



## Oysters – the Story behind the Headlines

Pacific Northwest oysters have been in the news recently, because of the problems oyster hatcheries have had in rearing oyster larvae. This recent decline in larval production has affected seed supplies and is threatening the West coast oyster industry, which has annual dockside sales currently valued at about \$100 million.

West coast oyster growers are dependent on commercial hatcheries for supplies of seed that they plant out in coastal waters. The seed matures and grows to market size after 2 to 3 years and is then harvested and sold to consumers. Recently, however, regional oyster hatcheries have been adversely affected by high concentrations of a bacterial species called *Vibrio tubiashii*.

This bacteria, the subject of several recent news articles, destroys shellfish larvae, the free-swimming seed stock for future oyster harvests. It does not harm the mature oyster and it's not transferable to humans.

Problems in rearing oyster larvae at the hatchery of the Molluscan Broodstock Program (MBP) were first noticed in 2005. In response, Chris Langdon and Alan Barton developed a complex seawater treatment system which improved seawater for rearing larvae. The system consisted of UV exposure to kill the bacterial cells, a protein skimmer to remove toxic extracellular products produced by the bacteria, followed by a bead filter to re-introduce a balanced bacteria flora to the seawater. Installation of the system allowed MBP to produce oyster larvae in 2006 and in subsequent years.

In 2006 and 2007 commercial hatcheries started to have problems rearing larvae and Dr. Ralph Elston, Sequim, WA, reported that the likely cause was *V. tubiashii*. In early 2007, the MBP seawater treatment system was installed at the Whiskey Creek hatchery and it was found to be beneficial and improved seawater quality. The hatchery is now able to produce 25 – 50% of its normal output of larvae. Further improvements are needed to fully protect hatcheries from the effects of very high *V. tubiashii* concentrations that are still occurring this summer in West coast waters.

In the long term, MBP will also be working toward developing resistant strains of oysters that will be able to survive the effects of *V. tubiashii*.

*For additional information, check out "Bacteria hit Shellfish Larvae" – Tillamook HeadlightHerald.com, May 20, 2008, or "A Warning from the Sea" - Los Angeles Times online, July 13, 2008, or the MBP website, <http://hmsc.oregonstate.edu/projects/mbp/>*

## Thayne Dutson, CAS Dean, Retires

Thayne Dutson, who became director of OSU's Agricultural Experiment Station in 1987 and dean of the College of Agricultural Sciences in 1993, retired on June 30. During his tenure, he oversaw the design, construction and program expansion of the Astoria Seafood Laboratory, the establishment of the Food Innovation Center in Portland, the

designation of the new Marine Mammal Institute, as well as the establishment of western regional headquarters for the national Sun Grant program.

Bill Boggess, who was appointed executive associate dean in 2007, will now serve as interim dean of the College and interim director of the Experiment Station.

*For additional information, see <http://oregonstate.edu/dept/ncs/newsarch/2008/Mar08/dutson.html> and <http://oregonstate.edu/dept/ncs/newsarch/2008/Apr08/boggess.html>*

## Seals, Sea Lions, and Oregon's Fisheries

Scientists, resource managers, and fishermen got together on Wednesday, April 30, for another Hatfield Forum on Marine and Coastal Issues. *Seals, Sea Lions, and Oregon's Fisheries: Contemporary Issues – Future Challenges* explored the wide range of perspectives by groups impacted by these animals, particularly Oregon's commercial and recreational fisheries.

Presentations included: Biology of Oregon Pinnipeds (Robin Brown and Susan Riemer, ODFW); The Role of Pinnipeds in West Coast Ecosystems (Jason Baker, National Marine Fisheries Service); Laws, Regulations, and Policies Governing Pinniped-Fishery Interactions (Brent Norberg, National Marine Fisheries Service); What Do We Know About Pinniped-Fishery Interactions in Oregon? (Robin Brown, ODFW, and Garth Griffin, NMFS). Afternoon panels included: Experiences of Oregon Fishermen with Pinniped Interactions: (Kim Reisbek, Paul Heikilla, Mike Sorenson, Wayne Butler, Terry Thompson); Research and Management Needs (Marcus Horning, Jim Harvey, Tom Eagle, Garth Griffin, Paul Heikilla, Robin Brown); Dealing with the Present and Preparing for the Future (Steve Williams, Terry Thompson, Fritz Graham, Gil Sylvia.)

