases in salmon. They have used molecular techniques to develop new strategies for disease therapeutics and vaccine development. NWFSC scientists cloned, sequenced, and characterized genes of *Aeromonas salmonicida*, the causal agent of furunculosis in salmon. They have also isolated a protein subunit and are testing it for its effectiveness as a vaccine.

Initiating a Cost/Benefit Economic Analysis of Recovery Options

Science provides the basis for sound management decisions. In salmon recovery, there are many possible choices. Two key dimensions of choice are benefit to the fish population of concern and the economic cost of management actions. To facilitate management decisions, NWFSC scientists, in collaboration with economists from the University of Washington, the University of California, and the Center for Ecological Analysis and Synthesis, produced a “biggest bang for the buck” description of alternative management actions. Using management options under consideration for salmon, this team of economists and biologists calculated ratios of increases in salmon productivity per \$100,000 expended. To date these studies have addressed only one “Evolutionarily Significant Unit” (ESU) in one region. The analyses are undergoing peer review and will be published and extended broadly to managers on the West Coast.

Developing Guidelines for Monitoring and Evaluation

Monitoring the status of federally listed anadromous salmonids is a key part of the recovery process. Currently, the region lacks a comprehensive monitoring and evaluation plan. To meet this need, the NWFSC established a monitoring and evaluation technical team. The NWFSC, in partnership with fisheries managers, began developing rigorous guidelines for monitoring and evaluation programs, paying particular attention to practical choices that must be made with regard to the type of sampling, the number and deployment of samples, and the frequency of sampling. Pilot monitoring and evaluation programs with strong research components have been established in the Salmon River and Columbia River Basin, in collaboration with state agencies, non-governmental organizations, and the U.S. Forest Service. These pilot projects are encouraging flexibility and a diversity of experimental approaches.

Evaluating Pesticides in Washington State Surface Waters

NWFSC scientists played a lead role in a state/federal task force charged with developing the white paper, “A Process for Evaluating Pesticides in Washington State Surface Waters for Potential Impacts to Salmonids.” This task force is undertaking a ground-breaking effort to develop a scientifically sound process to identify individual pesticides that are or are not a risk to threatened and endangered salmonids in Washington. This effort is receiving national attention and will assist other states with establishing similar processes.

Sustaining Healthy Coasts

Highlights include:

Developing Habitat Quality Criteria

In order to recover and conserve salmon in the Pacific Northwest, and maintain stocks of estuarine-dependent marine fish, it is necessary to improve habitat quality and quantity. While it is well recognized that water and sediment quality are degraded in urban estuaries and nearshore marine environments, there is little technical guidance on the thresholds above which adverse effects on fish health and their prey are expected. NWFSC scientists synthesized existing scientific information and determined thresholds for sediment contamination. This synthesis of information was provided to the Regional Office and other managers, and provides the best available science for conducting Endangered Species Act and Essential Fish Health consultations.

Leading a Harmful Algal Bloom Program

NWFSC scientists are leading the Olympic Region Harmful Algal Bloom Program (ORHAB), which is a state, federal, Tribal, and academic project. Harmful algal blooms on the Washington coast have severe economic impacts on coastal communities and Native Americans who depend on shellfish resources. ORHAB is a collaborative research effort designed to improve the ability to forecast HAB events in order to reduce their impacts, and to increase the monitoring capacity of state and Tribal managers. Initial ORHAB results were presented at the National Harmful Algal Bloom meeting in Woods Hole, MA.

Advancing Habitat-Related Recovery Planning

NWFSC scientists, in collaboration with state scientists, made an important step in moving habitat-related recovery planning forward. At a regional forum on salmon recovery, NWFSC scientists proposed a strategy for linking salmon production to fish habitat. This approach is both scientifically sound and practical, and was easily understood and embraced by both policy makers and scientists. Prioritizing habitat restoration actions has been a challenge in regional recovery efforts. There is little technical guidance available to assist local, Tribal, and state natural resource



managers. To improve this situation, NWFSC scientists conducted a critical and comprehensive evaluation of the scientific information available on the effectiveness of different habitat restoration techniques, and developed a scheme to prioritize actions on a watershed scale. A paper on the NWFSC's work will be published in the *North American Journal of Fisheries Management*.

Filling Critical Gaps on Fish Use of Estuarine Habitats

Estuaries play a critical role in the life history of many salmon. While estuaries are recognized as important, there has been little research linking the freshwater portion of the salmon life cycle to the estuarine phase. NWFSC scientists have initiated a project to fill critical data gaps on estuarine habitat use. Data from this research will support a fish productivity model that will, for the first time, allow managers to predict the benefits from specific restoration efforts.

