



Surfin' Salmon: Graduate Research by a Markham Scholar

by Jose Marin Jarrin, Ph.D. Student,
OSU's Department of Fisheries and Wildlife

Sandy beach surf zones occur along 70% of the Oregon coastline. These high energy environments are considered 'semi-enclosed' because there is limited exchange of waters between these zones, which extend from the shoreline to the outermost breaker, and offshore waters. Several fish species, including English sole, Northern anchovy, and Staghorn sculpin inhabit surf-zones, especially when they are juveniles, because it provides an abundant supply of potential prey and shelter from predators. Although juvenile Chinook are thought to migrate from estuaries directly to the open ocean, juveniles have also been collected within Oregon's surf zones.

My M.Sc. research project at the Oregon Institute of Marine Biology suggested that surf-zones provide an intermediate habitat for Chinook salmon between the estuary and the open ocean. For my Ph.D. research project working at Hatfield Marine Science Center with Dr. Jessica Miller, I am evaluating the role of surf-zones as a habitat for juvenile Chinook salmon. We are studying the presence, distribution, densities, growth and diet of juvenile Chinook salmon in surf-zones. At present, using a beach seine, we have collected over 400

juveniles at eight different beaches along the Oregon coast. Presence and distribution of the juveniles is related to whether the beach is located in



a littoral cell, which is a defined stretch of sandy beach that is bordered by rocky headlands that contain estuaries with local Chinook salmon populations. There are also more juveniles present along sandy beaches adjacent to estuaries. Densities of juveniles in the

surf zone vary widely and are positively related to estuarine water temperature, suggesting that higher temperatures may influence movement and prompt juveniles to exit the estuary. In surf-zones, juveniles grow at an intermediate rate when compared to the estuarine or offshore waters. They achieve this growth by feeding on a diverse diet composed of crustaceans, insects and fish.

This research has been supported, in part, with two Mamie Markham Research Awards, a Lylian Brucefield Reynolds Scholarship, a Wick Marine Fisheries Award, and with assistance by the Community Service Consortium 2009 Natural Resource Crew (see photo).

Innovations

Octocam!

The Hatfield Marine Science Center's newest phenomenon is not new at all, but is stretching his arms virtually through the world wide web! Octocam, the HMSC Visitor Center's newest online exhibit, brings viewers into the octopus's den through a camera linked to the internet. An underwater camera inside the tank provides an up close and personal view, while one above captures the octopus in the tank as well as staff and visitors,



allowing virtual visitors to tune in for interpretive talks. Thanks in part to the infrared capability of the Octocam's camera, virtual visitors can

even watch this nocturnal creature long after the Visitor Center has been locked up for the night!

While the giant Pacific octopus (*Enteroctopus dofleini*) has always been one of the Visitor Center's most popular exhibits, he is actually one of many octopuses over the years that have visited with us for a time. Most are donated, mainly by fisherman who find them in crab pots among a pile of shells, tempted by an easy feast. While resident at the Visitor Center, these fascinating creatures provide an opportunity for thousands of visitors and students each year to learn about their natural history, including their diet, behavior and reproduction, as well as conservation issues for this solitary species.

Bill Hanshumaker, a Public Marine Education Specialist with Oregon Sea Grant, has been fielding calls, emails and requests for interviews since early June when Octocam went live. Bill notes that this summer is an especially good time to come in to the HMSC Visitor Center, as this octopus, known as Deriq, will only be with us through Labor Day. At that time he will be released back into Yaquina Bay and replaced with a smaller octopus. Meanwhile, viewers can find him on the web at <http://hmsc.oregonstate.edu/visitor/octocam>, and can either tune in or come in during feeding time for an interpretive talk on Mondays, Thursdays and Saturdays at 1pm Pacific time.

