PRINCE WILLIAM SOUND SCIENCE CENTER
CORDOVA, ALASKA

the Breakwater

Spring 2012

A publication of the Prince William Sound Science Center

Cordova NOSB Team Takes the Silver!

by Kara Johnson

For the past nine years, PWSSC education staff has coached the Cordova teams for the National Ocean Sciences Bowl (NOSB or "Nose-Bowl") competition, the Tsunami Bowl held annually in Seward, Alaska. Our teams have always done well and have taken third place for the past four years. This year's senior team, the Nefarious Dawgsharks, was eager to break that pattern! James Allen (captain), Ben Americus, Keegan Crowley, Sophia Myers and Adam Zamudio took second place overall and first place in the research paper. Our other team, the Urchin Queens (comprised of Lindsey Hammer (captain), Gabrielle Brown, Sarah Hoepfner, and Robin Pegau) made their debut this year and did very well by placing seventh in the consolation division and fifteenth overall.

The Nefarious Dawgsharks. Back row: Sophia Myers, Ben Americus, Adam Zamudio, and James Allen. Front row: Keegan Crowley and Coach Kara Johnson

Teams wishing to compete in the entire competition are required to submit a 20-page research paper. This year's topic was ecosystem-based management of an Alaskan fishery. The Nefarious Dawgsharks wrote a paper about the importance of cold water corals to the golden king crab fishery in the Aleutian Islands and gave a presentation as part of the PWSSC Community Lecture Series. The team was incredibly pleased to learn they had taken first place with the paper, which set the stage at the Tsunami Bowl. All eyes turned towards the team to see if they could knock the Juneau-Douglas Pelagic Magic team out of first place.

Continues on page 9

President's Corner

by Katrina Hoffman

One thing that has become abundantly clear to me since coming aboard at PWSSC is the extent to which partnerships empower our work. Through partnerships, we leverage the unique strengths and skills of all contributors, increase the impact of dollars spent and build valuable, supportive relationships. The impact of these partnerships goes far beyond the Science Center's research and education programs. While our full suite of partners is too long to list here, I'll mention a couple of interest.

This has been a remarkable winter for snow in Southcentral Alaska. I know a number of snow and weather enthusiasts in Cordova who regularly check the Mt. Eyak snow pack telemetry, or "SnoTel" data summaries for information about wind speed, precipitation, air temperature, and more. But what folks probably don't know is that the SnoTel sites around Prince William Sound and Cook Inlet are functioning thanks to a partnership between PWSSC, the Oil Spill Recovery Institute, and the Alaska Ocean Observing System. Together, we secured the funding to ensure that data collection and maintenance occurs at six SnoTel weather stations around the Sound and beyond. In addition to eager skiers, this data is used by oceanographers, avalanche safety experts and mariners, for whom real-time weather data can be critical. If you go to the Alaska Ocean Observing System's online data portal, you can explore both SnoTel and other data that is available on the real-time sensor map (http://data.aoos.org/maps/sensors/#l=sensor-stations).

Mt. Eyak SnoTel weather station in summer.

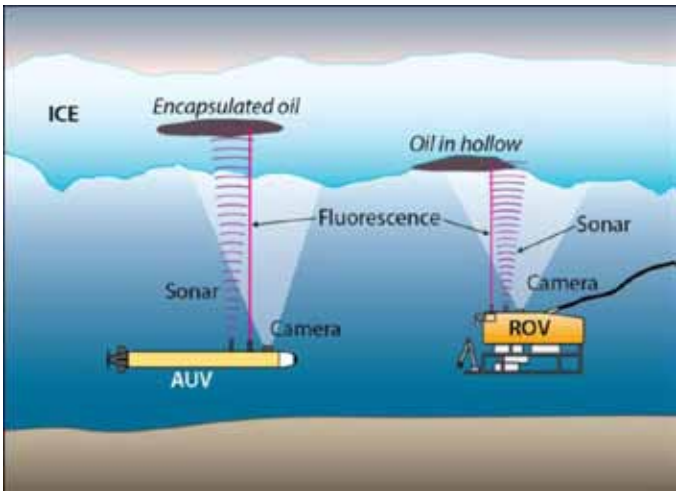
PWSSC scientists also partner with Cordova District Fishermen United to sample the herring populations

Continues on page 3

Finding oil under ice with existing technology

by Scott Pegau, OSRI

We do not know if the first large oil spill in the Arctic will be a ship crushed in the sea ice, a leak from an undersea pipeline, or some other unforseen accident, but when it happens we will need the proper tools to respond. As the sea ice moves, oil flows along the underside of the ice in search of high spots. Because of this, oil might not be near the original spill site. So how can the oil be found below snow and ice?



Can we find oil under ice using existing oceanographic technology?

An approach that has not been used is to look for the oil from below the ice. The PWS Oil Spill Recovery Institute recently supported a series of tests that used existing technologies to map the underside of the sea ice, to help locate trapped oil. The sensors included camera systems and sonar systems similar to a depth sounder.

