

Groundfish Research

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A tiger rockfish perches itself in a crevice at a depth of 92 meters. The white material in the upper portions of the photo is a large sponge.



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Scientists from the National Oceanic and Atmospheric Administration (NOAA) have completed an 18-day exploration of Astoria Canyon, a deep and previously little explored submarine chasm located ten miles from the mouth of the Columbia River. Never-before-seen geological features and new species of invertebrates are among the discoveries made by the interdisciplinary consortia

involved in the project. Research personnel on the expedition included geologists, chemists, biologists, ecologists, and physical oceanographers. Scientists from the Northwest and Southwest Fisheries Science Centers, and the Pacific Marine Environmental Laboratory (PMEL) were included, as were observers representing the environmental community, commercial

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NWFS continues summer research cruises

The fourth annual bottom trawl resource survey began June 28 on board chartered commercial trawl fishing vessels. The five-week survey will collect samples of Dover sole, sablefish, shortspine and longspine thornyhead, and other groundfish inhabiting the slope zone off the coasts of Washington, Oregon, and California. The goal of these surveys is to produce indices of relative abundance for these species and to characterize their distribution, biological condition, and population dynamics. The surveys are conducted under the direction of the Fishery Resource Analysis and Monitoring Division (FRAMD) of the Northwest Fisheries Science Center (NWFS).

Elizabeth Clarke, FRAMD Director, just returned from a survey turn aboard the *Capt. Jack*, owned by Mike Waldrop and skippered by Rex Leach. "I was very impressed with how well the survey was working. This is hard work—but before I go out on next year's survey I am going to spend a few weeks in the gym to prepare myself," Clarke said.

Each of four commercial vessels is chartered for five weeks, during which time they spend four weeks surveying the slope zone (100 to 700 fathoms) from Cape Flattery, WA, to Morro Bay, CA. One additional week on board the vessels is spent along the shelf conducting experimental surveys. Other vessels participating in this year's cruises were the *Limit Stalker*, owned by Sylvia James and skippered by Tom Jones; *Excaliber*, owned and skippered by Mike Retherford; and *Sea Eagle*, owned and skippered by Danny Parker.

High tech equipment, supplied by the NWFS, is used to monitor and measure various aspects of the trawl's performance during sampling hauls. This equipment tracks the trawl net as it moves along the bottom, allowing scientists to determine the success of the tow. Other advanced equipment used includes a compensating scale that adjusts to the roll, pitch, and motion of the boat to provide greater accuracy when weighing fish, and an electronic measuring board that is used to record weight and species identification eliminating use of paper forms on deck.

This Summer's cruises are expected to be completed by the end of September. A NOAA Tech Memo describing the results of the 1998 survey will be published at the end of August. Results of the 1999 and 2000 surveys are planned for publication by Spring 2002.

Observer Program on schedule to begin this summer

In late July, a group of twenty commercial fishing observers will begin their training as at-sea observers for the non-whiting west coast groundfish fleets. An observer program for the non-whiting fishery has been a long-term goal to improve understanding about fishing activities. The information gathered by these observers will provide accurate accounts on total catch, bycatch and discard associated with different fisheries and fish stocks.

"We expect to have five observers deployed on the sablefish long-line fleet in mid-August, with the remaining 15 observers deployed in 13 different port groups along the west coast by Sept. 1, when the new two-month trip limit periods begin for the trawl fleet," says Teresa Turk, a Northwest Fisheries Science Center (NWFS) fishery biologist who helped develop the program's design.

"We've used the experiences and information from previous observer programs to design an effective program on the west coast with observations from a variety of fishing vessels," says Turk. The NWFS is administering and monitoring the program, and maintaining the observer database. Observers and state coordinators are being provided by the Pacific States Marine Fisheries Commission as part of a cooperative agreement with the National Marine Fisheries Service (NMFS). In early June, NMFS held a series of informational sessions in several coastal communities to explain observer regulations and the plan that outlines where and when observers will be distributed.

"We hope this program will provide the information needed on discard rate and that we will continue to enjoy the support of the fishing community for these efforts to improve management of the resource," says Turk.

Vessel owners who have been selected to participate will be notified by mail shortly. For more information, contact the Observer Program at the Northwest Fisheries Science Center, (206) 860-3381, email: nwfs.observerprogram@noaa.gov or Al Didier at the Pacific States Marine Fisheries Commission, email: al.Didier@psmfc.org.

EFCL trials successfully completed

The Northwest Fisheries Science Center (NWFS) has successfully completed trials of its prototype fisheries dependent data system for commercial fishermen, processors, observers, scientists, and managers. The system uses cellular phones, satellite, or disks to transfer fisheries information. The prototype, called the Electronic Fish Catch Log Book, or EFCL, simplifies logbook and fish ticket data entry and allows for quicker and more accurate reporting.

Presently, most fishery dependent information, including information from fisher's logbooks and processors' fish tickets, is collected manually, often in different formats throughout the country. Fishermen asked the Northwest Fisheries Science Center to develop an electronic logbook to allow better use of data that fishermen are already required by state law to collect. In addition, users wanted to be able to enter fish landing data electronically, make use of electronic technology for observers and port biologists, and use computers to avoid duplicate data entry. It was felt that better, more up-to-date information showing fishing activities collected in near-to-real time, could improve fisheries management and support better fishing practices.

The NWFS received funding from the Innovative Technology Fund to complete EFCL development. The terms of the grant required a nationwide focus of a systems' product that could return the costs of development to the Fund.

