Student’s research sheds new light on
feeding habits of gray whales

Spotting gray whales off the central Oregon coast during their annual migrations between Alaska and Baja California has become a popular activity for tourists and local residents alike. But for Carrie Newell, a Ph.D. student in biological oceanography at Oregon State University, studying a sub-population of these whales that linger off the coast of Newport and Depoe Bay during summer months has been a full-time occupation.

Newell’s research has led to some important findings about the unique feeding habits of these “resident” gray whales. She has discovered that the whales have a preference for tiny mysid shrimp floating amid kelp beds off the Oregon and northern California coast, rather than the larger amphipods (found in mud) that were thought to represent 90% of the grays’ diet.

Newell was the 2003 recipient of the Curtis and Isabella Holt Education Fund award, which supported her research on resident gray whales at the 2004 HMSC-Markham Awards Symposium.

Ebbeismeyer lecture draws crowd to hear about “Beachcombing for Science”

Best known for charting the floating voyage of yellow plastic ducks and Nike sneakers lost in container ship cargo spills on the high seas, oceanographer Curtis Ebbesmeyer was at HMSC on August 18 to explain how these and thousands of other items found on beaches inform scientific understanding of ocean currents.

Approximately 80 people came to hear Ebbesmeyer’s weeknight lecture in the Hennings Auditorium, co-sponsored by the Friends of HMSC and CoastWatch, a program of the Oregon Shores Conservation Coalition.

Recently retired from a career as a consulting oceanographer, Ebbesmeyer continues to nurture his passion for scientific inquiry as an active member of Beachcombers’ and Oceanographers’ International Association. He founded the organization in 1996 to provide a link between oceanographers who track ocean currents and beachcombers whose observations provide useful data.

Ebbesmeyer showed photographs during his presentation of the wide variety of man-made objects that have been found and catalogued by his group -- hockey gloves and sticks, Lego toys, packing materials. Some of these can be traced back to a precise date and location where they were lost at sea in a cargo spill. That data has enabled Ebbesmeyer and his colleagues to create computer models showing how objects can float on ocean currents for decades, and where they end up.

“What floats on the sea is as poorly known as what rests on the sea floor,” says Ebbesmeyer, who contends the problem of floating junk is much larger than most people realize. He estimates that tons of cargo are lost off container ships at sea every month. Much of what does not wash up on
Notes from the Director

This summer has been a busy season for everyone at HMSC. The Markham Symposium again demonstrated the high caliber of graduate student research and the benefits that donor-driven awards play in enhancing its quality. SeaFest, opened by Senator Hatfield this year, was an immense success. We concluded an agreement for faculty and students with Ehime University in Japan and the University of Hawaii. And our undergraduate internship programs have grown and prospered, bringing students from all over the country to Newport. For the first time, two of our interns will be attending the national meeting of the American Society of Limnology and Oceanography, where they will make presentations on their research projects.

Many of us are also pleased to have completed, and submitted to the Provost, HMSC’s strategic plan. This plan will help plan cement HMSC’s future through articulation of our mission and vision, the strengths we possess and the challenges we face, and the strategic issues that form the basis for four principal goals. We are now working on a plan to implement these goals in concert with Oregon State University’s plan and the other units with interests in marine science. Look for summaries of this plan on our webpage soon.

Environmental events are also driving some things at the HMSC. First, the low oxygen waters experienced off the coast of Oregon in 2002 have returned in 2004, stimulating a good deal of activity. Second, HMSC is following up from two recent earthquakes centered off the central Oregon coast, magnitude 4.9 in July and 4.7 in August. This has renewed interest in the potential of a much larger seismic shift along the Cascadia subduction zone. We are clearly concerned – the low-lying HMSC is within the “tsunami inundation zone”. While CIMRS’ Bob Dziak and other researchers in the NOAA Vents Program were fielding press inquiries about undersea geological processes at work just off the Oregon coast, others at HMSC were once again contemplating the level of preparedness at the Center for larger earthquakes and possible tsunamis. We are working to improve awareness and knowledge of appropriate evacuation procedures.

Fall brings us back to a focus on education programs. The Fisheries and Wildlife students have begun their term at the coast, and planning is underway for our upcoming spring marine biology program and a summer college program. We hope you’ll have a chance to visit the Center in the coming months and learn more about our programs.

Cooperative agreement creates opportunities for international exchange and collaboration

Representing Oregon State University, Dr. George Boehlert returned from a recent trip to Japan with a new agreement between the Hatfield Marine Science Center (HMSC) and the Center for Marine Environmental Studies (CMES) at Ehime University in Japan and the Hawaii Institute of Marine Biology (HIMB) to cooperate on research and education in the marine sciences.