The tests showed that the existing technologies can find oil under the sea ice and in some cases even measure the thickness. The sensors are relatively inexpensive, can operate day or night, and have been deployed under the ice for other purposes. More work remains to ensure we can claim the ability to find oil under all conditions, but it is important to have demonstrated the capability to find oil under ice before a catastrophe occurs.

The New Wave Project - Go Green!

by Rob Campbell

Following a major refit, the Science Center's research vessel, the *New Wave*, is ready to reenter service. The refit has included the installation of new diesel engines and generator, a stern A-frame and doors, new decks, a new davit, and many new systems.

As this *Breakwater* goes to press, everything has been installed, the hull and decks painted, and everything is connected. On April 3rd the boat was launched back in the water. Once everything is ready to go, she will be heading out for oceanographic surveys of Prince William Sound and to the mouth of the Copper River. It has been a long (and expensive!) process, and we would like to thank the M.J. Murdock charitable trust for their generous support of this project.

The New Wave *in the shop.*

The New Wave *launched on April 3, 2012*

The 2011 OSRI Annual Report is now available at: www.pws-osri.org/publications/reports.shtml

This report describes the new and continuing projects that occurred in fiscal year 2011.
This year marks the transition to the new five-year research plan.

A fresh new look for the Science Center

by RJ Kopchak

April 22 is Earth day, and the birthday of the Science Center. On that day 23 years ago we committed to building an institution focused on understanding the human and natural processes that influence our regions environments and resources.

Since then, the Science Center has excelled in research and education programs. Our education program capacity is strong, and our science relevant. Funding our programs has always been difficult, but over the past few years it has become a bigger challenge. To address the challenges of an increasingly competitive funding environment our Board has adopted a strategic plan calling for aggressive branding, communications and outreach efforts.

This strategy was developed with the advice of communications and advertising consultants who volunteered their time helping us identify current constraints and opportunities in getting our program efforts recognized and funded.

Our plan calls for reasserting our brand and marketing our organization using an updated logo, new tagline, refreshed vision, and focused communications strategies. Logo and tagline updates are used by corporations and organizations to gain new clients and recapture current client/customer interest. This is important to compete effectively in a very tough funding environment.

In addition to the new logo, we are redesigning our website. Our website is our personality, our portrait, and our voice. It is the main interface between our constituency and the Center. Our current website is poorly designed by today's standards. It has obsolete "architecture", is not user friendly, and it inadequately presents our research and education programs. Our new site, will have a fresh, new look that is easy to navigate and will portray our programs more effectively.

Our new logo, designed by Karen Larsen of Creative Space, will be revealed in our *Delta Sound Connections* publication in May. Our website, redesigned by William Finley of Couloir Graphics, will be launched in June, just in time for Copper River Nouveau.

The moonsnail logo, designed in 1989 by local artist Susan Ogle.

***President's Corner**, continued from page 1*

around Prince William Sound. Every spring, we contract local fishermen to survey thirty bays around Prince William Sound for juvenile herring—a biological blitz, of sorts, to assess the herring population. Since the herring fishery crashed, cast netting is not practiced regularly as a capture method; to get some of the participating fishermen ready to do research, a PWSSC scientist trained them in the art of the "perfect" cast. As the CDFU vessels returned to deliver their samples, one of the fishermen commented that the experience was humbling—fishing isn't easy when the population is hard to find. But thanks to the help from local fishing partners, our research efforts are more robust.

We rely on partnerships like these to implement effective research and education programs every month of the year. Partnerships enrich and enable a vast swath of the work that we do. In times of tight budgets, partnerships can help maintain programs that might otherwise disappear. Thanks to all PWSSC partners in the Cordova area, in Alaska, and beyond. We value your contribution to the work that we do.

Left: Rob Eckley listens carefully to Michele Buckhorn as she gives him some pointers on cast net technique. Below: One of the fishermen tests his skills throwing a cast net.

Hydrography of a young fjord in Prince William Sound

by Shelton Gay

Relatively speaking, Columbia Fjord is a very new feature in Prince William Sound. Its formation began in the late 1970s as Columbia Glacier began to retreat. Since then, Columbia Glacier has retreated inland 16 km, creating a deep (>400 m) upper (inner) basin.

In August of 2011, during a juvenile herring nursery habitat survey, a flushing of calved ice at Columbia Bay allowed entry into the inner basin to collect hydrographic data (Fig. 1A). Oceanographic stations within Columbia Fjord were spaced between the glacier and the terminal moraine created by the last glacial advance. One station was also established in the outer basin within Columbia Bay proper.

The vertical profiles from casts made with a CTD (conductivity, temperature, depth sensor) and a TS (temperature-salinity) diagram made from these data are shown in Figure 2A and B respectively. These plots reveal highly unique physical properties within the fjord that result from the interleaving of cold, brackish subsurface glacial water in the far upper basin with warm, salty marine source water closer to the terminal moraine.

