Program Guide

2000–2004

Oregon Sea Grant

ORESU-Q-00-001

Sea Grant
Oregon

This publication was funded by the NOAA Office of Sea Grant and Extramural Programs, U.S. Department of Commerce, under grant number NA76RG0476 (project number M/A-13), and by appropriations made by the Oregon State legislature. The U.S. government is authorized to produce and distribute reprints for governmental purposes notwithstanding any copyright notation that may appear hereon.

Sea Grant is a unique partnership with public and private sectors, combining research, education, and technology transfer for public service. This national network of universities meets the changing environmental and economic needs of people in our coastal, ocean, and Great Lakes regions.

OREGON STATE
University

Contents

Oregon Sea Grant

For more than three decades, Oregon Sea Grant has made significant contributions to the rational management, use, and conservation of coastal and marine resources. Sea Grant research, outreach, and communications products bring the best available science to bear on problems and issues important to coastal communities, people, and the environment. Despite the program's modest size, it has identified real needs, found ways to leverage other resources, and partnered with others to make a positive difference to the coastal well-being of Oregon, the Pacific Northwest, and the nation.

For more information, see our World Wide Web page at seagrant.orst.edu

ADMINISTRATION

Besides overseeing the entire Oregon Sea Grant program, Sea Grant Administration also conducts two alternating-year fellowship programs (M/A-16) that provide graduate students with opportunities to develop a working knowledge of coastal and marine issues, management, and policy processes through assignment to either the Oregon legislature or one of the state's natural resource agencies.

Through its program development funds (M/A-2), Sea Grant also provides rapid response to unforeseen problems and opportunities. Modest program development grants are available to support research projects that arise outside the program's normal funding cycle or to support special requests for research-related conference and travel fees.

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Research

Sea Grant provides competitive, peer-reviewed grants that allow top ocean and coastal researchers to apply their skills to issues of critical importance to the state, the region, and the nation. Over the years, the program's funding emphasis has changed to meet and anticipate the region's changing needs. Emerging issues—the decline of once-abundant fisheries, the challenges posed by coastal population growth, the heightened awareness of invasive species—help propel Sea Grant's research priorities as the program strives to put its limited resources where they can do the most good.

Economic Leadership

Biotechnology

A Delivery System for DNA Vaccines for Aquaculture (R/BT-30)

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Leong is known worldwide for developing genetically based vaccines for the treatment of fish diseases that can be devastating to aquaculture operations. Through years of research, her team has developed an effective, DNA-based vaccine for hematopoietic necrosis virus (IHNV), a particularly troublesome fish killer. At present, though, the only way to deliver the vaccine is by injection, and that's not a practical or cost-effective way to immunize fish.

Leong is in the final year of a three-year Sea Grant-funded project that seeks to develop a microscopic, acid-resistant coating for the vaccine material, one

that would dissolve in water above a certain pH level. Such a system would allow vaccine to be added to the water in aquaculture rearing tanks so the young fish could be immunized by swimming through and ingesting the treated water. See also project R/SAQ-03.

Antifungals, Antitubercular Agents and Other Antiinfectives from Marine Algae (R/BT-34)

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Gerwick has spent much of his career investigating the biochemical makeup of tropical and temperate marine algae gathered from around the world in an effort to identify and extract powerful compounds that may someday become new medicines, pesticides, or herbicides. Sea Grant has supported much of that work, which has already led to pharmaceutical industry interest in some of the anti-inflammatory and anticancer compounds he has discovered.

Gerwick's latest Sea Grant project focuses on antimicrobial agents for human and fish diseases caused by certain bacteria and fungi. Gerwick plans to collect new algae and evaluate his existing collection in a quest for substances that have antimicrobial action. He will then isolate the active compounds and provide purified extracts for further testing and evaluation by collaborators in the pharmaceutical industry and at OSU's Salmon Disease Lab.

Revitalize Commercial Fisheries

Developing Incentives to Restore and Maintain Productivity in Exploited Marine Ecosystems (R/RCF-05)

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Although the 1996 Sustainable Fisheries Act was intended to help rebuild commercial and recreational fisheries, few incentives exist to encourage fishery managers to reverse historical practices that contributed to overfishing and lost productivity. While requiring major transition for management, the act itself gives little guidance to help that transition occur. How do we manage for multiple species while protecting ecosystems and biodiversity? How do we build both biological and economic productivity, not only for the present but for the future? How do we reduce fishing capacity?

