

Sea Star



Clear Your Head

Washington Sea Grant specialists embark on an ambitious statewide outreach campaign

By Christine Coltellaro, Summer 2009 WSG Science Writing Fellow

The Washington State Parks and Recreation Commission has selected Washington Sea Grant (WSG) to conduct a statewide Clean Vessel Awareness Campaign.

Launched this past summer, WSG's Clean Vessel Awareness Campaign is promoting the use of sewage pump-out facilities by boaters in both fresh and salt water. This involves familiarizing the state's 280,000 registered boaters with the sewage pump-out symbol created under the national Clean Vessel Act and increasing boater confidence in the reliability of the pump-out facilities they use.

"Our efforts will draw attention to an easy thing boaters can do to improve water quality," says Dan Williams, Communications Manager for WSG and co-leader for the Clean Vessel Awareness Campaign. "Boaters value the water, and raw sewage de-values it," he adds. "Raw or poorly treated sewage can spread disease such as hepatitis, typhoid fever and cholera. It can also contaminate shellfish beds and lower oxygen levels in water."

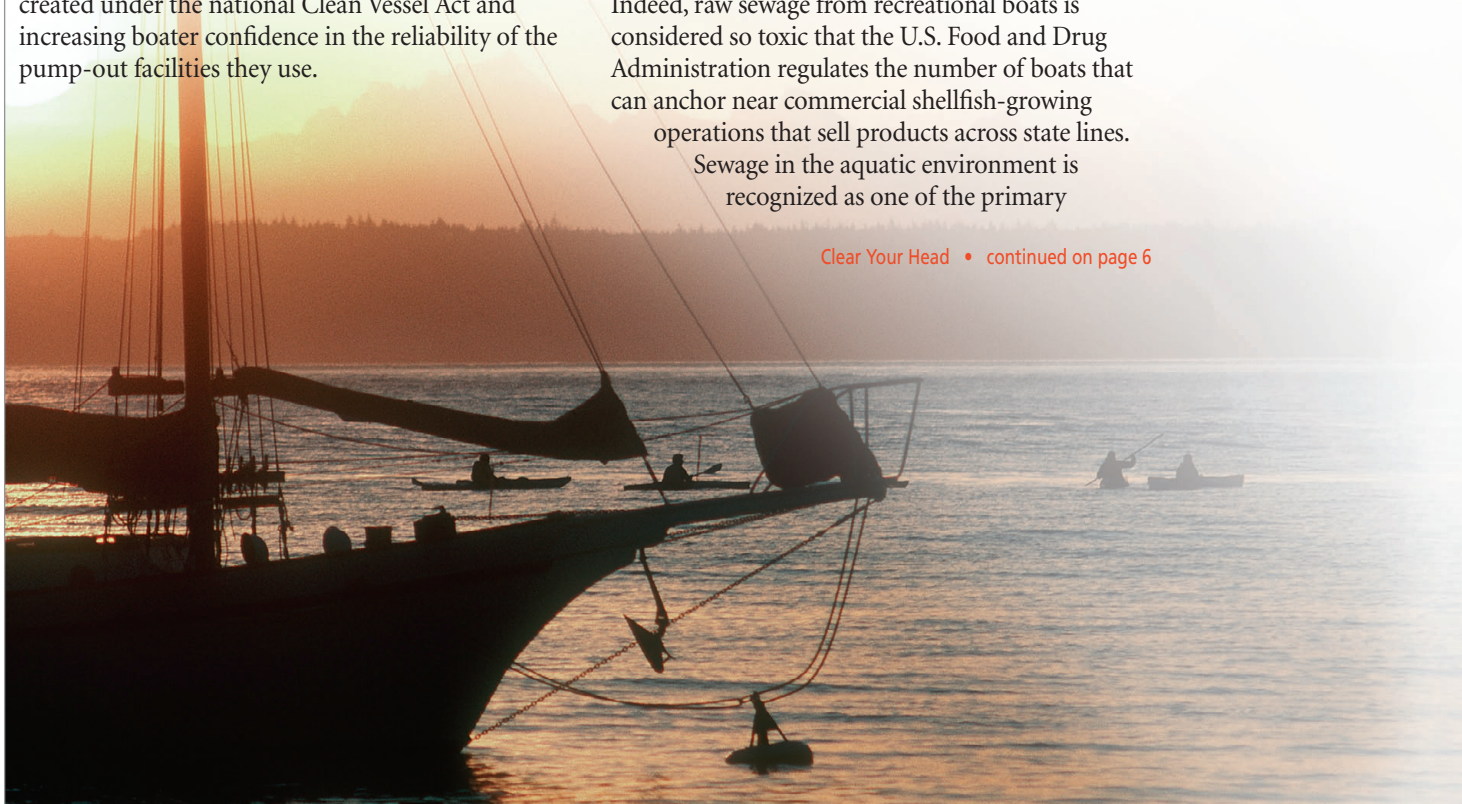
Indeed, raw sewage from recreational boats is considered so toxic that the U.S. Food and Drug Administration regulates the number of boats that can anchor near commercial shellfish-growing operations that sell products across state lines.

