NC STATE UNIVERSITY

CMAST COMMUNICATOR

THE CENTER FOR MARINE SCIENCES AND TECHNOLOGY

discovering coastal solutions

VOLUME 1 NUMBER 4 SPRING • SUMMER 2008

Observing the Ocean

Spotlight on current research being conducted by the NCSU Department of Marine, Earth and Atmospheric Sciences.

From high-tech computer models to ocean observing platforms to undersea gliders, researchers from NCSUs CMAST and Department of Marine, Earth and Atmospheric Sciences (MEAS) are using real-time data to observe trends and predict events in the ocean and estuaries.

In this issue of *CMAST Communicator* we continue our focus on the similarities of departmental work originating from two NCSU locations – CMAST in Morehead City and the NCSU Raleigh campus. First, we take a look at the research of Dr. Ruoying He in Raleigh on Ocean Modeling Systems which are helping to predict the when and where of toxic algal blooms. We then explore the work of NC EONS (North Carolina Environmental Observation Network System) and research assistant Don Stanfield, MEAS Electronic Technician based at CMAST, in the building of an ocean observing station in the Pamlico Sound.

Ocean Observing Through Computer Models

Dr. Ruoying He, Ocean Observing Modeling Group

Dr. Ruoying He

Imagine predicting a toxic algal bloom, months before it becomes reality. Or knowing which way a hazardous waste spill in the ocean will travel. Although he's not a practicing psychic, Dr. Ruoying He, Professor in the College of Physical and Mathematical Sciences, is however a physical oceanographer working on biophysical interactions. Dr. He's Ocean Observing Modeling Group (OMG) has been working on the development of projects with those possible direct applications. The group's work encompasses coastal and estuarine circulation dynamics, biophysical interactions, numerical modeling, data assimilation, and design and implementation of a coastal ocean observing system.

Dr. He comments, "Our approach is to use both in-situ and satellite remote sensing observations, and realistic numerical modeling and analysis to explain fundamental coastal ocean physical processes, and to gain an integrated, quantitative understanding of their impacts on coastal ocean biological,

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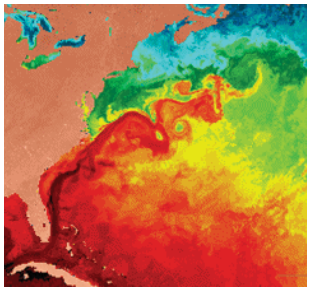

Satellite sea surface temperature image of the Gulf Stream.

CURRENT EVENTS

June 11
Oyster Restoration and Research Workshop
Information exchange and research coordination between NCSU, NCDMF and NC Sea Grant.

June 17
Carteret Marine Science Academy, Morehead City
Carteret County middle school students taking part in the week-long summer academy will visit CMAST.

June 19
Marsh Planting Event
Volunteers are sought to assist with planting marsh grasses behind the CMAST building, part of a Shoreling Restoration Project. Call Sarah Phillips, NC Coastal Federation at 252-393-8185 for more info.

June 26
NCSU Wolfpack Spring Caravan, Morehead City
Basketball Coach Sidney Lowe and others visit the Carteret County area with a social and dinner meeting at The Dunes Club in Atlantic Beach.

August 14
North Carolina U.S. Congressional Delegation
CMAST will host members and their staff for an exciting hands-on demonstration of research, education and outreach activities.

October 19-22
Joint Meeting of Seafood Science and Technology Society (SST) and Atlantic Fisheries Technology Conference (AFTC) in conjunction with the 1st North Carolina Biotechnology Conference, Wrightsville Beach
NCSU Seafood Laboratory hosts this international event. Visit www.seafoodlab.cmast.ncsu/sst_aft2008/ for information.

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From the Director

Welcome to the CMAST Communicator. In this issue, we highlight the collaborative nature of oceanographic research between resident CMAST faculty and their counterparts on NC State University's main campus in Raleigh, as well as among marine scientists throughout North Carolina.

