

# Partnership

Spring/Summer 2011 Issue: Volume 21, No. 2

## Letter from the Chair

- Debbie Scanlon, WHSTEP Co-Chair, MBL Ecosystems Center

As my co-chair Suzanne Avtges and I explored ideas for this letter, she commented that "the challenge for teachers is to bring real world problems into the classroom with the hope of sparking the passion to solve these problems." The real world dilemma that we all are facing is, to put it simply, saving our planet, and so we have chosen "Stewardship of the Planet" as the WHSTEP theme for the coming school year. In the next few months, we will offer ideas and programs that teachers can bring into their classrooms.

One such program that Suzanne has used is the C-MORE curriculum from the Center for Microbial Oceanography: Research and Education, a partnership of five institutions based at the University of Hawaii at Manoa. (WHOI is one of the five partners.) Its curriculum is appropriate for students in grade 3-12. Suzanne says it has led her students to formulate a keen interest in protecting our oceans because now they fully understand our impact on the marine environment.

Research at the Woods Hole scientific institutions addresses not only the oceans but also the land and atmosphere. We hope to bring in speakers on climate change from WHOI's Ocean and Climate Change Institute, the MBL's Ecosystems Center, and Woods Hole Research Center.

Our October Liaison dinner will feature some of the curricula that Suzanne and others have used: C-MORE science kits, Habitat Mapping Camera System (HabCam) Seafloor Education Activities, "Plastics in the Ocean" activities from Sea Education Association (SEA), and the Global Learning and Observations to Benefit the Environment (GLOBE) project (Kama Thieler, WHSTEP administrator, is also the GLOBE project coordinator at WHOI) that involves students in testing water quality of coastal waters. These materials and programs are being developed or supported locally, with staff to train teachers and work with classrooms.

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*Kama Thieler*

Children at the Bourne Public Schools Science Fair crowd around the microscope and other hands-on components of the C-MORE Plankton kit.

We hope that you, the teachers, will contact us for classroom activities and speakers, and that you, the scientists, will volunteer your time and expertise as we all strive to develop the minds that we hope will solve the environmental problems facing Planet Earth.

## Hands-On Marine Science Kits

- Abby Heithoff

Did you know WHOI hosts four Science Kits that contain everything you need to convey advanced topics in Oceanography to students in grades 3-12? Indeed it does, and they're available to any local educator who wants to bring marine science into their classroom. The kits, produced by the Center for Microbial Oceanography: Research and Education (C-MORE) focus on a wide range of topics in marine science and are outlined below.

**Ocean Acidification Kit:** This kit is intended for grades 6-12 and familiarizes students with the chemical causes and environmental consequences of anthropogenically driven ocean acidification. The first of the two part lesson includes a PowerPoint full of information about ocean acidification and a hands-on experiment examining the effects of acidification on coral sand. Lesson two includes a more advanced hands-on experiment using sensitive analytical equipment to examine the chemistry behind the process of ocean acidification. This kit was recently highlighted in *Science Scope* (February, 2011), the journal of the National Science Teachers Association.



*Courtesy C-MORE*

Students work on a lesson using CO<sub>2</sub> and pH probes from the Ocean Acidification kit.

**Ocean Conveyor Belt:** The Ocean Conveyor Belt kit introduces students in grades 8-12 to some fundamental concepts in oceanography, including water stratification, deep ocean circulation, nutrient and ocean circulation and how scientists collect and use data to explore ocean processes. The discreet units utilize a combination of hands-on and computer based lessons and can be rearranged as needed or used individually.

**Marine Mystery Kit:** This kit is geared to students in grades 3-8. The lessons follow an exciting "who-dunnit" format wherein students assume character roles in a marine murder-mystery. The students learn the basics of coral reef ecology and the interdependence of coral polyps and zooxanthellae. Students also learn about the various threats facing coral reefs, coral reef decline and gather clues designed to teach the basics of DNA testing. This kit was also recently highlighted in *Science Scope* (March, 2011).



*Courtesy C-MORE*

Students examine local seawater samples using the Plankton kit.

**Plankton Kit:** This kit can be modified to suit grades 3-12 and explores the global importance of plankton through 4 lessons. The 4 lessons include a narrated PowerPoint presentation, a lesson where students design their own phytoplankton based on information from the first lesson, a microscope unit and a computer simulation based activity examining phytoplankton bloom dynamics and various environmental factors. This kit is undergoing a facelift, and will soon include a new plankton net, a new microscope and a laptop to run the included software.