Notes from the Director



The late onset of summer in the Pacific Northwest did not change the intense schedule for HMSC's summer, and June was particularly busy. Starting with the groundbreaking and public celebration of our new neighbor, NOAA's Marine Operations Center of the Pacific, we subsequently hosted visits and briefings for Senator Jeff Merkley, Congressman David Wu, and candidate for Governor John Kitzhaber. Shortly after that, we enjoyed the arrival of the biggest, and most diverse, group of summer interns to date. The interns hail from all over the US, and the funding to support them comes from the National Science Foundation, NOAA, Oregon Sea Grant, and support from HMSC donors. Most of the interns arrived just in time for the 16th Annual Markham Symposium, which features talks and posters about student projects funded by various sources of endowed donor funding; funds awarded from a competition in spring 2010 totaled over \$90,000. In June we also kicked off our marine science radio talk show, "Hatfield Marine Science Chat". Interviews with marine scientists play on KCUP radio and the world wide web but are also available for listening on HMSC's website.

We are asking for your help in this issue of Upwelling. While the state has generously provided facilities upgrade funding, most noticeably in HMSC's education wing, we have had a difficult time finding funds for new compound and dissecting microscopes for our renovated teaching laboratories. As noted in this issue, a generous donor has provided funding for a challenge grant – matching your donations up to a total of \$6000. If this challenge is met, HMSC will have funds to purchase several new microscopes that will contribute to the quality of our educational programs. We appreciate any support you might provide to meet this matching grant challenge. I wish you all the best for the remaining months of summer, and let's hope it lasts to make up for the extended spring.



The Real Value of Student Research Awards and Scholarships

*Contributed by Itchung Cheung, Instructor and
HMSC Academic Program Coordinator*

Another student award, another student research project supported! Many thanks to all the donors that have supported undergraduate and graduate student research at HMSC over the years. But is that really all it is? The cost of a tissue sample to be analyzed? Another field sampling day supported? As enriching an experience conducting marine research is to many students, these research awards represent "real world training" opportunities in writing research proposals and reports, managing a research budget and presenting their research findings at the annual Markham Symposium. It is also the recognition, not just the money (although it helps) that affirms and reinvigorates a student's not so linear path of investigation, field sampling, and negotiating "domestic overhead". Receiving a student research award is affirmation that your research project is important, valued and worth continuing, not to mention worth noting forever in your resume. For this, thank you for recognizing and invigorating our student researchers at HMSC.

(see list of this year's student award winners on page 7)



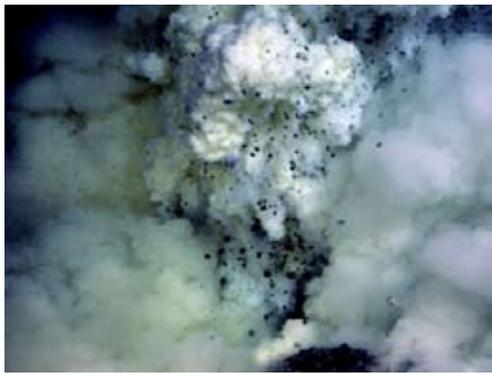
The Hatfield Marine Science Center needs your help! We are seeking funds for the purchase of compound and dissecting microscopes to be used for undergraduate educational programs based in Newport on the HMSC campus. **Janet Webster**, HMSC Librarian and generous '**Friends of the HMSC**' supporter has offered a **CHALLENGE GRANT** of \$6000! We hope our many Friends will rally to help match Janet's donation, which combined with funds donated from OSU academic units and HMSC will allow us to purchase high quality microscopes for HMSC's experiential courses. These popular courses offer field, laboratory and classroom instruction by HMSC's talented faculty. Along with our recent classroom renovation providing state of the art teaching labs, your donation will enhance a unique and valuable opportunity for students to learn about marine science right here on Oregon's coast.

Thank you for your support! <http://hmsc.oregonstate.edu/friends/>

Research Highlight

Landslide at Undersea Volcano Presents Unique Research Opportunity

HMSC scientists conducted a successful research expedition in March 2010 to NW Rota-1 in the Mariana Arc, a submarine volcano that has been actively erupting on every visit since 2003. Funded by the National Science Foundation, the expedition aboard the *R/V Kilo Moana* used the remotely operated vehicle Jason for a number of studies, including the effects of



Volcanic ash is erupted from an active vent named Phantom near the summit of NW Rota.

the eruptions on hydrothermal vent animals that live on top of the volcano in their midst.

