



Newsletter of the Friends of Hatfield Marine Science Center

## Big Squid - Big Ideas

Contributed by Sarikka Attoe

Humboldt squid, voracious predators that can reach up to six feet long and 60 pounds in weight, have become common off the Oregon coast in recent years. They typically consume ten percent of their body mass each day, with a diet consisting mainly of sardines, rockfish, hake, and small deep sea fish. William Gilly, a professor from Stanford University and an expert on Humboldt squid ecology and physiology, presented his research to an enthusiastic audience at the HMSC Visitor Center on March 10th.

Within the past decade, Humboldt squid have travelled outside of their known habitat of the central Pacific Ocean and into more extreme latitudes, including those along the coasts of Chile and Alaska. Dr. Gilly suspects that the range expansion might be partially caused by the shoaling and north-south extension of the oxygen

minimum zone (OMZ), which is known to provide habitat and refuge for the Humboldt squid. Offshore Oregon, the OMZ is normally around 600m water depth and results from the bacterial decomposition of organic matter from the above water column. Within the past 10 years, the OMZ has expanded, reaching into more extreme latitudes and shallower waters.

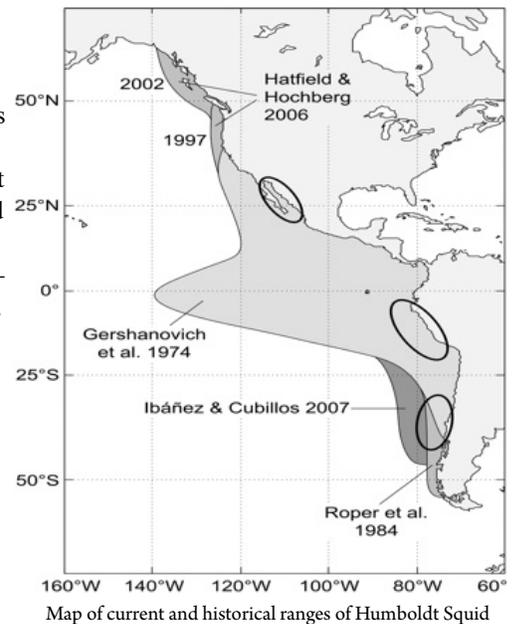
Recent studies by Dr. Gilly have shown that Humboldt squid can drastically reduce their metabolism to survive in oxygen-depleted water, such as that found in the OMZ. Tagging studies, performed by Dr. Gilly and others, have shown that the squid migrate vertically in the water column over the course of one day following their prey. In addition to being the daytime habitat of their prey, the OMZ is a refuge from many of the Humboldt squids' predators.

HMSC scientists Selina Heppell and Michael Banks, along with students

Sarikka Attoe and Mattias Johansson, are studying the diet of the Humboldt squid population off of the Oregon and Washington coasts. Using genetics to classify prey in the stomachs of Humboldt squid, the group is focused on identifying the squids' diet, which may consist of species commercially important to fisheries of the northwest Pacific.



photo by Al Pazzar



## Innovations

### HMSC-led team uses new capture cage to disentangle sea lion from marine debris

Less than one month after deploying a "capture cage" in an experimental effort to catch and rescue sea lions caught in man-made debris, a team led by HMSC used the floating enclosure to confine and free an adolescent California sea lion from a plastic packing band that had been caught around its neck for more than a year. The animal, which had become a familiar sight in Newport since first being spotted in September 2008, was seen hauled out along with six other sea lions inside the capture cage on April 28. The newly installed capture cage on a floating dock at Newport's bayfront is the result of

a collaborative partnership involving HMSC, ODFW, Oregon Coast Aquarium, Dan Lewer and Steve Brown of the Animal Medical Care Veterinary Practice, and the Port of Newport. Dan Lewer is a former intern of OSU's marine mammal program.



Left: The crew rushed to the cage in a skiff and closed its door, confining five of the animals inside.

Top: The tangled animal was lightly sedated using a syringe affixed to a pole. Team members reached through the cage with a second pole device to cut and finally remove the band. A reversal agent was administered to counter the sedation, and the animal was safely back in the water shortly thereafter.

## Notes from the Director



The past six months has been very busy time for Newport and the HMSC. The biggest local news continues to be the announcement that NOAA's Marine Operations Center –Pacific will be coming to Newport – despite protestations from Washington state. The facility will be just across the street from the HMSC, and will have buildings and docks to accommodate six NOAA research vessels. We are examining how NOAA's move here in May 2011 will affect HMSC's programs. We also received wonderful news last month that the State legislature will provide \$9 million in matching funds for the Marine Mammal and Marine Genomics Building. While we still need to gather the remaining \$15 million through a proposal to the federal government later this month, we are optimistic about our chances.