Sewage in the aquatic environment is recognized as one of the primary



Developed for the federal Clean Vessel Act program, this symbol reminds boaters to "pump it, don't dump it."

Clear Your Head • continued on page 6



F+RNA Coliphage Study Opens Window on Oakland Bay Water Quality

By Colleen Craig, WSG Communications Intern

In the summer of 2004, the Washington State Department of Health's Office of Shellfish and Water Protection (OSWP) detected unusually high levels of fecal coliform bacteria in water samples from the north end of Oakland Bay. To OSWP workers, the high fecal coliform levels were an early warning of problems in the productive shellfish-growing water body, connected at its southern end to Puget Sound.

Fecal coliform bacteria by themselves are not harmful to human beings. However, because they are among the many microorganisms in the human intestinal tract, they have historically been considered as indicators of more serious concerns. As filter-feeding organisms, shellfish take in and accumulate microorganisms, sometimes causing problems for people who eat uncooked oysters or clams. For this reason, it's important to keep tabs on fecal coliform bacteria levels in water, particularly in shellfish-growing areas.

Where were the fecal coliform bacteria in Oakland Bay coming from? There was no obvious pollution event to explain the high fecal coliform counts obtained by OSWP, nor had the bay experienced heavy rainfall — a condition that can often compromise water quality for several days. Computer modeling of the flow dynamics within the bay suggested that one potential source, the City of Shelton's wastewater treatment plant at the south end of the bay, was an unlikely cause of contamination in the north end.

By November of 2006, the northernmost part of Oakland Bay had failed the stringent water quality standards stipulated by the National Shellfish Sanitation Program (NSSP). To protect the seafood-consuming public, the north end of Oakland Bay has remained closed to commercial shellfish harvesting ever since then.



Enter Scott Meschke, an Assistant Professor of Environmental and Occupational Health Sciences at the University of Washington. With funding from WSG, Meschke sought to identify the specific type of fecal coliform bacteria that was being detected by OSWP — information that might shed light on the bacteria's source. To do this, he used a method that relies on the detection of a virus, known as the F+RNA coliphage, that infects fecal coliform bacteria. The different strains of this virus appear to be roughly host-specific. Group II coliphages are generally found only in human waste. Group I, III and IV coliphages are mostly found in animals (although group I does occasionally appear in municipal wastewater outfalls).

“With the coliphage method, you can get a crude cut between human and animal,” says Meschke. “You can't really get beyond that.” Because the coliphage method alone doesn't adequately answer the question, scientists tend to use it in combination with other methods (in Meschke's project, a U.S. Environmental Protection Agency study using a parallel approach), to gather what Meschke refers to as “a preponderance of evidence.”