Researchers found that the volcano was still activity erupting even though it had experienced

a major landslide since their previous visit

a year ago. The landslide gave researchers an unprecedented view of how arc volcanoes grow by the cyclic process of eruption, collapse, and regrowth, and also how the landslide affected the volcano's magma and hydrothermal systems and its resident biological community. This unique 'chemosynthetic' biological community relies on the chemical energy released by hydrothermal vents associated with the volcano rather than sunlight. The catastrophic event had a downside, however, as the

landslide destroyed some of the instrument moorings that were left last year to monitor the volcano's activity and capture just this kind of event. This landslide turned out to be much larger than researchers thought possible. However, one hydrophone mooring (deployed by Bob Dziak's hydroacoustics group) survived and will be examined for the valuable sound recordings it made during the event. This is likely the first ever near-field recording of a landslide on a submarine volcano, and it will allow a better understanding of what was seen with the Jason ROV on the sea floor.

HMSC staff participating on the expedition included Bill Chadwick,

Bob Embley, Susan Merle, Andra Bobbitt, and Leigh Evans.

Their cruise blog explores topics ranging from the challenges of deep sea science to musings on seafarer superstition (beware the Honeybear) and is posted at <http://nwrota2010.blogspot.com>.



The ROV Jason returns from the deep as it is lifted on to the deck of the *R/V Kilo Moana*

Sea Grant Briefs

MARINE RESERVES EXHIBIT COMING SOON: Amy Vandehey, a Master's student in the Marine Resource Management program, recently received the Holt Marine Education Fund to design, construct and evaluate an exhibit at the HMSC Visitor Center about marine reserves (MRs) in Oregon. This is an important current topic, and a survey conducted at SeaFest 2008 showed that many people along the coast and elsewhere are interested in knowing more about MRs in general, and the Oregon process in particular. The specific objectives of the exhibit are to: 1) describe MRs, including some benefits and challenges; 2) explain the difference between Marine Protected Areas (MPAs) and MRs; 3) show different roles played by stakeholders in the Oregon marine reserve process; and 4) provide information about the ever-changing Oregon process of establishing MRs. Look for the exhibit in Winter 2010-2011.

NEW EXHIBIT PLAN - WAVE TANK: Many visitors come to the HMSC Visitor Center (VC) to learn more about the proposed wave energy projects planned for Oregon. The VC currently features an interactive wave energy demonstration built by OSU's Engineering program and put on permanent display at the center. The exhibit breaks down the electrical-mechanical principals used in gathering wave energy. A larger area will be devoted to a wave energy education kiosk. This area is planned as three vertical liquid crystal display (LCD) panels that will dynamically provide information on wave energy technology, current project status, political and economic considerations, and key scientists and engineers talking about the benefits of wave energy. This kiosk would allow for the inclusion of outreach materials on OSU's current DOE grant to create a mobile ocean test berth that will be used by private corporations to evaluate their wave energy devices off the Oregon coastline. In addition, VC staff are exploring ways to fund a 20 x 40 foot wave tank for a more complete wave energy display, replacing the failing Chaos Wheel. The high ceiling above the tank will accommodate a rail crane to raise and lower wave platform models. The floor in the exhibit area is equipped with seawater infrastructure and reinforced footings to accommodate large tanks. The wave tank will be a significant attraction exhibit and will meet a number of educational objectives including wave energy, tsunami, and structural engineering learning and outreach. For more information, contact Nance Hunter (nancee.hunter@oregonstate.edu).

HMSC Snapshots



The Port of Newport hosted two events in June to celebrate the accomplishment of Newport's successful bid for the **NOAA Marine Operations Center - Pacific (MOC-P)** and the new infrastructure and future economic development it represents. Both events occurred on the MOC-P construction site on the waterfront in South Beach.

A groundbreaking ceremony was well attended by Oregon's Governor, US Senators and Congressmen, the State Legislature's Coastal Caucus, as well as local leaders and the Newport community. HMSC later hosted a visit by Senator Jeff Merkley, shown in the above left photo with Sea Grant Education Director Nancee Hunter. Congressman David Wu attended a meeting at HMSC in the morning, and along with OSU President Ed Ray took a moment to visit the HMSC Visitor Center's touch tank (top right).

