

the Breakwater

Fall 2009

300 Breakwater Avenue
PO Box 705 Cordova, AK 99574

Herring Program Awarded

Juvenile herring are the focus of a four-year, \$6.8 million research program approved this week by the Exxon Valdez Oil Spill Trustee Council. Cordova's Prince William Sound Science Center will coordinate the investigations to measure factors that may limit the success of herring recruitment including oceanographic conditions, food availability, disease, overwinter energetics of juvenile herring, and predation.

Other researchers participating in this effort are from the National Marine Fisheries Service, the U.S. Fish and Wildlife Service, the U.S. Geological Survey, the University of South Alabama, Flying Fish, Ltd. and the Prince William Sound Oil Spill Recovery Institute. The program also incorporates community involvement and will include contracts to commercial fishermen for some of the sampling activities.

"It's been 20 years since the 1989 Exxon Valdez oil spill," said Nancy Bird, President, "and yet Pacific herring remains listed as "not recovering" by the Trustee Council. While we've learned a lot, this concerted and integrated program will give us a much better understanding as to why herring have not recovered."



"We are very excited because this four-year program is such a strong commitment by the Trustee Council to understand the factors limiting herring's recovery and to determine what restoration efforts might be effective."

Bird said the 10 projects comprising the Prince William Sound Herring Survey program involve a diverse mix of scientific disciplines. She noted that Cordova District Fishermen United (CDFU) has an important role in the community-based sampling program. CDFU will provide 10 gillnet vessels and captains familiar with the region who will do annual broad-scale surveys to determine where juvenile herring spend the winter.

Scott Pegau, Ph.D., an oceanographer, is coordinator for the program's community involvement, outreach, logistics and synthesis. Aerial surveys will be used to assess herring, the distribution and density of herring predators (seabirds and marine mammals) as well as competitors (sea lance

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Outdoor Discovery for Student Scientists

As the summer season transitions into fall, students return to school and Science Center educators turn their attention to the upcoming year of Discovery Room programs. Discovery Room's many community partners are collaborating to put together an innovative and exciting line-up of educational programs. Students of Cordova's Mt. Eccles Elementary School anticipate fun and challenging science activities in store for them this year!

Long-time program partners at the U.S. Forest Service Cordova Ranger District are heading up Discovery Room lessons for students in Kindergarten, first and second grades. The youngsters will focus on local plant identification, amazing plant adaptations, the process of photosynthesis, biomes, soils and composting, as well as traditional uses of plants.

The Science Center, in partnership with the Copper River Watershed Project and Prince William Soundkeeper, is busy developing classes and field trips for the students in grades 3-6. Students in the third grade will learn what causes weather, how climate affects the plants and animals that live in certain areas, and how human activities may be affecting Earth's climate. In addition, project partners from the Copper River Watershed Project will teach students about salmon and salmon habitat, as well as facilitate information sharing between Cordova's third grades and students residing in the upper Copper River Basin.

Fourth graders will be participating in a salmon habitat monitoring project on Eyak Lake during which they will collect monthly water samples and measure water temperature and depth, turbidity, pH, dissolved oxygen and concentrations of nitrates and phosphates. This project is part of a three-year citizen science and monitoring project on Eyak Lake which is being conducted jointly by PWSSC and the Prince William

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Photo courtesy of PWSSC Education Dept

Sound Predictions 2009 - Testing Oceanographic Models

by W. Scott Pegau

Over the past ten years the Oil Spill Recovery Institute has strived to support the development of a nowcast-forecast system for Prince William Sound. During the past five years the effort to develop a nowcast-forecast capability has been merged with the Alaska Ocean Observing System, which chose Prince William Sound as its initial region of interest for developing a pilot ocean observing system in Alaska. The combined effort has led to the development of meteorological, ocean circulation, wave, and lower trophic level biological models for the Sound along with additional meteorological and oceanographic measurement programs. In order to test the models, field experiments were conducted in 2004 and again in 2009.

The 2009 Sound Predictions field program was conducted from July 19th through August 3rd. This time was chosen to match the 2004 observation period to see how much the models improved and to take advantage of the more benign summer conditions. As it turned out, the weather during the experiment was much more like the fall with a steady stream of small storms passing through. This provided a new set of conditions with which to test the models, but made the field operations a bit more challenging.

Four boats were used during the field experiment to support a wide variety of measurements. Measurements of ocean conditions were collected using a conductivity-temperature-depth (CTD) profiler, two autonomous vehicles, and by a flow-through system mounted on one boat. Drifters designed to follow water at the surface, one meter depth, 10 meter depth, and 40 meter depth were deployed and retrieved throughout the experiment. Surface currents were measured using high-frequency radar. Water was collected to determine the nutrient and phytoplankton levels. Net tows were used to collect the zooplankton. Bird and mammal observations were conducted to provide an indication of the presence of higher trophic levels.