The source of the deep brackish conditions in the upper basin is undoubtedly from intense mixing of subglacial freshwater discharge at various points across the bottom of the glacier. This process was first described by Walters et al. (1988) in the early 1980's when the glacier was still close to the outer moraine. In 2011, risings of the sea surface elevation from plumes of upwelling subglacial water were clearly evident in spots where the glacier had begun to shoal. Although the effects of the subglacial water are most dramatic on the temperature structure (Fig 2A), a horizontal gradient in salinity also exists throughout the inner basin due to intrusions of marine source water. The presence of this water can also be seen in the TS diagram as a progressively larger down-fjord subsurface temperature maximum (Fig. 2B).

The hydrography data were collected during an ebb tide, and at this time brackish subsurface glacial water was exiting the fjord as a plume flowing across the shallow (4-20 m) terminal moraine. The presence of this water within Columbia Bay proper is indicated by two sets of temperature minima and maxima (Fig. 2A and B), which formed due to differences in buoyancy. For example, the nearsurface glacial water flowing out over the moraine at 1-8 m is more brackish than water in the upper 5-7 m within Columbia Bay. However, the glacial water is also extremely cold giving it a density similar to the subsurface far-field water. This results in subsurface interleaving. A second, more prominent minimum occurs from interleaving of cold, brackish water from 9-12 m.

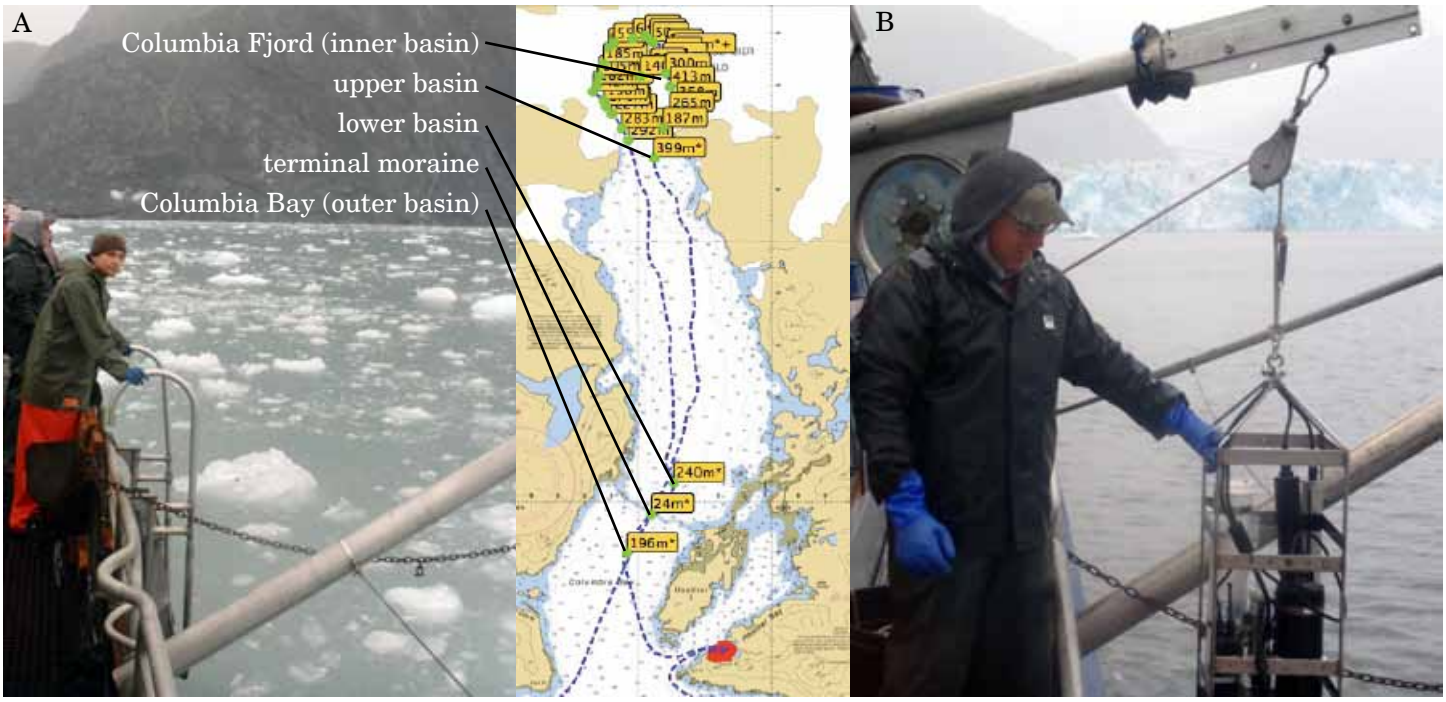


Fig. 1A) Small to medium brash ice within the inner basin of Columbia Fjord and a chart of Columbia Bay and Fjord dotted with sample sites; 1B) Columbia glacier in the background as the CTD is being readied for a cast. Photos by Dave Janka.