This is, and has been, a difficult issue — problem interactions between seals and fishermen

were recognized at least 77 years ago, and progress has been slight in spite of the many workshops, research projects, and management efforts that have been done during that time. Also, many of the highlighted problems are not due just to pinnipeds — other issues (habitat, hatcheries, and/or harvests, for example) are often involved. Because these ecosystems are so complex, the results of management interventions are also not very predictable.

Reasonable goals for dealing with the pinniped-fishery issue would be to relieve human distress while maintaining healthy pinniped populations, and to have the ability to fix specific problems. While management needs to use existing tools more effectively, additional research is also needed to obtain systematic data, measure impacts, and understand what is driving these problems. We also need to develop safe and effective non-lethal deterrents and make them legal and available, make sure the permitting process does not prevent necessary management or research, and amend the MMPA to provide the states, and perhaps individual fishermen, with more authority to deal with interaction problems in a timely and sensible way. A full report on the forum will be issued in the near future.

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## Offshore Aquaculture Forum in September 2008

The Hatfield Marine Science Center is hosting a two-day forum that will explore the feasibility of developing offshore aquaculture programs in the Pacific Northwest on September 9-10, 2008.

Chris Langdon, coordinator of the forum, says the event is designed to be informational and will explore the potential rewards as well as the downsides of offshore aquaculture in this region. "Global population is estimated to increase by 50 percent in the next 40-50 years and commercial fish stocks around the world are at or above sustainable harvest levels," Langdon said. "We need to explore other avenues of seafood production if we are going to maintain current levels of per capita consumption. However, expansion of offshore aquaculture in the United States would require a strong regulatory framework with environmental safeguards to protect natural resources and ensure consumer safety. In addition, aquaculture activities need to be sensitive to society's values and economic priorities."

Speakers at the forum include regulators, community leaders, aquaculture industry representatives, fishing industry representatives, economists and scientists. Among the topics: environmental, economic, biological and management issues, food safety, siting and engineering challenges, potential business models, and fish and shellfish species suitable for the Pacific Northwest.

*For additional information, visit the website: <http://oregonstate.edu/conferences/aquaculture2008/>*

*For registration, please use the link on the website.*

MARKHAM RESEARCH AWARD WINNERS, 2007 & 2008  
Coastal Oregon Marine Experiment Station  
June 2008

**Alana Alexander**, Fisheries & Wildlife, PhD

Scott Baker

*'08 Recipient: Mamie L. Markham Endowment Award - intended to assist graduate or postdoctoral level researchers and research utilizing OSU's Hatfield Marine Science Center.*

**Global gene flow and genetic diversity of the sperm whale (*Physeter macrocephalus*)**

The sperm whale is exposed to a number of threats, such as a reduction of numbers and genetic diversity due to 19<sup>th</sup> and 20<sup>th</sup> century commercial whaling, fishery bycatch and ship strike. By looking at gene flow and regional isolation, we can identify what populations will be most at risk by negative interactions with humans. We may also see how genetic diversity may have been reduced by whaling, so that if further reductions in diversity occur we can identify this happening

To look at migration between different areas of sperm whale distribution, we aim to use genetics (microsatellite and mitochondrial DNA) to obtain estimates of global gene flow and regional isolation (the way DNA is moving, or not moving between areas), which we can use as a proxy for the actual rate of migration of individuals between areas. We will use 985 biopsy (non-lethally obtained) samples collected from the *Voyage of the Odyssey* expedition, which was a five-year expedition designed to investigate levels of contaminants in the world's oceans (the sperm whale was used as a bio-indicator species, due to its high fat content and position in the food chain - pollutants tend to accumulate in its blubber). We will also use approximately 100 samples from animals which have naturally stranded around the coast of New Zealand. We also hope to be able to obtain some novel results due to the large sample size of our study, and the incorporation of populations not previously sampled for genetic diversity.

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**Pamela Archer**, Marine Resource Management, MS

Jessica Miller

*'07 Recipient: Mamie L. Markham Endowment Award - intended to assist graduate or postdoctoral level researchers and research utilizing OSU's Hatfield Marine Science Center.*

**The re-establishment of the native oyster, *Ostrea conchaphila*, in Netarts Bay, Oregon**

Oyster populations were severely reduced due to overharvest, degraded water quality, and declines in suitable habitat, namely, shell substrate. The Nature Conservancy of Oregon, the Oregon Watershed Enhancement Board, the National Oceanic and Atmospheric Administration, and COMES have been working on re-establishing Olympia oysters, the only oysters native to the west coast of North America, in Netarts Bay, Oregon.