Aside from normal research activities, HMSC staff have also been busy with many scientific meetings, and in this newsletter you will read about participation in the international meeting for PICES as well as some detail about the Ocean Science Meeting held in February 2010. HMSC was very well represented at both, especially the latter, where not only staff but many of our graduate and undergraduate students presented research results.

As we gear up for summer, the spring Marine Biology students have just arrived at HMSC, the new summer session course schedule is planned, and we have just chosen this summer's research interns. The Visitor Center is also bringing in new interns and will have an active public program this summer. One change however, will be the absence of SeaFest this June as we reassess the best way to address our opportunities to bring science to the public.

Finally, we are pleased in this issue to introduce Maryann Bozza, who replaces Ken Hall as HMSC's program manager. Join me in welcoming Maryann, who joins us with a very diverse background and has hit the beach running, taking on a backlog of Ken's projects and many new ones as well.

## Sea Grant education partnership receives presidential award

The Ocean Conservation and Education Alliance Northwest (OCEAN), a partnership of Oregon Sea Grant and several other coastal groups, received a 2009 Coastal America Partnership Award for outstanding efforts to restore and protect the coastal environment.

The Presidential award represents the highest level national recognition for outstanding multi-agency, multi-stakeholder collaborations that pool resources from many sources to accomplish coastal restoration, preservation, protection and education projects.

The award was announced on Nov. 6 by the Coastal America Partnership (<http://www.coastalamerica.gov/>) an action-oriented, collaborative partnership of federal agencies, state and local governments, and private organizations. The partners work together to protect, preserve, and restore our nation's coasts, accomplishing tasks that no one group could accomplish alone.

OCEAN is receiving the award for "efforts to bring together a network of innovative educators ... to engage students and inspire ocean science literacy," according to Coastal America director Virginia K. Tippie.

The OCEAN partnership came about three years ago as a result of discussions among the Sea Grant Education program at Oregon State University's Hatfield Marine Science Center (HMSC), the Lincoln County School District, and the Oregon Coast Aquarium.

The initial goal was to forge a partnership to help make local students among the most "ocean literate" in the country. Since then, the partnership has grown to include more than a dozen local, state, federal and university agencies and organizations, and the network is expanding to encompass the entire Pacific Northwest.

The network's goals are to unite organizations with strong marine science education programs to focus on ocean science literacy both in K-12 schools and among the public at large. The partnership aims to nurture children's inherent scientific curiosity by employing the multi-disciplinary allure of the ocean to help teach science, technology, math, and engineering concepts, and to create professional development opportunities to support teachers and marine science professionals in furthering that goal. The award was presented April 17th at the OCAMP Colloquium at HMSC by Louisa Koch, NOAA Education Director.



## PLAN TO ATTEND

**The 16th Annual  
Markham Marine Science  
Research Symposium**

**Wednesday, June 16th  
Hatfield Marine Science Center**

## HMSC Briefs

**RESEARCH CRUISE TO STUDY UNDERSEA VOLCANO:** The 2010 research expedition to NW Rota-1 in the Mariana Arc, a submarine volcano that has been actively erupting on every visit since 2003, has just concluded. The *R/V Kilo Moana* left Guam on March 16 and returned the end of March. Funded by the National Science Foundation, the expedition used the remotely operated vehicle Jason for a number of studies, including the effects of the eruptions on hydrothermal vent animals that live on top of the volcano in their midst. HMSC staff participating on the expedition include Bill Chadwick, Bob Embley, Susan Merle, Andra Bobbitt, and Leigh Evans. Check out the cruise blog at: <http://nwrota2010.blogspot.com> and look for research news in our next issue.

**EXHIBIT GRANT:** A new “Ocean Conditions” exhibit is under development for the Hatfield Marine Science Center Visitor Center, thanks to a \$14,000 NOAA National Marine Fisheries Service Internal Education Grant to the Northwest Fisheries Science Center and Oregon Sea Grant. An interactive kiosk will highlight the role of physical and biological ocean conditions in the survival of juvenile salmon in the California Current Large Marine Ecosystem off the coast of Oregon. The exhibit is slated for completion in Winter 2010.

