April 2007

Beach Log

Education, Research, Stewardship

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Paralytic Shellfish Poison

The Washington State Department of Health monitors a large number of sites throughout Puget Sound for the presence of a biotoxin which can produce paralytic shellfish poisoning in humans and marine mammals. The year 2006 proved to be the worst year on record for the presence of this biotoxin and, unlike previous years, has been present even during the winter months. The frequency and severity of this problem appears to be worsening, especially in Puget Sound.

Shellfish are collected by volunteers throughout the Sound and those samples are analyzed at the Public Health Laboratories in Seattle. This past year the department teamed up with Dr. Sonya Dyrman, a scientist with the Woods Hole Oceanographic Institute. In addition to biweekly collection of shellfish for sampling, one liter of sea water was siphoned through a filter and the actual filter was then sent to Woods Hole for analysis.

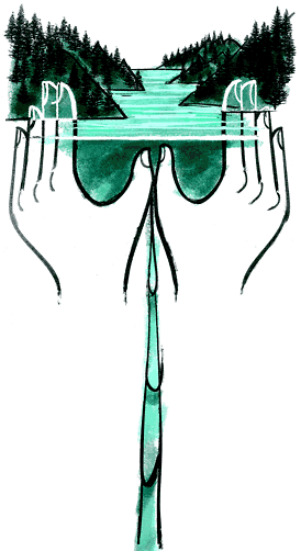
Microscopic view of *Alexandrium cantenella.*

Dr. Dyrman spoke at the Public Health Water Lab on April 5, 2007. She is attempting to determine if the organism producing the toxin, *Alexandrium cantenella,* can predictably be found in the filters. Using that information, it may become possible to predict blooms of this phytoplankton in the future.

The first step in the process for Dr. Dyrman was to isolate an *Alexandrium* DNA signature. Once the specific signature was determined, and the DNA was extracted from the cells, the samples could be subjected to quantitative polymerase chain reaction (qPCR) analysis. She determined that the qPCR test was very specific to *Alexandrium cantenella,* that it could accurately detect very small numbers of cells in a given sample, that large quantities of tests could be run at the same time at a reasonable cost, and that this methodology lends itself to the detection of the organism in the water before toxicity is evident in the shellfish.

Dr. Dyrman's study is going to continue this year at least into the fall. I am collecting mussels and water for sampling biweekly at Cornet Bay. If anyone wants to tag along sometime, get in touch at jimsomers@hughes.net or 360-675-7014.

Jim Somers, BW Class of 2004



Much Deserved Recognition

I'm sure everyone has read it by now, but if you still haven't read it from beginning to end you're missing out on some of the best WSU Beach Watcher recognition we've had in a major newspaper. What is "it" you may ask. A wonderfully written, concise and clear account by reporter Lance Dickie in the Seattle Times Opinion section of what a powerful and positive organization Beach Watchers is. Lance Dickie attended Sound Waters in February this year and was positively blown away by the passion, energy and organization that infused the whole event. A little birdie has informed me that the article was delayed in printing because it was being held back until a prominent place was available at the front of the section instead of hidden in a back corner. The first reaction most have had to this article is wanting to thank all the wonderful people who make this the incomparable program it is. That is exactly what I want to do. Thank you to the volunteers for being the passionate and engaged people you are, thank you to the dedicated and generous instructors, thank you to the citizens who continue to care and get involved, and thank you to a team of devoted and enthusiastic staff.

Kristen Cooley, BW Program Coordinator

Monitoring Highlights

A Trip to Padilla Bay

A recent trip to Padilla Bay captured my interest because of all the nonnative species encountered. As I arrived, the tide had receded to the +4 foot level revealing the upper intertidal zone of the soft sediment beach at Bay View State Park. Looking around, I spotted patches of Japanese eelgrass (*Zostera japonica),* shells from the purple varnish clam *(Nuttallia obscurata)* and Manila clam *(Venerupis philippinarum),* and a multitude of Asian mud snails (*Batillaria attramentaria).* Not one of these species is native to the Pacific Northwest. The Japanese eelgrass, Manila clams, and Asian mud snails are thought to have arrived with oyster cultures from Japan decades ago. Purple varnish clams are a much more recent arrival and are believed to have been transported to this area with ballast water or as fouling on the hulls of ships. Three of these species can be found on our Island County beaches, but not the Asian mud snails. Unlike some invasives that tend to spread like wildfire, these 2 inch snails do not release their gametes or young to swim or drift away as plankton, but instead lay eggs that settle near the parent snails. This has so far kept them confined to areas where the species arrived with the oyster spat. Feeding on diatoms, *Batillaria* apparently thrive in their adopted home. Scientific studies have found them in numbers up to 1000 individuals per square meter and estimates are that there are more than 70 billion of them at Padilla Bay.

The Asian mud snail found at Padilla Bay is believed to have been accidentally introduced with oyster cultures from Japan

It didn't take long to get chilled by the March wind so I headed on up to the Breazeale Interpretive Center to check out their aquaria and displays. A bratty little Dungeness crab (*Cancer magister)* was poking around and pestering the other inhabitants of his tank. Also making the rounds in that tank was a ten inch sunflower star (*Pycnopodia helianthoides)* and it was inevitable that the two would meet. As I watched, the crab finally took a break, settling down for a little lull and that predatory sea star was soon upon it, first with just a few tube feet of one ray snagging a hold on a crab claw. The crab, apparently oblivious to the danger, remained motionless as the sea star continued to strengthen its grip. Suddenly aware, the crab struggled frantically but the sea star soon had it in a half-nelson. Figuring that the crab was intended for display, and not as a sea star's entree, I headed out to the front desk to let the staff know about the unfolding drama in the tank. Jumping into action, a staff member armed herself with a long-handled net and came to the rescue of the crab. It took a bit of doing to pry the crab away from the sea star and it lost a claw in the process, but the lucky crustacean was soon settling into a new tank, this one without such predacious neighbors.

This unlucky crab was no match for a predatory sunflower star in a display tank at the Breazeale Interpretive Center.

