Oregon Sea Grant Program Guide 2006–2008

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Oregon Sea Grant
Corvallis, Oregon
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Oregon Sea Grant
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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.

Credits:
Editor: Sandy Ridlington
Photos: Joe Cone

Contents

With federal, state, local, and private funding totaling about $5 million annually, Oregon Sea Grant remains one of the largest and most productive of the 30 programs currently in the National Sea Grant network. Oregon Sea Grant is a part of Oregon State University, but its research, education, and outreach programs are open to all Oregon institutions of higher education. Oregon Sea Grant believes that all of the people of the state, the region, and the nation are its stakeholders.

Oregon Sea Grant works to further knowledge of the marine and coastal environments of the Pacific Northwest, and the forces—natural and human—that shape their destiny. From that knowledge, it is hoped, will come better understanding of the complex biologic, geologic, social, and economic forces that shape the region, and better stewardship of its resources.

Administration

The administration office conducts the biennial competitive grants program, from request for proposals to oversight of funded projects. Through its program development funds (M/A-2), Sea Grant also provides rapid response to unforeseen problems and opportunities that arise outside the scope of the biennial competition.

In addition, Administration oversees fellowships and internships (M/A-16) that provide undergraduate and graduate students with opportunities to develop a working knowledge of coastal and marine issues, management, and policy through assignment to an external organization or agency. Administration also accepts and screens applicants for fellowships offered through the National Sea Grant Office.

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Research and Education

Ongoing changes and challenges continue to confront communities, managers, and living resources on the coast of Oregon and throughout the region. Sea Grant provides competitive, peer-reviewed grants that allow top ocean and coastal researchers to apply their skills to these challenges. Urgent issues, such as the crisis in the Pacific Northwest groundfish fisheries and the increasing threat posed by aquatic invasive species, help drive Sea Grant's research priorities. At the same time, new groups such as public educators and coastal businesses are turning to Sea Grant for help. To do the most good, we use our limited resources with care. We also seek to find a balance between systematic decision making and well-reasoned risks.

Economic Leadership

Aquaculture

Modeling of Shipping-Related Stress in Marine Ornamental Fish (R/SAQ-09)

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Despite care in packing and shipping, many marine ornamental fish die soon after arrival at their destination following transoceanic transport. Heidel and Miller-Morgan contend that deterioration of the shipping environment, specifically water-quality factors such as pH, ammonia, and carbon dioxide levels, causes profound metabolic disturbances in these fish that can lead to their death after delivery. The researchers will test actual shipments of common clownfish for changes in water chemistry and fish blood chemistry; then they will set up a shipping simulation using the same variety of fish and measure their response to changes in shipping-water chemistry. The objective is to optimize protocols fish dealers follow to acclimate fish after delivery, thus increasing fish survival.

Molecular Marker-Based Pedigree Reconstruction for Mixed-Family Selection in Pacific Oysters (R/SAQ-10)

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Pacific oysters carry a high genetic load (a high frequency of mutations). As a consequence, selective breeding requires careful control of pedigrees by separating families during all phases of the life cycle in order to prevent inbreeding. The labor and equipment costs of maintaining separate families are high. Langdon and Camara are investigating ways to reduce these costs by combining families during culture, then

separating them after harvest using genetic "fingerprinting" techniques. If they succeed, growers could improve their stocks using similar techniques, perhaps developing their own "boutique" oyster varieties to open new markets.

Nonlethal Screening Method for Detection of Bacterial Kidney Disease in Pacific Salmon (R/SAQ-11)

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There are no reliable, nonlethal, sampling techniques for most infectious diseases of fish. In the case of bacterial kidney disease (BKD), diagnosticians must rely primarily on information obtained from dead fish. BKD is a major health problem of cultured salmonids, particularly hatchery-reared Pacific salmon, *Oncorhynchus* sp. In the Columbia River basin, BKD kills thousands of salmon every year, resulting in costly efforts to reduce this disease through the use of medicated feed and injectable drugs, an effort that cost Oregon hatcheries about $143,000 in 2004 alone. Cavinato will lead a team of researchers from Eastern Oregon University, Oregon Health and Science University, and the Oregon Department of Fish and Wildlife in an effort to develop a nonlethal, noninvasive screening technique using a fiber-optic probe to scan fish through skin and scales. Data from the probe would be analyzed using near-infrared spectroscopy to detect small changes in body composition that the researchers believe are caused by BKD.