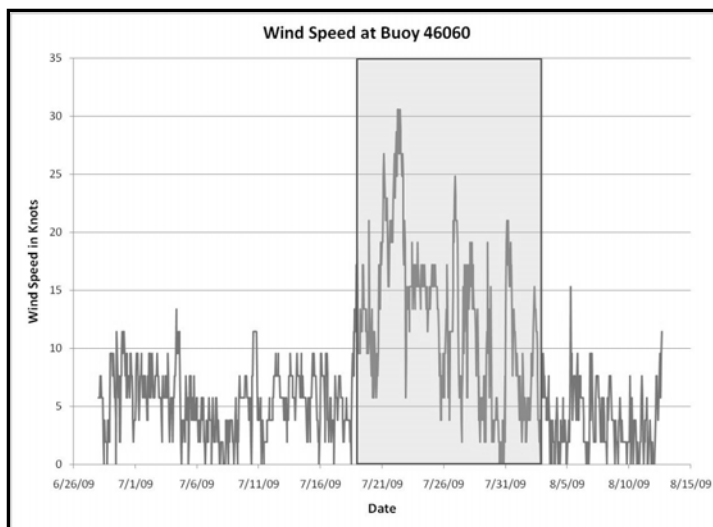
Leslie Abramson deploying a CTD from the Vixen.

Photo by W. Scott Pegau



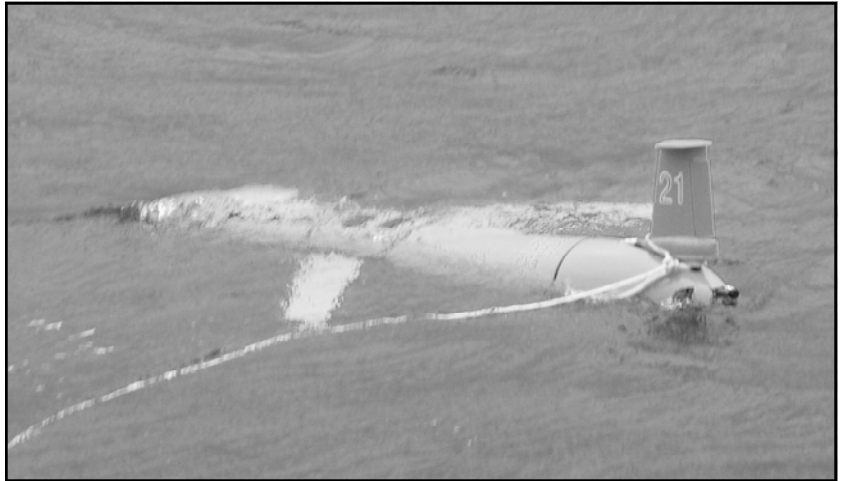
Mark Halverson and Kerstin Cullen biological sampling aboard the Auklet.

Photo by Dave Janka



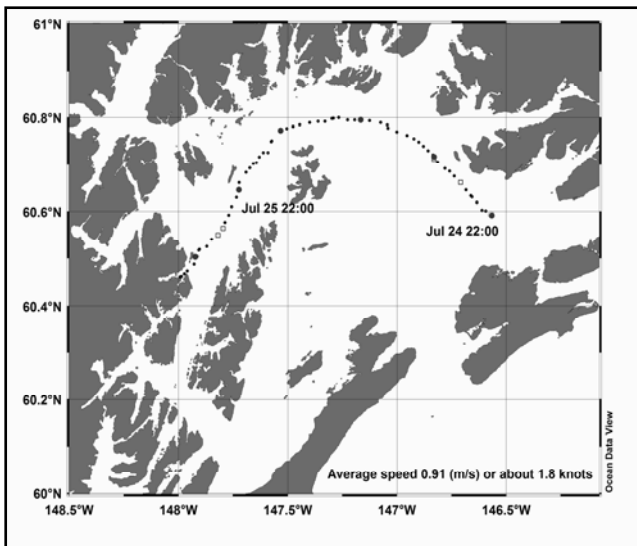


The Vixen with a fish hold full of drifters with Captain Jim Pettigrew looking on. Photo by W. Scott Pegau



Slocum Glider commencing its transect across Prince William Sound. Photo by W. Scott Pegau

We are just beginning the process of analyzing the data and determining how things worked. Some of the interesting results include that almost all of the freshwater and most of our surface drifters flowing out of Prince William Sound appeared to be flowing down Knight Island Passage, whereas in 2004 there was much more evidence for flow out between Montague and Knight Islands. The speed of some drifters was amazing. Drifters released south of Knowles Head made it north of Naked Island and down to the southern tip of Lone Island in a day. This meant the drifters were traveling at almost two knots with nothing but the currents propelling them. It was also surprising at how close drifters stayed together. Drifters released about 100 meters apart would be found two or three days later still within 100 meters of each other despite winds of over 20 knots. Normally small eddies in the ocean and the action of surface waves is expected to spread the buoys apart. As we delve into the data and the models further, we anticipate many more interesting results will appear. For more information on the Sound Predictions 2009 experiment, as well as its participating scientists and contributors, please explore <http://princewilliam2009.blogspot.com/>



The track of a drifter released south of Knowles Head. Each large dot represents six hours. Full color versions of these figures may be viewed at www.pwssc.org



Field experiment boat crews. Front row: Andy Craig, David Janka, Ian Robbins with Pete the Puffin, Rebekka Federer, and Mark Halverson. Back Row: Chris Boswell, Dave Rental, Jim Pettigrew, Leslie Abramson, Scott Pegau, Megan Cimino, and Kerstin Cullen. Not pictured are Mark Moline, Carter Ohlmann, John Eiler, Deborah Mercy and the HF-radar crew. Photo by Dave Janka

Four-Year Herring Program Funds Awarded - continued from page 1

and capelin). These surveys will be done by Evelyn Brown, Ph.D. (Flying Fish, Ltd.).