Mary Jo Adams, BW Class of 1999

The Adelie Penguin – Poster Child of Global Warming?

After Jill Hein and I became quite familiar with penguin poop while trekking over several Antarctic penguin colonies, an article in *Defenders of Wildlife* magazine caught my eye.

There are approximately 2.5 million breeding pairs of Adelie penguins who nest on the rocky shores and slopes of the Antarctic during September and October. Their numbers appear to be decreasing in the northerly, warmer areas of their range. One possibility for this population decline may be the rapidly rising temperature (five times faster than the world average) that affects the spawning of krill, the penguins' favorite food. In addition, the recent calving of huge icebergs has separated some birds from their feeding grounds.

A study by Steven Emslie, Larry Coats and Kathy Licht, published in the January issue of *Geology,* revealed a 45,000 year record of climate change in the Ross Sea. Enslie, a marine ornithologist at the University of North Carolina, excavated and carbon-dated 45,000 years worth of Adelie penguin poop, bones, feathers, skins and egg shells preserved in the ice. These birds build nests of small pebbles only on ice-free terrain, so the presence of nesting sites can be used as an indicator of the advance and retreat of the ice sheet. Some sites may be occupied for thousands of years.

Adelie penguins nest on bare ground, wherever they can find it, from coast to upper slopes. (Yes, there is a single gentoo penguin in the group).

Enslie studied the remains of 28 abandoned and eight active Adelie colonies near the Ross Sea. The cold, dry climate of Antarctica preserves penguin detritus. The sediments are black and gooey in an active colony. In an abandoned colony the sediments dry out and have a reddish tint derived from krill pigment.

The researchers excavated down into the selected sites at 2 inch intervals until reaching the bottom layer of detritus deposited during the initial colonization of the site. The age of the samples from each level was estimated by carbon-dating. The oldest breeding colony was at Cape Hickey in the South Ross Sea and contained shells from 43,000 to 27,000 years ago. Two feathers over 44,000 years old were found at a second site.

Examination of the data indicates that the sea was open water 44,000 years ago. The ice shelf advanced over the next 14,000 years. It began retreating about 13,000 years ago at the end of the last ice age.

About 8,000 years ago the Adelies returned to colonize the Ross Sea coastline until the two cool periods, between 5,000-4,000 years ago and 2,000-1,100 years ago, forced them to abandon most of the nesting sites. One colony at Inexpressible Island appears to have been occupied for the past 7,000 years. The largest penguin colony at Cape Adare, home to 150,000 nests, is 2,000 years old.

The finding that the Ross ice shelf began to advance after 27,000 years ago will now allow geologists to calibrate models of past climate change in order to improve on future predictions. What happens in Antarctica will have a ripple effect throughout the entire global system.

"For these cold-climate creatures, stopping global warming is essential – or these tuxedo-clad penguins could end up all dressed up with nowhere to go."

Sandy Dubpernell, BW Class of 1993

Dates to Remember
Upcoming Camano Island and Whidbey Island Events and Other Items of Interest

Events on Whidbey:

Thursday, April 19, 2007. ***Whidbey Evening Educational Series.*** Whidbey General Hospital Conference Room, 6:30 pm. Overview of course from Puget Sound Georgia Basin Research Conference by volunteers who attended.
Friday, April 20, 2007. ***Breakfast with Beach Watchers.*** 8:30 am at the 3 Cat's Café in Bayview. Call Nicole Luce for more information.
Saturday, April 21, 2007. ***Tire and Plastic Plant Pot Recycling.*** 9:30 am – 3:00 pm at the Coupeville Solid Waste Facility. For info call (360) 678-7974
Monday, April 23, 2007. ***Seining at Race and Harrington Lagoon.*** 8:00 am, call Bob Buck for more information (360) 321-2334
Tuesday, April 24, 2007. ***Septic System Workshop.*** 6:30 – 8:30 PM at the Monroe Fire Station in Oak Harbor. Call (360) 678-7974
Wednesday, April 25, 2007. ***Seining at Ala Spit.*** 8:00 am, call Joe Beck for more information, (360) 321-5048
Monday, May 7, 2007. ***Seining at Race and Harrington Lagoon.*** 7:00 am, call Bob Buck for more information (360) 321-2334
Friday, May 11, 2007. ***Seining at Ala Spit.*** 9:00 am**,** call Joe Beck for more information, (360) 321-5048
Saturday, May12, 2007. ***Penn Cove Water Festival.*** BW's childrens booth and informational display, call (360) 679-7391 to get involved.
Thursday, May 17, 2007. ***Whidbey Evening Educational Series.*** Trinity Lutheran Church, 6:30 pm. Mary Jo Adams with a slide show and update on our Puget Sound intertidal critters.

Events on Camano:

Friday, April 20, 2007. ***Elger Bay seining,*** beginning at 5:30 am. Contact Barbara Brock.
Saturday, April 21, 2007. ***Plastic Pot and Tire Recycling.*** Can Ku Road (Behind Camano Island CASA Animal Shelter), from 9:30 am to 3 pm. For more information call (360) 629-4522, ext. 7974.
Saturday, April 28, 2007. ***Sound Gardening Workshop.*** Camano Community Center, 9:00 am. This workshop will focus on bluff stability, composting, and will feature two bluff properties, both of which make use of native vegetation and composting. This event is being sponsored by WSU Extension agencies: Island County Shore Stewards, Beach Watchers, and WSU Waste Wise. Registration is required. Contact Beach Watchers office (360) 387-3443 ext 258 for current information.
Thursday, May 3, 2007. ***Steering Committee meeting*** at the Camano Beach Watchers office from 9:30 am to 11:30 am. Note the new earlier time for the spring and summer months.
Monday, May 7, 2007. ***Camano Island Beach Watchers monthly meeting.*** Camano Center, 9:00 am.
Monday, May 7, 2007. ***Elger Bay seining.*** Beginning 5:30 am. (Tentative schedule). Contact Barbara Brock.
Thursday and Friday, May 17 and 18, 2007. ***FOCIP 2nd grade Education Days*** at Camano Island State Park. Get ready for those curious kids. More information to follow.