Two brood years of oysters were outplanted in the Bay close to an area where oysters were previously found. The goal was to determine if the oysters were on their way toward becoming a self-sustaining population by monitoring oyster growth, survival, and reproduction. A secondary research goal was to evaluate how the oyster re-establishment project impacted the dense eelgrass beds (*Zostera marina*) characteristic of Netarts Bay and how we could utilize this information in the development of future projects. We hoped to identify a particular density of oysters which would provide a sufficient number of oysters without harming eelgrass.

We monitored oysters and eelgrass at the re-establishment site during spring and summer 2007. We found the outplanted oysters were surviving, growing, reproducing, and recruiting young oysters back to the site. We determined several additional limiting factors for the recovery of Olympia oysters and learned that our highest tested oyster density reduced both the percent cover of eelgrass and the density of shoots per m<sup>2</sup>. We concluded that of the oyster densities tested, a "moderate" density yielded a similar density of oysters as the "high" treatment but without the significant negative impacts to eelgrass.

This research provided the project partners with information which was used to direct subsequent oyster re-establishment projects. We were also able to recommend continued use of a "moderate" oyster density along with additional testing of oyster reef structures to determine an optimal oyster re-establishment strategy.

**Rebecca Baldwin**, Fisheries & Wildlife, PhD

Michael Banks/Kym Jacobson

*'08 Recipient: Walter G. Jones Fisheries Development Memorial - intended to encourage graduate work in subjects which contribute to fisheries development.*

*'08 Recipient: Mamie L. Markham Endowment Award - intended to assist graduate or postdoctoral level researchers and research utilizing OSU's Hatfield Marine Science Center.*

#### **Movement and Population Structure of the Pacific Sardine**

The age-class structure of commercially caught Pacific sardines (*Sardinops sagax*) recently caught in the Pacific Northwest suggests a separate spawning population from Pacific sardines found off of California, but more data are needed to support this finding. If there is more than one Pacific sardine population identified from this study, then the information can be used to reassess the current management strategies for the Pacific sardine fishery along the west coast of North America.

Since Pacific sardine genetic data is inconclusive in separating Pacific sardine populations within the California Current System, the use of macroparasite community analyses and genetic data are another approach to identify fish populations. These methods are commonly used worldwide to identify stocks and habitat use of marine fishes. Parasites are often referred to as biological tags since they are naturally acquired by their host and can remain in or on the host from months to years depending on the longevity of the parasite species. My results will have a wider applicability to other coastal pelagic fish species. With state agencies moving toward ecosystem-based fisheries management, my study and the techniques I develop can address food web dynamics and habitat use of the fish species being studied.



**G. Renee Gibb**, Fisheries & Wildlife, MS

Scott Baker

*'08 Recipient: Mamie L. Markham Endowment Award - intended to assist graduate or postdoctoral level researchers and research utilizing OSU's Hatfield Marine Science Center.*

#### **Migratory destinations and abundance of humpback whales from French Polynesia**

Humpback whales remain a fragile species in the South Pacific. The Japanese government now proposes to resume hunting humpback whales in Antarctic Areas. Without proper knowledge of migration routes, interchange and abundance, it is not possible to consider the potential threat of this hunting to recovering stocks. Genetic analysis and photo identification provide nonlethal study techniques that can

help demystify the migration routes in humpback whales. To collect DNA we use a biopsy dart from a veterinary air rifle. The best DNA comes from newly grown skin, so the dart only goes as deep as the first layer, which is right where the skin meets the blubber. It goes into the animal about 2 cm and bounces off. It has a floating device, so we can retrieve it from the water.

**Erin Kunisch**, Fisheries & Wildlife, MS

Markus Horning

*'07 Recipient: Mamie L. Markham First Year Student Award - to provide financial assistance to an incoming, first year graduate student who plans to be resident at the HMSC after completing first academic year in Corvallis.*

#### **Determining Early Pregnancy and Reproductive Rates in Northern Fur Seal Females**

The Pribilof Islands, Alaska, located in the southeast Bering Sea, are home to approximately half of the world's breeding population of the northern fur seal. This population experienced a steady decline in the last decade, for reasons that are still unknown. Decreasing reproductive rates have been suggested as a significant factor contributing to the northern fur seal population decline.