The second event, a Community Celebration, celebrated 'an expanding South Beach marine research and education complex' of which HMSC is proud to be a part. HMSC volunteers braved the dreary weather to bring children's activities to the event (photo at right), which drew over 1000 people.



Volunteer Corner



Brook Young, who, along with his wife Ilene, has been a dedicated HMSC volunteer since 2006, passed away on the morning of Saturday, July 3rd. Brook came to the Hatfield Marine Science Center with over 40 years of experience raising koi and goldfish, and his expertise, as well as his enthusiasm and kindness were appreciated and will be greatly missed by the HMSC Community.



A **Broom Bash** occurred on April 29, when several intrepid members of the HMSC Community took a small step toward eradication of Scotch broom from South Beach. Having achieved a "Scotch broom-free" campus, the interagency partnership shown above tackled South Beach State Park, leaving many piles of this invasive bush in their wake. Park employees, according to prior arrangement, later removed the debris piles. More opportunities to help remove invasive species will be coming soon.



The **2010 Newport Schools Science Fair**, held on May 6th at Newport Intermediate School was the culmination of more than 120 projects from over 850 public school students from two Newport schools. Over 30 science mentors, many from the HMSC Community including Anjanette Baker shown in the photo, volunteered their time, expertise and enthusiasm in this unique partnership that brings scientists into the classroom, sharing their love for science with the next generation.

Hatfield Marine Science Chat is HMSC's new radio program on local station KCUP. The 30 minute program broadcasts on Mondays at 9:30am on 1230 AM and



100.7-2 in High Definition Digital FM, and is streamed live at www.kcup.net. It's also available as a download from our website at www.hmhc.oregonstate.edu/radio. Since the premier broadcast on June 14, guests have included Capt Michelle Bullock of the NOAA Corps, and Jim Rice, Bill Hanshumaker and Bryan Black, all of HMSC. Stay tuned!



The **Annual Fish Cutting Party** on June 7th-8th allowed REUs and other interns from various disciplines to learn fish dissecting techniques and identify parasites while having fun. Efforts support future scientific research through the preservation of fish organs for an estuary purse seine study, genetic stock analysis, fish dietary observations, parasite identification, fish growth, and otolith microchemistry. Shown above is REU intern, Megan Cahill, who is at HMSC this summer working with Dr. Kym Jacobson of NOAA.



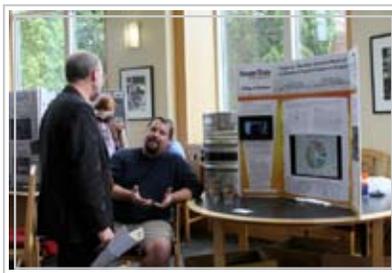
The **Shorebird Sister Schools Program** of the Oregon Coast National Wildlife Refuge Complex brought their field and classroom based program to Oregon coast students in grades 4-6 for the eighth year this spring, with nearly 800 participants this year alone. Dawn Grafe (see 'Honor Roll' below) of the USFWS, along with two full time Americorps volunteers and community members delivered interactive lessons about shorebirds in the classroom and on the refuge. Who knew shorebirds could be so much fun?

Honor Roll



Dawn Grafe, Supervisory Park Ranger for the Oregon Coast National Wildlife Refuge Complex, has been selected as the 2010 Federal Land Manager of the Year for the US Fish and Wildlife Service. Dawn oversees outreach, recreation, environmental education and volunteer programs for National Wildlife Refuges spanning

320 miles of the Oregon coast. This award recognizes her efforts to establish a coastal volunteer program that is a model for outreach and interpretation on a large-scale.



Beer as Environmental Science?

Dann Cutter, HMSC's IT Manager recently completed his honors college thesis on the logistics of craft brewery keg deployment for an OSU double degree program in Environmental Science and Finance. The result of his research is "Kegarray", a freeware brewery management database geared for the burgeoning craft brew industry of Oregon. (Photo by Gildha Cumming)



Mattias Johansson successfully defended his Ph.D dissertation on June 9. Mattias' research, "Genetic Patterns of Demography and Diversity in Eastern North Pacific Rockfishes (genus *Sebastes*)," was conducted in OSU's Department of Fisheries and Wildlife in the lab of his advisor, Dr. Michael Banks. Mattias' research was supported in part by a Markham Award.