Meschke's team found only Group I coliphages in northern Oakland Bay. Since there is no obvious large source of human contamination nearby, this seemed to suggest that the high fecal coliform counts might have come from cattle or other livestock but probably not from human waste. However, it was impossible to completely rule out human contamination, based on these data.

“The more we look, the more we find these phages in different hosts. It turns out the lines aren't as clear as we thought,” says Meschke.

Complicating matters further are the relative survival rates of the different coliphages. Lab-based studies have indicated that Group IV coliphages die off the fastest and that Group IIs die off faster than Is and IIIs. “If you were to just look at the numbers of each type in a water sample, it wouldn't necessarily represent the contribution of each particular fecal source,” says Meschke. “This complicates our interpretation of what the occurrence of a particular phage type might mean.”

Current water-quality studies rely heavily on a single fecal bacterial indicator, such as the total *Escherichia coli* count for fresh water or *Enterococci* for marine and estuarine waters. “But that's just a snapshot,” says Meschke, “and it's certainly not representative of virus or protozoan levels.” Ideally,

Meschke would like to have a suite of cost-effective methods for detecting many different indicators. He'd like to consider bacteria and phages and perhaps even endospores — the tough, nonreproductive structures that some bacteria produce to survive periods of environmental stress.

Of course, any investigation must be coupled with common sense. “You have to go look at the site, and basically do an inventory of what's there. If there are no horses or cows around, then any contamination is probably not from these animals,” says Meschke. As it currently stands, there are few large livestock populations in the vicinity of north Oakland Bay, casting doubt on these animals' roles as contributors of Group I coliphage in the bay's waters.

So where did Oakland Bay's seasonally high fecal coliform counts come from? Some have conjectured that the culprit is animal waste from long ago, mixed into the soil. As the summer sun beats down, warming the land, the bacteria may start to grow. This historical source of contamination may get re-suspended by winds and whisked into the water — an effect observed in other places, including the Great Lakes and Hawaii. In Oakland Bay, the Squaxin Island Tribe is examining this phenomenon.

“If this could be proven,” says Meschke, “it would suggest that the risk of a pathogen contamination in Oakland Bay is actually relatively low.”



WSG-funded researcher Scott Meschke at his UW Medical Center office.



Field Notes

Jim Brennan, WSG's Marine Habitat Specialist, has been appointed to a two-year term on the Salmon Recovery Funding Board (SRFB) Review Panel. Brennan brings expertise in marine and nearshore ecosystems, marine habitats and species and habitat restoration to enhance the SRFB's review of salmon restoration, protection, acquisition and enhancement projects. His responsibilities include project review and development of recommendations for project funding. Previously, Brennan has

served on a number of technical review panels. He is currently providing review and technical assistance to the Department of Natural Resources and the Puget Sound Partnership. Contact Brennan at 360.337.5625 or jbren@u.washington.edu.

WSG's Marine Fisheries Senior Scientist **Ed Melvin** was a judge at the World Wildlife Fund's International Smart Gear Competition in August. He participated in a final evaluation session, held in Tanzania, before assisting in the