Innovative Approaches to Cultivating Symbionts of Marine Invertebrates (R/BT-42)

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Species that must exist in symbiosis with one another in order to grow and reproduce are called *obligate symbionts.* The key characteristic of obligate symbionts is their lack of adaptability to changes in the environment. Thus, when preparing samples of obligate symbionts for research, care must be taken at every step to evaluate their survival and viability.

The objective of this study is to cultivate symbiotic bacteria from four different types of marine invertebrates. Sensitive and specific methods of detection and quantification of symbionts, based on rRNA gene sequences and viability stains, will be used to evaluate methods of sample preparation and incubation conditions. The bacterial isolates will be used to understand biosynthesis of valuable marine bioactive compounds and to develop new marine drugs.

Uptake and Metabolism of Polycyclic Aromatic Hydrocarbons by Tissue Cultures of Marine Seaweeds (R/BET-02)

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Significant environmental issues are associated with the contamination of the marine environment by polycyclic aromatic hydrocarbons (PAHs). The goal of this project is to characterize the capacity of tissue cultures of marine seaweeds to degrade PAH compounds. The researcher has discovered that tissue culture derived from the tropical red alga *Portieria hornemannii* removes the toxic polyaromatic hydrocarbon phenanthrene from seawater. Current work is directed toward determining if the phenanthrene is simply concentrated in the algal biomass or metabolized into other compounds. First results strongly suggest that marine seaweeds have the capacity to take up polyaromatic compounds.

Fisheries

Market-Based Environmental Standards for Sustainable Fisheries (R/RCF-12)

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While federal and state agencies have embraced sustainable fisheries management, they struggle to develop management frameworks that can do the job. On dry land, resource managers often use a standards-based approach, relying on market instruments that encourage managers and others to achieve the standards. These instruments—cap and trading schemes, environmental credits, trading ratios, and so on—generally have not been used to manage the environmental effects of fishing. They are based on property rights. Fisheries, by contrast, are usually managed via command and control or weak forms of harvest privileges. Both the Pew Ocean Commission Report and the Bush administration's Open Action Plan promote the use of market-based systems for fisheries management, arguing that such systems generate incentives that can help managers develop and implement standards that are both economically efficient and environmentally effective. This project will

identify and analyze market-based standards for fisheries management; use focus groups and workshops to test the concepts with stakeholders; evaluate various alternatives for efficiency, fairness, and acceptability; and educate managers about the effectiveness of such tools.

Tools for Managing Mortality from Myxozoan Parasites in the Klamath River (R/RCF-19)

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The Klamath River and other enzootic Pacific Northwest river sytems are managed for hydropower, agriculture, and recreational use, with little understanding of how this management affects interactions between fish and pathogens. Bartholomew's project builds upon previous Sea Grant-supported research to understand what conditions have allowed two myxozoan parasites—*Ceratomyxa shasta* and *Parvicapsula minibicornis*—to become key factors limiting salmon recovery in what was once the third-largest salmon fishery in the Pacific Northwest. The researchers are not only investigating the effects of these parasites on seawater salmon survival, but also hope to develop a method of rapidly determining how many of the organisms are in the water. Such a test could provide river managers with an early-detection tool to help them know when additional water allocation might most benefit endangered stocks and when hatchery releases might best be timed.

Improving Participation in Fisheries Management: Stock Assessment Training for Stakeholders (R/RCF-20)

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Successful fisheries comanagement and self-governance require empowering fishers to take responsibility for management decisions and ensuring that stakeholders and managers share baseline competencies. One critical area is stock assessment, the scientific basis for setting future allowable catch. Stakeholders have few opportunities to be involved in stock assessment and to understand the whole science-based, decision-making process. Sylvia and Theberge intend to develop teaching cases and provide workshop training to help stakeholders understand stock assessment. In addition, they plan to come up with best-practices guidelines for developing and disseminating stock assessment training materials in the Pacific Northwest and other regions.

Coastal Ecosystem Health and Public Safety

Ecosystems and Habitats

Impact and Removal of Two Beach Grass Invaders in Pacific Northwest Coastal Dune Systems (R/ECO-19)

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Dunes in the Pacific Northwest were once open, shifting-sand ecosystems. Since the early 1900s, however, they have been stabilized by means of systematic planting of European beach grass, *Ammophila arenaria.* By the 1950s, *A. arenaria* dominated dunes from Mexico to Canada and had altered the shape of Pacific dunes. This invasion has had several ecological consequences, including threatening already endangered flora and fauna.

