

# EXPLORE

EXPLAIN

WINTER 2008



## Volunteer Network Helps Collect Data from Unlikely Source

By Ben Larson, Washington Sea Grant Science Writing Fellow

Just outside the office of School of Aquatic & Fishery Sciences shorebird expert Julia Parrish hangs the caption from a now-forgotten cartoon, which ironically proclaims, "I really need to stop depending on birds for information. They're cute to look at but they don't have much upstairs."

In fact, Parrish does depend on birds for information. She just happens to get it from their carcasses rather than their intelligence.

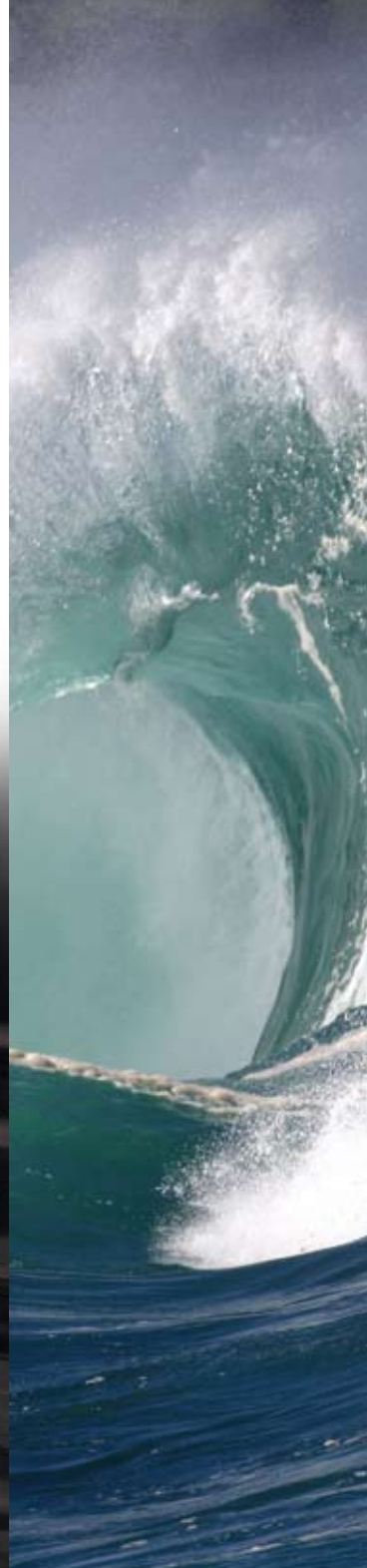
Parrish is the founder and operator of the Coastal Observation And Seabird Survey Team (COASST), a citizen science program built on a network of specially trained private citizens who roam the beaches tagging

and identifying dead birds. The data are funneled back to the University of Washington, where Parrish uses them to study the human impact on Pacific Northwest aquatic ecosystems.

"I was looking for a way to collect information pertinent to the entire coastline without spending a mint," said Parrish.

The program began in the summer of 1997, when Parrish and an intern made a beach on Tatoosh Island the first official COASST site. Observing a colony of

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In December, the Intergovernmental Panel on Climate Change (IPCC) and former Vice President Al Gore were awarded the Nobel Peace Prize. The Nobel committee cited IPCC's and Mr. Gore's efforts to increase awareness of both the human causes of climate change and the steps necessary to counteract that change as the basis of its decision.

We are exceptionally honored that more than a dozen scientists from the College of Ocean and Fishery Sciences contributed to the IPCC reports, and congratulate them on their deserved recognition. Their dedication to discovery exemplifies that of our faculty, staff and students across the College in a variety of disciplines.

Many of our outstanding investigators put their skills to work on the Washington coast, where the impacts of a warming planet will be extensively felt. COFS scientists provide invaluable data and recommendations for the health of our state and fellow citizens. Their diligence helps secure a bright future for us all.