“Each of our institutions have strengths in teaching, research, and facilities that complement those of the others,” said Dr. Boehlert. “We anticipate that this agreement will create opportunities for students and faculty at all three institutions.”

Ehime University’s CMES has received a major Japanese award as a “21st Century Center of Excellence” and has expanded marine research in several areas. They have particular strengths in coastal oceanography, marine microbiology, and pollutant stressors in marine ecosystems. The University of Hawaii’s HIMB has strengths in coral reef and tropical ecology; they have a new director, Dr. JoAnn Leong, formerly a professor of Microbiology at Oregon State University.

Discussions during the visit focused on how the agreement will be implemented. Initial efforts will include visits by Ehime University students to HMSC for research internships and coursework in topics not available at Ehime. Initial collaborative research may include work on the role of viruses in fish disease and on pollutant levels in tissues of marine mammals and seabirds.

A symbolic three-way handshake between Hidetaka Takeoka of Ehime University (left), George Boehlert of HMSC, and Charles Heslsy of the Hawaii Institute of Marine Biology (right) at the signing ceremony in Matsuyama in June.
Researchers examining re-appearance of “dead zone” off Oregon coast

Responding to evidence of a hypoxic “dead zone” forming off the central Oregon Coast this summer, scientists from Oregon State University and state and federal agency partners at HMSC have come together to analyze and share data in an effort to better understand the phenomenon.

In early July, members of the public began calling HMSC to report an unusual number of dead crabs and fish showing up on beaches south of Newport. Hundreds of dead Dungeness crabs and molts were found in tidepools south of Yachats. The signs were reminiscent of 2002, when an area of ocean water with low oxygen content formed in the nearshore Oregon coast between Newport and Florence, causing a massive die-off of fish and invertebrate marine species.

In 2002, the dead zone appeared to be a one-time anomaly, an odd combination of climate, winds and upwelling patterns that led to a hypoxic event - a situation in which the oxygen level was so low it could not support most marine life - which had not been seen in the region’s recent history. But continued research has shown that the same thing almost occurred last year and happened in full force again this year.

Dissolved oxygen levels are a great deal lower than those seen in the past 40 years. This is a disturbing trend with an unknown cause that scientists now say may reflect a major change in ocean circulation patterns, with serious impacts on marine biology. The issue is sufficiently important that OSU scientists from the Partnership for Interdisciplinary Studies of Coastal Oceans and the College of Oceanic and Atmospheric Sciences have joined forces in intensive research with experts from the Oregon Department of Fish and Wildlife, National Oceanic and Atmospheric Administration, and the University of Washington.

In the 2002 event, water at depths of 30-50 meters, within a mile or two of the shoreline, had dissolved oxygen levels in the range of 0.5 to 1 milliliters per liter - whereas a normal reading would be about four times that high. Any dissolved oxygen level below 1.4 milliliters per liter is considered hypoxic, capable of killing a wide range of fish, crabs, and other marine species that literally suffocate.

“The figures in 2002 were just off the charts compared to the historical norm, and already this year we have had some readings in that same range,” said Frances Chan, an OSU research associate with PISCO.

In the current event, Chan said, the “dead zone” of low-oxygen water appears to be “sloshing back and forth” between deeper water and, more recently, into shallower, nearshore water. What impact this will have on marine life is unknown at this point. In addition to the fish and crab kills already documented on beach and intertidal areas, researcher believe other dead animals may also be washed out to the deep sea.

“Studies are underway with a remotely-operated submersible vehicle to take video and measurements of the ocean floor environment and better document the current effects of this hypoxic event,” said Hal Weeks of the ODFW Marine Resources Program.

Summer winds normally bring deep ocean water closer to shore in a process called upwelling, but in the hypoxic events, the upwelled water is coming from the sub-Arctic, and is even colder, more nutrient rich and lower in oxygen than usual. And in this situation, the high nutrient waters support even more growth than usual of microscopic marine plants, which ultimately sink and decay, leading to consumption of even more of the remaining oxygen in the water.

Scientific data to document the changing ocean conditions only goes back a few decades at best. But anecdotal evidence from regional fisherman and other coastal residents also suggests that events such as the one that occurred in 2002 have no recent precedent, the researchers said. The possibility that other climatic forces such as global warming could be causing the change in ocean circulation - which sets the initial conditions for the dead zone - is possible but not certain, the researchers said.
Familiar Faces Return for SeaFest 2004

Sunny skies and mild temperatures greeted visitors to the Hatfield Marine Science Center’s 3rd annual SeaFest celebration on June 19th. Remarks from Senator Mark Hatfield and OSU President Ed Ray at the opening ceremony highlighted the importance of research and education activities based at HMSC. By day’s end over 4,500 people, many of them children, were counted as participants in the open house event.