HMSC Academic Program News

Where in the World are the HMSC Interns?

Contributed by Amy Jauron,
PROMISE Intern, Summer 2010

Keith Biederbeck



Roseville, CA
CSU Monterey Bay
"I'm working on a baseline survey of invertebrates near wave energy test sites"
HMSC REU

Elizabeth Lopez



South Florida, FL
UC Berkley
"I am studying the environmental effects of wave energy; specifically the mooring devices with Sarah Henkel"
NOAA Hollings Scholar

Maha Haji

Keith Chavez



Bloomington, IL
University of Illinois-Urbana/Champaign
"I am very interested in water surface chemistry. I would like to take what I learn here and apply it towards a master's degree in environmental science"
HMSC REU



Palisades, New York
Sunny Rockland



Daniel Brusa

"I am doing an evaluation of the informational signs at the sea lion docks on the Historical Bay front to eventually improve them...I am studying a public example of free-choice learning"
Sea Grant



Ernestine Ahgeak

Barrow, AK
University of Alaska-Fairbanks
"I'm working with Tom Hurst looking at Pacific Cod growth rate in relation to acidification and with Jessica Miller exploring otoliths of Walleye Pollock"
HMSC REU



Keya Jackson

Columbia, South Carolina
Hampton University
"John Chapman and Brett Dumbauld are my mentors and we are studying the reburial competence of mud shrimp"
HMSC REU

Dive into Summer Session Classes - 2009 Course Offerings

Biology and Conservation of Marine Mammals (BI/FW 302): Students study the biology and conservation of marine mammals. Topics covered in the class include reproduction, energetics and physiology of swimming and diving, vocal communication and echolocation, feeding and migratory behavior, marine mammal/human interactions, systematics and biogeography of marine mammals.

Ecology of Marine and Estuarine Birds (FW 499): Students learn about the incredible diversity of marine and estuarine birds. The course covers topics such as life histories, foraging behavior, migration, human interactions, and conservation. Field investigations, self-guided laboratory, and field trips are also included in the course.

Introduction to Marine Biology (BI 150): Students will be introduced to the captivating creatures that live in the sea in this 4 week long hybrid course, which combines online material and a weekend field trip to Hatfield Marine Science Center. The field trip will include exploring the hidden world of planktonic creatures, examining tide pools and the different species that live in them, and sloshing around in the mudflats to look for shrimp, worms, and clams.

Aquatic Biological Invasions (BI/FW 421/521): Students will learn about the diversity, natural history, theory, evolution, ecology, politics, economics, and conservation of biological invasions in this hybrid course combining online material and a weekend field trip to Hatfield Marine Science Center. The course will include field and lab research projects.



2010 HMSC Scholarships, Fellowships, and Awards

Fred and Joan Crebbin Memorial Fellowship – Intended to provide support for marine science public education program interns, and to students whose major study emphasis is marine biology, particularly marine mammals.

Erin Kunisch, Wildlife Science (Advisor: Markus Horning) “To research northern fur seal population demographics in the Pribilof Islands, Alaska”

Curtis and Isabella Holt Education Fund – intended to foster education in the marine sciences by providing financial support to undergraduate or graduate students pursuing marine science studies.

Amy Vandehey, Marine Resource Management (Advisor: Selina Heppell) “Development and evaluation of an exhibit on marine reserves for the Hatfield Visitor’s Center”

Mamie L. Markham First Year Student Award – to provide financial assistance to an incoming, first year graduate student who plans to be a resident at the HMSC after completing first academic year in Corvallis.

Stephen Meck, Fisheries and Wildlife (Advisor: Markus Horning)

Lillian Brucefield Reynolds Scholarship Fund – scholarship fund for graduate students engaged in study of marine science at HMSC.

Alana Alexander, Fisheries and Wildlife (Advisor: Scott Baker) “To sequence newly discovered Y-chromosome intron inserts & mitogenomes of the sperm whale (*Physeter macrocephalus*)”

Anja Robinson Shellfish Fellowship – intended to support graduate students research in shellfish aquaculture.