**HMSC SCIENTISTS ATTEND 2009 ANNUAL MEETING OF PICES:** The meeting was held in late October 2009 on Jeju Island, Republic of Korea. PICES is the North Pacific Marine Science Organization, and OSU and HMSC scientists have been involved with PICES since its inception. In addition to presenting their research each year, they currently participate in a variety of committees and working groups, which provide an excellent means of developing international linkages in research. HMSC’s Bryan Black was presented the Best Paper Award for his presentation, “Growth-increment chronologies reflect ecosystem responses to climate variability in the northeast Pacific” at the 2009 meeting. The 2010 PICES annual meeting will occur in Portland in October, which will be a unique opportunity for HMSC scientists, students and interns to present their research to international colleagues without the financial challenge of international travel.

**RANGE BAYER RETIRES FROM HMSC:** Range Bayer, naturalist and volunteer extraordinaire, has recently retired. Although he will be missed in his position at the Hatfield Marine Science Center, he regards his true occupation to be that of an observer, researcher, documenter and recorder of Oregon coastal natural history with a major emphasis on birds. This has been described as his life and his passion, and his considerable contributions to Oregon ornithology include numerous publications, reports, newsletters and other projects as well as serving as a local resource for those interested in the Oregon Coast’s rich flora and fauna. Look for Range leading field trips for the Yaquina Birders and Naturalists, and exploring and documenting the Oregon Coast’s natural history for this and future generations.

## Volunteer Corner

### Buoy Tales: Mike and Annie’s *Wecoma* Adventure

Two HMSC volunteers blogged about their adventures aboard the *R/V Wecoma* during a six-week research cruise to the equatorial Pacific. Salem retirees Michael Courtney and Annie Thorp joined a NOAA mission to repair, maintain and, if necessary, replace 14 buoys moored to the seabed several hundred miles south and west of Central America. The buoys form the backbone of NOAA’s Tropical Atmosphere/Ocean project, a major component of several important international scientific observation systems. Data from the buoys is transmitted in real-time by satellite to researchers around the world.

For Courtney and Thorp, the opportunity to serve as shipboard volunteers is a way to “stay engaged with others and to stretch our minds, to continue our own learning and to help others learn, and to provide help and assistance wherever we can”. The research cruise left Newport on March 1, and has recently returned. It’s the second *Wecoma* trip for the married couple, who took part in a similar NOAA cruise last fall; the third overall for Thorp, who served as a Teacher-at-Sea aboard the vessel in 2004 while working as an instructor at Chemeketa Community College. With help from Oregon Sea Grant, they’ve created a blog called “Buoy Tales” has allowed them to share their journal entries and photographs with anyone who’s interested in reading them – as long as the ship’s Internet connections permit.

In particular, they’re hoping to reach science teachers and their students. Readers can post comments and questions on the blog. The online journal is available at <http://buoytales.wordpress.com> and is also featured on the HMSC Visitor Center Web site.

Courtney and Thorp see the adventure as a logical extension of a lifelong love of water, the ocean and travel; they’ve long enjoyed boating, kayaking and surfing. “Going to sea provides us with a way to use all our talents and abilities, to teach, to work hard, to learn, and to have fun on the water,” said Courtney. “Not everyone shares our desire to do the unusual, to face challenges, and to operate outside of their comfort zone, but we love it.”



# HMSC Academic Program News

## More Internships, Courses and Programs at HMSC

Increasing interest in Hatfield Marine Science Center internships, courses and programs is just one of the signs of the growth of HMSC's academic programs. The season of internship applications is in full swing and HMSC has a diverse number of summer programs to offer to students interested in first-hand experience in field and lab research with faculty mentors. Students are also coming to HMSC this spring and summer for a variety of experiential courses, including 4-week long summer courses, as well as weekend experiential courses. In addition, most of the dust has settled from the renovation of our education wing, and the new wet labs for college courses and youth education are near final completion. Stop by the education wing for a peek!



## HMSC Academic Program Briefs

**Marine Biology Spring Term 2010:** OSU undergraduate students have taken up residence at HMSC to spend their spring quarter in an intensive term-long immersion course in Marine Biology. At 16 credits, the course has students essentially eating, breathing, and sleeping marine biology for 10 weeks... and they LOVE IT! Students divide their time between lectures in the classroom, field study along the coast (Cascade Head, Boiler Bay, Strawberry Hill, Seal Rock and Yaquina Bay) and laboratories in one of the wet labs. They collect seaweeds, invertebrates, trawl for fish on the *Elakha* and have gotten stuck in the mudflats. The students become regular members of our community, often seen in the library, having coffee and donuts with faculty, staff and graduate students, working late into the night in the lab and rising early in the morning for field trips along the coast.