Council Corner

The March meeting of the Advisory Council was hosted at "The Meadows" by our compatriots on Camano Island. Following approval of the secretary's and treasurer's reports, Jackie Johnson presented the program "W.S.U. Extension Budget 101." She explained in great detail the financial inner workings of the budget process, a very complex operation consisting of forty-some incoming soft money sources, and expenditures relying on these grants. The complexity and uncertainty of soft money funding would seem to lead to ongoing insecurity. However, as we have learned from experience, diversity of funding sources probably is preferable to a single, possibly uncertain source. Thank you to Jackie, who spent a considerable amount of time determining how the pot gets filled and then emptied.

Following Jackie's presentation, Graham Johnson, the former State Volunteer Services Director, delivered a poignant talk in which he emphasized the essential need for professional management of a volunteer organization. We are indeed fortunate to have that type of leadership on our coordinating staff.

One of the reasons for holding the meeting on Camano Island was to facilitate the learning process about their interests and projects. John Custer outlined the "Camano Map Project," and seed money was approved to produce 1,000 of these beautiful maps. Jeff Wheeler spoke concerning Cama Beach State Park and the possible need for funds to establish a lighthouse-like gift store at the park. Wayne Pierre discussed the bluff monitoring project and had no request for funds. Beth Horton reviewed the Camano beach monitoring status. There is a need for additional thermometers and magnifiers, in addition to the possible utilization of the handheld data recorders as they are perfected. Pat Foss presented the "reusable grocery bag project" and requested funding for a pass-through expense for an initial order of 500 bags. This was also approved. Alice Blandin spoke for Barbara Brock on the seining program and also discussed the partnership with Friends of Camano Island Parks to educate second graders about beach etiquette and environmental matters. Dave Baumchen indicated that the Salty project is about 75% complete and should be ready for the Cama Beach State Park opening. Duane Hoekstra presented a progress report on the Cama Beach Notebook, which will incorporate a park history of insects, water critters, flora and geology.

There were no other new or old business issues discussed.

Jim Somers, BW Class of 2004

Celebrate Earth Day by Volunteering at the Tire and Nursery Pot Collection

Thank you all who helped at the last event! We had a great turnout for the pot recycling and we had many folks come and get pots and reuse them – that's EXCELLENT!

Here's our second Tire and Nursery Pot collection event, Saturday, April 21 from 9:30a.m.-3:00 p.m., behind the Coupeville Transfer Station recycle area.

There will be many different jobs; directing traffic, taking money, helping unload tires or pots, sorting pots, and putting pots into sacks. There are two shifts, 9-noon and noon-3.

PLEASE let me know if you can help out!!!!

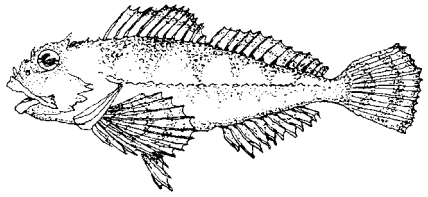
And…… if you volunteer you can bring all your pots for free. Also, if any one wants to take away any pots that would be great! Reuse is better than Recycle!!!!

Please respond to *halljn@wsu.edu, not* Stewart or Kristen's e-mail.

Let your neighbors know about this event and watch the newspapers for details.

Thanks,

Janet Hall, WasteWise Coordinator



Friends of Freeland Volunteer Opportunity

Friends of Freeland has purchased a substantial piece of wetland close to downtown Freeland, and a birder-friendly walking trail is being planned. It has lovely wooded uplands, as well as water. If you are interested in helping clear brush and construct the trail, let me know at *bonneynetzel@yahoo.com* or 360-331-5721. Help will probably be needed in early summer. Thank you!

Bonney Netzel, BW Class of 2004

Reports from three attendees to the Georgia Basin Puget Sound Research Conference

Note: Three Beach Watchers report on their perspective of the conference. Pictures are of Beach Watchers attending the conference and are interspersed in this segment. The pictures do not relate to the subject matter in the reports.

Reported by Mary Jo Adams

There was so much to learn at the Georgia Basin/Puget Sound Research Conference that it's hard to know where to start. It was a wonderful opportunity not only to learn, but also to be inspired and to network with other people who share our concern about the environment. After arriving home I discovered that if you have access to the web you can view two of the fine videos we saw at the film festival.

"Abalone Odyssey" is about the abalone crisis in Barkley Sound, located on the west side of Vancouver Island. In some B.C. waters, populations of **pinto abalone** (*Haliotis kamtschatkana)* have dropped 75% in the last 25 years. Local communities, First Nations with their traditional knowledge, and scientists from the Bamfield Marine Science Station have joined forces to try to help the species recover. Terra film company has created a wonderful video to tell their story. One of the things I liked best about the video was the commentary by First Nations spokesmen. One tells the story about when he was a boy and his grandfather took him for a walk in the woods. They looked back at his footprints and his grandfather pointed out how the footprints had touched so many things, and that illustrated their philosophy that everything is one; everything is connected.

Beach Watchers that attended the Georgia Basin Puget Sound Research Conference. Mary Jo Adams, Sandy Dupbernell, Jill Hein, Kristen Cooley, Jan Holmes, Finn Gatewood

On the website, the video is divided into two downloads. The web addresses for these are: http://www.lifeonterra.com/episode.php?id=47 for part 1 and http://www.lifeonterra.com/episode.php?id=48 for part 2.

In addition to the abalone video, Terra has created a number of other videos with nature themes and they too are available to be viewed online. Check out the archive for a complete listing: http://www.lifeonterra.com/archive.php.