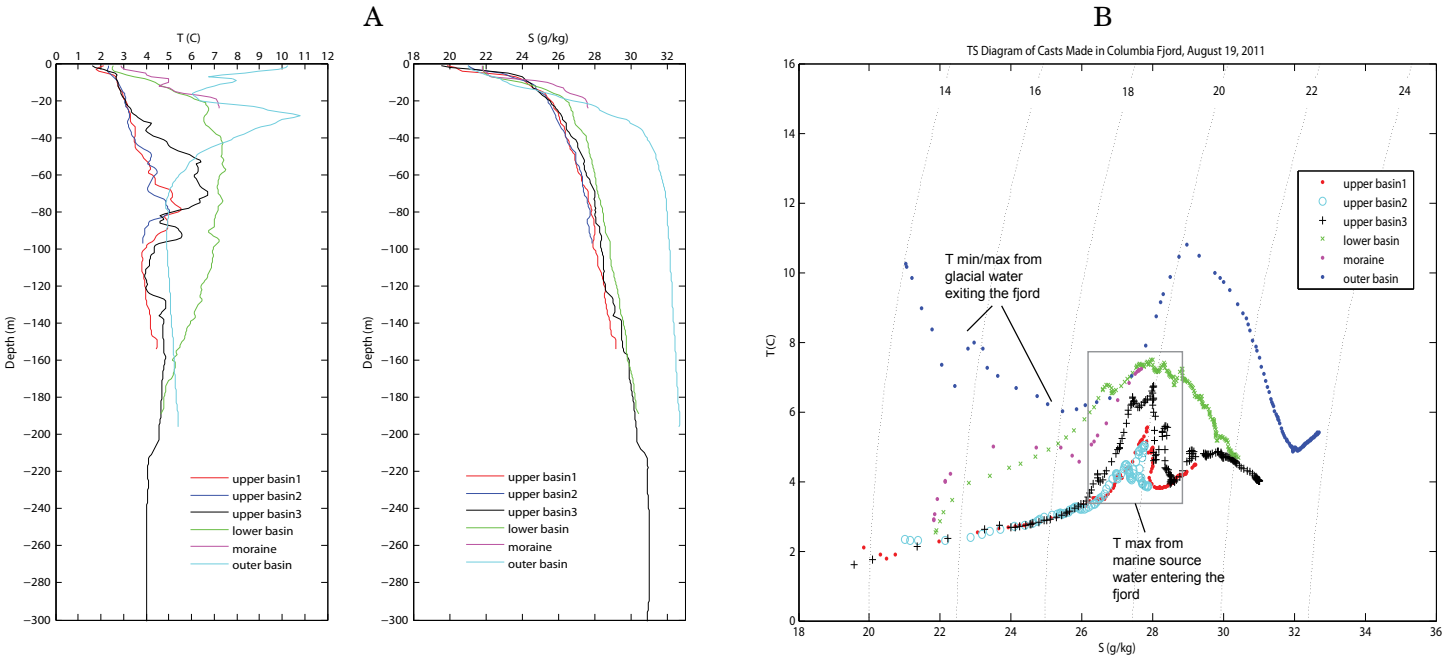


Fig. 2A) Temperature and salinity profiles collected at Columbia Fjord in Aug. 2011 (upper basin 1 & 2 are closest to the glacier); 2B) TS diagram made from the profile data showing the interleaving of marine source water inside the inner basin and subsurface temperature minima and maxima from glacial water exiting across the shallow moraine.

The casts made at the moraine were performed directly over a deep gap in the sill. The bottom water in this layer exhibits a marked increase in both salinity and temperature that exceeds values at similar depths over the entire inner fjord basin (Fig 2A). The high salinity at depth in this gap apparently arises from slightly deeper water in Columbia Bay that is drawn across the moraine in a hydraulic response to the outflowing layer. Just as in the early 1980's (Walters et al., 1988), it is very likely that these subsurface TS gradients represent an inflow of marine source water that balances the salt flux within the fjord possibly following Knudsen's relations (Dyer, 1997). The latter are simple mathematical relationships based on conservation of volume (i.e. mass), expressed as a balance between the volume transport (Q) and salinity (S) in the outflow (o) and that of the inflow (i) as:

$$Q_o S_o = Q_i S_i.$$

If either of the transports is known then the total freshwater input into the fjord (R) can be estimated by the ratio of the salinities times the discharges as follows:

$$R = Q_o(S_o - S_i / S_i) = Q_i(S_o - S_i / S_o).$$

The outflow of cold, brackish water from tidewater glacial fjords affects both the circulation in the western arc of PWS (Okkonen and Belanger, 2008) and water exchange within small fjords located downstream (Gay and Vaughan, 2001). Interactions of the latter type include Unakwik Inlet-Eaglek Bay and Icy Bay-Whale Bay respectively located in the northern and southwestern sound.

