PRINCE WILLIAM SOUND SCIENCE CENTER
CORDOVA, ALASKA

the Breakwater

Winter 2007-2008

Newsletter of the Prince William Sound Science Center
300 Breakwater Avenue, P.O. Box 705 Cordova, AK 99574

The PWS Science Center building reflected in the calm water of Cordova Harbor

INSIDE

Save the date
COPPER RIVER NOUVEAU
June 21, 2008
Orca Adventure Lodge, Cordova

Oceanography Class on the Coast Guard Cutter Sycamore by Allen Marquette, PWSSC

In December, 18 high school students, their teacher and 7 science Center staff including researchers and educators spent the day on the U. S. Coast Guard Cutter Sycamore doing physical and biological oceanography in Prince William Sound. Several members of the community were also able to participate in the cruise and assist or observe the planned activities for the day.

As the trip commenced, students were separated into three groups with each group spending approximately 20 minutes at each of three separate stations during the cruise out to Simpson Bay for the day's activities. The first group of students learned the effects oil has on the environment and the organisms living in it with Scott Pegau, OSRI, Research Program Manager. Scott helped students and community members understand the complex issues related to oil spills and the environment.

The second station was manned by Neil Dawson, an avian biologist working for the Science Center. Students spent time with Neil on the deck of the Cutter looking for sea birds with binoculars. Students observed many different species of sea birds as the ship made its way to Simpson Bay.

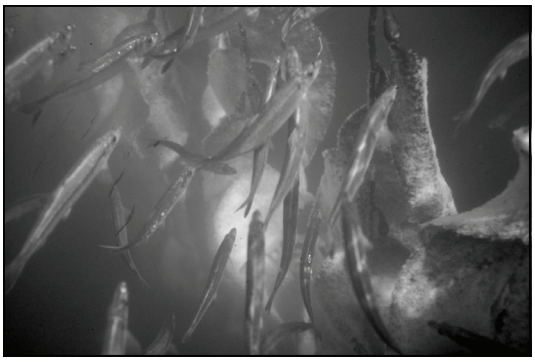
Cordova High School students pulling a plankton net aboard the U.S. Coast Guard cutter Sycamore

The third station was headed by the Sycamore's staff and provided students and community members with a tour of the ship and its navigation system.

Once the ship was on site at Simpson Bay, students again worked at three separate stations deploying a sediment dredge with Lindsay Butters of the education program and Kevin Siwicke a field biologist from the Science Center. They collected

Story continued on page 4

Prince William Sound Herring Collapse Linked with the *Exxon Valdez* Oil Spill



An important paper on the Prince William Sound herring collapse was published this month in a prestigious international journal, the *ICES Journal of Marine Science.* While scientists have generally believed that the 1989 Exxon Valdez oil spill did not cause the collapse of the PWS herring population -- because of a four-year gap between the spill and the 1992 collapse, this paper concludes that the decline occurred over a five-year period, rather than the single-year collapse previously reported.

"Herring and the *Exxon Valdez* oil spill: an investigation into historical data conflicts" is authored by senior PWSSC scientist, Richard Thorne, and former PWSSC president, Gary Thomas, now with the Rosentiel School of Marine and Atmospheric Sciences, University of Miami. The authors examined historical patterns of herring spawn, anomalies in historical fisheries model predictions, changes in predation behaviour of Steller sea lions, and the PWSSC's decadal database of acoustic measurements of herring biomass. They also show that the behaviour of adult herring makes them especially vulnerable to damage from oil spills and conclude the evidence supports the thesis that the start of the PWS herring decline was coincident with the *Exxon Valdez* oil spill.

In the same journal issue a separate paper, by Peter-John Hulson and others, continues to assert that the main decline started in 1992 although they conclude that alternative views, such as Thorne and Thomas', are also consistent with the existing data. Thorne states that both analyses suffer from a lack of data before 1993. "No level of sophisticated post-disaster analysis can replace the routine collection of well-considered environmental and fisheries management data," Thorne and Thomas conclude. "We support the ultimate conclusion of Hulson *et al*. (2008) that management would benefit from a comprehensive management framework, as provided by the ASA (age structured analysis model), and a methodology to provide a timely check on potential changes in mortality rates and biomass, as provided by acoustics."

Copies of these publications may be requested from the primary authors (rthorne@pwssc.org or p.hulson@uaf.edu).