My proposed study will estimate reproductive rates for the northern fur seal population on Polovina

Cliffs rookery, or breeding site, on Saint Paul Island. In this study, reproductive rates will be characterized as the number of females having successful births. Determining current reproductive rates is imperative so that future studies will be able to compare reproductive rates across time. We will incorporate a novel technique, trans-rectal ultrasonography, to determine early pregnancy in northern fur seal females. By using this technique on flipper-tagged individuals, we will know which females are pregnant before they leave the island for their winter at sea.

Northern fur seals return to their birth site throughout their lifetime to breed and to give birth. Once they return to their birth site the following spring, I will be observing these individuals throughout the summer breeding season to verify if they successfully give birth. After determining reproductive rates of females, this rate will then be compared to various maternal parameters: age, body mass and overall body condition (defined in this study as body fat content).

Understanding the relationship between age, mass, female condition, and reproductive rates in northern fur seals can provide crucial information on the potential demographic consequences of disturbances to marine food webs. The information gathered from this project can assist in better conservation and management plans for a declining species.

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**Jose Marin Jarrin**, Fisheries & Wildlife, PhD

Jessica Miller

*'08 Recipient: Lillian Brucefield Reynolds Scholarship Fund - scholarship fund for graduate students engaged in study of marine science at Hatfield Marine Science Center.*

*'08 Recipient: Mamie L. Markham Endowment Award - intended to assist graduate or postdoctoral level researchers and research utilizing OSU's Hatfield Marine Science Center.*

**Sandy Beach Surf-Zones: What is their role in the early life history of juvenile Chinook salmon?**

Twenty-five years ago, it was hypothesized that sub-yearlings stayed within 5 km of shore. However, large numbers of sub-yearling Chinook with standard lengths between 6.5 to 12.5 cm have only been caught in the surf-zone of a sandy beach (< 0.5 km), suggesting that the oceanic habitat of the smallest sub-yearling Chinook salmon is closer to shore than previously hypothesized. If some of the smaller sub-yearling Chinook salmon inhabit the surf-zone of sandy beaches when they first enter the ocean, the surf-zone could be an important habitat and possibly a nursery area.

To determine the importance of sandy beach surf-zones as a juvenile habitat for Chinook salmon, I propose to sample up to fifteen sandy beaches on the Oregon coast to: (1) determine the densities in which juvenile Chinook salmon are present in inner sandy beach surf-zones, (2) measure the juveniles' growth, and (3) determine the relationship of environmental variables, type and abundance of potential prey, and physical characteristics of the habitat with presence, density and growth of the juveniles as proxies of survival. When possible, the data obtained from these three objectives will be compared to data obtained in estuaries and offshore.



The present study will help fish, salmon and conservation biologists to increase our general understanding of the Chinook salmon life cycle and it will allow us to quantify the importance of surf-zones as a habitat for juvenile Chinook salmon.

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**Mattias Johansson**, Fisheries & Wildlife, PhD

Michael Banks

*'07 Recipient: Lillian Brucefield Reynolds Scholarship Fund - scholarship fund for graduate students engaged in study of marine science at Hatfield Marine Science Center.*

*'07 Recipient, William Q. Wick Marine Fisheries Award - intended to encourage graduate student research in the area of marine fisheries ecology with special area of interest in Pacific whiting or intended to fund graduate research in marine fisheries and ocean related research.*

**Genetic basis for pheromonal communication and mate recognition in Rockfishes**

Rockfishes are extremely diverse, yet their ability to communicate with conspecifics and select mates is nearly completely unstudied. Because they form an important fishery, which consists of a blend of species, it is important to understand how they select mates, and whether this process might be negatively impacted by the currently low population levels of some species.

To accomplish the project goals, I will characterize the MHC and V1r genes in copper rockfishes, then I will test for a signal of non-random mating based on these two gene families in a captive population of copper rockfishes.

Evidence of non-random mating will provide evidence that these two gene families are involved in mate choice in rockfishes, and will provide a first step toward understanding how rockfish select mates in the wild.