References:

Dyer, K.R. (1997) Estuaries: A Physical Introduction. John Wiley & Sons. London, New York Sydney and Toronto. 195 pp.

Gay, S.M. III and S.L.Vaughan 2001. Seasonal hydorgraphy and tidal currents of bays and fjords in Prince William Sound, Alaska. Fish. Oceanogr. 10 (Suppl. 1), 159-193.

Okkonen, S. R. and Be´langer C. 2008. Annual period temperature and salinity signals of surface waters in Prince William Sound, Alaska. Geophys. Res. Letters, Vol. 35, L14604.

Walters, R. A., E. G. Josberger and C. L. Driedger. 1988. Columbia Bay, Alaska: an 'upside down' estuary. Estuarine, Coastal and Shelf Science 26: 607-617.

Exploring the connections between Prince William Sound and the Gulf of Alaska

by Mark Halverson

Montague Strait and Hinchinbrook Entrance are the two most important waterways connecting Prince William Sound to the Gulf of Alaska and to the rest of the world. For example, most shipping traffic, including tug and barge and oil tankers, access Prince William Sound via the shipping lanes in Hinchinbrook Entrance. Oil spilled during the *Exxon Valdez* disaster in 1989 escaped Prince William Sound via Montague Strait.

But did you know that water also moves dynamically through these passages? To learn more about this exchange, the Science Center and Oil Spill Recovery Institute moored oceanographic equipment for five years in Hinchinbrook Entrance and Montague Strait. What we learned is that the nature of this water exchange varies with the seasons.

In winter, the exchange pattern is relatively simple (Fig 1). Water usually flows northward into Prince William Sound through Hinchinbrook Entrance and then out through Montague Strait. This pattern is consistent for all water depths except for a weak, near-bottom current flowing into Prince William Sound along the western shore of Montague Island.

The amount of inflow through Hinchinbrook Enterance could fill up Prince William Sound in about four months. The amount of water flowing through Prince William Sound increases with the strength of the easterly winds.

In the summer, the exchange pattern is quite complex (Fig 2). The water column tends to be highly layered so that light, brackish water rests on top of saline water. This, in turn, means that the currents also flow in layers, and these layers can each move in different speed and direction.

In Montague Strait, water flows out towards the Gulf of Alaska on the west side, but flows into Prince William Sound on the east side. The currents are strongest in the mid-depths. The currents in Hinchinbrook Entrance are even more complex. The direction of the currents in the upper and middle water column frequently changes from an inflow to an outflow so that on the average nothing much happens.

Independent of this, the currents near the seafloor always flow into Prince William Sound along the deep channel in western Hinchinbrook Entrance. On the average, less water flows into Prince William Sound through Montague Strait and Hinchinbrook Entrance in the summer than in the winter.

Knowledge of how and why water flows through Hinchinbrook Entrance and Montague Strait improves our understanding of the biological variability in Prince William Sound. It can also be valuable information in decision making and spill contingency planning.

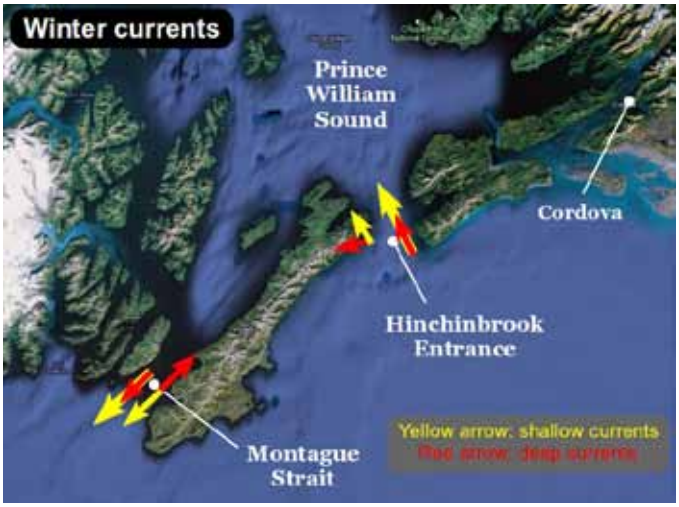


Fig. 1) Average currents in Montague Strait and Hinchinbrook Entrance during the winter.