Cruise Report : Herring and Sea Birds, PWSSC Researchers

Richard E. Thorne, Mary Anne Bishop, Neil Dawson, Richard Crawford

PWSSC personnel conducted a cruise in Prince William Sound during November 2007 that targeted juvenile herring and their predators. The cruise was a combined effort of several projects: (1) Steller Sea Lion Winter Food Limitation (NMFS, P.I. Richard Thorne), (2) Trends in Herring Abundance and Distribution (EVOS TC, P.I. Richard Thorne), (3) Seabird Predation on Juvenile Herring (EVOS TC, P.I. Mary Anne Bishop), and (4) PWS Herring Forage Contingency/ (EVOS TC, P.I. Tom Kline). The cruise participants were Richard and James Thorne, Tom Kline, Rick Crawford, Neil Dawson and Kevin Siwicke from PWSSC and Karen Brenneman of US Fish and Wildlife Service, Anchorage. The eight-day cruise involved two chartered vessels, the M.V. *Auklet* and the FV *Kyle David*. Day and night acoustic surveys and synoptic daytime seabird and marine mammal counts were conducted off the *Auklet*, while the *Kyle David* concentrated on biological sampling with mid-water trawls and cast nets. Six areas were covered: Simpson Bay, Eaglek Bay, Sawmill Bay, Whale Bay, Zaikof Bay and Port Gravina. Highest abundance of young-of-the-year herring were found in Whale Bay and St Mathews Bay. Simpson Bay had an unusually large abundance of juvenile sand lance.

Field biologists Dawson, Siwicke and Brenneman sampling juvenile herring using a beach seine net.

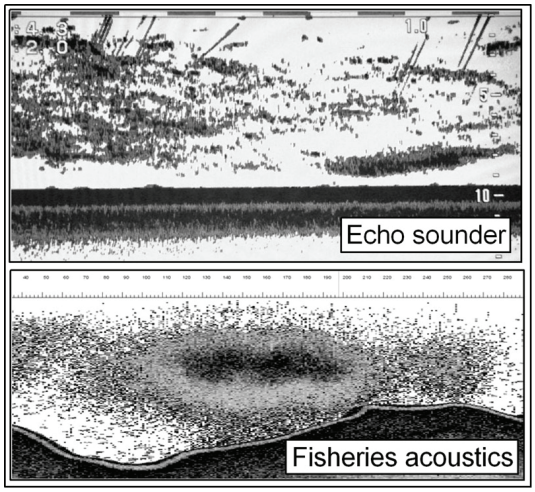


Figure 1. Video displays of Pacific herring and walleye pollock detected by two different kinds of fish finders. The echo sounder is in common use in Cordova's fishing fleet. The fisheries acoustics equipment is what we use at PWSSC. It is a highly refined version of the technology that allows us to accurately measure the amount of herring in our survey areas.

HERRING

Given that herring continue to be scarce at times, we are fortunate to have good equipment for our surveys. The instrumentation we use to study herring abundance and distribution is a highly refined version of the commercial-grade echo sounders in common use in the fishing fleet. The figure shows an echogram of a mixture of Pacific herring and walleye pollock displayed on a commercial-grade echo sounder. It does a good job of showing a fisherman where the main body of fish is in the water column. Compare this to the display from the scientific-grade fisheries acoustics sounder we use at the Science Center. This echogram reveals individual fish (also herring) in addition to the large concentration in the water column. The level of detail in the scientific grade sounder is not necessary in the normal routine of commercial fishing but is required in the realm of scientific assessment. Likewise, there is a large difference in our expectations and needs when it comes to biological sampling. While the commercial fisher seeks to maximize the catch, we only need 100 fish to make our day. That is why we can use much smaller nets, such as the small midwater try net and beach seine (Fig. 2) we used during our recent surveys. Nevertheless, herring are fast swimmers and sometimes it can be difficult to get a full sample. In our upcoming cruises during 2008, we plan to try small multi-mesh sinking gill nets in addition to towed gear.