The United Nations established three global observing systems for climate, oceans and land/freshwater. NCSU researchers use data from all three global observing systems to better understand our changing climate, predict hazardous weather, and inform resource managers. Coastal observing systems help to formulate and test predictive models for such issues as sea-level rise, nutrient enrichment of coastal waters, oil spill spread, hurricane and tsunami surge and impacts, habitat alteration due to urbanization, and harmful algal blooms. Dr. Ruoying He and his graduate students are applying ocean observations to predict biological phenomena such as the outbreak of harmful algal blooms. Mr. Don Stanfield is helping to design and implement an ocean observing platform in Pamlico Sound. An integrated coastal observing system provides North Carolina a unique opportunity to take advantage of the scientific and technological capacity of our universities, agencies and industries in creating a truly innovative and essential element to the future success of coastal management in North Carolina.

Lastly, we update you on many of the diverse research and community activities by CMAST faculty, students and staff, including our applied research on offshore sport fish, a new mariculture facility, shoreline restoration, a new Marine Magnetic Resonance Imaging facility, and some surprising outreach activities in Iraq! I invite you to visit our web-site, our beautiful facility located on Bogue Sound in Morehead City, or contact any of our faculty, staff or students with questions.

Best wishes, Dave Eggleston

SPOTLIGHT ON CMAST FACULTY AND NCSU DEPARTMENTS (con't.)

geological, and chemical processes." Dr. He's research is funded by various federal agencies, and he works closely with many other ocean scientists and engineers in the community.

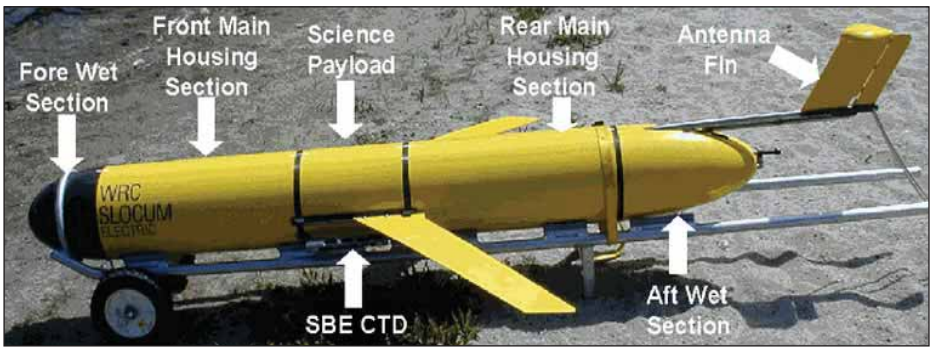
Dr. He's research projects range from developing rapid assessment tools for predicting ocean color and applying ocean color to identifying unique physical features of ocean circulation. OMGs research in the Gulf of Maine and its adjacent New England shelf waters is helping to better understand the dynamics and transport pathways of toxic dinoflagellates to better assist managers in developing appropriate safeguards for human health.

The OMG is also working on the experimental operation of a coastal ocean glider for use off the North Carolina coast. Gliders are state-of-the-art, autonomous underwater vehicles (AUV) that operate unattended for roughly a month-long period in the ocean. With a forward horizontal speed of 0.25-0.35 m/s, gliders can cover 20-30 km per day or 600-900 km per month. They move to different depths in the ocean by changing buoyancy. The vehicles generally trace a sawtooth pattern through the water, observing temperature, conductivity and other water properties as a function of water depth. When at the surface, a glider can fix positions via Global Positioning System. Onshore teams monitor and direct glider trajectories using two-way Iridium satellite communications, which permit near real-time delivery of observations and re-direction of mission or adaptive sampling.

Dr. He's research using ocean gliders improves our understanding of horizontal and vertical structures of coastal ocean waters, which can be applied to work such as search and rescue operations, hazardous material spill response, and fisheries oceanography and management.

Another benefit of gliders is their durability for use during tropical storms and hurricanes. For example, gliders can move underneath the water's surface and beneath a water column continually making measurements in a hostile ocean environment. Direct measurements of ocean responses, and heat and momentum flux exchanges between ocean and atmosphere, are also critical for understanding tropical storm dynamics.