Extensive user surveys of fishers, marketers, processors, scientists, NMFS personnel, state, Commission and Council members were conducted. A private applications developer, under a CRADA, developed the onboard application – which will be given free to commercial trawl fishers who test the system on the west coast. The onboard application is expected to sell for less than \$500 and the contractor will modify it to meet differing requirements in different regions. An external private sector GSA contractor developed the web interface and the database, meeting Center design specifications.

The EFCL onboard application connects to a vessel's GPS to record the location and time of fishing events, such as a haul or tow. When the fish catch from that haul has been sorted, fishers enter the fish catch species and weights on a computer keyboard. When all of the hauls are complete, the system downloads this information via a cell phone and modem to a

central database. Since catch and landing data are traditionally confidential, a sophisticated security system has been built-in.

Users will be able to access the central database via the world wide web to check their own data, though this part of the system cannot be officially implemented without legal changes (and can be disabled if these changes do not occur). The database and the web site will also provide fishers with maps of their own fishing locations, quota reports showing how much of a fisher's quota has already been landed, as well as an array of additional information.

The overall system is designed to mirror the existing paper reporting system, but to do it more quickly, accurately, cheaply and reliably. The most important data are likely to be catch per unit effort data, which can be used to support both fishery management decisions and fishing business decisions.

Minimizing costs to fishers was a critical design consideration. Since many skippers now have "on vessel" computers for electronic charting, GPS devices and cell phones, rather than develop new hardware requirements, the EFCL uses their components. The system will therefore cost less than a design based on custom hardware, and is modular to take advantage of technology advances. For example as wireless bandwidth increases, and costs decrease, fishers will be able to benefit from and contribute more electronic information, even from their boats.

Future Considerations

Extensive alpha testing is complete. Beta testing, using real participants during actual fishing and landings, is also complete. Independent testing and validation is complete on the web interface and the database. In other regions of the country, the parties that have responsibility for collecting logbook and fish ticket information, will be given copies of the programming. Some may need funding for implementation. These parties will then decide whether they want to use the system for data collection. Currently, there is broad enthusiasm inside and outside the NMFS for the project. The State of California has expressed interest in applying the fish ticket module of the EFCL to capture fish ticket data. The Observer Program for the West Coast Groundfish Fishery plans to use the observer module to capture observer information.

(Astoria Canyon-continued from front)

fishermen, graduate students, interns in marine technology, and middle school and high school teachers. Dr. Waldo Wakefield, of the Northwest Fisheries Science Center, Newport, OR, and Bob Embley of PMEL served as co-chief scientists for the Canyon Expedition.

Though it will take months, even years, to analyze and interpret all the data collected during the expedition, new insights have already been gained about the region.

Using sidescan and multibeam sonars deployed during an earlier cruise in June, and multibeam sonar on the NOAA research vessel, *Ronald H. Brown*, scientists created 3-dimensional, high-resolution images of Astoria Canyon that clearly depict features never seen before such as walls, outcrops, rocks, faults, and slides. The research team also conducted detailed biological, chemical, physical and geological surveys of the canyon using a variety of remote sensing and sampling devices and a sophisticated Remotely Operated Vehicle (ROV) from Canada - ROPOS (Remotely Operated Platform for Ocean Science). ROPOS provided the scientists with the critical tools for viewing, sampling, and data collection of the seafloor and its inhabitants. Scientists are now piecing together the puzzle as to how the structure of the canyon and the currents influence the distribution and abundance of biological life.

The expedition will likely result in the discovery of new species of invertebrates, including at least one new species of brittlestar. A critical aspect of the expedition was inclusion of a team of invertebrate zoologists from the Natural History Museum of Los Angeles County, who worked around the clock curating each day's collection of specimens. Over one thousand lots, representing several thousand specimens of invertebrates will be taken back to the museum to become part of its permanent collection, and form a reference collection for deep-water invertebrates of the Pacific Northwest coast.

Geologists were also excited to find a section of the canyon wall where the side was broken away revealing many layers of undisturbed sediments. Core samples taken at the base of this site will help scientists reconstruct the frequency of past earth-

quakes, tsunamis, and volcanoes, and provide insight into predicting future incidences.

After exploring the Astoria Canyon, the expedition ventured south along the Oregon coast to map and supplement ongoing National Marine Fisheries Service groundfish monitoring efforts at Heceta Bank, an important area for commercially fished groundfish such as whiting, rockfish, sablefish, and several species of flatfish. Researchers are comparing the habitats, fish and invertebrate populations of Astoria Canyon with those at Heceta Bank to provide a comprehensive picture view of fish and invertebrate associations in varying habitats. Surprisingly, preliminary results from Astoria Canyon indicate low numbers and diversity of certain species, some being absent all together.

A major discovery during the Heceta Bank portion of the research cruise was the existence of an expansive fluid seep habitat just south of Heceta Bank in 1500 feet of water, consisting of carbonate rock crusts, inhabited with dense communities of chemosynthetic clams, predatory snails, and other invertebrates. The carbonate deposits covered an area roughly a mile in diameter with the densest concentrations of organisms in patches 100 yards across. Patches of white filamentous bacterial mat were observed where fluid flow was probably strongest.

"There is a tremendous need to explore more geographic provinces within the U.S. Exclusive Economic Zone to continue the big picture approach started here, and to expand the knowledge base on marine habitats that can be gained from this type of research," says expedition co-chief Waldo Wakefield. "This exploration represents a fundamental change in the way NOAA is approaching ocean research because it brought together experts from many disciplines and provided the necessary platform and resources to explore areas they may never otherwise have the opportunity to study.

The successes of the mission were heralded during an open house at the Mark Hatfield Marine Science Center in Newport on July 13.