A sizeable crowd gathered in front of the HMSC entrance to hear Senator Mark O. Hatfield speak at the SeaFest 2004 opening ceremony.

Senator Mark O. Hatfield, Jean Roth (OSU alumna and Friend of HMSC), Antoinette Hatfield, and OSU President Ed Ray at the President’s reception

Interactive exhibits and hands-on activities designed to spark a child’s interest in science were among the most popular attractions at SeaFest.

Don’t miss next year’s SeaFest, scheduled for June 18, 2005!

Newport’s Port Manager Don Mann demonstrates the fine art of crab shaking to the crowd anxiously awaiting a taste of Oregon’s finest.
Research internships a highlight of Summer 2004 at HMSC

Thousands of visitors pour through the front doors of the Hatfield Marine Science Center (HMSC) every summer, but few get the opportunity to settle in and take on a research project working alongside scientists at the center. Eight lucky students from across the country recently did just that, completing the first “Research Experience for Undergraduates” (REU) program at HMSC this summer. With funding from the National Science Foundation, the students spent 10 weeks working on a wide range of research projects, each with real world applications.

Brian Yellen, a student at Brown University majoring in biology and geology, was one of those selected for an internship at HMSC. Yellen worked in Professor Chris Langdon’s aquaculture research lab, conducting experiments to determine optimal conditions for rearing larvae of tropical fish species such as the Hawaiian bluespotted goby and percula clownfish. Although he had very little knowledge or experience with larval fish culture, Yellen quickly learned about the importance of the research he was conducting.

“A great irony exists in the marine aquarium industry,“ said Yellen, explaining the context of his research to an HMSC audience earlier this month. “The same enthusiasts who celebrate the beauty and elegance of tropical marine fish species are contributing to deterioration of coral reef habitats by purchasing ornamental fish harvested unsustainably from tropical marine environments.”

For ten weeks, Yellen became a part of the team in Langdon’s lab working on ways to efficiently culture species that are currently being harvested from the wild. Langdon is hopeful that aquaculture can help meet the ornamental fish industry’s growing demand for many tropical fish species, thereby reducing damage to reef habitats.

“This research is important not only to the reefs, it may also lead to advancements in rearing food species such as halibut and turbot,” says Langdon. “If successful, this type of aquaculture could play a huge role in alleviating world hunger.”

HMSC will offer the REU program again next summer, with funding for two additional internship positions, bringing the total number of available slots up to ten. Undergraduate students who have completed at least two years of coursework are eligible to apply. Contact the HMSC at 541-867-0212 for more information.

Summer interns in action

Emily Cornwell of Kalamazoo College worked Peter Noah, Curator of Animal Husbandry for HMSC’s aquarium exhibits.

OSU Fisheries and Wildlife major Kalin Lee coring trees as part of research project incorporating tree ring analysis data.

Katri Laukkanen of Pacific University accepts certificate of completion for research project from mentors Tony D’Andrea and Ted DeWitt.

REU students hike the Paulina Lake trail during a field trip to the Cascades region of Oregon.

Rachel Ruppel of Syracuse University preparing for fish stomach content analysis.

Jessica Ramsey of Salem College prepares fish tank experiments.
Maria Kavanaugh, a 2004 Markham Award recipient, explains her research project to an invited guest. As an instructor at Lane Community College, Newell introduced the modules to her students, who analyzed photographs, video footage, acoustics and GPS data to learn more about the whales and the mysid shrimp populations in the near-shore environment.

“She has the skills and abilities to translate scientific research, and she is a committed teacher” says OSU oceanography professor Tim Cowles, who serves as Newell’s advisor. “Her enthusiasm is boundless and infectious.”

Having spent so many hours observing the giant marine mammals, Newell is on a first name basis with the resident grays that return annually to feed in the waters off Depoe Bay. She has photographed and studied the unique identifying marks visible on tails and flukes, giving names to some 55 individual whales.

Newell, who received funding support from a Markham Award in 2001-02, hopes that her research and the educational modules she has developed will find wide application through public outreach and education programs like those offered by HMSC. Already, she is sharing her knowledge first-hand with people on whale-watching cruises. She says she is happy to return the favor to local boat captains who so often ferried her out to sea so she could do her research.

Recently profiled in the Sunday Oregonian, Carrie Newell’s research has attracted international attention, as well. The Ocean Futures Society, led by Jean-Michel Cousteau, sent a film crew to Depoe Bay in August to meet Newell and get footage of the resident gray whales for a documentary series planned for release in Fall 2005.

Markham Symposium Highlights
Student Research Accomplishments, Importance of Donors

Many students doing research as part of their Master’s or Ph.D. degree programs in marine science disciplines receive financial support from scholarships provided by individual donors. In June of each year, students who are supported by these awards present their research at the Markham symposium, named for the Mamie L. Markham Endowment which provides two years of funding for up to eight students each year.