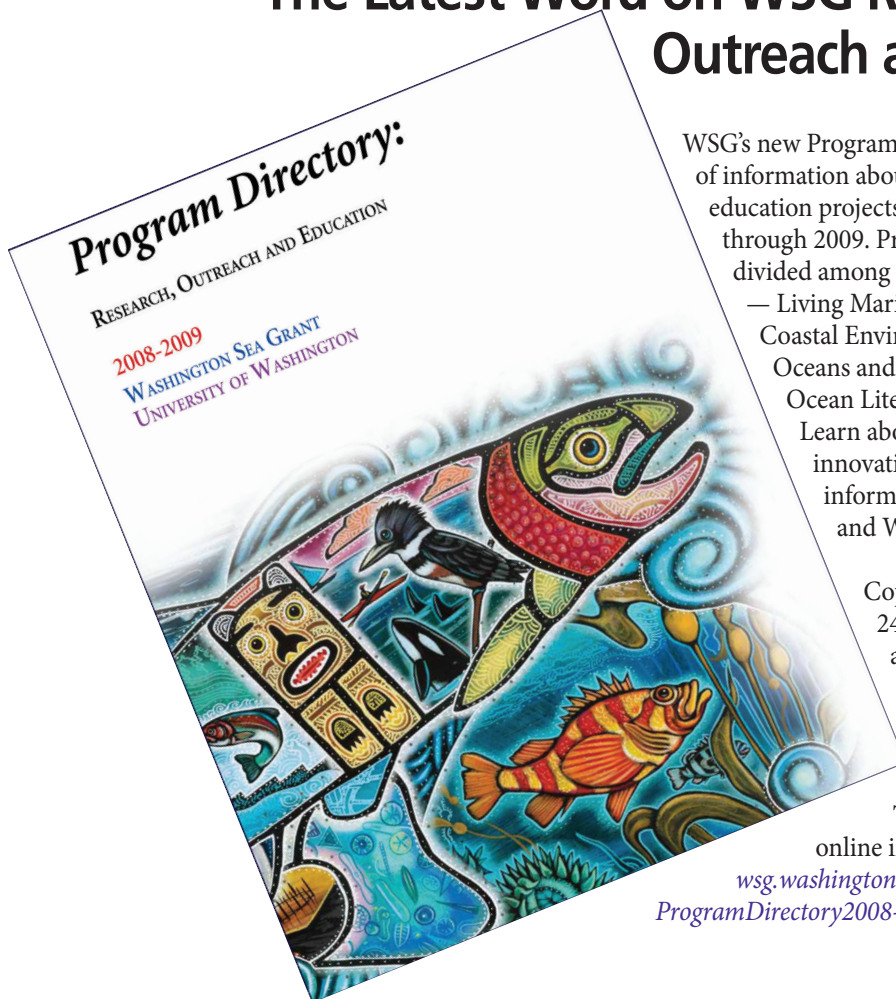
selection of winning entries. The competition was designed to inspire innovative ideas for environmentally friendly fishing devices that reduce bycatch — the unintentional capture of seabirds and other marine life. For information on the winning entry, visit wwf.ca/newsroom/?4600.

Washington Sea Grant is scheduled to become part of the University of Washington's new College of the Environment in 2010. This summer, the College enlisted WSG

Communications to redesign and build its Web site. WSG Web Specialist **Marcus Duke** and Creative Services Specialist **Robyn Ricks** worked together on the project. The results can be seen at <http://coenv.washington.edu>. The College of the Environment unites the many UW schools and programs that are dedicated to environmental research, education and application.

An article in the July/August issue of NOAA's *Coastal Services* magazine,

The Latest Word on WSG Research, Outreach and Education



WSG's new Program Directory contains a wealth of information about research, outreach and education projects funded by WSG for 2008 through 2009. Projects in the directory are divided among five Critical Program Areas — Living Marine Ecosystems, Ocean and Coastal Environmental Health, Changing Oceans and Coastal Communities, and Ocean Literacy and Workforce Capacity. Learn about cutting-edge research and innovative outreach and get contact information for project investigators and WSG staff.

Copies of this indispensable 24-page resource are available at no cost from WSG Publications, 3716 Brooklyn Avenue NE, Seattle, WA 98105-6716 or by e-mail at sgpubs@u.washington.edu.

The directory is also available online in a downloadable format at wsg.washington.edu/communications/online/ProgramDirectory2008-09.pdf.

"Adapting to Climate Change Is the Focus of Washington Workshop" focused on the work of WSG Coastal Resource Specialist **Kat Hoffman**. The piece quoted Hoffman and mentioned the contributions of partnering agencies — WSG, Padilla Bay NERR, King County and the UW's Climate Impacts Group.

