



Steven Rumrill, PERS President
 Steve.Rumrill@state.or.us

The coastline, estuaries, and nearshore marine environment of British Columbia, Washington, and Oregon experienced unusual spring and summer conditions over the past few months. Neutral El Niño-Southern Oscillation conditions prevailed in the northern hemisphere, but they were coupled with persistence of a cold La Niña event along the west coast that reflected the negative (cold) phase of the Pacific Decadal Oscillation. This means that the nearshore marine waters were relatively cold throughout the north-eastern region of the California Current, the spring was unusually wet, and the estuaries received unusual volumes of freshwater from rainfall and snow-melt.

Oregon Sea Grant Scholars Program

It was during these unusual summer coastal conditions that a group of nine recent graduates and undergraduate students were teamed up with professional science mentors to participate in the second year of the Oregon Sea Grant Scholars Program. The goal of the program is to provide graduate and undergraduate fellows with a meaningful opportunity to work side-by-side with marine scientists, policy makers, and resource managers.

■ **Sarah Kolesar** (Research Program Specialist with the Oregon Sea Grant Program) coordinates the summer internship program, and she was pleased with the scope of experiences reported by the scholars and mentors during 2011. *"The Oregon Sea Grant's summer scholars program provides a great opportunity for students and recent graduates to gain hands-on experience with marine science research and outreach projects,"* said Sarah, and the *"scholars contribute directly to ongoing science investigations while learning about diverse career options in their field."*

The new imports braved the persistent Oregon winds to complete a series of innovative projects that ranged from the design of a coastal and marine spatial planning workshop to shellfish restoration and web-site development. A brief summary of the summer scholar projects is provided below:

■ **AnnaRose Adams** recently graduated from Oregon State University with an Honors BS in BioResource Research. Her undergraduate work focused on marine ecology and policy, with her thesis work on a Caribbean marine plant. AnnaRose worked with her mentors (**Steve Brandt** and **Jenna Borberg**, Oregon Sea Grant Program) to help design and plan for a regional workshop on Coastal and Marine Spatial Planning. AnnaRose reflected that "I was thrown into an interesting side project working in the area of fisheries economics. Needless to say, it was a grueling process, it made my head hurt, and my brain wanted to explode!"

■ **Joanne Choi** recently graduated from Yale University with a BA in Environmental Studies. She focused mostly on marine systems, conducting research in the Caribbean on marine protected areas, soil run-off and sedimentation; and she completed her undergraduate thesis on jellyfish ecology. Joanne worked with her mentor (**Steve Rumrill**, South Slough National Estuarine Research Reserve) to assist with the restoration and recovery of native Olympia oysters in Coos Bay and the South Slough. Joanne "learned that science isn't all about the lab or even field work. You have to spend time writing grants for funding; putting together reports, seminars, or presentations for meetings; and gathering information into summaries that are void of scientific jargon; so that the majority of people can understand them. I personally think it adds a bit more variety to the job."

■ **Lauren Dimock** is a junior at Willamette University, where she majors in Environmental Science with an emphasis in social science. Her most recent research has been on the effects of climate change on local water resources through the perspectives of the indigenous people of the Sacred Valley, Peru. This summer, she is working with mentor **Greg Krutzikowsky** (Oregon Department of Fish and Wildlife; Marine Resources program) to develop an estimate of the spawning biomass of Pacific Herring in Yaquina Bay, and to update the

ODFW Nearshore Strategy for Management of Ocean resources. Lauren said that she "read over 50 articles about climate change related to things as large as all the oceans on our watery planet, to as small as a single species in Newport's own Yaquina Bay..." and her "knowledge has increased ten-fold since I came to Newport."

■ **Sara Duncan** is a senior at Hawaii Pacific University, where she works as the Environmental Monitoring and Restoration Coordinator for the Natural and Computational Sciences Department on a series of projects to assess stable isotopes, investigate trophic levels in ponds, and monitor changes in water quality. This summer, Sara worked with mentor **Ted DeWitt** (US Environmental Protection Agency; Western Ecology Division) to investigate the ability of vegetation within the Yaquina Bay estuary to remove and utilize dissolved nutrients from the sea and river water. Sara says, "I enjoy being outside doing field work, but some of it is pretty intense. I faced a particular challenge because I am a rather small person, and lugging 20L bladders full of water in and out of the marsh is very difficult. Marshes are muddy and full of hidden holes and channels."

■ **Shealyn Friedrich**, a junior at Willamette University, majors in Biology with a minor in Spanish. She has conducted previous research on the lateralization of Caspian Terns on East Sand Island, and is interested in science education and outreach. As a Sea Grant Scholar, Shealyn worked with mentors **Steve Brandt** and **Jenna Borberg** (Oregon Sea Grant Program) to build the framework and create content for the Oregon State University/Marine Council website. One thing that Shealyn realized was a "keen appreciation for what the Oregon State communications people do! On the outside it doesn't seem too difficult to create a website, but the software is complex!" Her pride and joy was the feature story rotating banner that she was able to import into the Marine Council website.