BIRDS

Winter is an energetically demanding time for seabirds and any concentration of food, particularly of lipid-rich fish such as herring, will attract them in numbers. Our observers recorded all seabirds encountered within a 150m radius of the *Auklet,* both during acoustic transects for herring and while in transit between survey areas. Seabird numbers and species varied greatly between areas. Unusual for this time of year were the numerous sightings of fork-tailed storm petrels, most occurring in western and central areas of PWS. For other species, bays in northeast PWS were the busiest: Simpson Bay held high densities of marbled murrelets, black-legged kittiwakes and bonaparte's gulls while St. Matthews Bay contained an impressive number of loons along with glaucous-winged gulls and common murres. Apart from Zaikof Bay, which was popular with glaucous-winged gulls and kittiwakes, bays in other parts of PWS held very few birds and were unusually quiet. Interestingly, good numbers and varieties of birds were recorded in more open water outside of the bays, suggesting that fish were not yet concentrated in wintering sites, and the scarcity of humpback whales provided more evidence for this. This was confirmed two weeks later on a related cruise when high numbers of humpback whales and birds, particularly common murres, were observed in several straits and bays.

Field biologist Dawson shows off a string of three herring.

NOAA Completes Tidal Current Survey in Prince William Sound

by Jennifer Ewald, PWSSC

May 2007, the peaks of Hinchinbrook and Montague Islands were heavy with snow and Eyak Lake still covered with ice, when the first of four cruises on the ADF&G R/V *Solstice* began for the NOAA/Evans-Hamilton Team that would cover most of the Prince William Sound (PWS) Region and conclude in late September. The primary mission of this work was to update the tidal current predictions for NOAA's Tide & Current Tables, in support of safe marine commerce, the data will also be used to support the Alaskan Ocean Observations Systems (AOOS) PWS demonstration project, planned to commence in August of 2009.

A total of 47 stations of data averaging 40 days were collected using sub-surface moorings with Acoustic Doppler Current Profilers (ADCP), additionally a cast was taken at each site during the deployment and recovery collecting salinity and temperature data. This data will also compliment the ongoing oceanography program at PWSSC, where concurrent mooring arrays are strategically placed to enhance understanding of Gulf of Alaska water transport and exchange at Hinchinbrook Entrance and Montague Straight. The ADCP technology enables the researcher to measure high quality speed and direction data in layers troughout the water column.

Several stations were deployed for 70+ days near Cordova in Mud Bay, Cannery Row and Salmo Point. This data will aid in the understanding of the local circulation patterns that may be applied to other projects at the Science Center such as the Seafood Waste Discharge in Orca Inlet. These stations were very shallow, collecting many organisms on the moorings during the deployment period.

This was the most comprehensive survey done by NOAA's National Current Observation Program (NCOP) in one year. The last NOAA survey of this nature done in Prince William Sound was on the NOAA ship McArthur from 1976-1978 utilizing older technology allowing only a single point of measurement to be made in the water column. For PWS, a total of 47 stations are currently reported in the NOAA Tidal Current Tables, the data collected this year will be used in conjunction with the historic measurements to update the existing predictions and add new stations based on the updated user needs.

A NOAA team spent the week of August 28, 2006 in PWS on a quest to better understand local user needs for tidal current information. Jennifer Ewald, Laura Rear and Chris Paternostro of NCOP began the week in Cordova in the southeastern region between two major ecosystems, PWS and the Copper River Delta. A meeting to gather user information was hosted at PWSSC, on a clear and warm day. Cordova Harbor is home to humdreds of fishing boats, the Alaska Marine Highway System (AMHS) ferry, USCG Cutter Sycamore, along with cargo barges that keep this small harbor alive; all in need of up to date tidal current data. After the meeting, the team departed on the M/V Auklet, a local research charter, to meet with the Chiefs of both the Chenega Bay and Tatitlek tribes in their respective communities, the Southwest Alaska Pilots Association at their pilot station in a secluded natural harbor close to the pilot exchange, and then the US Coast Guard and the Alaska tanker Service in Valdez.

The team spent an afternoon in Chenega Bay, a village that has survived both natural and man made disasters over the last 40+ years yet still maintains a community of approximately 60, a museum, and a school; Chris, Laura, and Jen were invited to talk to the students about the work that they do for NOAA. The tribe rebuilt their homes on Evans Island after the entire village (save 1 building) was destroyed by the tsunami triggered by the 1964 Earthquake. They faced disaster again, exactly 25 years later on another ill-fated Good Friday when the Exxon Valdez wrecked on Bligh Reef spilling 11 million gallons of North Slope crude oil into PWS. Chief Pete Kompkoff of Chenega explained that the community conducts spill exercises to keep the equipment and skills prepared. A better understanding of the circulation in PWS will aid the spill response community to predict spill patterns and react to such an incident.