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**Stephen Meck**, Biology, BS

Markus Horning

*'08 Recipient: Fred and Joan Crebbin Memorial Fellowship – intended to provide support for marine science public education program interns, and to students whose major study emphasis is marine biology, particularly marine mammals.*

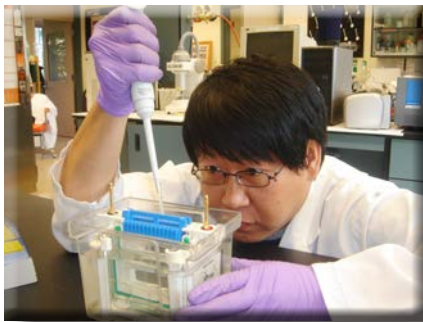
**Determining attendance patterns and entanglement rates of Steller sea lions (*Eumetopias jubatus*) in Oregon using high definition remote video**

Longer foraging trip durations have been attributed to low food availability in Antarctic fur seals, amongst others. I'll be doing will be video analysis of mother/pup attendance patterns in an attempt to tie the effects of food abundance (or lack thereof) to time spent ashore attending the pup vs. time spent at sea foraging, by observing mother/juvenile attendance patterns at the Sea Lion Caves on the Oregon coast. The work will involve both high definition video analysis and regular trips to the caves to correlate field data and verify consistency with the video cameras.

This project will allow us to compare results to concurrent and past studies in Alaska, and possibly establish a research and monitoring program at Sea Lion Caves to address long term ecological interactions of Steller sea lions and relate them to marine ecosystem changes, as well as provide a noninvasive method of making inferences about food quality and availability to pinnipeds (SSL's) off the Oregon coast.

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**Joodong Park**, Food Science & Technology, PhD

Jae W. Park

*'07 Recipient: Walter G. Jones Fisheries Development Memorial - intended to encourage graduate work in subjects which contribute to fisheries development.*

**Characterization Of Pacific Sardine**

The Pacific sardine is a new fishery to the Pacific Northwest with a landing of over 40,000 tons. Currently almost all sardines are rapidly frozen in a small block and sold as a tuna bait. However, in certain parts of the world, sardines are also consumed as human food. Our intention was to characterize the biochemical and gelling properties of fish protein and phospholipids, for better utilization as a human food, so that this fishery can be used as a raw material for surimi or fish protein isolate.

The use of pH shift technology for fish protein isolate could be a solution for the utilization of Pacific sardine. We hope to find a local processor to engage in the development of fish protein isolate from Pacific sardine.

## **DNA Study of Japanese ‘Whalemeat’ Markets Suggests Illegal/Unreported Hunting of Fin Whales**

NEWPORT, Ore. – A research team using DNA analysis has identified whale meat from 15 different endangered fin whales for sale in Japanese markets in 2006 and 2007, which are two more fin whales than the government of Japan reported killing under its scientific whaling program during the same period.

Scott Baker, a cetacean geneticist from Oregon State University, led the research team’s study of whale meat purchased in Japanese markets. The team examined 99 whale products from those markets and identified meat from six baleen whale species, including humpback, fin, sei, Bryde’s, North Pacific minke and Antarctic minke. “We use methods similar to human forensic genetic studies,” Baker said. “Individual whales can be identified by their unique genetic markers, much the same way that humans have identifiable genetic codes or DNA fingerprints. This advance in technology is giving us new insights into the number and species of whales and dolphins – many of which are endangered or threatened – sold in markets in some parts of the world.”

Japan’s whaling program has faced intense global scrutiny and criticism for killing whales for “scientific purposes.” Some critics say the endeavor is a thinly veiled commercial operation operating under the guise of science and little data is shared with whale experts from other countries.

Baker, who is associate director of OSU’s Marine Mammal Institute, located at the university’s Hatfield Marine Science Center Hatfield Marine Science Center in Newport, Ore., said other non-lethal methods of study can provide much of the relevant data needed to study endangered and threatened whale species.

The Japanese market study findings are similar to a study study Baker published last year on whale meat sold in Korean markets, which suggested a higher number of whales sold in Korean markets than was reported to the International Whaling Commission.

*For complete article, by Mark Floyd, please see: <http://oregonstate.edu/dept/ncs/newsarch/2008/Jun08/finwhales.html>*

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## **Joe Easley and Bob Schoning receive CAS’ Highest Honor**

Four Oregonians, recognized for their close cooperation with Oregon State University and their contributions to Oregon agriculture and natural resources development and research, have been inducted into the OSU College of Agricultural Sciences Hall of Fame. Judson Parsons, Michael Macnab, Robert Schoning and Joe Easley were honored recently by the college.