■ **Margaretmary Gilroy** recently graduated with a BA in Environmental Studies from College of the Holy Cross, where she carried out research in freshwater ecology on macroinvertebrates as bioindicators; she also studied in the Caribbean, where she focused on habitat preferences of juvenile spiny lobsters.

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OLY-ROCS: Artificial Substrata to Enhance Habitat for Native Olympia Oysters

Populations of native Olympia oysters (*Ostrea lurida*) were historically driven to local extinction in Oregon estuaries by the combination of tsunamis, sedimentation, over-harvesting, and habitat loss.

Steve Rumrill (South Slough National Estuarine Research Reserve) and Joanne Choi (Oregon Sea Grant Scholars Program) worked together over the summer to develop a new technique to enhance recovery of Olympia oyster populations in the intertidal and shallow subtidal zones of Coos Bay. Design and testing for a low-cost, modular, and heterogeneous habitat unit is needed to provide school groups, community organizations, and volunteers an opportunity to gain hands-on experience and contribute directly to the Olympia oyster recovery effort.

Olympia oysters typically occur in small, multi-generational clusters of 5-15 oysters, that are affixed to rocks and each other in the intertidal and subtidal habitats. This complex, heterogeneous habitat increases the retention time for tidal currents, enhances settlement by oyster larvae, and provides habitat for juvenile crabs, shrimp, and small fishes.

Recipe for Construction of OLY-ROCS (Olympia Oyster – Restoration of Oysters on Cement Substrata):

1. OLY-ROCS are constructed from a plastic mold for making concrete paving stones.
2. The separate stones are held together by biodegradable burlap, which will stabilize the underlying mud.
3. Crushed and whole Olympia oyster shells are added to the top layer of cement to add complexity and heterogeneity to the surface.
4. Different types of OLY-ROCS are created with high relief, low relief,

and to incorporate living Olympia oysters.

A total of 12 OLY-ROCS were placed into the lower intertidal zone of Coos Bay in August 2011.

The artificial oyster habitat units will be recovered after one-year and surveyed to determine recruitment of juvenile oysters, retention of adult oysters, sedimentation, and habitat use by crabs and fish. After placing the OLY-ROCS out into the intertidal, Joanne lamented, "I'm exhausted from lugging 60 pounds of concrete down rocky hillsides while being eaten alive by mosquitoes, but those concrete OLY-ROCS will serve as habitat for the protected Olympia oyster; and I'm sure they'll appreciate my bravery and goodness of heart!"



Steve Rumrill (South Slough National Estuarine Research Reserve) and **Joanne Choi** (Oregon Sea Grant Scholars Program) working to enhance recovery of Olympia oyster populations in the intertidal and shallow subtidal zones of Coos Bay. Photo credit: Steve Rumrill

Margaretmary worked over the summer with her mentor **Henry Lee II** (US Environmental Protection Agency; Western Ecology Division) to gather essential information on the potential vulnerability of marine and estuarine species with calcium carbonate shells to degradation and damage due to ocean acidification. Margaretmary said, "I'm learning more and more about reproduction and larval development for bivalves. It's nice to gain more knowledge in this area, since I only had a brief brush with concepts such as an animal being dioecious or monoecious in Biology 101 of my freshmen year."

■ **Diego Martin-Perez** recently graduated from the University of Louisiana at Lafayette with a BS in Biology. This summer, Diego worked with mentor **Bill Hanschumaker** at the Hatfield Marine Science Center to build an exhibit that highlights **Markus Horning's** research on California sea lions and applications of the Life History Transmitter. Diego also gave

tours and presentations about the Yaquina Bay estuary and the findings of the Ocean Quest surveys into the deep sea. Diego appreciated that "people seemed to understand what the Life History Transmitter Tag does and how it works. That was the main point of the research, which makes me happy to share the information with the public."

■ **Nicole Matthias** is a senior at Michigan Technological University, where she studies Biology with a concentration in fish biology and a minor in Ecology. Nicole worked over the summer with her mentor **Mike Donnellan** (Oregon Department of Fish and Wildlife, Marine Resources program) to develop a means for policy makers, scientists, and the public to view underwater still images and videos of Oregon's nearshore marine environment. Nicole also worked to create a simple, intuitive map-based interface that will connect the underwater videos to their geographic locations along the seafloor.

Nicole reflected that she was "surprised at how long it's taking me to go through the videos. The perfectionist part of me wants that *perfect* clip, but in reality, what's perfect? There is SO much diversity out there. Every video I look at is unique. I very much enjoyed exploring the habitat and species diversity in the footage."

■ **Betty Mujica** recently graduated from Louisiana State University with a BS in Agricultural Business and Economics. Her academic interests are in food marketing, economics, and social media marketing. This summer, Betty worked with her mentors **Tim Miller-Morgan** and **Rob Emanuel** (Oregon Sea Grant Extension) to conduct an economic analysis of the transportation of live seafood in Oregon. Betty said, "my work this summer has introduced me to the huge impact international trade plays on our country. It has given me perspective that will be invaluable in navigating my future careers." 