Hanna, a recognized national and international expert in fisheries economics, will use this grant to organize a collaborative advisory group including representatives of industry, state and federal regulatory bodies, and environmental organizations. The group will analyze existing Pacific Fishery Management Council groundfish regulations, develop monitoring and evaluation protocols, and design proposals for new regulatory incentives intended to encourage the industry and managers to contribute to resource stabilization and stewardship in order to maintain economic productivity over the long term.

Lingcod Stress and Effects on Fisheries (R/RCF-06)

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When fisheries regulations require the release of fish—for size or number limits, for instance, or because of incidental catch—many of those fish die. Worldwide, such fish mortality has become a critical fisheries management problem. Just how large a problem is difficult to tell, because little is known about what happens to those fish after they are caught and released or escape from fishing gear. For lingcod, an important commercial and recreational fish as well as a key part of the marine food web, the question is especially important.

Schreck's earlier research regarding the stress physiology and that of his NMFS collaborators examining the behavior of stressed sablefish and walleye pollock showed that it is possible to measure the stress caused in such circumstances and to determine how well fish recover from it. Such measurements can be used to predict the animals' chances of survival. This project seeks to apply that knowledge to lingcod, first by determining how the fish respond to the stress of capture, and then by developing handling and recovery methods to help maximize the fitness and ultimate survival of those fish that are caught and released.

Sustainable Aquaculture

Evaluation of an Attenuated Bacterial System for DNA Vaccine Delivery (R/SAQ-03)

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Leong continues her efforts to find practical, economical methods for delivering genetically based vaccines for the treatment of potentially devastating fish diseases—in this case, hematopoietic necrosis virus (IHNV). Leong has developed a DNA vaccine against IHNV, but to date, the only way to inoculate the fish is by injection, which is not practical for treating large numbers of young fish.

In her latest project, Leong will attempt to induce an attenuated bacteria—itself a vaccine for another disease, *Yersinia ruckeri*—to carry the DNA-based

IHNV vaccine as well, thus "infecting" treated fish with immunity to both diseases. Ideally, the bacterial vaccine could be added to fish-rearing tanks at aquaculture operations to economically immunize the fish that swim in and ingest the treated water. See also project R/BT-30.

Seafood Technology

Protein Recovery by Adsorbtion on Chitosan-Polyanion Networks (R/SF-18)

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Chitosan, extracted from the shells of crustaceans, is a versatile substance with many promising uses in waste management, medicine, food processing, and biotechnology. The substance is especially useful for separating solids from liquids, particularly when natural compounds are demanded. However, chitosan has its limitations: it can recover only negatively charged particles, and its use is not cost-effective in many situations.

Torres is investigating a modified form of the substance, chitosan-polyanion complex, to determine how it compares with pure chitosan for recovering proteins from wastewater. A commercially feasible application would help reduce waste and waste-disposal costs for shrimp, surimi, dairy, poultry, beef, corn, and soybean processors. An effective recovery system would also benefit local communities and the environment by reducing the load on sewage-treatment systems.

Intrinsic/Extrinsic Factors and Their Use in Marketing Albacore (R/SF-23)

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A rapidly changing albacore tuna fishery has fishers and processors looking for alternative markets but also recognizing that those markets won't develop without improvement in the quality and consistency of the albacore catch. Improved—and possibly standardized—handling and chilling techniques are one way to address that concern. Understanding and promoting the qualities that might make albacore more attractive to consumers is another.

Morrissey and Sylvia, who have extensive background in albacore quality and marketing issues, will analyze a sample of albacore for intrinsic quality factors, such as the content, body chemistry, and appearance. They will also examine different handling practices commonly used on tuna boats (quick chilling, bleeding, spiking) to determine how such extrinsic factors affect product quality. Finally, they will survey consumers and market buyers in an effort to discover how all those factors affect albacore retail and wholesale purchases.