The kits' discreet lesson based structure allows them to be easily adaptable, giving educators the chance to focus on areas of interest. Units can be swapped out for other lessons or taught individually as needed. The Plankton kit has recently been used by educators at Mashpee High School and at Boston Day and Evening Academy. The response was positive, and with updates to the Phytoplankton kit coming in June, the science kits will be ready to roll for the fall semester.

More information on each kit and instructions for requesting a kit online are available at:

[http://cmore.soest.hawaii.edu/education/teachers/science\\_kits.htm](http://cmore.soest.hawaii.edu/education/teachers/science_kits.htm).

## Science Community Lends Support to Local Science Fairs

- Kama Thieler

Science Fair season is a busy time of year for teachers, students, and the local science community. Many local institutions contribute mentors, judges, prize donations, and exhibits to science fair efforts.

For 14 years, WHSTEP has organized a science project mentoring program at the Lawrence Junior High School in Falmouth. Members of the WHSTEP scientific community volunteer their time to meet with 7<sup>th</sup> and 8<sup>th</sup> grade students and help them design and refine their science projects. This year, mentoring took place in late January - early February.

WHSTEP thanks the following volunteers for taking their time to help the students at the Lawrence School: **J.C. Weber, Sam Kelsey, Shanta Messerli, Anne Thessen, Suzanne Thomas, Erica Lasek-Nesselquist, Mary Anne Alliegro and David Graham (MBL); Bill Waite, Claudia Flores and Brian Buczkowski (USGS), Vicke Starczak, Julie van der Hoop, Betsy Gladfelter and Porter Hoagland (WHOI); Nancy Dunn (WBNERR); David McKeirnan, Jim Newman and Alan Alai (Falmouth VIPS); Amy Siuda and Jeff Schell (SEA); Molly Cornell, Beth Schwarzman, Livia Gong and Lynn Parks (WHSTEP).**



*Kama Thieler*

Sam Kelsey (center) and Erika Lasek-Nesselquist (right), both of MBL, meet with Lawrence School students during the WHSTEP mentoring week.

WHSTEP arranged for institution exhibits at the Falmouth District Science Fair on March 5. Woods Hole Oceanographic Institution displayed a REMUS underwater vehicle; Sea Education Association presented materials about their high school and

undergraduate sailing research programs; Marine Biological Laboratory brought horseshoe crabs, starfish and other organisms from the Marine Resources Center; Encyclopedia of Life showed their on-line resources, Waquoit Bay National Estuarine Research Reserve brought a hands-on exhibit of their research and education programs, USGS Coastal and Marine Science Center exhibited maps and 3D images, WHOI/MIT graduate students displayed the C-MORE science kits and Woods Hole Sea Grant contributed a poster promoting marine careers.

The Bourne Science Fair, sponsored by the PTA, was held on March 18 at Bourne Middle School. WHOI, USGS, MBL, C-MORE and Project Micro exhibited at the Fair.



*Chris Polloni*

Amy Kukulya, WHOI engineering technician, describes the REMUS autonomous underwater vehicle to a student as part of the science institution exhibits at the Falmouth District Science Fair in March.



## WHSTEP Mini-Grant Award

-Kama Thieler

WHSTEP offers mini-grants to teachers and their partners to provide support for new and innovative science, math, and technology programs in our member schools. During our recent funding round, Syrel Dawson, Mullen Hall 4<sup>th</sup> grade teacher, received a grant for a project entitled, "Monitoring and Recording Life on Shivericks Pond."

Visit the WHSTEP website for more information, and a copy of the grant application:

<http://www.who.edu/whstep/minigrants.html>

## WHSTEP Annual Meeting: Great White Sharks in New England

-Debbie Scanlon

In September 2004, fisheries biologist Greg Skomal got a phone call from a friend saying there was a great white shark in Lackeys Bay on Naushon Island. He was skeptical, to say the least. "A great white sighting is like a UFO reporting," he said. Not very likely, according to Skomal, senior fisheries biologist with the Massachusetts Division of Marine Fisheries and head of the Massachusetts Shark Research Program.