Richard Thorne, Ph.D. (PWSSC) will lead acoustic surveys of juvenile herring to provide a better picture of the variability of herring, helping provide understanding of which habitats are most suitable for juvenile herring survival. Herring predation by fish and seabirds will be examined in conjunction with the acoustic surveys. The combination of aerial, acoustic and community-based direct capture techniques will provide critical information about areas that may be appropriate for potential restoration efforts.

Rob Campbell, Ph.D. (PWSSC) will be looking at the availability of food, and Shelton Gay (PWSSC) will study herring "nurseries" and collect data for evaluating sites for potential restoration efforts. Paul Hershberger, Ph.D. (USGS) will look at the role of disease as a factor in preventing recovery.

Thomas Kline, Ph.D. (PWSSC) and Ron Heintz, Ph.D. (NOAA) will look at overwintering "energetics", the growth and energy allocation in overwintering herring. This work has close linkages to the food availability and community involvement portions of the effort.

Herring are an important prey item for many fish, birds, and mammals in Prince William Sound. Understanding the conditions that may limit the recovery of herring requires an understanding of predation pressure. Mary Anne Bishop, Ph.D. (PWSSC), Sean Powers, Ph.D. (University of South Alabama) and Kathy Kuletz, Ph.D. (USFWS) will conduct research to determine the role of seabird and fish predation on reducing the herring population, and which predators must be accounted for in developing restoration activities.

The PWS Herring Survey is the result of discussions and planning that began in 2006. The draft Integrated Herring Restoration Program plan completed in the fall of 2008 was followed in the spring of 2009 by the Trustee Council's invitation for an integrated program proposal.

In his proposal, Pegau stated the objectives of the integrated herring survey program as: (1) Identify juvenile rearing bays for use in restoration planning; (2) Measure factors that may limit the success of herring recruitment including factors of oceanographic conditions, food availability, disease, overwinter energetics of juvenile herring, and predation; and (3) Provide protocols and recommendations for spatial and temporal coverage of monitoring projects for potential inclusion in the core herring restoration effort.

For further information, please contact Nancy Bird, PWS Science Center, nbird@pwssc.org or (907) 424-5800 x 225

Outdoor Discovery Program - continued from page 1

Soundkeeper. The primary objective of this project is for students to gain an understanding of the interconnectedness of physical and biological factors in an ecosystem, specifically water quality changes resulting from climate change, and its effects on salmon productivity in Eyak Lake.

Fifth grade students will be involved in classroom and field activities to increase their understanding of ocean sciences, climate change and oceanographic monitoring. Science Center educators will facilitate monthly field trips to Cordova's boat harbor to conduct monitoring activities, including measurements of ocean temperature, salinity and pH. Classroom topics will include interpretation of data collected during monitoring events, ocean-climate interactions, technologies used in ocean observing and connections between oceanographic conditions and fisheries.

Cordova's two sixth grade classes will be studying various types of technology used to study the ocean and predict weather based on ocean conditions, as well as the use of robotic technology in oil spill response efforts. The ocean technology program will be rich in hands-on activities and concepts that are used by researchers studying the oceanography of Prince William Sound. Through classroom and lab exercises, students will learn about properties of seawater, and how wind, waves and

ocean circulation can be measured using various instruments including weather buoys, autonomous underwater vehicles (AUVs), gliders and oceanographic moorings. Students will also construct remotely operated vehicles (ROVs) that will be used in response to a mock oil spill.

The 2009-2010 season of Discovery Room is made possible by contributions from local businesses and grants from the National Fish and Wildlife Foundation, Jiji Foundation, Oil Spill Recovery Institute and the North Pacific Research Board. This year promises to be full of new experiences that connect students with their environment and make learning science fun!



Photo by Alice Dou-Wang

Interested in volunteer opportunities in the Discovery Room? Contact Education Specialist Alice Dou-Wang at adouwang@pwssc.org or (907) 424-5800 x237

Students Learn and Play in Multiple Camps

by Alice Dou-Wang

The summer began early this year with an intensive **Oceanography Course** in May for students from Steller Secondary School in Anchorage. The students of grades 7-12, spent a week with the Science Center studying oceanography in a course led by Dr. Rob Campbell. The group spent three days learning about basic physical and biological oceanography, and two days kayaking in Orca Inlet, paddling to Humpback Creek and Observation Island. On these trips, they studied the intertidal zone, took a plankton tow, and made other measurements of the water from kayaks. They also designed and built Remotely Operated Vehicles (ROV's) which they tested in the harbor.



Steller students storm the beach as superheroes in their dry suits after kayaking to Observation Island.

All photos by Education Staff

Two sessions of overnight Science Camp were held. **Science Camp 1** had a full week of activities including kayaking, canoeing, hiking, and river rafting. Guest

scientists from USFS taught campers about wetlands and fish. Excited to spend a day and a night tent camping at Childs Glacier, they witnessed very active calving.



Science Camp 2 was filled with lessons and activities to learn about climate, the carbon cycle, landscapes, and forces of erosion. One force of erosion was witnessed firsthand; It rained almost nonstop all week. The rain put a damper on some of our plans, but not the campers' spirits! After spending a little more time indoors than was planned, a day of glacier trekking with guides from Alaska River Expeditions was the highlight of the week. Science campers also built ROVs and practiced driving them in the harbor. They even braved the elements in rain and heavy wind to collect a plankton tow from the city dock.