Matthew Gray, Fisheries (Advisor: Chris Langdon) “Inter-specific competition between Olympia oysters (*Ostrea lurida*) and the introduced Pacific oyster (*Crassostrea gigas*)”

William Q. Wick Marine Fisheries Award – to encourage graduate student research in the area of marine fisheries ecology with special area of interest in Pacific whiting, or other fisheries-related research.

Sarikka Attoe, Fisheries and Wildlife (Advisor: Selina Heppell) “To study the diet of Humboldt squid in their northern expanded range.

Mamie L. Markham Endowment Award – intended to assist graduate or post doctoral level researchers and research utilizing the HMSC OSU

G. Renee Albertson-Gibb, Wildlife Science (Advisor: Scott Baker) “To study the *Steno bredanensis* dolphin in several areas of its known habitat”

Alana Alexander, Fisheries and Wildlife (Advisor: Scott Baker) “To sequence newly discovered Y-chromosome intron inserts & mitogenomes of the sperm whale (*Physeter macrocephalus*)”

Tom Calvanese, Marine Resource Management (Advisor: Scott Heppell) “Movement Patterns and Home Range of Rockfishes in the Redfish Rocks Marine Reserve”

Rebecca Hamner, Wildlife Science (Advisor: Scott Baker) “Next generation genetic monitoring and conservation for Hector’s and Maui’s Dolphins”

Donald Hawkyard, Fisheries and Wildlife (Advisor: Chris Langdon) “The effects of ocean acidification on the digestive

Joe Haxel, Geosciences (Advisor: Robert Dziak) “Global, Regional and Local Perspectives of the Marine Ambient Sound Field”

Jeremy Henderson, Zoology (Advisor: Sally Hacker) “Investigating physiology of marine fish larvae”the influence of sediment deposition on the population dynamics and distribution of an invasive seagrass in Oregon estuaries”

Jose Marin Jarrin, Fisheries and Wildlife (Advisor: Jessica Miller) “Do growth conditions in estuary influence juvenile Chinook salmon timing of migration in Oregon coastal habitats?”



HMSC scholarships & awards
are funded by our
generous donors.
Thank you!





Hatfield Marine Science Center

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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: maryann.bozza@oregonstate.edu)

Yaquina Head Murres: View from the Lighthouse

By Cheryl Horton, OSU Summer Intern and Americorps Member with the U.S. Fish & Wildlife Service

Assistant Research Professor Rob Suryan has been leading an annual study tracking the reproductive biology and foraging ecology of Common Murres at Yaquina Head Outstanding Natural Area since 2007. This is one of the largest and most successful murre colonies on the Oregon coast, supporting between 60,000 - 80,000 breeding birds.

This year's field crew has brought great enthusiasm to the project. In late May, I began spending early mornings on the viewing decks and at the top of Yaquina Head Lighthouse recording the progress of 150 Common Murre eggs, and now chicks. Much like monitoring human populations, biologists are documenting the population vital signs of reproductive rate, survival of young, diets, and overall population size - all of which are affected by changing environmental conditions. We also record detailed information on predation events, such as Bald Eagles hunting on the colony and gulls eating eggs or chicks. In a rare instance, OSU undergraduate and

field technician Adrian Lohr observed a California Brown Pelican devour 10 murre chicks as it flushed adult murres off a portion of the colony. Amanda Gladics, a Master's student in OSU's Marine Resource Management Program, has been instrumental in expanding the scope of our research by integrating seabird studies with cooperative fisheries investigations. Amanda and Leah Segui, a National Science Foundation summer intern, are comparing the diets of murres to those of salmon, rockfish, and halibut from Newport based sport and commercial fishing vessels. All of these species are predators of forage fishes such as sand lance, juvenile rockfish, smelt, and herring; key links in the marine food web and together could serve as coastal ecosystem indicators to gain a better understanding of how ocean conditions affect food availability for these economically and aesthetically important species.

Being a part of this research team, which is a partnership between Oregon State



University, the U.S. Fish and Wildlife Service, the Bureau of Land Management, and the National Oceanic and Atmospheric Administration, has been a wonderful learning experience and has solidified my interest in working with seabirds in the future.