In late September, several WSG representatives attended the 68th Annual Pacific Coast Shellfish Growers and National Shellfish Association (Pacific Coast Section) meeting in

Portland, Oregon. MAS Program Leader **Pete Granger** gave a talk on current WSG activities in shellfish aquaculture, WSG student employee and UW master's candidate **Danielle Rioux** shared preliminary results from her survey of shellfish growers' perception of risk, and Water Quality Specialist **Teri King** helped finalize the program agenda.

With assistance from the Citizen Science Advisory Panel and WSU Extension's Donald Meehan, WSG's Citizen Science Specialist **Kate Little**, Senior Program

Coordinator **Michelle Wainstein** and Director **Penny Dalton** submitted their report, *Harnessing Citizen Science to Protect and Restore Puget Sound*, to the Puget Sound Partnership. The report describes the opportunity for citizen science in Puget Sound, includes a brief description of citizen science models and challenges to effective use of citizen science and concludes with recommendations to support and enhance citizen

science efforts that would contribute to scientific research, monitoring and management needs in Puget Sound. The report and stand-alone executive summary are available as downloadable (pdf) documents at wsg.washington.edu/citizenscience/citsci_toolbox.html.

Editor, David G. Gordon; Designer, Robyn Ricks; Web Editor, Marcus Duke; Communications Manager, Dan Williams. Photos: page 2, Windermere Himlie Real Estate, Inc.; page 5 (bottom), Elliott's Oyster House; all other photos © Washington Sea Grant, except as noted. ©2009, University of Washington, Board of Regents. WSG-MR 09-04

This publication was funded in part by the National Oceanic and Atmospheric Administration. The views expressed herein are those of the authors and do not necessarily reflect the views of NOAA or any of its sub-agencies.

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The End of an Era — and a New One Begins

This past June, when Al Krekel retired from his position as WSG's Administrator, he ended an era that began four decades earlier with his decision to join the program's newly assembled staff. Filling Krekel's shoes might have been a daunting task to anyone but Cathy Burdett-Freeman, WSG's new Administrator, who became a WSG staff member in July.



Cathy Burdett-Freeman

Before joining the Brooklyn Avenue team, Burdett-Freeman spent nine years at the UW College of Ocean and Fishery Sciences. Her previous job experience included positions at the UW School of Oceanography and

Geophysics. After a hard day of overseeing WSG budgets and accomplishing other work-related tasks, she spends her off-hours learning to quilt and crochet, plus taking her dog Finna on long walks in her hometown of Arlington.

"I've been surprised by the range of subjects in which Washington Sea Grant is engaged," says Burdett-Freeman. "I'm glad to be working for a program that really makes a difference, whether it's studying the life around undersea volcanoes or teaching people how to stop their septic systems from polluting Puget Sound."

Join us in wishing Krekel a peaceful retirement and welcoming Burdett-Freeman to WSG's Seattle suites. You can contact Burdett-Freeman at 206.543.9966 or cburdett@u.washington.edu.

Visit Us in November

Look for our booth at some of our favorite fall venues. We'll be there, along with an assortment of Sea Grant publications and give-aways.

Saturday, Nov. 7 at Elliott's Oyster New Year Bash, a food-lover's paradise and fundraiser for shellfish restoration projects, hosted by Elliott's Oyster House on the Seattle waterfront. For information and tickets, visit the Elliott's Web site, www.elliottsoysterhouse.com/ony.cfm or call the restaurant at 206.623.4340.

Thursday through Saturday, Nov. 19-21 at Pacific Marine Expo, the West Coast's largest marketplace for the working waterfront, at the Qwest Field Event Center in Seattle. For information, visit the Expo site, <http://www.pacificmarineexpo.com/09/public/enter.aspx>, or contact Pete Ganger at pgranger@u.washington.edu or 206.685.9261.