Application of Revolutionary Acid-Aided Surimi Processing for Enzyme-Laden Pacific Whiting (R/SF-24)

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Conventional surimi processing uses only 20 percent of the body of white-fleshed fish; much of the rest goes into the waste stream. A new process, developed at the University of Massachusetts, can recover up to 40 percent of the fish protein, promising to reduce processing waste and provide a much greater yield of usable food product. But questions remain about whether the new process can be used with Pacific whiting and Alaska pollock, which are the backbone of the Oregon surimi industry. Those fish contain enzymes that cause the flesh to soften and become mushy, resulting in a low-quality product.

Oregon Sea Grant-supported research has helped solve the softening problem in conventional surimi processing. Now Park will turn his attention to the new process. First, he will determine how much of the softening enzyme remains in the fish protein recovered by the new process and to what degree the resulting gels are subject to softening. Then he will test whether adding an acidic solution to the fish during processing improves the gel strength, resulting in a higher-quality surimi. The research results will be disseminated primarily through Park's annual OSU Surimi School (www.orst.edu/dept/seafood/surimi).

Coastal Community Development

Locating Possible Late Pleistocene and Early Holocene Prehistoric Sites on Oregon's Southern Coast (R/CC-04)

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Who were the first people to arrive in North America? How did they get here, and when? Why did they make the journey, and where did they first settle? Questions like these are changing what we know about the history of human life in North America. The long-dominant model—that a single overland migration led to the earliest colonization of the continent—is being reconsidered by scientists like Hall, who suggest it is possible that small groups of wayfarers made their way around the Pacific Rim in small boats, foraging along the western coast of North and South America.

While logically attractive, this hypothesis has proven difficult to test. Changing geology and rising sea level have drowned most of the coastal landscapes that would hold evidence of such early settlement. But there are a few places where tectonic uplift has outpaced sea level rise, preserving ancient marine terraces, dunes, estuaries, and riverine landforms dating back as far as the late Pleistocene. Hall and her team, which includes earth scientists, archaeologists, and the cultural resource branch of the Coquille Indian Tribe, will try to locate areas of the southern Oregon coast where such ancient landforms still exist and look there for evidence of early human habitation.

Coastal Ecosystem Health and Public Safety

Coastal Ecosystems

Biotechnological Methods to Distinguish the Sources of Fecal Pollution in Estuarine Waters (R/ECO-04)

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Animal and human feces are an increasingly troublesome source of pollution in some coastal estuaries, including Tillamook Bay, an area rich with dairy farms. Fecal pollution poses significant human health risks and also threatens the area's shellfish industry. But it's often difficult to tell whether the pollution is coming from cows or humans, and controversy over that question has blocked many efforts to correct the problem.

Field is testing two novel methods for distinguishing cattle fecal contamination from human, each using a different biotechnological tool to create genetic fingerprints of specific strains of fecal bacteria found in Tillamook Bay. Unlike previous methods, these tests do not rely on growing indicator organisms, but measure the gene patterns directly from water samples. Field is working with the Tillamook Bay National Estuary Project, which routinely samples and monitors the bay, to see if her tests can show exactly where these fecal markers are turning up, and when.

Life History, Residence Time, and Growth of Juvenile Salmon in Salmon River Estuary (Phase B) (R/ECO-02)

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Breaching dikes to allow the tides to flow back into historic marshlands is one of the few viable options many areas have for restoring large coastal wetlands. The strategy has the potential to return large tracts of land to their historic role as productive habitats for juvenile salmon. But few studies have been conducted to determine whether the strategy will work in the long term.

This study expands upon previous research documenting the dynamics of fish movement and residence times through the Salmon River estuary and among restored marsh habitats. This phase of

the project will use indicators of salmon life history, growth, and survival to evaluate the benefits of marsh restoration to salmon. Research results should be useful to watershed recovery programs throughout the Pacific Northwest by providing important information about estuary habitat needs.

The Role of Microzooplankton in Planktonic Energy Transfer and Community Structure in an Estuarine Habitat (R/ECO-12)

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Recent developments in plankton research have called into question much of our understanding of marine food webs. A key to this shift was the discovery of the potential role microzooplankton (protozoa) play as dietary middlemen between such microscopic organisms as diatoms and larger creatures such as fish. Traditionally, scientists have focused either on the metazoan food web (phytoplankton, zooplankton, fish) or on components of the microbial or detrital food web (bacteria, flagellates, ciliates). In those models, the protozoan's role as nutritious food for larger consumers was thought to be less important.