ARTHUR R.M. NOWELL  
DEAN, COLLEGE OF OCEAN AND FISHERY SCIENCES



## Arctic Adventure! Ocean Tales of Currents and Creatures

**Dr. Rebecca Woodgate**  
"The Changing Arctic Ocean" February 12

This summer, dramatic shrinking of the Arctic sea-ice startled the world. From sea floor to the atmosphere, discover what we do (and don't) know about the complex interplay of ice, ocean and air at the top of the world, and what it means for the planet.

**Dr. Kristin Laidre**  
"People and Whales in Greenland" February 26

Some whales are specially adapted to live in the Arctic, and humans have been living alongside them for centuries. Experience the intersection of culture and biology by learning how people and whales live together in this fascinating environment.

**Dr. Jody Deming**  
"Some Like it Cold: Extremophiles in the Arctic" March 11

Some life forms have evolved unique strategies to thrive in frozen habitats. Learn about enduring the harsh winter on-board an icebreaker to better understand microbes in frigidly cold ice, and the implications for life in our solar system.

In its continuing celebration of International Polar Year, the College is proud to present a public lecture series featuring three of its exceptional researchers. Drs. Jody Deming, Kristin Laidre and Rebecca Woodgate will delight audiences with their tales of science and travel north of the Arctic Circle. All lectures are in Kane Hall, room 210, at 7 p.m.

The wonders and mysteries of the Arctic inspired Deming to brave the severe Arctic winter for a month-long research cruise this January. "Nobody goes there in the winter. But that's when I have to be there," she says.

Deming's work focuses on the ability of certain microorganisms to be actively productive in some of the coldest places on Earth. These special adaptations give insights for study of Jupiter's moon, Europa. "Our planet does not have the only oceans in our solar system," states Deming, "but it's the only one we can study hands-on."

Back on Earth, partnerships with native communities characterize research projects and provide valuable traditional knowledge. Local residents are frequently enlisted as research assistants, guides and even personal "bodyguards" on the lookout for polar bears. These unique collaborations are often essential components of a successful study. "I couldn't conduct research without them," says Laidre. She and her team track belugas, bowheads and narwhals from small aluminum boats and, sometimes, even from dry land as the whales swim offshore.

The watery environ of Laidre's whales is Woodgate's passion. She collects data from ice-covered polar oceans to illuminate their impacts on worldwide climate. But be careful not to confuse her research of the entire water column with the surface-only action of waves. "Waves are just waves," exclaims Woodgate. "Currents are what make the ocean go round." ❄️

## Protecting Resources and Economies of Coastal Communities: How Tourism Might Help

Washington's Pacific coast is awash in contradictions. Dense forest can give way to clear-cut scars. Sunshine can turn quickly to hard rain. The coast's stunning natural beauty attracts many travelers, and its sheer remoteness discourages many others.

It all adds up to promising opportunities and daunting challenges for those who believe that tourism could help the area. At the School of Marine Affairs (SMA), Professor Marc L. Miller and his students study the best ways to develop and promote tourism on the coast, an area long adrift in the economic doldrums.

Pointing to the decline of fishing and logging, two mainstays of Washington's Pacific coast economy, Miller says carefully managed marine tourism could prove a boon to the region. Several of his students have taken up that notion and studied tourism policy and promotion in coastal areas.

SMA graduate Rachel Gregg has worked on reports about tourism on both the outer coast and Puget Sound. One of her reports, *A Coastal and Marine Recreation and Tourism Baseline Assessment of the Pacific Coast of Washington State*, found that tourism is a \$14-billion-per-year industry in the state, and marine tourism is among its largest sectors. Yet in 2004-2005, Washington's tourism marketing budget ranked 44<sup>th</sup> out of 47 states reporting.

While Gregg found outdoor recreation – including sightseeing, hiking and wildlife watching – to be the primary attraction for visitors to the coast, she also noted that coastal tourism is constrained by limited public access, remoteness from urban centers and susceptibility to coastal hazards. In a classic catch-22, Washington's largely unspoiled Pacific coast is at risk from “decreased environmental quality from both tourism development and activities,” Gregg's report found.