Fun for foodies at Oyster New Year 2008

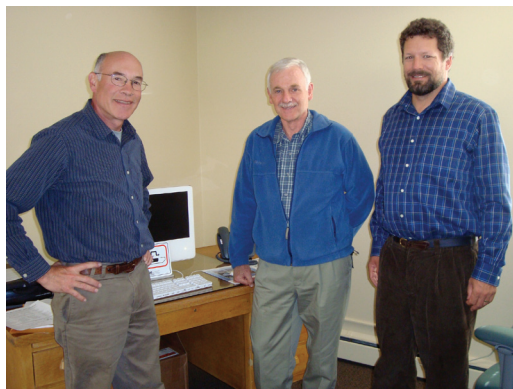
causes of so-called dead zones — relatively lifeless areas that result from pollution-related oxygen depletion of marine waters. WSG enjoys a long-standing, cooperative relationship with the boating community. It works directly with boat owners, marina operators and boating associations and other groups to curb pollution from small oil spills and provide safe and practical alternatives to spill-prone practices. In recent years, it has joined with the Northwest Marine Trade Association, Puget Soundkeeper Alliance, Washington State Parks and Recreation Commission and the Washington departments of Ecology and Natural Resources to encourage area marinas to “clean up their acts” and get certified through the Clean Marina Washington, an expansion of the multi-county EnviroStars.

The primary audience for the Clean Vessel Awareness campaign is operators of recreational boats equipped with Type III marine sanitation devices (boat toilets with holding tanks). This target audience includes not only the operators of state-licensed vessels but also those visiting from out-of-state and others with transient moorage and live-aboard arrangements.

“The bottom line is, we need to inspire people to want to change,” says WSG’s Eric Olsson, who provides technical expertise and program management to the campaign. Olsson’s primary work for WSG focuses on oil spill prevention and preparedness, safety at sea and Clean Marina certification. “For our campaign to succeed, we need clear, easily understood signage and messaging to remind people that it’s important to ‘clear their heads’ and let them know that pump-outs do indeed work.”

Communicating this third message is a major part of the campaign. “Studies have shown that if people have had an unpleasant experience at a pump-out station, they are unlikely to return to one,” explains Olsson. “That’s been a persistent problem in the past.”

The first pump-out stations in Washington were installed in the late 1970s and early 1980s. They were powered by a diaphragm



Project team members, l to r: Dan Williams, Eric Olsson, Chris Wilke; not pictured, Aaron Barnett.

pump, which proved problematic. Unreliable diaphragm pumps were last replaced by pump-outs with peristaltic pumps. These super-dependable pumps operate without diaphragms, so less clogging occurs. For the most part, “Out of Order” signs at pump-out stations are now a thing of the past.

As a result of this changeover, “bad equipment is no longer an excuse not to pump out,” according to Aaron Barnett. A graduate student in the University of Washington’s School of Marine Affairs, Barnett first became familiar with pump-out technology as a sales rep for SaniSailor, the company that introduced peristaltic pump technology to marina owners in the United States. Today, his technical expertise and hands-on experience are invaluable to the Clean Vessel Awareness Campaign.

Chris Wilke is another important member of the Clean Vessel Campaign team. As Pollution Prevention Director for the nonprofit Puget Soundkeeper Alliance, Wilke has worked with Olsson on the Clean Marina Washington project and complements Olsson’s first-hand knowledge of boating, as well as his passion for encouraging others to “leave a light boat print.”

According to data from the Washington Boater Needs Assessment of 2007, 60 percent of marine service providers cited marine sewage as an area of particular importance, Wilke says. “They know that dumping raw or poorly treated sewage into the water poses a serious threat to the marine ecosystem, seafood harvesting and recreational use of our waters in general.”

Outreach efforts began in the Puget Sound region this past boating season. Lessons learned from this initial round of outreach will be applied to next year’s campaign, which will be extended to Eastern Washington, where large communities of recreational boaters in locales such as the Columbia River exist. This second phase will begin with boat shows and other events throughout the state in fall 2009 and winter 2010, and continue through the spring and summer 2010 boating season. Surveys distributed at the beginning and end of the campaign will help guide its direction and measure its success. WSG will also monitor use of pump-out facilities by analyzing annual usage report data compiled by Washington State Parks.