Over the last decade, though, strong evidence has emerged that microzooplankton may be more important than had once been thought. It turns out that protozoan food not only is more nutritious than diatoms, but also is a preferred choice among certain larger species such as copepods. Shapiro and her team plan to explore the roles microzooplankton play as consumers and as prey and as potentially important players in the transfer

of energy in aquatic environments. The research could lead to new ecological models of marine food webs, improving our ability to predict the effects of fishery management options and natural variability on populations of economically important species.

Harmful Algal Blooms

Are Algicidal Bacteria Important in Controlling Phytoplankton Blooms in Oregon Coastal Waters? (R/HAB-01)

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Harmful algal blooms, already a source of much attention in the eastern U.S., also represent a serious problem on the Pacific coast, where paralytic shellfish poisoning and domoic acid outbreaks have been traced back to the days of early settlers and coastal Indians. Although the ecophysiology of such blooms has received intense scrutiny, little has been done to explore the role that marine bacteria may play in the natural control of these outbreaks. Yet from a purely theoretical perspective, bacteria seem to have both the means and the opportunity to influence the course of algal blooms. Researchers already know, for instance, that marine bacteria produce chemicals that are toxic to marine algae.

Giovannoni plans to pursue this question at its most basic levels, first identifying which bacteria co-exist with natural phytoplankton blooms along the Oregon coast. Then he will isolate the bacteria, screen them for compounds that affect algal metabolism, and investigate the chemistry of those

compounds. The investigation will provide fundamental insights into the coastal food web and could lead to better methods for predicting and controlling harmful algal blooms.

Sustainable Development

New Paradigm on Coastal Paleodunal-Landscape: Broad Implications for Sustainable Development of the Coastal Plain (R/SD-04)

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For the last half century geologists have assumed that sand along the Pacific coast was pushed ashore by rising sea levels during the late Pleistocene (80,000–120,000 years ago) and the recent Holocene (back to 5,000 years ago). These assumptions have helped shape much of what was thought about coastal sand deposits, their origins, and their predicted stability. But recent research is casting doubt on those assumptions, and the implications for coastal development and planning could be great.

It turns out that as much as 50 percent of the Pacific coastal zone is underlaid by "paleodune sheets," sand formations with unique geological and hydrologic properties derived from alternating layers of unconsolidated sand and ancient, clay-rich soil horizons. Peterson and his team plan to map, date, and identify the ancient dune sheets and to demonstrate the role they play in forming dunal lakes and ponds, drinking water aquifers, buildable sites, active dune environments, beach erosion, and archaeological sites, among others. Their goal is to build a framework of understanding about the fundamental nature of the paloedunal landscape as it relates to sustainable development of the coastal plain.

Assessing the Decision-Making Capacity of Oregon Coastal Watershed Councils (R/SD-05)

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The Oregon Plan for Salmons and Watersheds is a one-of-a-kind state effort to address, through local and voluntary restoration of salmon habitat, statewide recovery of populations listed under the Endangered Species Act. But the plan's success depends on the effectiveness of watershed councils responsible for implementing site-specific restoration activities. One important question facing Oregon and the Environmental Protection Agency is how to measure the capacity of watershed councils to make effective decisions about habitat restoration or protection. Simply counting salmon in the streams ignores questions about how council decision making translates into on-the-ground habitat improvements.

Lach will use interviews, surveys, and direct observation to examine Oregon's coastal watershed councils with the goal of developing a protocol that can be used by Extension Sea Grant, the Oregon Watershed Enhancement Board, and other parties to assess the councils' capacity for making decisions and putting them into practice.

Nonindigenous Species

Research and Outreach to Prevent and Control Aquatic Nuisance Species Invasions—Marine Invasive Species Team (MIST): Regional Outreach on Nonindigenous Species (R/NIS-06)

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The introduction of nonindigenous species into the coastal waters of the Pacific Northwest poses both an economic and an environmental threat. Nonnative species such as the European green crab have the potential to damage fisheries, aquaculture, waterways, and the functioning of natural ecosystems. As awareness of the threat grows, so does the need for regional coordination and cooperation and for public education and awareness.