Another video that dealt with **invasive silver carp** in the Mississippi and Illinois Rivers left us slack jawed with amazement. During the 1970s, these fish, native to China, were introduced into Arkansas ponds where catfish are commercially farmed, in an attempt to control underwater vegetation. You may remember the severe flooding that affected that area in the 1990s. Those overflowing rivers provided an avenue for the carp to escape and make their way into the Mississippi where they have proliferated, moved north, and now threaten the Great Lakes. The carp, which can grow to 50 pounds, are now a threat not only to native species that they compete with for food, but also to human boaters, who have been knocked out cold when the fish jump out of the water and crash into them in their boats. In one astonishing sequence, wildlife officials applied an electric current to the water to try to get an idea how many of the invasive carp were present. The waters around the boat suddenly took on the appearance of wildly popping popcorn coming out of the water, except instead of popcorn kernels, large fish were flying through the air. In researching for this article, I discovered the video, "Asian Carp Invasion," is available on Youtube at:
http://www.youtube.com/watch?v=yS7zkTnQVaM&NR=1 (part 1) and http://www.youtube.com/watch?v=2ChwJiKKBdA&NR=1 (part 2).

Getting away from the film festival and back to the actual conference, there was discussion of another invasive species, the **European green crab** (*Carcinus meanas).*

Reports from three attendees to the Georgia Basin Puget Sound Research Conference *(continued)*

Beach Watchers have been watching for this aggressive species for more than six years now. Although it has not been found in Island County waters, word from the conference is to continue looking for it. The invasion of the European green crab has not been a steady march up the West Coast, but instead, has tended to take giant steps during El Niño years when warmer water temperatures and changes in water current patterns seem to give a boost to its dispersal. Because we are now in the midst of an El Niño event, this could very well be the year this crab shows up in our waters. Researchers have been working on a DNA based test to detect European green crab larvae in plankton samples. Success with this would add a tool for monitoring our waters for the presence of this species. In addition, trapping projects have been undertaken to try to decrease the numbers and impact of the green crab. In Bodega Bay, California where the species has had a major environmental impact, more than 10,000 were trapped over a 75-day period. Scientists are hoping to come up with a pheromone that will attract these crabs to their traps so even more can be caught and eradicated.

For more information about the European green crab, see the Beach Watcher EZ ID web page http://www.beachwatchers.wsu.edu/ezidweb/animals/Carcinusmaenas.htm or Washington Dept. of Fish and Wildlife aquatic nuisance webpage http://www.wdfw.wa.gov/fish/ans/greencrab.htm .

Dr. Roland Anderson, an expert on cephalopods, has worked at the Seattle Aquarium for 29 years. His discussion of the **giant Pacific octopus** (*Enteroctopus dolfleini)* was absolutely fascinating. He confirmed that the proper grammatical term for octopus in the plural is "octopuses" rather than "octopi" because the word originates from the Greek language, not Latin. You are probably aware of the octopus's amazing ability to change color and blend with its background. Dr. Anderson explained that this is accomplished by specialized cells within the skin. Chromatophores reflect color, leukophores reflect white, and iridophores are reflective to help the animal blend with the background and can also produce a metallic sheen. Additionally, the skin has papillae that allow it to change in texture. In spite of these amazing camouflage capabilities and the fact that octopuses have eyes with retinas like ours, their eyes lack color receptors, so they are colorblind.

Two species of octopus are commonly found in Puget Sound area waters. They are the giant Pacific octopus and the Pacific red octopus (*Octopus rubescens).* In addition to size differences, these two species can be differentiated because the body of the giant Pacific octopus is wrinkled, while that of the Pacific red octopus is not. Also, the giant Pacific octopus has a white bar across its eye, another feature that the Pacific red octopus lacks.

Giant Pacific octopus like to live in dens and over the years, Dr. Anderson has made the observation that when they are small, they often take up residence in beer bottles, seeming to prefer brown beer bottles over those that are either clear or green. They also like beer bottles with a lot of growth on them, such as barnacles. Older octopuses are often located by searching for middens. They tend to pile up clam shells and crab carapaces just outside their den.

Sandy Dubpernell and Jill Hein turn their backs on the caimans.

Reports from three attendees to the Georgia Basin Puget Sound Research Conference *(continued)*

Dr. Anderson can judge how fresh a crab carapace is in the midden by how it crunches. Immediately after the crab is consumed it is not brittle, but becomes so after about a week.

You may have read stories about the ability of an octopus to learn to open a jar to get at a food item inside. In the past, octopuses have sometimes opened jars but it had not been shown that this was a consistent learned behavior. Dr. Anderson provided octopuses with jars having varying cues about the crayfish prey inside. The jars were either clear, opaque, with holes in the lid, or smeared with mucus from herring. The first 3 variables seldom resulted in the jars being opened. The jar smeared with herring mucus was a different story. Dr. Anderson told us that octopuses can taste with their suckers. Because of this, the octopus could detect the mucus even while the jar was up under its mantle and out of sight, and would continue trying to open it more persistently than it had the other jars. It took an octopus 41 minutes to open the jar on day 1, and that time had improved to performing the task in only 15 minutes on day 3. This was a classic learning curve and showed that the octopus had indeed learned the behavior.

Mary Jo Adams, BW Class of 1999

Sandy Dubpernell mans the Central Puget Sound Marine Mammal Stranding Network display.

Reported by Jan Holmes

Street cleaning is a cost effective way to reduce stormwater pollutants

Roger Sutherland of Pacific Water Resources in Beaverton, Oregon has been a watershed management engineer for 32 years. His specialty is engineering projects that enhance water quality and reduce stormwater toxins. His presentation presented compelling evidence (budget percentages) that municipalities could save just by cleaning the streets on a regular basis. Street cleaning reduces the need for costly stormwater treatment systems by eliminating the pollutants before they become part of stormwater runoff.

Most of the pollutants in stormwater runoff, including heavy metals, pesticides, herbicides and petroleum products, are stuck onto small particulate matter (dirt and debris). Mr. Sutherland said that a decade ago, street sweeping was dismissed as ineffective because the sweeping/cleaning equipment was not advanced enough to do a thorough cleaning. He said historically, sweeping has been done for esthetic reasons, or to move salt and gravel off the roads after winter snow and ice.