So how do you make tourism work for you and not against you? The master's thesis of another of Miller's former students, Morgan Schneidler, may hold some answers. *Ecotourism in a Tribal Community: A Micro-Enterprise Strategy for The Makah Cultural and Research Center* looks at ways the Makah Tribe could use marine and coastal ecotourism as a development strategy and potential source of income.

For the isolated Makah community, on the northwest tip of the Olympic Peninsula, “the casino model doesn't work,” Schneidler points out. Besides, she notes, “The Makah people are interested in preserving their natural landscape and using it to educate others about their culture and their relationship to the area's natural resources.”

After surveys of tribal members and visitors, Schneidler worked with the Makah Cultural and Resource Center (MCRC) to identify tourist activities that the tribe could offer. They included guided birding, guided canoe and kayak tours, guided beach trips, remote camping, ethno-botany lessons, carving and weaving demonstrations, and lectures and storytelling.

“Expansion of the MCRC's touristic function toward guiding services and ecotourism has begun to take place,” Schneidler notes in her thesis. “The MCRC is particularly interested in tourism which employs Makah people, teaches about Makah past and contemporary life...and preserves the natural and scenic attributes of Neah Bay.”

Miller likes the approach the Makahs are taking toward tourism and says every coastal community needs sustainable marine recreation policies of some kind – policies that should be developed as carefully and publicly as those for land use or transportation or emergency management. Sustainable tourism, he says, can both underwrite conservation initiatives and provide employment opportunities in Washington's coastal communities. 🐟



Professor Marc L. Miller, School of Marine Affairs.



# COFS Investigators on the Washington

By Kayvon Sharghi and Dan Williams

**T**he UW College of Ocean and Fishery Sciences (COFS) has been involved for several years in studying harmful algal blooms (HABs) and their impacts on the Washington coast. Of particular interest are the blooms produced by phytoplankton of the genus *Pseudo-nitzschia*. Under certain environmental conditions, these organisms produce domoic acid, a neurodegenerative toxin that, if ingested by humans, can cause short-term memory loss, brain damage and even death.

Such blooms occur with some regularity along the Pacific coast of Washington, mostly in the summer and fall, historically causing significant revenue loss for the shellfish and tourism industries due to state-mandated beach closures. They also raise public health concerns over the consumption of seafood harvested from these areas.

Working with scientists from the National Oceanic and Atmospheric Administration (NOAA) and other academic institutions, researchers from the UW School of Oceanography are trying to understand the environmental factors that initiate *Pseudo-nitzschia* blooms, the movement of currents that transport these blooms from the open ocean to the shoreline, and the mechanisms by which the toxins are produced.

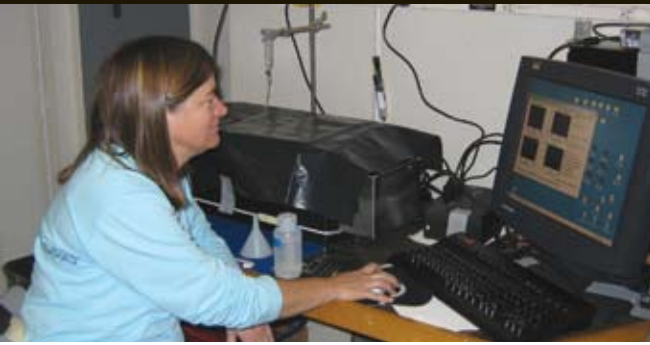
Rita Horner, a School of Oceanography research scientist, was working on HABs when the first recorded outbreak of domoic acid hit the Washington coast in 1991. The event brought together scientists and state and federal resource managers to learn as much as possible about the outbreak and determine possible mitigation measures. In spite of scarce funding, some sampling was done from beaches over the next four years, and scientists took advantage of research cruises, sponsored by the Olympic Coast National Marine Sanctuary, to sample offshore.