But Skomal, featured speaker at the WHSTEP Annual Meeting in May at the Mashpee Public Library, said he made the trip over to Naushon and confirmed that it was indeed a 13-foot, 1700-pound immature female great white shark. She was stuck in the shallow water of the salt pond. Finally weir fishermen were enlisted to herd her with water pumps, forcing her out through the estuary.



Debbie Scanlon

Greg Skomal presents research on white sharks in Cape Cod waters at the 2011 WHSTEP Annual Meeting.

Skomal was able to tag the great white. "After 20 plus years of shark research, a great white shark was delivered to my back yard," but then the tag came off. "I gave up, but then became Junior Ahab!"

In his talk, "Jaws Revisited: The White Shark in New England," Skomal said shark sightings - legitimate sightings - are still rare in this part of the world. The hot spots are the Indian and Pacific Oceans.

Lately, however, the gray seal population has increased due to the Marine Mammal Protection Act of 1972, and sharks like to eat seals. "It all came to a head Labor Day 2009 off Monomoy Island near Chatham," said Skomal. A spotter pilot saw great white sharks within 50 yards of the beach. Skomal was able to tag five sharks then, using pop-up

satellite archival transmitting (PSAT) tags that examine site fidelity, seasonal movements, and habitat use.

The next year, he tagged eight more. Data from the tags show that "they have a simple migration that mimics the Cape Cod tourist," he said. The sharks leave Cape Cod and go to northern Florida, except sharks follow the Continental Shelf. Total travel time down the coast is about 60 days.

With the increase in seal population, and their proximity - Skomal pointed out that now 80 percent of the gray seal population is born at Muskegat Island between Nantucket and Martha's Vineyard -who knows what 2011 will bring?

WHSTEP annual meeting business included the election of three new board members: JC Weber, senior research assistant at the MBL Ecosystems Center; Wendy Scholes, third grade teacher, East Falmouth Elementary school, and Ann Vachon, science teacher, Upper Cape Tech. Nancy Soderberg, who retired from USGS this year, was honored for her many years of service to WHSTEP.



Debbie Scanlon

Dr. Skomal talks with Nancy Soderberg, who was honored at the meeting for many years of service to WHSTEP.

### White Shark Resources

MA Division of Marine Fisheries site for white shark trapped in a Cape Cod salt pond, Naushon Island, 2004: [http://www.mass.gov/dfwele/dmf/marinefisheriesnotices/white\\_shark.htm](http://www.mass.gov/dfwele/dmf/marinefisheriesnotices/white_shark.htm)

MA DMF site for the 2010 white shark tagging program: [http://www.mass.gov/dfwele/dmf/spotlight/white\\_shark\\_2010.htm](http://www.mass.gov/dfwele/dmf/spotlight/white_shark_2010.htm)

Encyclopedia of Life Podcast: Great White Shark <http://education.eol.org/podcast/great-white-shark-0>

Aerial photos of shark tagging off Chatham, MA: <http://oceanaerials.com/Sharks.html>

## WHSTEP Family Science Night: Engineering behind the *Titanic* Exploration

- Kama Thieler

April 14, 2011 marked the 99th anniversary of the RMS *Titanic*'s fateful collision with an iceberg in the North Atlantic Ocean. On that night, WHSTEP sponsored a Family Science Night program at the Falmouth Public Library, "The Engineering behind the *Titanic* Exploration." A panel of scientists and engineers spoke about the search for the *Titanic*, the remotely-operated vehicles that explored the shipwreck, and the underwater imaging systems that documented the condition of the wreck. About 100 people attended, with more than 50 young students crowding the floor of the Hermann Foundation meeting room.

The first speaker was Cathy Offinger, a research associate in Woods Hole Oceanographic Institution (WHOI)'s Applied Ocean Physics and Engineering Department. Ms. Offinger, a former assistant to Dr. Bob Ballard, was part of the team on research vessel *Knorr* when the WHOI group first discovered the *Titanic* in 1985. She described the early technology of towed camera systems, which required lowering down and retrieving film cameras from thousands of meters below the ocean surface, then processing the black and white photographs on the research ship. Cathy showed some of the iconic first images of *Titanic*, identifying the crow's nest, bow, and anchor of the ship.