There is now a new generation of "Regenerative Air" sweepers that dislodge dirt and debris with high-pressure air hoses, and then suck up the dislodged particles into a container. These cleaners are currently in use in many parts of the country (and world) including Portland, our sister municipality to the south. Mr. Sutherland is currently working with the City of Seattle on a pilot street sweeping program. I contacted Keith Ward of Seattle Public Works about the program, and he directed me to an interview he did with *worldsweeper.com,* an international street sweeping organization! In the interview, he said their main objectives are to reduce the pollution entering Lake Washington and Puget Sound and to reduce maintenance costs. He said they have been overly focused on treating water after it was polluted. He said a water cleaning truck costs $300,000, and takes two people to run. A regenerative sweeper costs half that amount and requires one driver. He said the Seattle pilot program has three sweep sites, including the Duwamish Basin–one of the

Reports from three attendees to the Georgia Basin Puget Sound Research Conference *(continued)*

most polluted runoff sites in Puget Sound. The pilot project began in 2005 and will be complete in 2007. To read the entire interview or to find out more about regenerative air sweeper projects or to contact Keith Ward, please log on to: http://www.worldsweeper.com/Street/Studies/Seattle2006/SeattleInitialInfo.html.

Ballast water exchange is not effective in reducing non-indigenous species entering Puget Sound

Several researchers from Canada and the United States presented oral and poster presentations about the effectiveness of ballast water exchange in preventing non-indigenous/invasive species from invading new territories. Currently, ships entering Washington waters and planning to discharge ballast must exchange their ballast water with water collected at least 50 miles offshore (if traveling up the coastline) or 100 miles off shore (if traveling across the Pacific). However, many exemptions currently exist. Samples of exchanged ballast water, from ships exchanging both 50 and 100 miles out, were found to have large numbers of non-indigenous and nearshore invertebrate species in the samples. More organisms per sample were found in the 50 mile exchange water.

Now recognized as a major maritime and ecological problem that must be dealt with effectively and soon, countries and maritime organizations around the world are changing their standards for maximum allowable numbers of viable organisms in ballast water samples coming into foreign ports. Proposed limits will be virtually impossible to achieve by just exchanging the water. Inevitably, ballast water will have to be treated to kill off the non-indigenous biota.

Water treatments currently include ultraviolet (UV) radiation, ozone, sodium hypochlorite, a combination sequential filtration and UV light system, and SeaKleen, a naturally occurring biocide (menadione or Vitamin K3) that kills dormant eggs of marine species. Different treatments have different positive and negative attributes, and some work better on a large scale while others are more effective on a small scale.

Two years ago the research conference was in Seattle and many of these treatments were just in experimental stages. Now many of them have been tested and evaluated onboard ships. Science has done a good job of addressing the problem, and now it's up to the policy makers (and the opposition they will face from the shipping industry and other economic interests).

Orion, Mars, Venus and Neptune—and you thought they were celestial bodies

The earth, ocean, and planetary sciences are shifting from an intermittent research cruise "dip stick" sampling method of identifying "what's out there" to a sustained, real-time experimental mode of exploring natural systems daily, or even hourly. Such approaches are crucial to understanding episodic and prolonged processes in the ocean, which directly impact human society, our climate and the incredible range of natural phenomena found in the largest ecosystem of the planet.

Phyllis Kind and Frances Wood show their Pigeon Guillemot Breeding Survey data.

Reports from three attendees to the Georgia Basin Puget Sound Research Conference *(continued)*

The Orion, Mars, Venus, and Neptune programs are the future of ocean science. They are cable-connected, ocean floor research stations that will be sampling 'round-the-clock and making use of Internet and telecommunications technology to create a permanent link to monitoring instruments on the seafloor. This gives scientists and the public an on-going way of monitoring the ocean environment.

ORION The Ocean Research Interactive Observatory Networks, will be composed of three cabled observatory research areas:

1. **MARS** the Monterey Accelerated Research System in Monterey Bay will serve as the test bed for a state-of-the-art regional ocean observatory. It will include one science node on 51 km of submarine cable, with expansion capability for more nodes in the future. The science node will provide eight science ports.

2. **VENUS.** The name VENUS, short for Victoria Experimental Network Under the Sea, points to its location in southern British Columbia. VENUS aims to study three sites near Victoria, B.C.: a location in Saanich Inlet north of Victoria which went into operation in February, 2006; a location near the Fraser River Delta; and a location in the deeper waters of the Strait of Georgia.. The Strait of Georgia cable is in place and will be in operation sometime in 2007. See the web pages on each location to learn about their distinctive properties.

Each VENUS location is linked to the Internet with an underwater power and fiber optic cable. Instruments at each of the three locations are attached by their own cables to a node, which is the interface with the main cable. The nodes will collect data on dissolved oxygen, temperature, salinity, density, conductivity, particulate matter, chlorophyll, total dissolved gas pressure, water column velocities, acoustics, and hydrophone profiles of phytoplankton, fish, marine mammal vocalizations and marine traffic, and continuous video scanning of the area.

One recent experiment conducted by a forensic scientist was examining decomposition processes of a human body (using a pig carcass) in the ocean. They deposited the carcass near a video camera and watched the "pecking order" of scavengers and the time it took them to devour the carcass; this can be viewed on the website.

The first phase of VENUS is up and running, and all data is accessible and user friendly, even to non-scientists. An orientation section on the VENUS website makes it easy to explore.

3. **NEPTUNE** the North-East Pacific Time-series Undersea Networked Experiments will be the world's largest cable-linked seafloor observatory. It will expand the boundaries of ocean exploration and give us a new way of studying and understanding our planet. NEPTUNE brings the power of the Internet to the ocean environment through novel technologies.

Stage I of the NEPTUNE project will lay an 800 km ring of powered fiber optic cable on the seabed over the northern part of the Juan de Fuca tectonic plate. The Juan de Fuca plate is the smallest of the dozen major plates that make up the planet's surface, and offers a full range of earth and ocean processes to observe. The cable will have a series of 15-20 instrument nodes, like VENUS, from which land-based scientists will control and monitor the sampling instruments, video cameras, and remotely-operated vehicles,

Kristen likes what she sees at the Vancouver Aquarium.