Eventually, Horner's efforts and those of others led to the establishment of the Olympic Region Harmful Algal Bloom partnership (ORHAB), which began operating in 2000. Funding for the first five years came from NOAA and now comes from the state through a small portion of clam harvest license fees. Miranda Wecker, Marine Program Manager for the UW's Olympic Natural Resources Center, was instrumental in transferring ORHAB from federal to state funding and is the current ORHAB director. ORHAB provides ongoing sampling from beaches, analysis and early warning of possible domoic acid outbreaks. Thanks to ORHAB, the state is much better able to pinpoint the

Top: A long *Pseudo-nitzschia* chain in a sample taken off the Washington coast.

Below: The ECOHAB Pacific Northwest team on the R/V *Thomas G. Thompson*.





Far left: Associate Professor Evelyn Lessard, School of Oceanography.

Left: UW technician Michael Foy (left) and graduate student Brady Olson work with an on-deck incubator growing *Pseudo-nitzschia*.

# on Coast: Follow that Toxic Algae!

location and severity of a HAB event and much less likely to unnecessarily close an area to harvest.

Two other School of Oceanography faculty members – Professor Barbara Hickey and Associate Professor Evelyn Lessard – are involved in ECOHAB Pacific Northwest, a multi-disciplinary project studying the physiology, toxicology, ecology and oceanography of toxic *Pseudo-nitzschia* species off the Pacific Northwest coast.

As ECOHAB-PNW science director, Hickey is interested in understanding how organisms respond to changes in their environment. Her research focuses on maintaining sensors that monitor water properties and currents off the Washington coast, sampling water properties from research vessels during ECOHAB-PNW research cruises, and deploying drifters to track movement of plankton patches. All of these data are used to develop models for ocean circulation along the Washington and British Columbia coasts. This enables Hickey's research team to determine if a bloom of toxic phytoplankton found offshore will be advected toward the coast of Washington. For example, ocean models illustrate that HABs initiated offshore at the mouth of the Strait of Juan de Fuca are transported to the coastline during periods of downwelling.

*“Pseudo-nitzschia cannot move to escape the effects of waves, tides and ocean currents and are thus susceptible to be transported wherever the ocean may take them,”* says Hickey.

Lessard, a microbial ecologist, focuses on the population dynamics of *Pseudo-nitzschia*. Through ECOHAB-PNW, she took part in six one-month research cruises off the

Washington coast to study the diatom in its environment. Being able to work with samples outside of a laboratory “helps us tease out the important influences that spur the growth of *Pseudo-nitzschia* and its toxin production,” says Lessard. “We can also study what conditions make it successful – that is, make it accumulate and bloom – and how its population numbers may affect its toxicity. We can look at how fast they grow and how fast they die in their natural environment.”

School of Oceanography Professor Virginia Armbrust, who is also co-director of the UW Center for Oceans and Human Health, brings a molecular focus to the region's work on HABs, probing the hypothesis that the synthesis and release of domoic acid help *Pseudo-nitzschia* acquire micronutrients, such as iron and copper, which are important for metabolic processes and cell growth. Armbrust's lab at the Center for Environmental Genomics uses molecular approaches combined with lab- and field-based studies to understand when and under what conditions *Pseudo-nitzschia* produces its toxin.

“Understanding how nutrients influence the behavior of these organisms gives us insight into their physiology and, ultimately, the genetics underlying those mechanisms,” says Armbrust. In the laboratory, Armbrust is able to initiate domoic acid production in *Pseudo-nitzschia* by limiting the nutrients available to the cells.

Armbrust would like to see real-time sensors, using genetic markers, deployed in the ocean. The sensors would be able to indicate the population diversity of phytoplankton blooms, specifically if potentially toxic blooms are present in the water.

Ultimately, these COFS researchers hope that their work will help predict HAB outbreaks on the Washington coast before they occur, helping to protect public health while minimizing economic losses. 🐟



Research Scientist Rita Horner, School of Oceanography.