During our visit with Chief Gary Kompkoff in Tatitlek, he shared a first hand experience of the 1964 tsunami that did not hit the Village of Tatitlek but emptied the Narrows in front of it, feeding the ~220 foot wave that destroyed Valdez (largest wave height reported at Shoup Bay, Valdez Inlet at 67 meters). The team was honored by this unique experience with Chief Kompkoff and was deeply sorry to hear of his passing.

During meetings in Valdez information was gathered from the SW Pilots, PWS Regional Citizens Advisory Counsel, Alaska Maritime Agency, Coast Guard Marine Safety Office, Alaska Tanker Service, Ship Escort Response Vessel System (SERVS) Alyeska Pipeline, AK Department of Environmental Conservation, Stan Stevens Glacier Cruise and National Weather Service. The team then departed Valdez as guests on the AMHS High Speed Ferry CHENEGA. The Captains described the Ferry routes, areas of concern and shared their vast knowledge of navigating in the area.

High School oceanography students with teacher Mrs. Heitz, sketching marine organisms in their at sea laboratory

Students, high school science teachers, Science Center staff and community members participated in the December oceanography class cruise aboard the US Coast Guard Cutter Sycamore

Oceanography class trip,

continued from page 1

mud samples from the bottom of the bay. A vertical plankton tow was the next station students visited with Rob Campbell, a zooplankton specialist with the Science Center. Students used a single file hand over hand method of retrieving the plankton net.

At the last station, students worked with Scott Pegau to deploy a CTD instrument logging temperature, conductivity, depth, chlorophyll fluorescence and turbidity data. The data was later downloaded onto a computer for students to use in their classroom.

Students and Science Center staff spent the rest of their time on the trip back to port using microscopes to view and sketch the different organisms they found in the plankton tow and sediment dredging activities.

This trip would not have been possible without the support and enthusiasm of Commander Dunn and crew of the Cutter Sycamore.

Photos and story by Allen Marquette

The Discovery Room is *ENERGIZED* *by Krysta Williams, PWSSC*

Discovery Room kids on a harbor monitoring field trip.

The Discovery Room Program, a partnership between the Prince William Sound Science Center and United States Forest Service, Cordova Ranger District is in full swing as we investigate all aspects of energy!

October was devoted to defining and describing energy. In the coming months we will be exploring various renewable and nonrenewable sources of energy. Avalanche threats and technical difficulties made an autumn trip to the Power Creek hydro-electric plant impossible, however students will visit Cordova's diesel power plant in December to learn how fossil fuels are used to generate electricity. By the end of the school year, students at Mt. Eccles Elementary School will be able to answer this year's essential questions:

In what ways do people use energy?

How can we use energy more efficiently, effectively, and responsibly in order to reach our goals?

A generous contribution from Cordova Electric Cooperative (CEC) will help students to understand the processes necessary to supply a town with energy and to see concrete examples of the ways consumer choices affect energy conservation. Financial support from CEC allowed for the purchase of temperature data-loggers and coordinating software for use by students on Discovery Room Monitoring Fieldtrips. Each month, two delegates from each class in grades four through six accompany Science Center Education Staff on a fieldtrip to conduct an energy audit of a public building in Cordova. Students monitor the building for air drafts as well as for basic building design efficiency such as double pane windows, arctic entryways, the type of light bulbs being used and the source of heat for the building. The data-logger deployed in the elementary school building will allow students to analyze the use of artificial light and heat throughout the year. The energy audits conducted during the Monitoring Fieldtrips will give students a basis for recommendations they can make to local organizations to increase their energy efficiency.

The Science Center Education Staff would like to take this opportunity to thank the Mt. Eccles Elementary School of the Cordova School District for their donations of craft materials that allow the students of Cordova to take a little bit of the Discovery Room experience home to share.

The Discovery Room is also supported by Cordova Telephone Cooperative, Alaska Marine Lines, the Oil Spill Recovery Institute, ConocoPhillips, BP, and Prince William Sound Science Center members like you!

Teens Participate in Youth Environmental Leadership Program

By **Andrew Grant**, grade 10, Anchorage School District

From July 18th-27th Andrew Grant, Ryan Langston, Karl Oman, Chelsea Rothchild, Jake Nowicki, Drew Lindow, Zeben Kopchak, and Erik VanCleve participated in the Youth Environmental Leadership Program (YELP). During this 10 day trip we learned about the effects oil has on the environment, such as causing damage to the ecosystem when spilled. We learned that oil emissions contribute a great deal to Global Warming and we learned that Global Warming is a major contributor to Ocean Acidification, a process in which the ocean's pH scale goes down, causing certain species of shellfish to potentially die off and dealing serious damage to the ecosystem.