Reports from three attendees to the Georgia Basin Puget Sound Research Conference *(continued)*

as they collect data from the ocean surface to under the seafloor. The instruments will be interactive–scientists will instruct them to respond to events such as storms, plankton blooms, fish migrations, earthquakes, tsunamis, and underwater volcanic eruptions, as they happen. Information and images gathered by NEPTUNE instruments will flow instantly via the Internet to laboratories, classrooms and living rooms around the world.

For more information on these projects, visit these sites:

http://www.orionprogram.org/
http://www.mbari.org/mars/new/overview.html
http://www.neptunecanada.ca/
http://www.venus.uvic.ca/resources/related_links.html

Low oxygen levels in Hood Canal; dead zones, fish kills and bacteria mats

Several sessions of presentations were devoted the chronic low oxygen levels that are found in parts of Hood Canal, either seasonally or throughout the year. Several focused on the September 19, 2006 animal die-off, and bacteria mats often associated with low oxygen conditions.

Low oxygen levels can be the result of human intervention or can be caused by natural marine processes:

• Nutrients entering marine waters from the shoreline and upland can trigger plankton and macroalgae blooms. Initially these organisms release oxygen through photosynthesis, but as they die bacteria, in the process of breaking down dead tissue, can deplete oxygen in the bloom area.

• The shape and depth of inlets can create areas of poor tidal flushing and minimal water exchange, resulting in low oxygen. Some basins in Hood Canal and Puget Sound require numerous tidal exchanges to move older, deeper water out and replace it with surface water.

• Nutrient-rich cold, upwelled water entering Puget Sound and Hood Canal through the Strait of Juan de Fuca from the Pacific can be low in oxygen to begin with, and as nutrients enter the photic zone and are taken up by phytoplankton, the same scenario occurs as in the first example of nutrient runoff from upland areas.

The massive fish and invertebrate die-off in 2006 was triggered by a combination of these events. Bottom water was already low in oxygen (exact cause is undetermined) and then three days of sustained winds blew surface water offshore, which was replaced by very low oxygen upwelled waters from the Pacific. There was a 24-hour time period in which oxygen levels reached lethal limits for invertebrates and fish. The fish made an attempt to move off the bottom to the surface where oxygen levels were a bit higher, but even near the surface oxygen levels were lethal for fish, and there was no place for them to go. This event happened on the Olympic side of the main arm of Hood Canal. Footage taken just after the event showed miles of invertebrate and fish carcasses covering the bottom.

Related to low oxygen levels is the presence of visible mats of white bacteria on the surface of sediments and rocks in several marine habitats in Puget Sound, including Hood Canal, Commencement Bay and others. The bacteria is *Beggiatoa* spp., one of the largest species of bacteria, which can be seen with the naked eye! *Beggiatoa* is chemosynthetic, requiring hydrogen sulfide for its metabolic processes (*Beggiatoa* is also found at hydrothermal vent locations). But it also requires small amounts of oxygen, so it lives in the sediments at the interface of oxygenated sediments above and anoxic sulfur sediments below. Normally *Beggiatoa* remains below the surface, but when oxygen levels on the ocean bottom become very low it rises to the surface in search of oxygen. The increased incidences of *Beggiatoa* mats may be an ecological indicator of hypoxic (low oxygen) and anoxic (no oxygen) conditions in Puget Sound.

Can these scenarios happen in our backyard? They *can* and they *have* in the past. Three years ago, a sea lettuce bloom was responsible for a fish and invertebrate die-off near the end of Penn Cove. Currently, a researcher from Shannon Point Marine Lab (Western Washington University) is studying the causes of sea lettuce blooms in Penn Cove.

Penn Cove and Holmes Harbor are shallow inlets, susceptible to low surface mixing and warm water temperatures in the summer, and geographically located to receive nutrient runoff from upland areas. This is a recipe for marine mortality. How much of it is preventable by human behavior? How much of it is part of changing climate patterns? How much of it is "normal?" The questions are as yet unanswered.

Reports from three attendees to the Georgia Basin Puget Sound Research Conference *(continued)*

For more information on low oxygen in Hood Canal and the science and biology of low oxygen conditions, visit the Hood Canal Dissolved Oxygen Program website at http://www.hoodcanal.washington.edu.

Jan Holmes, BW Class of Summer 1990

Conference reports by Finn Gatewood

The next time I'm feasting on salmon, Dungeness crab, or other seafood, I'll probably take pause to think of other marine life that may have died subsequent to collection of the seafood on my plate. Ginny Broadhurst, Northwest Straits Commission, presented a talk on "The Impacts of Derelict Fishing Gear to Species and Habitat in Puget Sound" at the Georgia Basin Puget Sound Research Conference. She played a video showing a driftnet, covering several acres, that had been lost for about 10 days. The net encompassed a huge kelp bed and its inhabitants. A dead seal and fish hung from the net.

Lost or abandoned commercial and sport fishing nets, lines, pots, and traps can trap and kill a variety of marine organisms for years. The derelict fishing gear (DFG) is made from synthetic materials and therefore, doesn't degrade. As a result, the DFG "continues to fish," as in the case of crab pots. Use of an escape cord on crab pots, made of biodegradable cotton cord, is now recommended to lessen the chance of organisms dying in lost or abandoned crab pots. Other problems with DFG are that it entangles divers and gets into propellers. In addition, when marine life gets entangled and dies, the carcasses attract more predators. The gear can also smother marine habitat and make habitat inaccessible. Reasons given for DFG include weather, human failure, and mechanical difficulties.

Howie Garrett and Susan Berta founded OrcaNetwork.

A DFG survey and removal program in Puget Sound was developed through a Northwest Straits Initiative. The program is funded from federal, tribal, state and local governments, and private foundations. A reporting system for fishermen and the public to report lost gear has been established. Currently, there are about 4,000 targets in the database. Sonar is being used to help find DFG, which is removed by divers and also by the use of remotely operated vehicles in deep water.