For more information on the work of the Ocean Observing Modeling Group, contact Dr. Ruoying He at 919-513-0249 or ruoying_he@ncsu.edu.



Left: Oceanographic buoy for recording ocean and atmospheric properties.

Above: About 6.5 feet long, this coastal ocean glider weighs about a hundred pounds, and carries two microcomputers, several oceanographic sensors, communication equipment and batteries for power.

It's Not Just Pilings That Support an Ocean Platform

A multi-agency project provides ocean answers.

At exactly 35° 04' 06" N and 76° 17' 01"W sits a remarkable collaboration of 15 departments - representing seven universities, and a variety of state and federal agencies – an Ocean Observing Platform. This platform is the product of the efforts of a new partnership called NC EONS (North Carolina Environmental Observation Network System) brought together to monitor and aid in the protection of North Carolina's most valuable marine resource, the Albemarle-Pamlico Estuarine System (APES). This collaborative platform stands for more than just a partnership of agencies with interests in the oceans--it stands for a coordinated effort of all the marine science programs in NC towards a common goal: to learn more about the second largest estuary in the US--an estuarine system that is vital to the well being of the creatures that inhabit it and the people that live near it.

This partnership has helped develop a coordinated environmental observing and modeling system in the North Carolina estuaries and coastal waters. From this platform, scientists, government officials, educators and others will be able to conduct experiments and collect data that is vital for monitoring the health and to better understand the APES response to extreme events such as hurricanes, as well as more chronic conditions such as climate change and sea-level rise.

> **"The vision for NC EONS is to use [the platform] as a part of an environmental modeling and monitoring system that covers all the North Carolina estuaries and links with complementary efforts in North Carolina coastal waters and its watersheds."** ***– NC EONS Web site***

The NC EONS project received funding from the North Carolina Research Competitiveness Fund via legislative support to the UNC-system, as well as support from the National Oceanic and Atmospheric Administration (NOAA) and U.S. Army Corps of Engineers. With this funding, the NC EONS team designed and constructed a 325 square-foot platform in southern Pamlico Sound. The nearly-completed platform will be loaded with sensors and monitoring devices equipped with power and high bandwidth communications to allow researchers in laboratories, students in classrooms, and government employees in offices to access the real-time data.

Live video, meteorological conditions, water level, circulation, temperature, salinity, water quality parameters - nutrients, dissolved oxygen, chlorophyll - and fisheries information - such as acoustic reflection data - will be part of the on-going data collection. This information will help to evaluate the impact of development, coastal storms and climate change on the Pamlico Sound ecosystem and help officials develop policies based on solid scientific data. NC EONS is coordinating with the NC Ferry System to place antennas at the Cedar Island terminal to assist in broadcasting the data wirelessly. The platform will be powered by solar panels. Battery banks will store energy for use at night and on cloudy days.

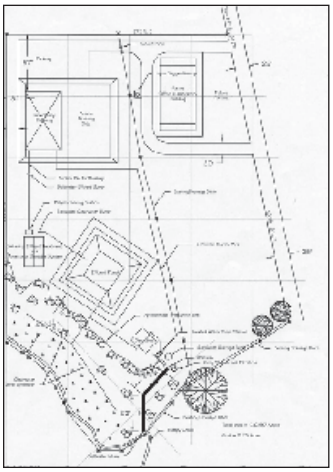
CMAST is one of several NCSU partners involved in the NC EONS project. Dr. David Eggleston, Professor in Marine, Earth and Atmospheric Sciences (MEAS) and Director of CMAST, and Mr. Don Stanfield, MEAS Electronic Technician located at CMAST, have been working intensively with UNC-IMS's Dr. Rick Luettich and Mr. Tony Whipple, and UNCWs Dr. Lynn Leonard, Project Director.

CMASTs Don Stanfield knows the project all too well – he is responsible for the platform design. In addition he is one of two lead technicians (the other is Tony Whipple) who will engineer and install the instruments on the platform. Stanfield has years of experience with ocean instrumentation through past work on several ocean observing programs in the southeast US.