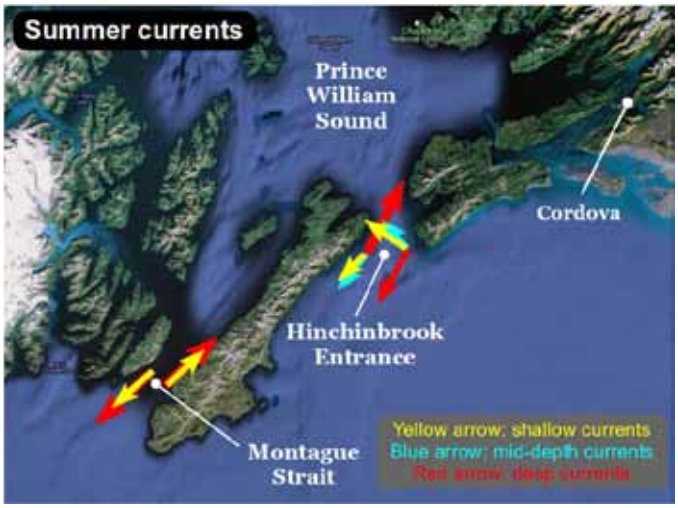


Fig. 2) Average currents in Montague Strait and Hinchinbrook Entrance during the summer.

Did you know that the 1964 earthquake, which originated in Prince William Sound, deformed 100,000 square miles of the Earth's crust? That is nearly the same size of Colorado! Portions of Montague Island were uplifted over 35 feet. Harriman Fjord in the northwest corner of Prince William Sound sank six feet.

Source: Lethcoe, Jim. *An Observer's Guide to the Geology of Prince William Sound, Alaksa*. Valdez: Prince William Sound Books, 1990.

ROV Challenge Comes to the Tsunami Bowl

by Kara Johnson

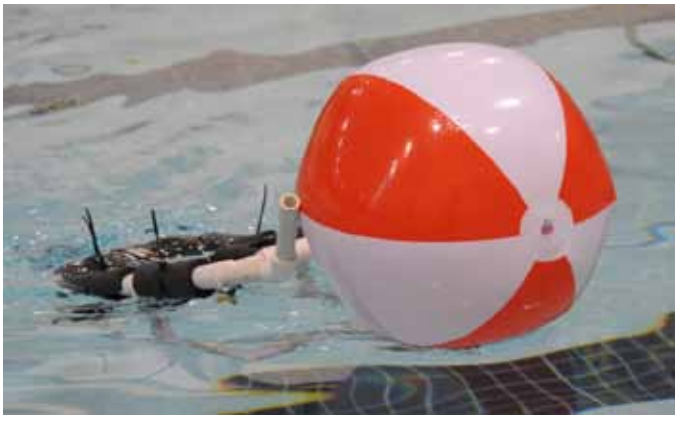
At this year's Tsunami Bowl (Alaska's regional competition of the National Ocean Sciences Bowl, Prince William Sound Science Center staff hosted the inaugural ROV (remotely operated vehicle) challenge with the generous support of the PWS Oil Spill Recovery Institute (OSRI) and Alyeska Pipeline Service Company.

Twenty teams from mostly rural Alaska were given one and a half hours to construct, test, and operate their ROVs to complete a series of five water-based tasks that simulated an under-ice oil spill. The teams were grouped into sets of five teams to cycle through the build and pool stages. At any given time we had ten teams working on their ROVs! The competition was a success with students commenting on how much fun it was to build the underwater machines, operate technology that is used in oil spill response, and take a break from intense NOSB competition.

Many of the students had never heard of or seen an ROV, much less built one in only one hour. After working through their initial apprehension and with guidance from Scott Pegau (Project Manager for OSRI) and Kris Holderied (Acting Director for the NOAA Kasitsna Bay Laboratory), students were busy joining pieces of PVC together to make their ROV. Scott and Kris floated between groups to insure that students attached the motors correctly, adhered to basic ROV designs, and gave suggestions about what might or might not work. Once the building hour was over, five teams at a time headed down to the pool.

In the pool, Kara Johnson (PWSSC Science Education Director) and Sophia Myers (Cordova high school student) set up the challenge courses that simulated an oil spill under sea ice. Teams had to operate their ROV to perform a scouting mission to find pools of oil trapped under the ice, take a sample of the oil, return the sample to the analysis station, deliver a piece of equipment to an underwater work station, and transport a piece of equipment across the surface. After ten minutes for a test run, the teams had twenty minutes to complete as many of the tasks as they could. Each task was worth points, and the top three teams won cash prizes thanks to Alyeska Pipeline Service Company. All students took turns operating their ROVs and showed great teamwork, support, and excitement. Congratulations to the Tiger Sharks (Mat-Su Career & Tech High School), Twilight Zone (Homer High School) and Rock Lobsters (Mat-Su Career & Tech High School)!

The entire event was a huge success. We are thrilled with the invitation to bring the event back for future Tsunami Bowls. Be sure to check our blog for ROV photos: www.pwssc.org/blog



Top: Students watch as their ROV is tested in the pool. Bottom left: Scott Pegau helps one of the teams during the building phase of the ROV challenge. Bottom right: An ROV successfully retrieves a beach ball during the challenge. Photos courtesy of Pennington Photography.