We also learned about the ecosystem around the Copper River Watershed. For the first two days we camped at Mavis Island, went kayaking to Humpback Creek where we learned about Geographic Information Systems with Stephanie Waite. After that we went to the museum at Ilanka where we talked about the Exxon Valdez oil spill. We also visited the Copper River Watershed Project and learned about the possibilities of an oil spill in the Copper River Watershed and the damage that such an oil spill could do. We then went to Valdez and met the Prince William Sound RCAC (Regional Citizens Advisory Council) where we learned about measures being taken to prevent another oil spill in the Prince William Sound such as the introduction of double hulled tankers and escort tugboats. We then drove to Chitina where we began a five day rafting trip down the Copper River with Alaska River Expeditions.

During this trip we learned about the ecosystem of the Copper River. We had a great time and we learned much. After we got back to Cordova we began creating projects to teach other people what we had learned. We also went on a hike to the reservoir, picking berries along the way. We also went to the Power Creek Hydroelectric Plant where we learned about electricity production and alternative energy sources, such as using water and wind power. After that we began putting the finishing touches on our projects. On the 27th we went down to the Copper River Watershed Project and presented our projects as well as talking about what we had all learned at an open house. The YELP camp officially ended at noon of the same day.

Altogether, we had a great time. We learned a lot, had a lot of fun, and had the experiences of a lifetime.

pwssc.org Website gets new look, new home

After many years of hosting our website locally, **pwssc.org** is moving to a new location. Having the webserver in the lower 48 will allow us to add several features we've been unable to do with the limited speed available to us in Cordova.

So besides loading faster than before our website will soon be adding some new content like more video footage and pictures. Also look for cruise reports from our researchers when they return from the field.

We will also be adding nuggets of information about the copper river delta and Prince William Sound gleaned from our years of research displayed on every page. The expanded education section will have more resources for students and teachers. Educator Krysta Williams now webmaster for her department's pages. Schedules for community education, camp and special events will be easily accessible.

And finally we will soon add flyover animations of Prince William Sound and Copper River Delta for playback in Google Earth. These animations will highlight some of the results of our ongoing research.

Welcome new field biologist Neil Dawson

Neil Dawson joined the Science Center team as avian biologist in October 2007. His previous work has centered on the population ecology of Atlantic seabirds and identification of marine protected areas in the UK, enabling him to spend long and happy periods on remote Scottish islands. He was off on a two week field trip on Prince William Sound within days of his arrival in Cordova.

He comes to us with a Masters in Science in Marine and Fisheries Science from the University of Aberdeen, Scotland, his thesis focusing on jaegers on the Shetland Isles. His interests lie in ecosystems approaches to the marine environment and his work here will explore the role seabirds in regulating herring populations around PWS. He is relishing the prospect of working on and living in the stunning and diverse environment of coastal Alaska.

Oil Spill Recovery Institute News, *W. Scott Pegau, Research Program Manager*

The Oil Spill Recovery Institute is vigorously pursuing involving people of all ages in developing and learning about new oil spill technologies. We have the oil-spill response prize program that looks for innovative solutions to existing challenges in the recovery of oil. There are two education oriented programs designed to attract students to study issues related to oil spill recovery; an undergraduate scholarship program, and a program tailored to introduce and involve students at the K-12 levels. Brief updates of these programs follow.

Oil-Spill Response Prize

The Oil Spill Recovery Institute is pleased to announce its first oil-spill response prize award for an innovative solution to improving oil spill response and recovery. OSRI worked with InnoCentive and partner groups to develop "challenges" this spring. Among those challenges that were developed was a challenge to develop a theoretical solution to break viscous shear in oil below its pour point. The pour point is the temperature at which the oil quits flowing (essentially freezes). This can occur if it is stored in a mini-barge in the arctic. At this point it is not possible to pump out the barge. The challenge was to develop a means to get the oil flowing to the pump inlet. See the June 2007 Breakwater for more details on this program.

OSRI and its partners worked together to define the criteria of success for the challenge. InnoCentive then advertised the challenge to its large pool of "solvers". After three months the solutions were provided to OSRI for review. There were 27 solutions provided to OSRI, of those there were three promising technologies described. A prize of $20,000 was awarded to John Davis for his solution using concrete vibrators mounted on poles that could be inserted through the access hatches of a mini-barge. The vibrators are normally used to liquefy concrete that has begun to set up. John's solution required the least modification to existing equipment and met the needs of operating at cold temperatures in remote locations.