Eight high school juniors and seniors from as far away as Florida participated in the **Oceanography of Prince William Sound** field course. Led by Dr. Rob Campbell, the students learned basic oceanographic principles and expedition skills in Cordova before going to Whittier to begin a 4-day sea kayaking expedition in Blackstone Bay. While kayaking among icebergs and exploring the coastline, students collected oceanographic data which they analyzed after the expedition.

After returning to Cordova, the course headed off again on an overnight trip to Egg Island, where students surveyed and collected marine debris. Seven bags of marine debris were collected, and many more surveyed. By walking transects along the island, the students surveyed a total of 26 acres of land and counted a total of 2,040 pieces of trash! From their experience on Egg Island, they created outreach projects to educate others about marine debris. PWSSC education staff would like to thank all of our sponsors, supporters, volunteers, and guest scientists for a great summer. We couldn't have done it without your help!

President's Corner by Nancy Bird

It's great to look back on our accomplishments during our first 20 years and, at the same time, look forward to expanded research and education programs yet to come! The PWS Science Center can proudly point to positive contributions its programs have made in the lives of PWS residents. Today, our programs and staff are on a steady growth curve which I largely attribute to perseverance and our willingness to partner.

Whether it's through research, like the new herring survey program involving six different organizations, or education programs, like the new Copper River Watershed Stewardship project, the results are most effective when multiple groups take ownership and combine their resources to tackle issues. "Sound Predictions 2009" is a clear example of the success of partnering. A newer program that we're delighted to assist with includes monitoring and education segments of the Copper River Watershed Project's "Million \$ program for Lake Eyak."

Thanks to an informal partnership with PWS Community College, our community lecture series expanded last year via video-conferencing to Valdez. We'll be working to further that partnership and include more in-person programs in Valdez and elsewhere in the region.

Sharing results and resources is an important goal for all our programs. Past efforts in this regard have included this newsletter, our lecture series, scientific papers and reports, regular radio programs and our websites. To stay "up with the technology," we've just added a Science Center page on Facebook! We look forward to using this media as it encourages your comments and suggestions to us. Check it out by clicking on the "Facebook" link at www.pwssc.org.

Where Does Fish Food Come From?

by Thomas C. Kline, Jr. Ph.D.

'You are what you eat' is an old figure of speech. More than a figure of speech, it is possible to distinguish between alternative food sources through differences in their stable carbon isotope signature. Since fish eat zooplankton, I compared zooplankton from PWS with zooplankton from the GOA (Figure 1). Zooplankton from PWS have a distinctive stable carbon isotope signature with a mode value of about -19. While some GOA carbon resembles that from PWS, most has a much more negative value, with a mode of about -23. Because the very negative values observed in GOA zooplankton are generally not observed in PWS zooplankton, these very negative values can be said to be diagnostic of GOA zooplankton. The reason for this difference is probably related to the type of single celled algae present and eaten by the zooplankton that I measured. When diatoms dominate, we get values like those observed in PWS.

When dealing with stable carbon isotope values there is a small food chain effect so that a fish eating zooplankton with a value of -19 will end up with a value that is 1 higher, or -18. When a fish consumes more plankton from the GOA than PWS it will pick up carbon atoms in food that came from the GOA and so will tend more toward the GOA carbon isotope signature of -18. If a fish's diet came exclusively from the GOA, it would be expected to have a value of about -22, that is, +1 above the GOA mode value of -23.



Why does it matter? Stable carbon isotope values measured in fish are not fixed but can vary according to diet, migration, etc. Measured changes of stable carbon isotope value in time can be related to things important for us. For example, fluctuations in the number of pink salmon returning each year to PWS wreak havoc with the PWS fishing industry. Anxiety over run size would be reduced considerably if we had a reliable forecasting tool.

Each year approximately the same number of pink salmon are released by hatcheries, therefore the large fluctuation observed in hatchery pink salmon run size is driven by inter-annual variability of marine survival rate. Stable carbon isotope value measured in early marine (within a few months of being released) pink salmon varies from one year to the next and this variation is correlated with marine survival rate (Figure 2). Statistical analysis suggests that 50% of inter-annual variation in marine survival rate is explained by stable carbon isotope variation. Using the stable carbon isotope diagnostics explained above, this correlation is interpreted to suggest that marine survival rate is enhanced when a greater proportion of the food consumed by salmon during their early marine phase came from the GOA and was reduced when a greater proportion came from PWS. Somehow when their food supply is subsidized by food from the GOA marine survival rate was enhanced leading to larger run size. This concept is not totally new. One of the hypotheses looked at during the Sound Ecosystem Assessment (SEA) project of the 1990's was called the river-lake hypothesis. Under this hypothesis in some years PWS is more like a lake and in other years PWS is more like a river. When it is more like a river there is much more exchange of water between the GOA and PWS. It is this exchange of water that is assumed to be driving the variation in GOA subsidies in PWS.

The stable carbon isotope data (Figure 2) provides supporting evidence for the river-lake hypothesis. The SEA project made observations over a four-year period whereas the data in Figure 2 are a product of the northeast Pacific Global Ocean Ecosystem Dynamics (GLOBEC) program's observational period that lasted for seven years. It took seven years to develop the relationship shown in Figure 2.