**2010 Summer Research Experience for Undergraduates (REU) program at HMSC and COAS:** This summer will mark the seventh year of the NSF Research Experience for Undergraduates (REU) program at HMSC, recently renewed by NSF for an additional three years. Summer 2010 will see 21 students participating in the joint program between HMSC and the College of Oceanic and Atmospheric Sciences (COAS). Half of the students will be located in Corvallis and the other half here at HMSC. We had an overwhelming number of applicants for the REU program this year, with over 250 applications, the highest received to date for the program. In addition to their faculty-mentored summer research, the student interns will attend the Markham Marine Science Research Symposium, DaVinci Days in Corvallis, tour the H.S. Hinsdale Wave Research Lab, and spend a weekend at the H.J. Andrews Experimental Forest.



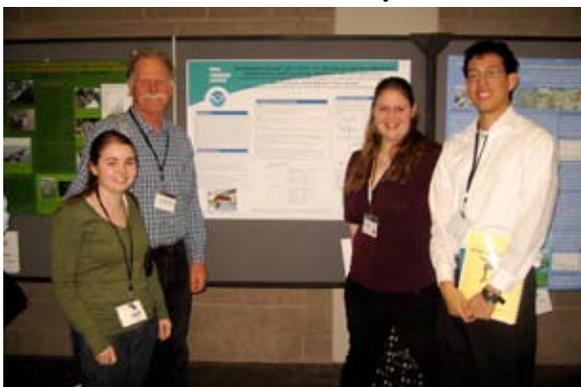
### HMSC Weekend Experiential Courses are a Big Hit:

This winter HMSC saw it's first "Ecology of Coastal Forests" version of the HMSC Weekend Experiential courses. This introductory course, with an experiential field/laboratory emphasis, was designed for non-science and potential science majors as an "immersion learning" weekend-long course on coastal forests, including an overnight at HMSC. The goal is to introduce, inspire and educate undecided or non-science major students through labs and "hands on" field experiences. Due to the popularity of this course model not only with first year undergraduate students but also sophomores, juniors and seniors, the program has blossomed into four different weekend courses planned for the next academic year, covering the varied topics of marine mammals, marine habitats, marine birds, and coastal forests.

## REU Interns Present at Ocean Sciences Meeting in Portland, Oregon

The Hatfield Marine Science Center was well represented at the annual Ocean Sciences Meeting in February 2010. This year's conference, hosted by the American Geophysical Union, the American Society of Limnology and Oceanography (ASLO), and the Oceanography Society, took place in Portland, Oregon. The theme "From Observation to Prediction in the 21st Century," highlighted the challenge of developing predictive tools based on models and field observations, and the importance of these tools for effective stewardship of marine resources.

The location of the conference in HMSC's backyard allowed attendance by an unprecedented number of interns from our Research Experience for Undergraduates (REU) program, who presented their research on a variety of topics. The 11 HMSC REU presentations included Hillary Browning's "Isotopic analysis of Chinook salmon (*Oncorhynchus tshawytscha*) otoliths to determine oceanic migration patterns" and Sara Dewey's "Satellite observations of Oregon coastal upwelling". The REU program, recently renewed by NSF for an additional three years, will allow OSU to host 18 marine science interns each summer, with 9 on-site at the HMSC and 9 placed in campus research labs. Three additional interns will be funded by other sources.



Dr. George Boehlert with three HMSC REU interns. From left: Emily Whitney, Ashley Van Brink, and Camilo Vanegas.

A well-attended special event organized by the HMSC and the University of Wisconsin REU sites was the "REUnion", a gathering of over 100 REU alumni mentors and interns from the recent to more distant past from some 15 ocean science REU sites nationally. A significant benefit of HMSC's REU program is the

professional network that students join, and the event reinforced that network, allowing former interns at all stages of their careers to reconnect, meet new colleagues with a common background, and draw from each other's experiences as graduate students, scientists and mentors.



Great turnout for the "REUnion" special event.

A goal of the REU Program is to provide opportunities for underrepresented students with an interest in marine science. HMSC Director George Boehlert has served as a meeting mentor for the ASLO Multicultural Program for several years, and enjoyed mentoring six aspiring marine scientists through this year's conference. Dr. Boehlert said, "Several of these students have come to our REU program, and a Hampton University student from this year's group will come to HMSC for the summer with NOAA funding. Our REU program consistently brings some of the nation's brightest undergraduates to the HMSC, and many of them have returned to OSU, either for jobs or for graduate degrees."

The HMSC's diverse research projects presented by interns, students and faculty included those focusing on the conference theme of observation, modeling, and field or laboratory experiments that ultimately seek to enhance our predictive ability, as well as efforts focusing on education, outreach, and marine policy. Dr. Boehlert organized and chaired a session on Marine Renewable Energy, and noted the increasing interest in this research topic as the Oregon coast becomes a test bed for wave energy.