The Discovery Room in Pictures

by Lindsay Butters

Cordova's Salmon Tank project located in Mt. Ecceles Elementary School, has been incredibly successful. 1) In October 2011, students collected fertilized eggs from Flemming Creek.

2) In February 2012, our eyed-eggs hatched into alevins! Cordova's third and fourth graders have established a regional exchange program we call "Skype pals" with students in Kenny Lake and Yakutat who also have salmon incubation tanks in their schools. The students use Skype to share tank observations, weather data and information about their communities with each other. This project is sponsored by the Alaska Department of Fish & Game, Copper River Watershed Project, PWS Science Center, the Cordova School District and Orca Adventure Lodge.

3) Kate Alexander teaches third graders how to collect and record weather information such as temperature and precipitation. In addition to Skyping with their pals in Kenny Lake, the students have studied the water cycle, salmon life cycle and forest types through dance—an energizing and fun way to learn science.

4) Marita Kleissler helps eager fourth graders dissect a salmon and identify each of the fish's internal organs. This exciting activity is just one of many hands-on experiences the students have had this year as they study salmon biology and the effects of climate change on salmon habitat. One of their favorite demonstrations simulated glacial melting and increased glacial stream flow using a frozen glacier model and a blow torch.

5) Fifth graders studying the effects of climate change on our oceans and fisheries bubble CO_2 into tap water to simulate the process of ocean acidification. They discovered that this decreased the pH of the water, causing it to be more acidic. The students also met with scientists from ADF&G and PWSSC to learn how Pacific herring are studied in Prince William Sound. The students practiced aging herring by analyzing annual rings on their scales and then dissected several herring, which is a bit more challenging than dissecting a salmon!


5

6) In January 2012, the sixth grade students began their study of oil spill science by observing how oil interacts with different sediment types. Soon they will be putting their knowledge of ocean technology and marine oil spills to the test when they design and construct underwater robots that will be used to respond to a mock oil spill.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***Cordova team takes silver**, Continued from page 1*

The quiz bowl competition was fierce and nerve-wracking. During this section, teams compete against each other to answer multiple-choice, short answer, and team challenge questions about ocean sciences. Both an extensive knowledge base as well as good strategy are necessary to win. The Urchin Queens faced off against the undefeated Pelagic Magic and held their own, leading to the round where Pelagic Magic scored the least number of points. This certainly unnerved the undefeated team who thought it would be easy to go against our novice team.


The Urchin Queens: Sarah Hoepfner, Gabrielle Brown, Robin Pegau, and Lindsey Hammer

By the time the double elimination rounds were done, it was down to two teams: Cordova's Nefarious Dawgsharks and Juneau-Douglas' Pelagic Magic. Back and forth the teams buzzed in and answered (sometimes correctly, sometimes incorrectly). Coaches, parents, and audience members were on the edge of their seats: could Cordova knock Juneau out? By the end of the match we knew. The score was close with Pelagic Magic barely edging out the Nefarious Dawgsharks to take first. Disappointment among our team did not last long as they had moved out of their third-place rut and into second.

Even though two of our senior students will be moving on to college next year (James Allen and Sophia Myers), we have an excellent and seasoned core who will be even more determined to take on Juneau next year. What a great showing of superb teamwork and talent by all of our students! Please congratulate all of our NOSB students for their time and effort in this extra-curricular academic competition. PWSSC would also like to thank the Cordova community for your generous support of our fund raising efforts throughout the winter so the students could make the five-day trip to Seward.

We attribute our successful education and research programs to the generous contributions of our current members and sponsors. Thank you for your support!

Northern Lights ($10,000+)
Trident Seafoods

Humpback ($5,000-$9,999)
CoBank
Eyak Corporation
Odom Corporation

Brown Bear ($1,000-$4,999)
Alaska Ocean Observing System
Alaska Tanker Company
AlaskaUSA
Alyeska Pipeine Service Company
Sue Coliton
Joe and Belen Cook
ConocoPhillips, Alaska
Cordova Telephone Cooperative
Crowley Maritime
John and Jackie Goering
John and Barbara Harvill
Meera Kohler
RJ and Barclay Kopchak
Chuck Meacham
The Meacham Foundation
PWS Oil Spill Recovery Institute

King Crab ($500-$999)
Alaska Sea Grant, Marine Advisory Program
American Seafoods
Howard and Jean Baumann
Joe Bundrant
Copper Valley Telecom
Jim and Patti Kallander
Mike Mahoney
Shoreside Petroleum
Andrew Smallwood

Bald Eagle ($250-$499)
Auklet Charter Services
Nancy Bird and Karl Becker
Mary Anne Bishop
Ted and Jacquelyn Cooney
Cordova Electric Cooperative
John Garner
Jay Fleisher and Judy Pachter
Katrina Hoffman
Jim and TJ Holley
Paul and Linda Kelly
Riki Lebman and Dave Mesiar
Sen. Lisa Murkowski and Verne Martell
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William Rome
Lelea Seymour
James Thorne
Richard Thorne
USFS Cordova Ranger District
Jeff and Molly Welker
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Ed and Elaine Zeine