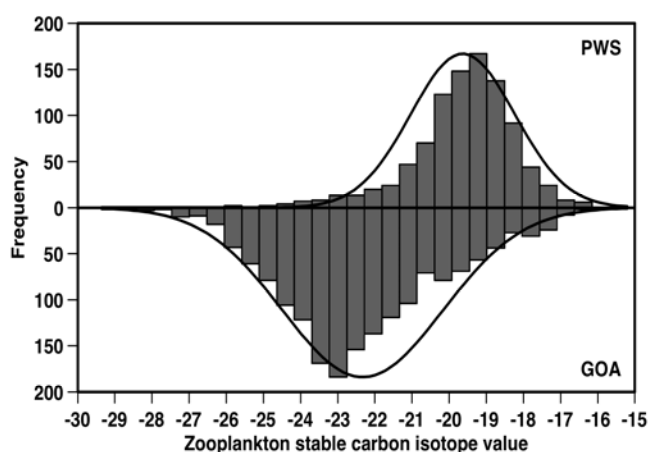


Figure 1. Developing the diagnostic tool for identifying food sources. Frequency distribution of the stable carbon isotope values measured in zooplankton from PWS compared to those from the adjacent GOA. These graphs summarize more than two thousand samples collected from 1995 to 2008. Mode values of -23 and +19 are representative of food originating, respectively, in the GOA and PWS. A normal distribution, also known as the bell-shaped curve, is fitted to the data.

Similar pink salmon samples obtained from PWS during the last four years of GLOBEC suggest a similar relationship. However, it is not statistically significant because there are only four data points underscoring the need for making sustained observations longer than the short duration typical of most research projects. Only through long-term systematic observation like the results shown in Figure 2 can we derive functional relationships between changes in fish population size and potential environmental drivers. These functional relationships form an incipient forecasting tool that may enable forecasting the size of a salmon runs. Presently, similar research is focused herring. Herring, like other PWS fishes, vary from year to year in their dependency on GOA subsidies. However, among PWS fishes, herring have the greatest dependency on GOA subsidies. How this may be affecting herring recruitment is a question I am working on.

Acknowledgements

Funding was provided by the U.S. National Science Foundation, Exxon Valdez Oil Spill Trustee Council, Oil Spill Recovery Institute, and the M.J. Murdock Charitable Trust.

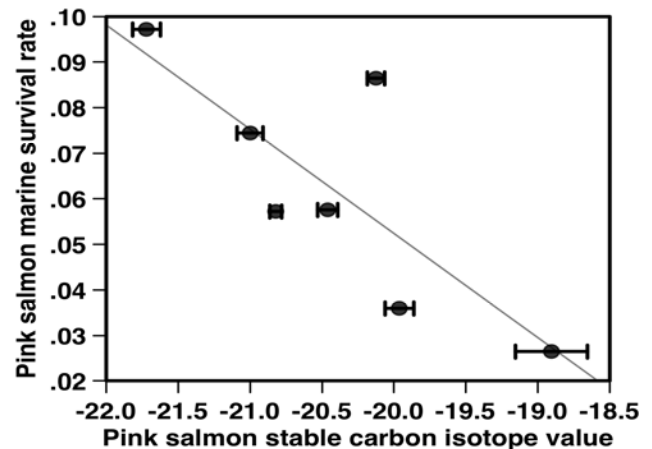


Figure 2. Inverse relationship between the stable carbon isotope values of early marine pink salmon from PWS hatcheries collected off the coast southwest of PWS in August from and their subsequent marine survival rate. Error bars indicate the standard error of each sample. The fitted regression line has an r^2 value of 0.5

PWSSC Hosts Author and Discover Magazine Columnist Dava Sobel

by Mary Anne Bishop

The first week in May the Science Center hosted Dava Sobel, author of *Longitude*, *Galileo's Daughter* and *The Planets*. Ms. Sobel was here to write an article for *Discover Magazine* on the Census of Marine Life and the Pacific Ocean Shelf Tracking Project (POST). The Science Center has a joint project with POST and the Oil Spill Recovery Institute to track movements by lingcod, a demersal fish associated with the nearshore zone.

One of our local charter operators, Dave Janka owner of the *MV Auklet* and a fan of Ms. Sobel's, took Ms. Sobel, POST Board member Buck Meloy, Dr. Mary Anne Bishop (Co-Principal Investigator on the Lingcod Project) and Brad Reynolds (PWSSC) out to the Port Gravina array.

We demonstrated a data upload from a VR3 and a VR2w receiver. We also monitored for our 14 acoustic-tagged lingcod using a portable receiver. For Dava Sobel's article on our trip, see "Field Notes: An Exhaustive New Marine Census is Tracking Everything That Swims in the Sea, One Fish at a Time" in the September 2009 issue of *Discover Magazine*.



Dr. Mary Anne Bishop, Brad Reynolds, Buck Meloy, Dava Sobel. Photo by Dave Janka

The 10th Annual Copper River Nouveau — June 13th, 2009

by Signe Fritsch

What a success - we raised a net profit of \$45,000! This would not have been possible without the support and generosity of our Corporate and Individual Sponsors, in-kind contributors, auction donors, entertainers, dinner guests, and our small army of staff and volunteers.