MIST is a collaborative, regionwide effort to provide natural resource managers, industry, local government, and the public with access to the broadest possible pool of university research and expertise on this subject. The project will develop science-based information for target audiences, act as a link to scientific expertise, and coordinate and

promote targeted research to help understand and stop the spread of nonindigenous species. At the same time, the MIST team plans to develop exhibits, resource material for teachers, and other tools to raise public awareness of this significant ecological problem.

National Strategic Investments

Biotechnology

The Use of High Hydrostatic Pressure to Reduce Pathogens and Facilitate Shucking in Oysters (R/SF-22-NSI-TEC)

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The U.S. oyster industry is an important fishery, centered in the Pacific Northwest and the Gulf of Mexico. But increasing consumer concern about the safety of raw shellfish threatens the industry, particularly the segment of it that relies on fresh, raw oysters. Although heat and other pasteurization techniques produce a safe product, they also change the unique flavor and texture that make fresh oysters desirable to some consumers.

Morrissey will investigate the use of high hydrostatic pressure, a heatless method that, applied correctly, is lethal to dangerous microorganisms. The method involves subjecting oysters to pressures of at least 35,000 pounds per square inch, a process that not only has been shown to kill bacteria, but

which, at higher pressures, also severs the adductor muscle that holds the oyster shell so tightly closed. If successful, the technique could not only produce a safer consumer product, but could also save processors money by making the oysters much easier to shuck.

National Sea Grant Industrial Fellowship

Evaluation of Ozone in Processing of Raw Seafood Products (E/INT-31-NSI-IFP)

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Current procedures to control bacterial growth during raw seafood processing include use of chlorinated water, which can taint the delicate flavor of such products as oysters and salmon caviar. Ozone is a widely used water disinfectant that may be an alternative to chlorine.

Morrissey's team at the OSU Seafood Lab will use a portable ozone generator capable of treating 10 gallons of water per minute to determine the parameters needed to reduce bacterial content in oysters and salmon caviar. At the same time, the researchers will test to see whether use of ozone, a powerful oxidizer, accelerates rancidity and reduces shelf life. After initial testing in the laboratory, additional tests will be run under normal in-plant processing conditions at plants of industry collaborators, the Nisbet Oyster Company and Ward's Cove Packing Company. The University of Alaska's Fishery Industrial Technology Center in Kodiak, Alaska, meanwhile, will conduct similar tests on salmon fillets.

Extension

Extension is Oregon Sea Grant's outreach arm, bringing the vast resources of research and higher education to bear on real-world issues facing coastal residents, businesses, and communities. Extension Sea Grant marine agents, based at coastal offices of the OSU Extension Service, deliver advice, assistance, and informal education as local issues and needs arise, in areas ranging from vessel safety to the restoration of inland fish habitat. Specialists and educators, based on campus or off, focus on subjects of broader concern: for example, watershed and ecosystem health, marine fisheries, community development, and seafood. Together, they form a team that helps coastal residents, communities, and policymakers look at problems and find the right tools to solve them.

For up-to-date information about individual agents, specialists, educators, and their projects and fields of expertise, see seagrant.orst.edu/extension.html

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Extension Marine Agents

Extension marine agents are stationed in county offices of the Oregon State University Extension Service and affiliated with academic departments on the OSU campus. Each agent is responsible for developing and delivering outreach and informal education programs to meet local needs and issues. Agents also serve statewide clientele with their own areas of expertise, ranging from marine safety to watershed restoration.

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E-mail: ginny.goblirsch@orst.edu

Projects and specialties: fishing industry, fishing families and communities, marine vessel safety.

Multnomah County

Paul Heimowitz
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OSU Extension Service
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Phone: 503-722-6718
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Projects and specialties: aquatic ecosystem health, Oregon Watershed Weeks, aquatic invasive species (see research project R/NIS-06), oil spill prevention and management.

Tillamook County

John Faudskar
Tillamook County Office
OSU Extension Service
2204 Fourth St.
Tillamook, OR 97141
Phone: 503-842-3433
Fax: 503-842-7741
E-mail: john.faudskar@orst.edu

Projects and specialties: oyster/shellfish culture, aquaculture, water quality, marine recreation, general public marine education, Tillamook Bay National Estuary Project.