For more information, contact Dan Williams, WSG Communications Manager, at 206.616.6353 or dw7@u.washington.edu.



A pump-out station awaiting use.

Hot Fun at NOAA Science Camp

By Christine Coltellaro, Summer 2009 WSG Science Writing Fellow

This past summer's super-sunny weather set the stage for what many are calling the two best sessions of NOAA Science Camp ever.

Under the organizational umbrella held by WSG, Camp Director Rina Hauptfield, Camp Coordinator Danielle Rioux and WSG Education Coordinator Julie Hahn organized and led an enthusiastic group of camp educators, who, alongside NOAA scientists and staff, shared the fun and excitement of scientific discovery with nearly 100 young attendees from a total of 48 elementary and middle schools.

Each day of the two five-day Science Camp sessions was filled with thought-provoking activities about our oceans and atmosphere. Identifying whale and dolphins, talking to a scuba diver underwater and making navigational charts were among the favorite activities of campers.

"The camp is about abandoning textbook learning in favor of first-hand experience with science in action," says Rioux. "The campers really rise to the occasion and have plenty of fun," she notes.

"For me, the best part was seeing the looks on campers' faces when they came back from an activity," Rioux recalls. "Those kids could hardly contain their excitement after looking at plankton samples under a microscope."

"The key to the kids' excitement and the overall success of this camp are the hours spent elbow-to-elbow with scientists on the NOAA campus," adds Hahn.

NOAA scientist also benefit from the experience. While working closely with the next generation of scientists, they learn how to better communicate their research to audiences beyond the lab. Scientists who participated in this year's camp came from a number of programs, including NOAA Fisheries, National Ocean Service, National Weather Service, NOAA Research and NOAA Marine and Aviation Operations.

John Delaney, Program Director and Principal Investigator with the UW's Neptune project, was a guest speaker at one of this past summer's sessions. During the camp's culminating ceremony, he spoke about his ongoing passion to establish a network of permanent observation stations to monitor the activities of undersea volcanoes, or hydrothermal vents, on a daily basis. Washington Sea Grant science writer David G. Gordon spoke about overcoming the "science nerd" stereotype — an unspoken goal of NOAA Science Camp. The two speakers shared the podium with Darcy Nothnagle, Congressional staffer for Representative Jim McDermott, and Pete Mills, community liaison with Representative Jay Inslee.

Early registration for next year's camp is recommended, as camper positions fill quickly. Specific dates, registration fees and scholarship information will be posted at the NOAA Science Camp page of the WSG Web site, www.wsg.washington.edu/education/events/noaa.html. For more information, contact Julie Hahn, 206.685.9117 or jkhahn@u.washington.edu.



Staff and kids gathered for an informal portrait on the last day of NOAA Science Camp.



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FALL 2009

CLEAN VESSEL AWARENESS CAMPAIGN
OAKLAND BAY STUDY
NOAA SCIENCE CAMP



Get Ready to Be WOWed

Scheduled to “go live” this fall, Washington On Water (WOW) is WSG’s new online clearinghouse of marine education resources for K-12 educators.

WOW provides information on regional marine science topics and opportunities for professional development and classroom support. Its Web-accessible database includes Pacific Northwest education resources with clear connections to a coastal component of watersheds throughout Washington. The WOW database also contains information on national marine education resources that are relevant to the Pacific Northwest. By linking marine educators and resources, WOW will nurture

partnerships between those with inquiry-based science programs and those who need them.

WOW is the brainchild of Nancy Reichley and Julie Hahn of WSG’s Education Office. “We recognized an important niche that needed to be filled,” says Reichley. “Following WOW’s launch, we plan to fine-tune the Web site regularly to ensure the database is both comprehensive and current.”

For more information about WOW, contact Nancy Reichley, WSG Education Specialist, at 206.685.8302 or reichn@u.washington.edu.

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