Fisheries Achievement Award and Reception

A dockside reception at the PWSSC kicked off the evening's event. Thea Thomas, a Copper River gillnetter for more than 20 years, was presented the **Fisheries Achievement Award**. Mary Anne Bishop, Danny Carpenter, and Nancy Bird each spoke briefly of Thea's many contributions to the region's fisheries.



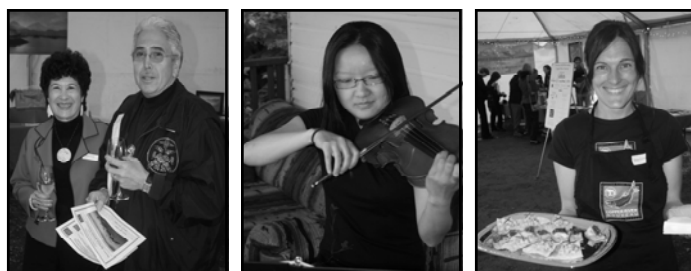
Most recently, she was instrumental in the successful formation of the Copper River/Prince William Sound Marketing Association, Alaska's first Regional Seafood Development Association. She has served as Board President since its inception in 2005. At the state level, Thomas has been active on the Alaska Seafood Marketing Institute. She is a past Board Member and current Committee Member on ASMI's Retail and Salmon Committees. Additional fishery organizations in which Thomas has been active as an officer or Board member include the Copper River Salmon Producers Association, the Cordova District Fishermen United, and the Prince William Sound Aquaculture Corporation.



Top: Thea Thomas. Bottom: A troop of Copper River Fleece supporters pose for the camera at the reception.

Silent Auction and Appetizers

The dinner event at Orca Adventure Lodge began as guests perused the silent auction items under an open-air tent, while Alice Dou-Wang performed on the violin. The silent auction was an impressive display of artwork from local and Native Alaskan artists, vouchers for wilderness and travel adventures, and many other goods and services from local businesses and abroad.



Left to right: Belen and Joe Cook, Alice Dou-Wang, Shawna Keeley.

Dinner and Entertainment

The five-course, gourmet dinner featuring Copper River Sockeye, was prepared by Chef Naomi Everett, an instructor at the UAA Culinary Arts and Hospitality Program.

During first course, guests were treated to a performance by Jonathan Smallwood, a local fisherman and self-trained vocalist.

Our Honorary Host, Senator Lisa Murkowski was unable to attend the event this year. One of her staff members, Rachel Kallander, graciously offered to perform a couple of songs on the guitar. She and Sen. Murkowski co-wrote the lyrics to a tune, relaying Murkowski's disappointment that she could not be in Cordova and couldn't wait to see us at next year's event.

Later in the evening Nancy Bird and Penelope Oswalt, both whom have been working at the Science Center for 20 years, were honored for their service. Jerry Gallagher spoke on behalf of the Board of Directors for the Science Center and presented them with Copper River Fleece jackets.



Dessert and Live Auction

The dessert and live auction rounded up the night's activities. Auctioneer RJ Kopchak was in fine form; he helped raise \$18,675 in 50 minutes! Over half of that, was earned in just a few minutes during the "Raise-the-Paddle" pledge. Nearly 30 guests, staff, and volunteers pledged to give varying amounts directly to our award-winning Science of the Sound Education Program. State Representative Bill Thomas was instrumental in helping raise a good portion of the pledge funds. It was an awe-inspiring moment during the eventful evening.



From top to bottom: Chef Naomi Everett, Jonathan Smallwood, Nancy Bird and Penelope Oswalt, Rachel Kallander and the Copper River Queens, RJ Kopchak, and Rep. Bill Thomas. All photos for this story were taken by Allen Marquette.

The Copper River Stewardship Program Connects Upriver and Downriver Students

by Keaton Shepherd, student

The Copper River Stewardship Program, a youth environmental leadership curriculum, began on the crisp morning of July 21, 2009. Daniel Leahy of Kenny Lake, Alaska, and I sat at the end of his driveway at mile 74 on the Richardson highway, atop of our weatherproof backpacks, stuffed to the brim with supplies for a ten day adventure in the Copper River Watershed. We were awaiting the arrival of our adult chaperones, (representatives from major sponsors of the C.R.S.P.) with whom we would be travelling to Valdez to meet our Cordovan counterparts. The opportunity to participate in the Copper River Stewardship Program was given to five outstanding applicants from the Copper Basin, and five from Cordova. The selection process for the program involved writing an essay in response to questions such as a list of five reasons why you should be selected to participate in the Copper River Stewardship Program as well as a description of your family's cultural or historical tie to the watershed.