Two other challenges were posted with InnoCentive. One was to economically remediate lingering oil in Prince William Sound. Six solutions were provided, but none were deemed to have met the criteria for a successful solution. The third challenge was for a means to contain and pick up submerged oil. Twenty solutions were provided for that challenge and we are still in the process of reviewing them to determine if a prize should be awarded.

OSRI plans to continue this process and will be working with its partners to develop new challenges this fall. Likely subjects will be looking for methods to prevent ice from forming on oil-spill recovery equipment, the development of an oil-spill simulant to be used during drills, and techniques that would allow oil recovery at night.

PRINCE WILLIAM SOUND
OIL SPILL RECOVERY INSTITUTE

Technology Scholarship

OSRI did not receive any applications for its technology scholarship being offered to undergraduates at the Kenai Peninsula College in the Process Technology or Industrial Process Instrumentation programs. We felt that part of the reason was that we were aiming for freshmen in a two-year program. These students would not have a good feel for the type of project that they might like to do for the internship. Therefore we rewrote the announcement with a November 2007 application date. This way we could target students already in the program. We look forward to seeing applications in the near future.

Technology Education Demonstration Project

In response to one of the recommendations of the National Research Council, we released the following request for proposals for a technology education demonstration project designed to introduce and involve school age students with oil spill recovery related technologies.

The Oil Spill Recovery Institute wants to demonstrate to and involve students with the technologies associated with oil spill recovery. It is accepting proposals for a grant to design and demonstrate a school activity that incorporates technologies related to oil spill detection, response, and ecological assessment in Arctic and Subarctic marine environments. OSRI is looking for a hands-on activity engaging students in the field of oil spill technologies. The activity is to be transferable to other locations in arctic and subarctic waters. Possible activities include, but are not limited to: have students work with existing spill recovery equipment, build and test small-scale oil recovery equipment of the student's design, use a remotely operated vehicle to map a portion of the seafloor, build an oil detector, and/or test organisms for the presence of hydrocarbons.

Proposals should clearly outline the type of technology program that is to be developed, provide a letter of support that states that a local school is willing to participate in the demonstration of the activity, and describe a process to make the activity available to other schools. Proposals are due by December third.

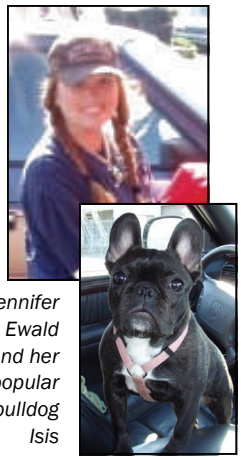
We are awaiting the arrival of proposals at this time. We have received inquiries about the program from as far away as Missouri, which makes me hopeful that we will have some high quality proposals coming in.

Focus on staff at the Prince William Sound Science Center

Jennifer Ewald began work with PWSSC in October 2007 as the incoming oceanographer, overlapping with Claude Belanger for the month. Jennifer's primary work will be with the oceanographic mooring program, funded by OSRI and with AOOS leading the effort for the PWS demonstration project planned for 2009.

Jennifer has been working as an oceanographer and project manager for NOAA's National Current Observation Program over the last 6 years. During this time, she built infrastructure for field operations in the Pacific Basin primarily in Alaska and is operationally experienced in 60 current meter deployments per season. She developed and managed engineering improvements for submersible buoy systems and established cross agency communications between Kachemak Bay Research Reserve and the Alaskan Ocean Observation System. In support of outreach and education, she sponsored and followed a NOAA Teacher at Sea with corresponding Documentary on the NOAA ship RAINIER.

Her work on the West Coast includes Cook Inlet, Southeast Alaska, Humboldt Bay CA and Narragansett and Chesapeake Bay on the East Coast. This year's tidal current survey brought her to Prince William Sound, where she decided to continue her work with the Science Center. She received her B.S. from Coastal Carolina University in Marine Science and attended graduate school at the University of Rhode Island working with current meters in Narragansett Bay. Graduate work at URI will be applied to the data sets collected in Prince William Sound focusing on tidal analysis and non-tidal transport.