## HMSC Scholarships, Fellowships & Awards

Wednesday, June 16<sup>th</sup> marks the 16<sup>th</sup> annual Markham Marine Science Research Symposium. Scholarships and awards for research and education activities at the Hatfield Marine Science Center (HMSC) for the 2010-11 academic year, including the Markham Scholarship, will be presented. A highlight of the Research Symposium will be presentations by award recipients of the research made possible by this support. At this year's symposium, 2010-11 student award recipients will also be presenting posters of their proposed research.

HMSC scholarships are given for excellence in academic and research performance. Some scholarships are awarded for research in any marine related discipline, while others encourage research in a specific area, such as fisheries ecology

and management, or marine education.

Funding for the scholarships and fellowships comes from endowments and private donations to the HMSC, some of which have been providing financial assistance to students for more than three decades. The awards support research in academic disciplines as diverse as Fisheries and Wildlife, Microbiology, Oceanography, and Animal Sciences. One of the largest sources of support is the Mamie L. Markham Research Endowment, which provides funding annually for several students with awards of up to \$10,000 each. Most of these students spend at least one year in residence on the coast so that they can work with HMSC scientists and take advantage of lab and field research opportunities found here.



## Hatfield Marine Science Center

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[www.hmsc.oregonstate.edu/friends](http://www.hmsc.oregonstate.edu/friends)

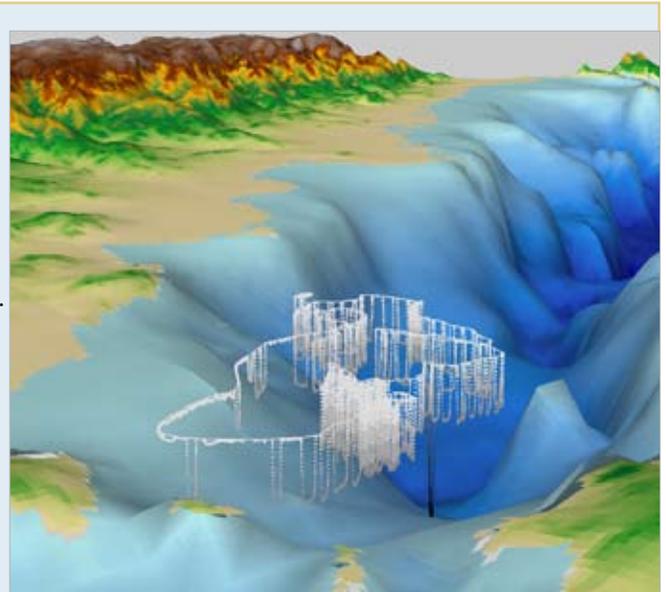
*Upwelling* is produced and distributed 3 times a year to the Friends of HMSC membership. Your feedback is welcomed.  
(email: [candace.rogers@oregonstate.edu](mailto:candace.rogers@oregonstate.edu))

## Tagging evidence suggests cooperative herding behavior in sperm whales

In a new study, HMSC scientists have found evidence suggesting herding behavior in sperm whales. The researchers were able to track the movements and diving patterns of sperm whales in the northern Gulf of California between Mexico and the Baja Peninsula using sophisticated new tagging instrumentation. Findings of the study, by researchers at HMSC, OSU and Universidad Autónoma de Baja California Sur in Mexico, were announced on February 22 at the American Geophysical Union's Ocean Sciences Meeting in Portland, Oregon.

Three of the tagged animals traveled in a social group and took turns diving for squid, according to Bruce Mate, director of the Marine Mammal Institute and principal investigator on the study. Such coordinated feeding behavior had not previously been observed among sperm whales. "We expected their dives to be similar, but each time one of the three whales went deeper than the other

two – suggestive of how sea lions coordinate their predation on bait balls of schooling fish," Mate said. "In both cases, it appears that some animals need to dive deeply to prevent the prey from escaping downward." Sperm whales have been difficult to study in detail because they make deep dives and tags used to track their movements have been short-lived, or not accurate enough to adequately describe their dives. However new tags and a special tagging protocol, developed by Mate and Seattle-based Wildlife Computers, use ARGOS satellite transmitter components fitted with a GPS receiver and a time-depth recorder that allows the scientists to track the whales for up to 28 days. The tags, called Wildlife Computers' Mark 10, are designed to



detach and float to the surface, where they can be recovered and the data on dives can be downloaded and analyzed. Mate, a professor of fisheries and wildlife at OSU and Director of HMSC's Marine Mammal Institute, is a pioneer in the use of satellites to track threatened and endangered whales and other marine mammal species.