This research will help hone ongoing management efforts and allow scientists to forecast the impacts of other invasive species on existing management programs. It will also help them better predict the consequences of removing *Ammophila.*

Coastal Hazards

Physical and Numerical Modeling of Intensity-based Tsunami Inundation (R/CNH-11)

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Coastal areas with low water levels may seem safe from tsunamis, but they may in fact have very high water velocities (intensities). These forces could damage or destroy critical infrastructure such as buildings and bridges or lifelines that carry water, power, gas, and telecommunications necessary for recovery efforts.

This research project, to be conducted in the new Tsunami Wave Basin at Oregon State University's O.H. Hinsdale Wave Research Laboratory, will address the critical knowledge gap of tsunami run-up and inundation. The goals are to (1) produce the first benchmark data set with high-resolution velocity measurements of tsunami inundation over a complex bathymetry and (2) compare two numerical model predictions to validate or refute underlying simplifications to the physics of free-surface turbulent tsunami flows.

The inundation velocity data from this experiment will test—for the first time in a large-scale laboratory facility—the potential of numerical models to estimate impact on structures during tsunami inundation.

Large-Scale Laboratory Tests of Coastal Dune Erosion and Overtopping (R/CNH-12)

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The O.H. Hinsdale Wave Research Laboratory at Oregon State University is hosting CROSSTEX, a comprehensive study of cross-shore sediment transport. During CROSSTEX, groups focused on many aspects of nearshore processes, but always inside the surf zone. The objective of this research is to extend the existing project up onto the dry beach with a study of coastal dune erosion and overtopping by waves. The researchers plan to examine the turbulence of waves as they scarp dunes and assess simple models for how waves run up onto dunes and eventually overtop them. They will also be providing a comprehensive set of observations of hydrodynamics and sediment dynamics with which to guide further development of process-based models, with the long-term goal of improving the ability of those affected by eroding shorelines to make informed management decisions.

Flow and Transport above and within a Rippled Sandy Bed (R/CNH-13)

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The exchange of particulates and solutes between the water column and the underlying seabed on continental shelves helps to sustain biological productivity, thereby helping to maintain abundant fisheries production. Although permeable sands cover 70 percent of the continental shelf, muddy sediments have received more attention because of their high organic content. However, it is now being recognized that sandy beds can also have a high metabolic rate despite their low organic content, because they are permeable and allow for the transport of nutrients in and out of the bed.

Through experiments in the large wave flume at the O.H. Hinsdale Wave Research Laboratory at Oregon State University, the researchers will address an aspect of the global carbon and nutrient supply that so far has been neglected. This will help improve understanding of the role of sandy shelves in the ecosystem balance and thus enhance ecosystem management.

Coastal Community Development Program (A/ESG-8)

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The Coastal Community Development Program is a small fund intended to help Sea Grant Extension establish and enhance educational programs for coastal decision makers. This program will provide decision makers with enhanced science-based support needed to balance environmental, social, and economic considerations. Through workshops,

presentations, publications, and other means, coastal communities will receive information and strategies for tsunami preparedness, nonpoint source pollution, and issues related to land use planning, smart growth, and sustainable economic development.

Investigating the Causes of "Hot Spot" Beach Erosion (R/CNH-06)

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The influence of El Niño events and the embayments caused by rip currents are important factors affecting shorelines on the West Coast. These erosional hot spots can lead to catastrophe on developed coastlines. In this continuing project, the researchers are investigating the formation and evolution of rip current embayments through numerical simulations and field observations. In a paper recently submitted for publication, they demonstrated the importance of wave reflection near bathymetric depressions, such as nearshore canyons or dredged pits. Using a new type of wave model for waves over steep features, the researchers found that wave reflection can have an important effect on the wave propagation near these features. This effect has been neglected in the past. At present, they are analyzing beach survey data from the Pacific Northwest to develop a model for rip embayment evolution and also are assembling instrumentation for surveying subtidal bathymetry on the Oregon coast.