Those selected were notified in mid-May, allowing plenty of time to gather the necessary supplies for the Program's climactic rafting trip from Chitina to Miles Glacier. This event was obviously the major incentive; rafting one of the most powerful glacial rivers in the world is an once-in-a-lifetime experience! Though the raft trip was amazing, the awareness that we all gained through the educational portion of the Program outweighs on a scale of importance. Our instructor, Cordova's own Kate Alexander of the Copper River Watershed Project, challenged us to look at the watershed, and the world around us, as a whole, something that we all depend on. During the land portion of the Program, Team C.R.S.P toured the Gulkana Hatchery and learned how it is helping to keep sockeye salmon populations up with minimal environmental impact. It was here that we began to realize the importance of the salmon run; not only does it support the rural Alaskans who depend on the salmon for subsistence, it also provides commercial fisherman (Alaska's third largest industry) with the lucrative, world-renowned "Copper River Red" salmon. We also met with a representative from the Bureau of Land Management, who was focusing on the preservation of one of our nationally designated Wild and Scenic Rivers, the Gulkana. We learned the importance of practicing leave-no-trace ethics, as though we may not realize it, our presence in the natural environment can cause great damage. (Ethics we would later practice as we floated down the Copper River.) The most thought provoking meeting for me was the campfire chat that the team had with the Copper Country Alliance, an environmental protection coalition focusing on grass-roots political activism. The hot-topic around the campfire was the danger that the Alyeska Pipeline poses to the watershed, as it crosses several major tributaries. The Pipeline just celebrated 32nd birthday, though it was originally thought to exist only 30 years. If oil were to enter one of the tributaries, the Copper River would be devastated, and there would be no way to stop it. Many experts believe that, similar to the Exxon spill in 1989; it isn't a matter of *if*, but *when* it will happen. The meeting left us with the question: Will we, as the leaders of tomorrow, be prepared to keep our watershed safe from the many threats that it is faced with?

Throughout the Program, we learned that we are a part of a much greater system; we are all connected by water, water that we all need in order to survive. This type of awareness is crucial, especially since so many people take water for granted, and, though we may not realize it, we *are* the next generation, and we will have to work hard to preserve the few resources we have left. I am so incredibly thankful for the experience, and I can honestly say that after the Program, I am much more conscious of my impact on the fragile environment. It is my sincere hope that the Copper River Stewardship Program continues to change the lives of High School students for years to come; it is a great investment for the future of the watershed!

This program was run in partnership by the Prince William Sound Science Center, Copper River Watershed Project, Wrangell Institute for Science and Environment, Bureau of Land Management, and Wrangell St. Elias National Park. Additional funding was contributed by American Legion Post #27, BP, Cordova District Fishermen United, Environmental Protection Agency, Harborside Pizza, Kenny Lake and Glennallen Revenue Sharing, Oil Spill Recovery Institute, Carol Treadwell Scholarship Fund, HB Alexander Foundation, and individual contributions.

Photo courtesy of CRSP



Exploring Science in Prince William Sound Through “Field Notes”

by Allen Marquette

Prince William Sound Science Center education programs are quite varied and unique in their ability to reach learners of all ages. Students from grade-school to high-school age receive exciting science programs in their classrooms and outdoors in the field throughout the school year and summer. One education program that reaches a diverse audience from Cordova to Valdez and many small and remote communities in and around the Copper River is Field Notes, a three to five minute science based radio program heard on KCHU Terminal Radio, a public radio station based in Valdez, Alaska.

KCHU's signal serves a population base of more than 10,000 people and serves seven communities around Prince William Sound and the Copper River Basin. Started in May 2005, Field Notes airs several times during the week and weekends. Listeners within KCHU's broadcast area learn about the natural and physical world with programs exploring the science around Prince William Sound, Alaska and the world. From the response of emails and phone calls of Field Notes listeners, it is obvious this program has been able to get people interested and excited about science in their own backyard as well as in and around Prince William Sound.

Field Notes also highlights many of the PWS Science Center's research and education projects and programs throughout the year allowing Science Center researchers an opportunity to share their work with a diverse audience. Some of the recent Field Notes programs that have aired this spring and summer included *Snow Roller on Eyak Lake*, a program which explored the cause and effect of hundreds of large donut shaped balls of snow which formed on Lake Eyak overnight. After the program aired several listeners called and emailed expressing their interest and amazement over the formation of these unique shapes.

Two teachers from the local elementary school asked for classroom presentations after hearing the program on the radio discuss how and why snow rollers form. Since many students witnessed the unusual phenomenon on the lake a few days before, teachers wanted their students to have their questions answered. A local Girl Scout troop requested a field trip out on frozen Lake Eyak to look at the snow rollers which also gave this educator an opportunity to share river and lake ice safety with the children. Other recent Field Notes programs included *Winter Seabird Surveys in PWS*, a study on seabird species, populations and numbers in PWS by Science Center researchers Dr. Mary Anne Bishop and Neil Dawson.

In May, a Field Notes program called *High School Oceanography Aboard the C.G. Cutter Sycamore*, aired that shared with listeners around PWS and the Copper River Basin an oceanography fieldtrip high school marine biology students, their teacher, several Science Center research and education staff and community members took on the Coastguard Cutter Sycamore. Students carried out physical and biological oceanography experiments allowing them to see how oceanographers study the ocean environment. This Field Notes program showed the diverse and exciting discoveries students made during their cruise.

The latest Field Notes program this summer was a two part program on the research being carried out in Simpson Bay located in northeastern PWS. Part one looked at the research Science Center oceanographers Dr. Dick Thorne carried out in Simpson Bay on Herring stocks and Shelton Gay's research on the complicated currents in Simpson Bay and the effects of phytoplankton numbers on juvenile herring within the Bay.

The second part of the Field Notes program focused on sea otter research being done by Texas A&M researchers and graduate students at Alice Cove in Simpson Bay. Listeners learned specific facts about sea otter behavior and their feeding habits in the Bay. This ongoing sea otter research will help scientists understand the dynamics of sea otter behavior and their interactions with each other and with their physical environment in PWS.