Halibut ($100-$249)
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Pangaea Adventures
Blaize Potts
Mike and Cheryl Reynolds
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Kristin and Danny Carpenter
Thomas Folsom
Fried Family
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Adam Kenyon
Clay and Lila Koplin
Carol Kreader and Brian Wrenn
Bill and Renee Lindow
Craig Matkin
Kyle and Alice Mehalek
Thane and Sherry Miller
Don and Barbara Moore
Nikki Newcome
Liz O'Rourke
Scott and Cathy Pegau
James Pfeiffenberger
Cheryl Roussain
Victor Williams
Keith and Kathy Zamudio

Copepod ($25)
Cally Bateman
Eileen Becker
Gerald Brookman
Mike Butler
Tom and Karen Egan
Mark Halverson
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Kirsti Jurica
Laurel McFadden
Caitlin McKinstry
Penelope Oswalt
Linée and Jason Perkins
Steve and Mimi Rothchild
Dana and Anita Smyke
Thea Thomas
Erica Thompson and Dan Clark
Jordan Watson
David Wellman

Diatom ($10)
Jim and Signe Fritsch
Alex Naquin

Staff and Board Updates

We would like to extend a huge thank you to the following staff and Board Members for their many years of hard work and dedication. Good luck in your new endeavors! We would also like to welcome our newest members of the Board.

Staff Departures

Allen Marquette, Community Education Program Coordinator, 2002-2012

Linée Perkins, Executive Assistant, 2009-2012

Board Departures

John Goering, Ph.D., Professor Emeritus, Institute of Marine Science, Univ of Alaska Fairbanks, 2002-2011

John Harvill, Retired Engineer, Cordova, 2010-2012

Gale Vick, Executive Director, Gulf of Alaska Coastal Communities Coalition, Fairbanks, 2002-2011

New Board Members

John Garner, Vice President of Sales, Trident Seafoods Corporation, Seattle

Meera Kohler, President/CEO, Alaska Village Electric Cooperative, Anchorage

Gordie Reeves, Ph.D., Research Fish Biologist, Pacific NW Research Station/USDA Forest Service, Corvallis

After a long, snowy winter, staff at the Science Center were treated to this beautiful scene. Venus shines brightly above the Heney Range and Cordova boat harbor, February 6, 2012. Photo by Jordan Watson

Yes! I would like to become a member of the Prince William Sound Science Center.

All memberships include the Basic Package: a subscription to our biannual Breakwater newsletter, 10% off all merchandise in our gift shop, plus other special mailings!

Name _____

Mailing address _____

_____

City _____ State _____ Zip _____

Telephone _____

E-mail _____

Three ways to pay

1. Mail this form, along with a check to: PWS Science Center, PO Box 705, Cordova, AK 99574
2. Pay online with PayPal at www.pwssc.org/membership
3. Pay with a credit card by calling 907-424-5800 ext 232

	Rates	Premiums
Diatom	$10	basic package
Copepod	$25	basic package
Razor Clam	$50-$99	basic package and a mug
Halibut	$100-$249	basic package, mug and a $1 coupon for our gift shop
Bald Eagle	$250-$499	basic package, mug and a $3 coupon for our gift shop
King Crab	$500-$999	basic package, mug and a $5 coupon for our gift shop
Brown Bear	$1,000-$4,999	basic package, mug and a $15 coupon for our gift shop
Humpback	$5,000-$9,999	basic package, mug and a $50 coupon for our gift shop
Northern Lights	$10,000+	basic package, mug and a $75 coupon for our gift shop

The PWS Science Center is a 501 (c)(3) corporation; your contribution is fully tax deductible.

Summer Education Programs are just around the corner!

Program	Dates	Ages	Day/Time	Cost
H2O†	June 18-22	8-11 years	M-F* 10am-4pm	$250
Wetland Ecology	July 9-13	12-14 years	M-F* 9:30am-4:30pm	$325
H2O†	August 6-10	12-14 years	M-F* 10am-4pm	$250

†H2O (Headwaters to Oceans), formerly "From the Forest to the Sea."
*Includes an overnight on Thursday

For more details visit our website at:
www.pwssc.org/education/summer/daycamp.shtml
or contact Kara Johnson
907-424-5800 x237; kjohnson@pwssc.org

2012 Calendar

April 23
PWSSC 23rd Anniversary
May 2-5
Shorebird Festival
June 8
PWSSC Board Meeting
Gallery Night at the Reluctant Fisherman
June 9
Copper River Nouveau Fundraiser
Reception at the PWS Science Center
Dinner and auction at Orca Adventure Lodge
June-August
Summer education programs

Keep up to date by following PWSSC here:

www.pwssc.org/blog
www.pwssc.org/news

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