Sea Grant Professorship (E/UEd-03)

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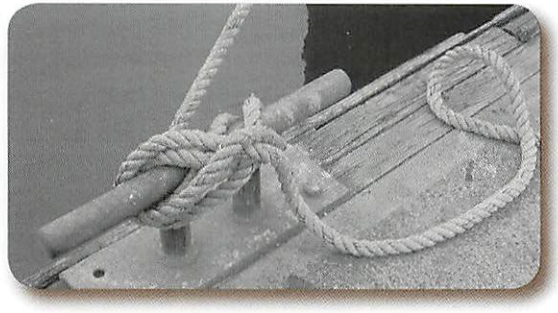
Oregon Sea Grant is dedicating special funding over a five-year period to establish a Sea Grant professorship at Oregon State University. This tenured, senior faculty member will use the theme of ocean and coastal science to establish a regional or national focal point for research and teaching in free-choice learning. Most of what we know we learn outside the classroom, and we continue to learn throughout our lives by free choice. As a nation, we have made and continue to make an enormous investment in providing learning opportunities for the public in a wide variety of venues such as museums, aquaria, and interpretive centers. At the same time, an enormous quantity of printed material, videos, films, and other media is produced and distributed annually for the purpose of public education. Yet there is relatively little effort underway to advance the art and science of public education through research and teaching in such free-choice learning. This professorship will augment that effort significantly.



Extension

Oregon Sea Grant Extension (A/ESG-7) brings the vast resources of research and higher education to bear on real-world issues facing coastal residents, businesses, communities, and the environment. Sea Grant Extension agents, often based at offices of the OSU Extension Service, deliver assistance and informal education on local issues and needs in areas ranging from watershed restoration and invasive species to fisheries and seafood. Specialists and educators, located on campus and off, specialize in such subjects as ornamental fish health, coastal hazards, and free-choice learning, and they develop and deliver educational programs to specific groups.

Extension faculty, all of whom are affiliated with academic departments, collaborate with researchers, agency staff, and others to objectively apply research, models, and tools that encourage science-based solutions to problems.

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

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Extension Agents, Specialists, and Educators

Sea Grant Extension agents have their headquarters in county offices of the Oregon State University Extension Service. At the same time, they are affiliated with academic departments on the OSU campus. Each agent is responsible for developing and delivering outreach and informal education programs that meet local needs and issues. Agents also share their areas of expertise with statewide clientele.

Sea Grant Extension specialists and educators, many of whom operate from OSU, focus on topical issues of importance to the state or region. They provide support to SGE agents, conduct academic research, and develop practical, specialized information for use by industry, agencies, and the public.

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Projects and specialties: coastal and statewide community outreach for the development of community educational programs and materials related to conflict transformation, personal and group leadership, community economic development, and managing change; Master Watershed Stewards Program; Towns in Transition: Natural Resources Communities Managing Change; fishing family issues

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Projects and specialties: outreach coordinator of NOAA Coastal Storms Program, whose purpose is to better protect communities, businesses, and natural resources from the impacts of severe weather; coastal hazards education, including earthquake and tsunamis, safe coastal development, and storm-resilient watersheds; liaison between NOAA researchers and modelers and local stakeholders to create useful tools for the region

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Projects and specialties: coordinator, Master Watershed Stewards programs of Marion and Polk counties; watershed restoration; watershed council outreach and education

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

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Projects and specialties: Sea Grant-funded research on market-based mechanisms for managing the adverse impacts of fishing on marine ecosystems; community-based management of fisheries and coastal marine resources; implications of climate change for coastal communities; member of Independent Multidisciplinary Science Team advising state legislators and agencies on salmon recovery and watershed restoration issues

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Projects and specialties: coastal watershed restoration, fisheries management, fish quality and gear and equipment; member, Coquille Watershed Association, Pacific States Marine Fisheries Commission, and Pacific Fishery Management Council Habitat Steering Committee

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Projects and specialties: cooperative fisheries research; communication between fishers and scientists; marine vessel safety; and fishing families and communities

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Projects and specialties: ornamental aquatic animal health and husbandry in aquarium or pond environment; educational programming for wholesalers, retailers, and hobbyists in the aquarium industry

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Projects and specialties: statewide coordinator, the Watershed Stewardship Education Program; chair of project implementation committee for Marys River Watershed Council

Shawn Rowe
OSU Hatfield Marine Science Center
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Projects and specialties: free-choice learning for youth and adult audiences; family science literacy and identity

Steve Theberge
OSU Extension Service, Clatsop County
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Projects and specialties: collaborative research between fishers and scientists; selective harvest technology; fisheries management; fishers' ecological knowledge; fish behavior; essential fish habitat

Michael Thompson
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Projects and specialties: promoting sustainable West Coast fisheries and fishing communities by strengthening the integration of the community-based seafood industry with fishery management; seafood quality and handling; seafood marketing; new seafood technology; fisheries education; collaborative research between industry and scientists