Studying Unexplored Marine Habitat in Astoria Canyon

A team of scientists, led by the NWFSC and the Pacific Marine Environmental Laboratory, began mapping the undersea phenomenon of Astoria Canyon, 10 miles west of the Columbia River's mouth, to document its physical and biological characteristics. Scientists from NOAA's Southwest Fisheries Science Center and the Olympic Coast National Marine Sanctuary, Oregon State University, Washington State University, the University of British Columbia, the California Department of Fish and Game, curators from the Los Angeles County Museum, and the public aquarium and outreach center of OSU's Hatfield Marine Science Center participated in the project. This study will yield extensive data about the characteristics of an essentially untouched ocean ecosystem and allow scientists to test assumptions about how human impacts contribute to sea floor deterioration.



The Newport, Oregon based Astoria Canyon Research Team.

Management

Expanding the West Coast Groundfish Program

The NWFSC's West Coast Groundfish Program has undergone an exciting and challenging transition. Dr. Elizabeth Clarke was hired as the new Director of the Fishery Resource Analysis and Monitoring (FRAM) Division. The previous director, Dr. Richard Methot, is now leading the NWFSC's stock assessment improvement program. Through the leadership of Dr. Clarke and Dr. Methot and the efforts of the FRAM Division staff, the NWFSC successfully launched an observer program; expanded current stock assessments with university partnerships; began to transfer surveys conducted by the Alaska Fisheries Science Center; and strengthened outreach activities with diverse constituent groups.

Developing and Implementing an Innovative Pollution Prevention Program

The NWFSC developed and implemented an innovative Pollution Prevention Program, which resulted in a dramatic reduction of hazardous waste, chemical usage, potential employee exposure, and cost. NWFSC management and staff received a Certificate of Achievement from the White House "Closing the Circle" Task Force on Recycling for their contribution to "greening the environment."

Receiving a NOAA Diversity Spectrum Award

The NWFSC's Center Management Team was recognized by NOAA with a Diversity Spectrum Award for its innovative management approaches, including the creation of cross-organizational teams to address NWFSC issues. These diverse teams enhanced the professional growth of staff by enabling them to address and problem-solve relevant issues (e.g., space allocation, safety, promotion guidelines) and provide recommendations directly to the Center Management Team.

Receiving NOAA Best Practice Awards

Dr. Bob Iwamoto, a division director, and Julie Peddy, Administrative Officer, each received NOAA Best Practice Awards for their management abilities, support of training and employee



development, and for fostering a productive and supportive work environment.

Establishing a Monthly Seminar Series

The NWFSC established a series of monthly research seminars to foster discussion of new ideas and scientific growth. Titles ranged from “Life-History Constraints of Marine Invertebrates and Algae” to “Biggest Bang for the Buck: Salmon Recovery Actions Viewed Through the Lens of Economics.” Sixteen topics have been presented in the “Monster Seminars” series since April.

Developing an Internal Research Grant

An ad hoc NWFSC team developed an internal research grant program to expand research opportunities, encourage innovative research, and promote career development of scientific staff.

Diversity and EEO

Holding Seminars and Training Sessions

The NWFSC hosted an American Heritage Month Celebration to celebrate the cultures of Native Peoples of North America and sponsored a seminar entitled, “Tribal Indigenous Knowledge and Western Science.” A number of general training sessions were also held, including a career

development workshop, a briefing on succession planning, and cultural diversity training on “working in a different culture.” A thorough assessment of staff and manager training needs is currently being conducted.

Improving Educational Opportunities for Minorities

The NWFSC remains committed to the Department of Commerce’s Minority Serving Institutions Initiative and continued to work with the Northwest Indian College on the development of the National Indian Center for Marine and Environmental Research and Education (NICMERE). In August, NICMERE sponsored a credit class on Washington Coast Harmful Algal Blooms. NWFSC scientists helped develop and teach this class to Native American students, which increased understanding and communication about HABs and phytoplankton monitoring.

Partnering with Universities

The NWFSC continued to support cooperative institutes with the University of Washington and Oregon State University, both by expanding collaborative projects with faculty and by supporting undergraduate and graduate students in diverse fields. The NWFSC acts as the lead Commerce/NOAA entity with the Northwest Indian College, creating scientific training opportunities for Native American students under an MOU that created the National Indian Center for Marine and Environmental Research and Education (NICMERE). An agreement with the Washington State Board for Technical and Community Colleges provides internships to community college students in programs such as computer programming, administration and web development, providing practical experience for students and adding needed expertise at the Center. In FY 2001, NWFSC hosted summer interns from Smith College and the University of Washington, and continued to fund a faculty position in the University of Washington’s School of Fisheries to expand the number of graduate students in population dynamics.