Professor Barbara Hickey, School of Oceanography.



Professor Virginia Armbrust, School of Oceanography.



Right: Washington Sea Grant staff collects stakeholder input at regional planning workshops.

Far right: Washington Sea Grant Director Penny Dalton (left) and Regional Research Coordinator Michelle Wainstein.



## Marine Research Not Stopping at State Borders

*Explore* is produced three times yearly by Washington Sea Grant under the direction of the Office of Development & Community Relations, College of Ocean and Fishery Sciences. For more information contact April Wilkinson, [amwilk@u.washington.edu](mailto:amwilk@u.washington.edu)

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The Washington coast has its own unique features, but it's also part of an interconnected system – not unlike Washington Sea Grant (WSG), which is a unit in the UW College of Ocean and Fishery Sciences and part of a system of 32 Sea Grant programs nationwide.

So it's natural for the Sea Grant programs in Washington, Oregon and California to collaborate in assessing the long-term marine research and information needs of the entire West Coast of the United States. The goal is to help the region move toward an ecosystem-based approach to marine resource management, research and information.

Supported by the National Oceanic and Atmospheric Administration (NOAA), the project is a response to recent national recommendations calling for a regional approach to research planning. This Sea Grant-led effort is also in collaboration with the West Coast Governors' Agreement on Ocean Health ([www.westcoastoceans.gov](http://www.westcoastoceans.gov)).

"This is an exciting partnership that will provide us with a comprehensive and cohesive regional research and information plan and could shape the future directions for marine research," says WSG Director Penny Dalton. "Ultimately, we'll have an excellent tool for encouraging federal support for work that's important to the West Coast."

The Sea Grant programs are listening closely to their stakeholders, according to WSG Associate Director Raechel Waters. "We're trying to involve the broadest possible range of ocean and coastal interests in the process," Waters says. "Programs in all three states have

conducted workshops for coastal residents, researchers, community organizations, marine conservation groups, state and local governments, resource managers and people who depend on ocean resources for their livelihoods or recreation. People also were invited to comment through a Web-based survey."

Sea Grant has identified the following themes that recur in state, regional and federal research agendas and should be addressed by the project:

- The social and economic vitality of coastal communities
- Coastal natural hazards
- The ocean and human health
- Ecosystem dynamics, quality and connectivity
- The ocean and climate variability
- Marine transportation and security
- Ocean education and environmental literacy.

Michelle Wainstein, WSG's Regional Research Coordinator, says that the Regional Planning Web site, <http://seagrant.oregonstate.edu/research/RegionalPlanning/index.html>, provides a way to track progress. "Stakeholders will be able to view and comment on draft reports as they're developed," Wainstein says. "They'll also have access to details of workshops and summaries of stakeholder input."

Another collaborator on the project is the UW School of Marine Affairs (SMA). UW graduate researcher Kary Coleman, advised by SMA Professor Marc Hershman, is cataloguing regional marine research needs on the West Coast, as identified in existing planning and resource management literature. 🐟





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common Murres gave Parrish an intimate knowledge of the population dynamics in that corner of the world, but she was frustrated by the study's geographic limitation. She wanted to get a sense of the bigger picture on the Washington coastline. Based on results from Tatoosh, Parrish secured 18 months of funding from the David and Lucile Packard Foundation and established her multi-state project, using volunteers and generating high-quality data.

To date, COASST has attracted more than 500 volunteers. "I have to say I'm fairly stunned at the number of people who are very jazzed about going out to find dead birds," said Parrish. Collectively, they survey about 270 beaches along the Pacific coast. Participants conduct monthly surveys, fill out standard data sheets and snap photographs of every bird carcass they find.