Tillamook County Office (TBA)
OSU Extension Service, Tillamook County
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Tillamook, OR 97141
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Fax: 503-842-7741

Projects and specialties: water-quality monitoring; riparian restoration; capacity building for watershed councils; volunteer training; general watershed management

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Projects and specialties: fisheries management and salmon issues; fisheries enhancement; marine coastal development; serves Curry County, Oregon, and Del Norte County, California

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Projects and specialties: design and coordinate seminar demonstrations and workshops that focus on seafood product and market development; manage product development educational projects; provide fee-based product development services to seafood businesses

Communications

The purpose of Sea Grant Communications (M/A-21) is to get research-based information about the ocean and coast to people who can use it. The professionals in Communications use every tool at their disposal—from print to audio and video to the Internet—to reach many different users with information about important issues and scientific developments that concern ocean and coastal resources 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. In addition, we cooperate on projects with our communication colleagues at the university, in the national Sea Grant network, and in NOAA.

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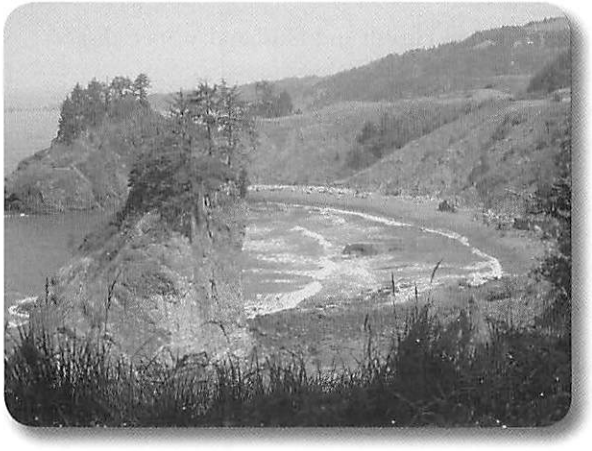

HMSC Visitor Center

People of all ages have a chance to learn more about the ocean and coastal environment when they spend time at the Visitor Center at the Oregon State University Hatfield Marine Science Center. The exhibits and programs at the center explain how scientific research, much of it based at the HMSC's own laboratories, enhances our ability to interpret the natural patterns that shape our world and enables us to better appreciate, manage, and sustain coastal and marine resources. Among the activities offered are classes, nature walks, lectures, seminars, and summer programs for the entire family.

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Advisory Council

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

Xanthippe Augerot
Director of Science Programs, The Wild Salmon Center

Kirk Beiningen
Retired, Oregon Department of Fish and Wildlife

Anne Berblinger
Economic Development Administration, U.S. Department of Commerce; small-farm owner

Ralph Brown
Curry County Commissioner; commercial fisher; former member, Pacific Fishery Management Council

Ellie Dumdi
Former member, Lane County Board of County Commissioners

Nancy Leonard
Waldport City Manager; former member, Oregon Land Conservation and Development Commission; former member, Oregon Water Resources Commission; former member, Ocean Policy Advisory Council

Bob Montgomery
Former member, Oregon House of Representatives; former manager, Port of Cascade Locks

Mikell O'Mealy
Oregon Department of Environmental Quality

Allan Rumbaugh

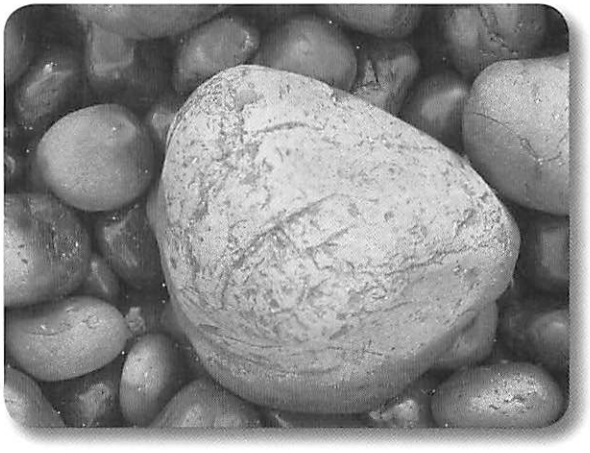
Former General Manager, International Port of Coos Bay

William Schreiber

Commercial charter boat captain; Port Commissioner, Port of Garibaldi; former owner, Smith's Pacific Shrimp Processing Company of Tillamook, Oregon; former owner, FV *Captain Ryan*

Merritt Tuttle

Retired, National Marine Fisheries Service



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