Besides removing the gear, the program is focusing on quantifying the impacts that DFG is having on the Puget Sound ecosystem. Ginny reported that in an area where 123 acres of netting had been removed, there were 16 dead marine mammals, 123 dead birds, 833 live and dead fish and about 5,000 live and dead invertebrates. This small sampling shows that the impact of DFG in Puget Sound is significant. We must all do our part in minimizing any contribution to this DFG problem, encourage the use of escape cords on crab pots, and report any DFG observed. Ginny Broadhurst is the Marine Program Coordinator and can be contacted at *broadhurst@nwstraits.org.*

Finn Gatewood, BW Class of 2006

Meet the 2007 Beach Watchers Class

Tom Albrecht
Born and raised in Wheaton, Ill. After graduating from Bradley University, Peoria, Ill., worked for Hyster Company (fork lifts and construction machinery). Transferred by Hyster Co. to Seattle to cover four Northwest states, B.C., Alberta, and Alaska. Ended up working for N.C. Machinery (Caterpillar) dealer selling heavy construction equipment in South King County for 20 years. Retired 1997 to home on Whidbey (site of our old summer cabin). I have two children living in the Seattle area and two grandchildren.

Jene Anderson
I moved up with my family in 1988 from Santa Barbara, Calif. to Whidbey Island.
I worked at the Channel Islands National Park as an interpretive park aide in the 1980s. I graduated from Santa Barbara City College with an Associates of Sciences in Environmental Studies. I have been a volunteer at the Admirality Head Lighthouse at Fort Casey since 1992.

Nancy Bartlett
I have lived on Whidbey for almost 20 years and raised three children on Holmes Harbor, where my husband and I are still putting finishing touches on the house we began building when we moved here from Seattle. I have been a technical writer and reporter, and currently work for Coldwell Banker Tara Properties, doing special and technical projects, ranging from web site design and content development, to construction project coordination. In my spare time I write, play soccer and travel as often as possible.

Anne Baum
My arrival on the island five years ago was the culmination of a 25-year dream. In another life, it seems, I traveled and lived abroad with my husband's business, had a career in professional golf, had a second career as an entrepreneur in technology marketing; but this is the life and this is the place that I was made for. And I'm having fun.

Lee Chavez
My husband Harrison and I live near Langley with our cat, Petey. We have been here for five years, before that we were in Pueblo, Colo. I worked as a hydrologist for the U.S. Forest Service for 25 years, mostly in Colo. and Wyo. I still do some consulting work in hydrology. I graduated from Colorado State University with a degree in Watershed Science. My hobbies include biking, learning to kayak, birding and skiing (which I haven't done much of since leaving Colorado).

Connie Clark
Moved from N.J. to Scatchet Head in June '06. Interested in gardening (particularly with native plants) and in using the web to effectively organize and disseminate the great collective information in BW brains.

Neal Clark
Retired and moved to Whidbey Island from Fair Haven, N.J. in June, 2006. Had a technical career in telecom, multiprocessors, and internet technology. Enjoy singing, exploring, and hiking into beautiful places.

Karin Coleman
My first flight took me to my dream country, America. Soon I got married, raised three great sons, they and their families are today my best friends. Went to restaurant school, started party planning and catering for the rich and famous and the not so famous for 20 years, lots of work, fun and interesting. We came to Whidbey in 1988. My husband and I, by ourselves, built our waterfront dream house. I never felt at home there. Now we live in an old, cozy, little mobile next to the Greenbank Farm, we love it. I sell sausages and good mustard at the Loganberry Festival. We go "Island hopping" every year on our Vespas (mine is hot pink). I hike the fields and forests every day. We ski, kayak, travel, some back packing. We grow all our vegetables at the Farm's peapatch. I refinish old furniture, knit, sew, cook, and do some watercoloring on rainy days. Some days I go to Ikea demonstrating my mustard, having fun talking with the Swedes. Life is good here.

June Davis
I am a horticulturist by profession, now in semi-retirement, and excited to spend some time learning about a new area of the great outdoors. My husband, who continues as the breadwinner, will be learning the material as I tell him about the classes and all the fascinating things we learn each session. We are both avid outdoor, animal, and kid people who look forward to meeting everyone.

Meet the 2007 Beach Watchers Class (continued)

Sean Donalty
Outdoors man, father of two "little guys," proud and hard working "Navy spouse." I enjoy field studies and hope to be able to contribute to a better understanding of our environment so that appropriate decisions can be made in the future. Would like to focus on wildlife habitat, have a biology and economics degree, and am a firefighter and EMT.

Sharon Dunn
I moved from Seattle to Whidbey four short years ago. During that first year I met native plant people and was able to take their stewardship class. Now I am excited about adding that knowledge and the beach together. I enjoy traveling, reading almost everything, gardening, quilting and the interests of my twin grandsons. My remodeled home adjoins the Greenbank Farm–what a great neighborhood.

Barry Dunn
I am a retired nurse who moved from Florida last May with 16 four-legged children who are rescue babies, in a 31-foot motorhome. I love the outdoors, gardening, golfing, and being around people. I volunteer at the Naval Base in the hospital–to remind me why I retired. I am a licensed search and rescue pilot.

Kathy Fritts
Originally from a ranch in the Wyoming sandhills–lots of beach, no water. Moved to Washington in 1976–cannot imagine living anyplace else. Have degree in Social Science-anthropology/archaeology. Retired from Verizon in Dec. '06. Love to travel, kayak, garden, spend time with my grandkids, read and learn.

Lisa Harkins
A Greenbank resident of seven years. She and her husband of 19 years have a 12-year-old daughter, and Lisa is no stranger to volunteerism. She is involved in WSU 4-H, Girl Scouts, Whidbey Audubon, and the Marine Mammal Stranding Network. She also participates in the COASST and Pigeon Guillemot surveys. When she's not outdoors or working with the Island's youth, she is a textile artist and papermaker.

Ann Koehler-Christensen
Worked for the "Telephone Company" for 34 years in Public Policy and Regulatory Finance (Masters in Regulatory Economics). I was raised in Mt. Vernon (I've known Experiment Station and Extension people all my life) and have lived on Whidbey for nearly 13 years with my husband Dale (4 children; 6 grandchildren). I love the Northwest and all it has to offer, including swimming, hiking and boating in the summer, snow skiing in the winter and gardening, walking the beaches and kayaking all year long. I'm so impressed with WSU Beach Watchers and looking forward to my life as a Beach Watcher.