Field Notes will continue to air on a weekly basis and can be heard in Cordova on KCHU terminal Radio at 88.1 on the FM dial every Wednesday afternoon at 12:55pm and Sunday mornings at 9:54am. Archives of past Field Notes programs can be heard as mp3 files on the PWSSC community education web page located at: <http://www.pwssc.org/education/community/communityradio.htm> If you would like to comment about a program or suggest a topic for a new Field Notes radio program contact Allen Marquette at amarquette@pwssc.org

Sea Otter Feeding in Alice Cove, at Simpson Bay, in Prince William Sound. Photo by Allen Marquette

Changes at the Prince William Sound Science Center



Leslie Abramson joined PWSSC as a Marine Research Technician for the Sound Predictions 2009 Field Experiment. She recently completed a Master's degree in Environmental Science and Management at UC Santa Barbara, with a specialization in Coastal Marine Resource Management and Conservation Planning. While at UCSB, Leslie was a Resource Protection Intern with the NOAA Channel Islands National Marine Sanctuary. There, she worked to protect large cetaceans from fatal ship strikes in Santa Barbara Channel. She is interested in the interactions between society and marine environments and believes in the potential of ecosystem-based management and cooperative fisheries.



Kerstin Cullen served as a Summer intern for the Sound Predictions 2009 Field Experiment. Tasked with supporting the Prince William Sound model validation exercise, she brought much enthusiasm to her fieldwork. Kerstin grew up in Valdez, Alaska and is currently majoring in physics at Montana State University, Bozeman.

Jake Oudheusden joined us for the summer season as an Environmental Education Intern. He has returned back to Vermont to pursue his degree in outdoor education and leadership at Sterling College.



Brad Reynolds, Fish Biologist, is pleased to announce that in March 2009 he delivered his final research thesis to the dean of the graduate college at the University of South Alabama who in turn delivered his Master's of Science diploma the following June. Reynolds, who is excited over these deliveries, is also excited about the timeliness of said deliveries as his wife, Julie, is also expecting a major delivery in October 2009. In addition to exploring new realms of diaper changing, swaddling arts, and off-key lullaby singing, Reynolds will continue working with research ecologist Mary Anne Bishop on Prince William Sound and Copper River Delta studies. You may reach him at 907-424-5800 ext 234 or breynolds@pwssc.org .



Linee Bradford now serves as Executive Assistant for the Science Center. Her background is in sociology. Once she discovered Cordova's small town community with access to a vast wilderness, she made her home here. Besides being an avid hiker, she is involved in the local quilters' guild. Linee offers her quilting services as sole proprietor of [The Quilting Studio](#). She looks forward to meeting you in the Science Center lobby or out on a trail. You may reach her at 907-424-5800 ext. 227 or lbradford@pwssc.org .

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- ☐ \$500-Grizzly... basics + poster, t-shirt, and 2 retail items

Members receive a 10% discount on purchases of merchandise

Thank you for your support!

The Prince William Sound Science Center is a 501(c)3 corporation. Your contribution is tax deductible.

Upcoming Events

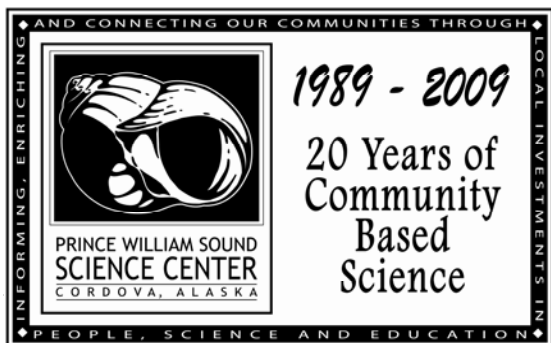
- **Tuesday Evening Community Program**
Sept–May schedule posted on our website;
Join the weekly email update by contacting
Allen Marquette at amarquette@pwssc.org
- **PWSSC Board of Directors meeting**
Tuesday Sept 29, 2009 in Cordova
- **OSRI Advisory Board meeting with the Scientific & Technical Committee** Wednesday & Thursday Oct. 7-8, 2009 at the Anchorage Hilton Hotel
- **PWS Regional Citizens' Advisory Council Science Night** Thursday Dec 3, 2009 in Anchorage
- **Alaska Marine Science Symposium**
Jan 18-22, 2010 at the Captain Cook Hotel in Anchorage
- **Alaska Forum on the Environment**
Feb 8-11, 2010 in Anchorage
- **OSRI Advisory Board meeting**
Friday Feb 12, 2010 in Anchorage
- **PWSSC Board of Directors meeting**
Friday Feb 19, 2010 in Anchorage

The Board & Staff of the
Prince William Sound Science Center
invite you to join
Honorary Host Senator Lisa Murkowski
at the
**11th Annual
Copper River Nouveau!**
June 12, 2010



Chef Brett Knipmeyer from Anchorage's Kinley's Restaurant & Bar (www.kinleysrestaurant.com) will be our guest chef. This annual fundraiser event for the Prince William Sound Science Center includes a five-course, gourmet meal, featuring Copper River Salmon and carefully matched fine wines. A silent and live auction, as well as lively entertainment, makes this an event you won't want to miss!

contact Signe Fritsch
sfritsch@pwssc.org or (907) 424-5800 ext 232



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