Schoning served Oregon and the Pacific Northwest in fisheries research and management for 34 years. His career includes service as director of both Oregon fisheries and the National Marine Fisheries Service, as well as service on numerous state, national and international boards and councils. He received OSU’s Distinguished Service Award in 1987. He also has served as a member of the OSU Coastal Oregon Marine Experiment Station advisory board since 1997.

Easley, a fisherman by trade, has played a leading role in fisheries management and development over the past 40 years. He served as member of the Pacific Fisheries Marine Council from 1976 to 1990, and was chairman in 1985-87. He also served as director of the Oregon Trawl Commission from 1980 to 2003. Under his leadership the Trawl Commission worked closely with OSU and the OSU Agricultural Experiment Station on many seafood development projects. He also worked with the OSU Coastal Oregon Marine Experiment Station and the OSU Hermiston Agricultural Research and Extension Center to help develop the Salmon Ecology Initiative.

*By: Bob Rost, Source: Betsy Hartley*

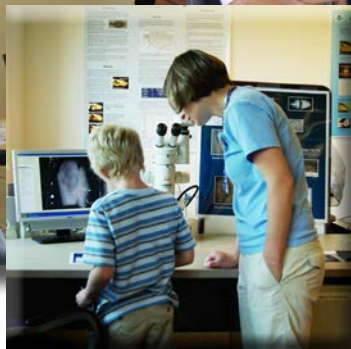
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## **Jae Park elected IFT Fellow**

We extend our congratulations to Jae Park, who was recently elected an IFT fellow. This unique professional distinction is conferred only on individuals with outstanding and extraordinary qualifications and experience, for their contributions to the food science and technology field. IFT is the largest professional society of food science and technology in the world.



Above: Bobby Ireland and Rene Bellinger. Right: Londi Tomaro and friend.



Above: Marileen Reavis, Chris Langdon and Steve Kupillas. Right: Jessica Miller and friends.



## SeaFest 2008

### Research Aimed at Protecting Salmon in Jeopardy

NEWPORT, Ore. – Commercial fishermen and scientists from Oregon, California and Washington have agreed to collaborate on a critical coast-wide study to learn more about salmon distribution, migration and behavior in the Pacific Ocean, but an alarming projected shortage of fish this year is putting their research in jeopardy. Ironically the study, which expands a two-year pilot program began by Oregon State University researchers, is designed to help protect weak salmon stocks.

“We’ve got the funding, we’ve got the science and we’ve got the interest and cooperation of the fishing industry,” said Gil Sylvia, director of the Coastal Oregon Marine Experiment Station at OSU’s Hatfield Marine Science Center in Newport, Ore. “Now, we just need some salmon.”

For the past two years, the Collaborative Research on Oregon Ocean Salmon project, or CROOS, has paired Oregon State University scientists and the state’s commercial fishing industry in a study to improve scientific knowledge about salmon behavior in the ocean. More than 190 salmon fishermen from 11 Oregon counties were trained in sampling protocols as part of the project, which was funded by the Oregon Watershed Enhancement Board.

The fishermen clipped fins and took tissues samples from the salmon before processing them, and logged when and where the fish were caught using a handheld GPS unit. The scientists brought the samples back to Hatfield Marine Science Center laboratories and conducted the genetic studies.

In the first year of the project, the scientists were able to match 2,100 salmon caught to a river, basin or specific region with 90 percent probability, according to Michael Banks, an OSU geneticist and director of the scientific portion of the project. Not all samples work flawlessly, Banks said, and genetic markers for some river systems are similar to others. Still, the scientists were able to confidently pinpoint the origin of roughly four out of every five salmon they tested.

Buoyed by the results, the CROOS leaders sought to expand their studies in 2008. The two years of field study focused solely on the ocean off Oregon – and much of the study was concentrated off the central Oregon coast. Broadening the scope of the research to include Washington and California is critical, Sylvia says, because of the migratory nature of the salmon.

For the full story, by Mark Floyd, visit the website: <http://oregonstate.edu/dept/ncs/newsarch/2008/Apr08/westsalmon.html>



Coastal Oregon Marine Experiment Station