Mahmoud Abdel-Monem (Monem),
Born in Cairo, Egypt. Married, two sons and one grandson. Served on the Faculty of the University of Illinois, University of Minnesota and WSU (1966-1998). Retired as Professor & Dean of the College of Pharmacy, WSU (1998). Moved to Whidbey Island from Coeur d'Alene, ID in 2005.

Missy Merickel
Grew up in the middle of 13 kids and wanted to become a "saint" when I grew up. At 13 I got interested in science and changed my mind. I ended up a pediatric dentist some years later and married my boyfriend "Jim"–moved to Duluth, Minn. and we practiced together for enough years so we could retire to live out our dreams. My boyfriend and I ended up finding a place in the woods, on a lake, on an island in this land of Oz where people volunteer to keep their dreams alive.

John Moon
Over my 70+ years, I have been a black shoe in the Merchant Marine, an airdale in the Navy, a builder (sort of), an entrepreneur, volunteer firefighter, part time farmer/ cattleman, 4H leader, Alpine skier, Coupeville Festival volunteer and, oh yes, father of five.

Wendy Moon
Wife, proud mom, friend, organized, gleefully retired, a volunteer, amateur naturalist, sun worshipper, environmentalist, avid skier, walker and hiker, former horsewoman and backpacker. I like animals, people, wildflow

Meet the 2007 Beach Watchers Class (continued)

ers, reading, sunny days, and being outside. I dislike early mornings, big cities, grey days, and being cold.

Judy Opheim
Raised in rural Pennsylvania, I completed my undergraduate education in sunny Long Beach California and taught high school for three years. Too much sun and not enough rain in Cali led me to Seattle where I met my husband John in the Mountaineers. We have two adult sons in the Seattle area no grand-hatchlings . Retirement and a new job brought us to Oak Harbor, and my retirement led us to the Island beaches and to Beach Watchers.

John Opheim
Hatched, Aberdeen Wash. 1943. Moved to Pendleton Ore. 1945. Moved to Southern California, (unwillingly) 1948. Grew up there. . .work in progress. U.S. Air Force 1961-1965. Cal State Long Beach B.A. 1966-1971. Moved to Seattle 1972. Married 1975. Two adult sons. Still married (very happily). Retired from 35 years with Sears 2002. Moved to Whidbey Island 2005. Never looked back. Hope Seattle enjoys their tunnel or whatever. Signed up for Beach Watchers 2006. Active in Boy Scouts and Audubon.

Toni Piazzon
A very active volunteer in our community, Toni is involved in many organizations that are involved with stewardship for wildlife habitat in the air, land and sea.

Rex Porter
A life-long Northwesterner–growing up in Oregon an hour from the beach. After a 22-year temporary diversion with the U.S. Air Force, he and his wife settled down in Coupeville three years ago. After putting energies into Lighthouse Keepers, Docent and LEP board efforts since 2004, Rex decided to dive into Beach Watchers. His hobbies and interests include photography, raptors, salmon recovery, our nearshore and surface water quality, and baking. He hopes to be an active beach watcher and that between our many, enthusiastic volunteers and efforts to bring more environmental stewardship resources to Island County (read that as dollars), we can keep our way of life as we, our birds and fish, want it!

Peg Urstad
Married to Ken (BW class of '05), retired field forester, outdoorsman, busy!, mother of Scott (COO of MediaPro, drummer in a "garage" rock band, soccer coach and player) and Heidi (attorney, restaurateur, professor, soccer coach). Five grandchildren, three "made from scratch" (ages 11, 9, 6), two came already assembled (ages 23 and 25). Worked in advertising for *TV Guide* and *Seventeen* magazines before starting family. Retired as print shop manager for Anacortes public schools after 25 years in education. Have lived on Whidbey part-time and now full-time for 53 years. We are in our dream house on North Bluff Road in Greenbank. Love our grandchildren, walking, skiing, anything to do with the water. Love to read (and not the least bit selective!). I have a passion for this area and am searching for the best way to use that through Beach Watchers.

Jeannene Wisniewski
I moved to Whidbey 27 years ago. We raised two boys and they are now 40 and 36 years old. One lives in Graham, Wash. and the other in Sacramento, Calif. Both graduated from Oak Harbor High. I have been an Oak Harbor Lion for 17 years and have started working with Relay for Life as well as starting with Beach Watchers. I have been married for 42 years to a very loveable man. Navy, Retired. I came here originally from Long Beach, Calif. I was medically retired from working two years ago. I love to go camping and walking. I like to walk on beaches and look for tide pools to see the creatures there. I haven't done that in a long time until now. I will really enjoy being on the beach with all the Beach Watchers in the class of 2007.

Steve Young
Married (too many times), two daughters, four grandkids. U.S. Navy, Retired. Vietnam vet. Was an aviation electronics technician working on bombers. Engineer on fishing boats up in Alaska, retired. Enjoy travel (got back in September from three weeks in Europe). Play on my computers. Do beach walks with my dog Yogi. Will be feeding around a hundred hummingbirds this summer (I call them my air sharks). And of course, just loafing around and enjoying life.

Pigeon Guillemot Survey Meeting

The Pigeon Guillemot Survey Team will meet Thursday, May 3, at 7:30 p.m. in Trinity Lutheran Church, to coordinate the 2007 survey. New volunteers are most welcome, or just come to the meeting to learn about these charming seabirds and our methods of surveying them. You don't need to be an expert birder to take part in the survey. For more information please contact Phyllis at *phizhawk@whidbey.com,* 360-331-6337 or Frances at *wood@whidbey.com,* 360-341-2326.

Phyllis Kind, BW Class of 2000

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WASHINGTON STATE UNIVERSITY ISLAND COUNTY EXTENSION

WSU BEACH WATCHERS ISLAND COUNTY

"In the end we will conserve only what we love; We will love only what we understand;

We will understand only what we have been taught."

~Baba Dioum, Senegalese ecologist

DEADLINE FOR NEXT BEACH LOG
May 4, 2007