Jennifer Ewald and her popular bulldog Isis

Ken visiting Sheridan Glacier

My name is **Ken Gibson**, and I love to learn! I have been a lifelong fan of both science and education, so the opportunity to work with the accomplished staff of the Prince William Sound Science Center is one I simply could not let pass by.

As Director of Development for PWSSC I will work with the local and regional community to create and sustain a program that diversifies PWSSC's funding. In addition, we'll explore ways to generate interest in PWSSC.

At the Science Center we have four goals for development: 1) to build organizational capacity, 2) to help support specific research projects and education programs, 3) to build an endowment, and 4) funding capital and equipment needs.

As a member of the Association of Fundraising Professionals, my assurance to the community is that we will conduct our development efforts strategically, according to the highest of ethical standards, and with the greatest efficiency. We, like you, want your gifts to matter.

I've spent my career leading and managing museums, science centers, libraries, zoos and parks in the Puget Sound region. I am a graduate of Seattle University's Nonprofit Leadership Masters Degree program, and currently advise it and several other boards. When I'm not working, I spend time with my wife, Aimee and my three kids. I love to go fishing, am a volunteer in emergency radio communications, and like to play guitar.

I am looking forward to what we can do together to make PWSSC a truly great science and education organization.

Please Join as a Member of the Prince William Sound Science Center !

The mission of the Prince William Sound Science Center is to:

- Contribute to the comprehensive description, sustained monitoring and ecological understanding of Prince William Sound, the Copper River and Gulf of Alaska;
- Promote the goal of maintaining long-term, self-regulating biodiversity, productivity and sustainable use of renewable resources;
- Educate and inform the youth and the general public about the critical interdependence of the biology and regional economies of Alaska

Your contribution supports locally based research and education in Prince William Sound, the Copper River Delta and the North Gulf of Alaska.

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Please check the membership level of your choice. THANK YOU!

❑ $1,000—Orca ❑ $500—Grizzly ❑ $250-Eagle

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Premium gifts include mugs, posters, sweatshirts, T-shirts and aprons!

Credit card contributions may be made by calling (907) 424-5800 x 223 or 227

or mail to: P.O. Box 705, Cordova, AK 99574

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See the latest news about our research and education programs as well as membership premium gift details at our web site: **www.pwssc.org**

The Prince William Sound Science Center is an independent, nonprofit research and education organization based in Cordova, AK. Most of our research and education programs are grant-funded. Communications and research planning activities are funded by membership contributions. Help us to continue to serve the public as an information resource.

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NOAA completes Prince William Sound tidal work, from page 3

Improving predictions and monitoring of tides and currents for navigational safety is of particular importance to the people of PWS because they rely on the water in many aspects of their daily lives. There is no road to Cordova, so the primary transport mode is fishing boats or ferries, aside from the few daily flights. Roads connect Valdez and Whittier, but travel to the other PWS towns requires a flight or boat ride. Much of the year the Sound remains under cloud cover so flights are not always reliable, neither are satellite images that could provide much data including marine and aviation weather.

In addition to improving navigation, a better understanding of the PWS circulation is needed for spill response and search and rescue models. The Alyeska pipeline feeds North Slope crude oil to the tankers in Valdez, which transport this "Alaskan Gold" out of PWS Sound by way of Hinchinbrook Entrance. The threat to PWS was realized by the 1989 Exxon Valdez spill, but the threat beyond PWS to coastal waters must also be considered. Over 1,500 miles of coastal lands and over 10,000 square miles of ocean were contaminated by oil flushed out of the Sound (1). Groups like SERVS, a division of Alyeska Pipeline, work with multiple agencies in preparedness drills, maintain oil spill response equipment, and provide escort and docking assistance. Providing improved and up to date tide and current data combined with updated bathymetry has the potential to significantly increase understanding of the circulation derived from numerical models. This will in turn allow drill assimilations to produce faster spill response.

Commerce and safety in the PWS waters has been shown to have great value, but the effect on the people and environment is more difficult to evaluate. Commercial and recreational fishermen are among the most intensive users of PWS and a major part of the regional economy (2). The Native Villages of Chenega, Tatitlek, and the Eyak Corporation rely on subsistence fishing grounds that are threatened not only by tanker spills, but pipeline leaks or spills and invasive ballast water input. A better understanding of the regional circulation may improve fisheries and ecosystem management and response.

(1) Oil Regions Of Alaska Foundation publication
(2) http://ak.aoos.org/obs/osc_fish.php?region=PWS

Story and photos by J Ewald