Each volunteer (a.k.a. Coasster) surveys his or her assigned beach in a path designed to maximize spatial coverage. To a bystander, "the path looks like a drunken sailor's," joked Parrish. In truth, the approach is careful and deliberate, the path modeled after a sine wave. When Coassters encounter a specimen, they photograph the carcass, then use meticulous measurements of foot size and other physical features to identify the bird. This information makes its way every month to COASST headquarters at the UW, where Parrish pools the data and looks for changes in the normal patterns.

But the project serves more than just a scientific purpose. "There's a community benefit," said Parrish. "I didn't know this when I started COASST, but now I'm a fervent believer. Many people in coastal communities feel disenfranchised about science. They read about environmental issues in the paper and hear about them on TV, and they feel kind of powerless and frustrated. They want to be part of the solution. COASST helps people understand their local natural resources and provides a basis for getting involved."

In COASST, information flows both ways. Volunteers provide raw data, and results and findings go back out to volunteers. "We want to get important information back to citizens, who can then present it to the media, to elected officials and to other audiences to promote the health of the ocean and its creatures," Parrish says.

Many current Coassters got involved with the program after hearing about it from others. UW environmental science student Penelope Chilton ended up in the COASST office by way of the Farallon National Wildlife Refuge near San Francisco, where she learned of the UW effort from other biologists. One of her main responsibilities is to coordinate data submitted online with photographs sent by mail. But that doesn't keep her from walking a beat.

"I do a survey at Carkeek Park in northwest Seattle. Truthfully speaking, I never find birds," Chilton admits. "But the idea is that we're setting this baseline so when you get a pulse of dead birds, it sends up alarms."

Though Chilton's bird surveys might have proved uneventful so far, her recent run-in with a sleeping harbor seal proves that there are some program experiences that just don't show up on a data sheet.

As for Parrish, the extensive dataset helps her pick up disturbances in the system. In one dramatic case at the end of October 2007, the number of bird carcasses at a beach near Indianola spiked from less than one bird per kilometer to more than 200 per kilometer in one weekend. The likely culprit was nearby commercial fishing activity using nets that are known to ensnare diving shorebirds.

A large presence of dead birds doesn't always spell doom; it can be a good thing, signifying a successful bird population. The declining number of bird carcasses on the shores of Puget Sound in recent years may actually be a symptom of an ecosystem in distress. Only time and, perhaps, COASST's extensive data will tell. ➤

Top left: Associate Professor Julia Parrish, School of Aquatic & Fishery Sciences. Top right and below: Coassters on the prowl.





CAMPAIGN FOR STUDENTS!



To learn more about COFS efforts to support students or Campaign UW: Creating Futures, please visit [www.cofs.washington.edu](http://www.cofs.washington.edu).

## Oceanography Recipient of New “Students First” Endowment

This fall, School of Oceanography Director Russ McDuff was nearly speechless upon hearing some very good news: a brand new Students First endowment was being created for the benefit of Oceanography students.

The estates of two UW alumni – Alice McCabe ’35 and her son Lowell Barger ’63 – established the Lowell K. and Alice M. Barger Endowed Scholarship Fund to support Oceanography’s undergraduate and graduate students.

“Building our capacity to provide student support is a top priority of the School, especially as the cost of a UW education is increasingly funded by tuition,” says McDuff. “This scholarship gives us unparalleled means to help students for whom the cost of tuition could be a financial burden.”

The Bargers’ generosity will have an even greater impact, thanks to the Students First program. Through this matching initiative, the University provided an additional 50 percent to the principal investment. Overall, the School of Oceanography will be able to award more than \$90,000 to its students annually.

Associate Director of Undergraduate Education Gabrielle Rocap hopes the new scholarships will enable students to find their passions in science. “Giving students the financial freedom to pursue research internships rather than other part-time employment will allow them to experience first-hand the thrills of oceanography,” she says. “This is a wonderful gift in support of our education program.”

In recent years, students have conducted research in the Galapagos Islands, Antarctica and Washington’s Hood Canal. The Barger scholarships will ensure similar opportunities to Oceanography students for generations to come. 🐟



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