Awards bearing the names of individual and family donors -- Crebbin, Holt, Jones, Reynolds, Wick -- provide financial assistance for another half dozen students each year. Altogether, these awards represent over $60,000 in support of graduate students pursuing research in various disciplines, from oceanography to aquaculture, fisheries ecology and management.

The 2004 Markham Symposium, held on June 11, brought together representatives of donor families and the students they support, along with faculty advisors and other HMSC researchers and staff. The financial assistance that these awards provide is greatly appreciated by the academic and research community at HMSC.
Fall term brings students to HMSC for “total immersion”

September sees the return of students to the mud flats of Yaquina Bay and the labs and classrooms of the Hatfield Marine Science Center. Twenty-one students are in residence at HMSC for Fall term classes led by Oregon State University Fisheries and Wildlife department faculty.

The academic term begins with an intensive two-week immersion course in coastal ecology and resource management. The course is considered a “capstone experience” for OSU seniors majoring in fisheries and wildlife, with lectures by resource management professionals and field site visits and boat trips deepening students’ understanding of coastal and estuarine habitats. Building on the field experience, students work in teams to develop research projects which are presented at the end of term during a poster session scheduled for the second week of December.

Other courses offered during the Fall term focus on the ecology and management of marine fishes, freshwater fish biology, aquaculture, strategies of marine fishery management, population genetics and conservation, and diseases and parasites of marine fishes and invertebrates.

Fall Seminar Series Highlights Diversity of Research Interests

The HMSC seminar series, which features scientific lectures by visiting scientists and researchers based at HMSC, takes place every Thursday from 3:30pm to 4:30pm (unless otherwise noted) in the Guin Library Seminar Room. Friends of HMSC are welcome to attend! The fall schedule is:

Sept. 30 – Mark Hixon, Department of Zoology, OSU
Mechanisms of Density-Dependent Mortality in Groundfish: Lessons From Coral Reefs

Oct. 7 - Janet Webster, HMSC Guin Library
Responsible Fisheries Information

Oct. 14 - Marta Torres, College of Oceanic & Atmospheric Sciences, OSU
Methane-ice in marine sediments: Where, how, and why we study these deposits.

Oct. 21 - Sean Rowe - HMSC, Oregon Sea Grant.
But are they really learning? Studying cognition and communication in interactive science museums.

(TUES.) Reconstructing past climates - Can bivalve mollusks help?

Nov. 4 - Claudia Halsband-Lenk - School of Oceanography, University of Washington.
Do diatoms kill copepod eggs?

Nov. 11 - Richard Feely, NOAA/PMEL.
Impacts of anthropogenic CO2 on CaCO3 shell-forming organisms in the oceans

Nov. 18 - Martin Fisk (OSU/COAS).
Microbes in deep sea lavas and the possibility of extraterrestrial life

Dec. 2 - Peter Lawson - NMFS NWFSC.
Climate impacts on OPI area coho salmon production: insights from a species sensitive to habitat change at daily to centennial time scales.

Dec. 9 - Alan Trimble - University of Washington.
Alternative Stable States in Marine Communities

For complete, up-to-date schedule, visit the HMSC events web page:
http://hmsc.oregonstate.edu/events.html
Tours of R/V Wecoma
Scheduled for October 16

An invitation to tour the research vessel Wecoma during its October stay in home port is being extended to Friends of the Hatfield Marine Science Center and Volunteers of the HMSC Visitor Center. On **Saturday, October 16th, between 10am and noon**, research scientists from Oregon State University’s College of Oceanic and Atmospheric Sciences (COAS) will be on board to offer guided tours of the 185-foot research vessel and explain some of the scientific work performed at sea.

Owned by the National Science Foundation, the R/V Wecoma is based in Newport and operated by COAS as part of the 30-ship fleet of oceanographic research vessels managed by the University-National Oceanographic Laboratory System. UNOLS is an organization of 62 academic institutions and National Laboratories involved in oceanographic research and joined for the purpose of coordinating oceanographic ships’ schedules and research facilities.

Friends of HMSC and Visitor Center Volunteers interested in taking a tour of the Wecoma are asked to **RSVP to Ken Hall at 867-0234 or Bill Hanshumaker at 867-0167**. Tours can accommodate groups of 10-12 people at a time and will last approximately 30 minutes.

For more information about the R/V Wecoma, including technical information about equipment and operations, visit the website: [http://www.coas.oregonstate.edu/coasvessel/martech/WecomaHome.html](http://www.coas.oregonstate.edu/coasvessel/martech/WecomaHome.html)