Specialists and Educators

ESG specialists and educators focus on topical issues of state or regional importance. They provide support to Extension Sea Grant agents, conduct academic research, and develop practical, specialized information for use by the industry, agencies, and the public.

Coastal Resources

Jim Good
College of Oceanic and Atmospheric Sciences
104 Ocean Admin. Bldg.
Oregon State University
Corvallis, OR 97331-5503
Phone: 541-737-1339
Fax: 541-737-2064
E-mail: goodj@oce.orst.edu

Projects and specialties: coastal zone management, estuarine restoration, coastal hazards management, GIS in ocean and coastal management. Director, Marine Resource Management Graduate Program. Projects include Reducing Earthquake-Tsunami Hazards in Pacific Northwest Ports and Harbors, Netarts Littoral Cell Management Plan Pilot Project, and Watershed Stewardship Education Project.

Watershed Management

Derek Godwin
Marion County Extension
3180 Center Street NE
Room 1361
Salem, OR 97301
Phone: 503-566-2909, 800-718-2668
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Projects and specialties: Watershed Stewardship Education Project

Watershed Stewardship Education

Tara Nierenberg, Program Coordinator
Oregon State University
125 Ballard Hall
Corvallis, OR 97331
Phone: 541-737-8715 or 877-652-0302
Fax: 541.737.3039
E-mail: tara.nierenberg@orst.edu

Projects and specialties: coordinating watershed council trainings, chair of outreach and education for Marys River Watershed Council.

Community Development and Outreach

Flaxen Conway
Department of Sociology
Oregon State University
307 Fairbanks
Corvallis, OR 97331
Phone: 541-737-1418
Fax: 541-737-5372
E-mail: flaxen.conway@orst.edu

Projects and specialties: Watershed Stewardship Education Project; Towns in Transition: Natural Resources Communities; managing change; fishing family and community issues; leadership training, coalition building, and conflict management.

Pat Corcoran
OSU Extension Service
Oregon State University
307 Social Sciences
Corvallis, OR 97331
Phone: 541-737-1421
Fax: 541-737-2289
E-mail: patrick.corcoran@orst.edu

Projects and specialties: public policy education, organizational skill building and leadership training (especially for watershed councils), workshop design and facilitation, consensus decision making, and conflict resolution.

Marine Economics

Susan Hanna
Agricultural and Resource Economics
Oregon State University
229 Ballard Extension
Corvallis, OR 97331
Phone: 541-737-1437
Fax: 541-737-2563
E-mail: susan.hanna@orst.edu

Projects and specialties: change in fishing communities and regions, economic history of U.S. fisheries, the impact of access limitations. Member of U.S. Department of Commerce Marine Fisheries Advisory Committee; member of the Scientific and Statistical Committee of the Pacific Fishery Management Council; president of the International Association for the Study of Common Property; and vice president of the International Society for Ecological Economics.

Marine Education

Vicki Osis
OSU Hatfield Marine Science Center
2030 S. Marine Science Drive
Newport, OR 97365
Phone: 541-867-0257
Fax: 541-867-0320
E-mail: vicki.osis@hmsc.orst.edu

Projects and specialties: marine education offerings for teachers and students, watershed education and water quality monitoring, Global Environmental Issues (GLOBE Program Franchise), marine science day camps and aquatic programs for youth groups.

Bill Hanshumaker
OSU Hatfield Marine Science Center
2030 S. Marine Science Drive
Newport, OR 97365
Phone: 541-867-0167
Fax: 541-867-0320
E-mail: bill.hanshumaker@hmsc.orst.edu

Projects and specialties: educational research, marine science educational programs, exhibits and interpretive material at OSU's Hatfield Marine Science Center.

Marine Fisheries

Hal Weeks
Lincoln County Extension Office
29 SE Second Street
Newport, OR 97365
Phone: 541-265-3463
Fax: 541-265-3887
E-mail: hal.weeks@orst.edu

Projects and specialties: groundfisheries issues, *Grenadier Times* quarterly newsletter (sharing scientific and management information with those involved in Oregon fisheries), fellowship collaboration putting students to work on issues of interest to fishery managers and industry, (proposed) development of Web database on undersea habitat and related fisheries.