Courtesy WHOI

WHOI researchers explored the hull of the *Titanic* with the ROV *Jason Jr.* in 1986.

Jim Newman, chief engineer at Woods Hole Marine Systems, Inc., was on the WHOI team that designed and built *Jason Jr.*, the remotely operated vehicle (ROV) that explored *Titanic* in 1986. This small ROV worked in conjunction with the three-person submersible *Alvin*. Personnel on *Alvin* piloted *Jason Jr.* around the shipwreck to places where the submersible could not go. Jim described the evolution of deep-sea technology and engineering, and showed how an ROV is built, from the

welding of the frame to the installation of electronics and camera systems that are designed to withstand the crushing pressure of the deep ocean. He also brought a sample of "old-fashioned" heavy coaxial cable that was used prior to the development of modern fiber optic cables that now speed communications, data and video transfer between surface ships and ROVs.

The final speaker, Clay Kunz, is a WHOI/MIT graduate student in WHOI's Applied Ocean Physics and Engineering Department. Clay has expertise in underwater imaging, and his research interests include exploration robotics and computer vision. He has been involved in the development of photo mosaics of shipwreck sites, including *Titanic*. Clay described the many challenges of underwater photography, such as lighting up the complete darkness of the deep sea, and how to compensate for the color absorption of water compared to air. He showed spectacular image mosaics of ancient Greek shipwrecks, as well as *Titanic* in its resting place on the sea floor.



Debbie Scanlon

Clay Kunz, WHOI, describes a photo mosaic of the *Titanic* to a student at the Family Science Night program.

The students asked many questions, ranging from why some of the wreckage such as leather shoes and pottery has been so well preserved, to whether ship designs have changed to make them less likely to sink if they hit an iceberg. The speakers also had hands-on displays, including a table-sized mosaic of *Titanic* images, different types of cable used to connect ROVs to surface ships, a small ROV, and syntactic foam used as flotation material in deep-sea underwater vehicles.

The Family Science Night was moderated by WHSTEP Executive Committee member Deb Coulombe. WHSTEP thanks the Falmouth Public Library, and especially the panel and the many parents that brought their children to the program for a fun and educational evening.



*Kama Thieler*

Falmouth High School environmental science students measure the salinity of a water sample from West Falmouth Harbor. Over 100 students visited the harbor in April to participate in the GLOBE coastal waters sampling program.

Visit the WHSTEP website at:  
<http://www.who.edu/whstep/>  
 For announcements about events related to science and math, subscribe to the WHSTEP listserver at:  
<http://lists.mbl.edu/mailman/listinfo/whstep>  
 For all WHSTEP questions, send an e-mail to:  
[whstep-info@who.edu](mailto:whstep-info@who.edu)

**Summer Lectures in Woods Hole**  
**WHOI Science Made Public Lecture Series**  
<http://www.who.edu/page.do?pid=9156>  
 All talks are held in the WHOI Ocean Sciences Exhibit Center Auditorium located at 15 School Street, Woods Hole.

**MBL Friday Evening Lecture Series**  
[http://www.mbl.edu/events/events\\_friday.html](http://www.mbl.edu/events/events_friday.html)  
 MBL Lillie Auditorium, 8:00 PM, 7 MBL Street, Woods Hole. Lectures are free and open to the public.

**Distinctive Voices at The Jonsson Center**  
[http://www.nasonline.org/site/PageServer?pagename=Jonsson\\_main](http://www.nasonline.org/site/PageServer?pagename=Jonsson_main)  
 A series of public events at the National Academy of Sciences J. Erik Jonsson Center, 314 Quissett Avenue, Woods Hole.

The WOODS HOLE SCIENCE AND TECHNOLOGY EDUCATION PARTNERSHIP (WHSTEP), established in 1989, is a partnership of schools, scientific institutions, businesses, and community resources. Its purpose is to support, promote, and expand science, math, and technology education and science literacy in the participating communities.

How to get involved:

- ✓ Attend a Partnership meeting in January or May, or a Science and Math Safari
- ✓ Contact an Executive Committee member or a liaison with program ideas or feedback
- ✓ Host a teacher tour or class field trip in your lab
- ✓ Volunteer to present your research at a WHSTEP event
- ✓ Serve as a mentor for a student science fair project
- ✓ Make a financial contribution to support WHSTEP programs and grants for teachers

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