Marine Mammals

Bruce Mate
OSU Hatfield Marine Science Center
2030 S. Marine Science Drive
Newport, OR 97365
Phone: 541-867-0236
Fax: 541-867-0105
E-mail: bruce.mate@hmsc.orst.edu

Projects and specialties: marine mammal conservation and management policy and practice, including public education programs and research to identify the critical habitats of endangered whales (areas of breeding, feeding, calving, and migration), as well as strandings and marine mammal-fishery interactions.

Marine Trades, Coastal Recreation, and Tourism

Bruce DeYoung
College of Business
Oregon State University
209 Bexell
Corvallis, OR 97331-2063
Phone: 541-737-0695
Fax: 541-737-3804
E-mail: deyoungb@bus.orst.edu

Projects and specialties: coastal visitor information technology, port and harbor executive training, recreational boater safety education, coastal enterprise e-commerce innovations, low power AM radio, World Wide Web applications, virtual e-mail community development, and other innovative information technologies.

Regional Fisheries Engineering

Ed Kolbe
1207 NW Naito Parkway, Suite 154
Portland, OR 97209-2834
Phone: 503-872-6676
Fax: 503-872-6648
E-mail: ed.kolbe@orst.edu

Kolbe serves Sea Grant programs and constituents in Oregon, Washington, and Alaska. Projects and specialties: seafood thermal process engineering (chilling, freezing, cold storage, cooking/pasteurizing), onboard refrigeration and storage, energy conservation in seafood processing, electrical heating of foods.

Seafood

Ken Hilderbrand
OSU Hatfield Marine Science Center
2030 S. Marine Science Drive
Newport, OR 97365
Phone: 541-867-0242
Fax: 541-867-0138
E-mail: ken.hilderbrand@hmsc.orst.edu

Projects and specialties: control of histamine production in albacore tuna, federal seafood guidelines (e.g. Hazard Analysis and Critical Control Point [HACCP]) technology, value-added seafood products (smoked fish, etc.). Member: National Sea Grant HACCP Seafood Alliance.

HMSC Visitor Center

The Visitor Center at OSU's Hatfield Marine Science Center in Newport offers visitors a chance to learn more about the ocean and coastal environment, often through the work of marine researchers based in the HMSC's own labs. From hands-on exhibitry to classes for children—and for those who teach children—along with whale watch programs, nature walks, lectures and seminars, and summer programs for entire families, the Visitor Center provides a window on Oregon's ocean for visitors of all ages.

Jon Luke, Visitor Center Program Manager
OSU Hatfield Marine Science Center
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Craig Toll, Exhibit and Volunteer Coordinator
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COMMUNICATIONS

Getting research-based information to people who can use it: that's the purpose of Sea Grant Communications. This team of professionals uses every tool at its disposal—from print to audio and video to the World Wide Web—to inform the public, near and far, about important issues, fascinating facts, and scientific discoveries that affect the oceans, the coast, and the creatures and people who depend on them.

The Communications staff also supports researchers, extension faculty, the HMSC Visitor Center, and the rest of the program in meeting Sea Grant's mission and collaborates with state and federal partners on projects to benefit the public.

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Advisory Council

Oregon Sea Grant's Advisory Council helps ensure that research and outreach programs address the real needs and priorities of Oregon and its coastal communities, businesses, and policymakers. Council members, appointed to three-year terms, meet periodically to help set program priorities, offer advice on specific plans and research proposals, and counsel the program's administrative staff.

Don Barth
Retired banker, realtor, and Oregon Fish and Wildlife Commissioner, and member of the First Security Bank Board of Directors, Newport, OR

Kirk Beiningen
Retired from the Oregon Department of Fish and Wildlife, Oregon City, OR

Anne Berblinger
Economic Development Administration, U.S. Department of Commerce, Portland, OR

Ralph Brown
Commercial fisher; member, Pacific Fishery Management Council, Brookings, OR

Ellie Dumdi
Retired Lane County Board of County Commissioners, Junction City, OR

Nancy Leonard
Former member of Lincoln County Board of Commissioners, member of Oregon Water Resources Commission, Waldport, OR

Bob Montgomery
District 56 state representative, Cascade Locks, OR

Willa Nehlsen
U.S. Fish and Wildlife Service, Portland, OR

Merritt Tuttle
Retired, National Marine Fisheries Service, Newberg, OR

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