Stanfield (above) aboard the R/V Savannah; Buoys being readied by Stanfield for other ocean observing projects. (bottom)

The NC EONS affiliates representing NC State are Dr. Robert Reed, Researcher and Oceanographer and Dr. JoAnn Burkholder, Professor, both of the College of Agricultural and Life Sciences (CALS) Center for Applied Aquatic Ecology; Dr. James Rice, Professor and Extension Fisheries Specialist in Zoology; Nicholas Meskhidze, Assistant Professor in MEAS; Dr. Dave DeMaster, Professor in MEAS, Dr. Dan Kamykowski, Professor in MEAS and Dr. Len Pietrafesa, Associate Dean and Professor, College of Physical and Mathematical Sciences.

Other NC EONS partners include: UNC-CH, UNCW, ECU, Albemarle-Pamlico National Estuary Program, Duke University, Elizabeth City State University, NC Department of Transportation, NC Division of Marine Fisheries, NC Division of Water Quality, UNC Coastal Studies Institute, UNC General Administration, US Army Corps of Engineers, and the Renaissance Computing Institute (RENCI)



New Aquaculture Facility Planned

NC State University's College of Agriculture and Life Sciences (CALS), in collaboration with CMAST, as well as the generous support from a donor, will begin construction of a new marine aquaculture demonstration facility near Marshallburg in Carteret County during Summer 2008.

The site will be developed and operated as a mariculture research station with special emphasis on the development and transfer of technology related to the hatching and nursery culture of marine finfish and crustaceans.

Plans call for three agricultural-type buildings to be erected on the site, two will contain wet laboratory space and the other will be used as an office. All fish and crustacean culture will occur in tanks at this site. Stay tuned for future developments!

Circle-Hook vs. J-Hook: Will Big Fish be the Winners?

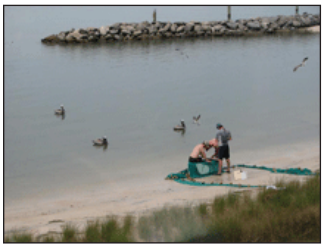
Ballyhoo, ready for trolling, rigged to J-hook (top) and circle-hook (bottom).

In the world of recreational fishing - particularly when white marlin are the target - folks usually like to stay with what works. But what works for catching these large fish, traditional "J-hooks," at times ends up with an unwanted mortality - due to deep hooking, in what otherwise should be a catch and release fishery. In some studies, it's been found that when utilizing "circle-hooks" mortality can be greatly reduced. If white marlin were the only species being targeted, circle-hooks would likely be used exclusively for offshore fishing.

Some anglers aren't convinced that circle-hooks will maintain their catch as compared to J-hooks. Now researchers are going to study just that – whether the circle-hook can be as effective a tool as the J-hook for catching other big, economically important fish – dolphinfish, yellowfin tuna and wahoo. CMAST Researcher Dr. Jeff Buckel and Research Assistant Paul Rudershausen, both of NCSU Zoology, along with Biologist Randy Gregory of the NC Division of Marine Fisheries, with funding from a North Carolina Fisheries Resource Grant, will study and determine if using circle-hooks as opposed to J-hooks will influence the strike, hook-up, and landing rates for these three highly-prized, pelagic migratory bluewater species. This project provides an opportunity to not only determine the hook performance in this fishery, but to see if the mortality rates of incidentally caught billfishes will indeed decline.

For this project, groups of recreational fishers and researchers are traveling together aboard local charters: the *F/V Sensation* (www.sensationsportfishing.com) and the *F/V Energizer* (www.energizersportfishing.com), operating out of Morehead City. Each group will fish for yellowfin tuna, dolphinfish, or wahoo utilizing circle- and J-hook trolling methods in the Gulf Stream waters off North Carolina. This past May teams targeted dolphinfish. Fall trips are planned for catching yellowfin tuna and wahoo. The project will continue for two years and when complete will have direct management implications. As an example, if it's found that circle-hooks work as well as J-hooks for tuna, dolphin, and wahoo then management agencies can use that information when deciding on circle-hook regulations in this offshore fishery.

For more information contact Dr. Jeff Buckel (jeffrey_buckel@ncsu.edu) or Paul Rudershausen (pjruders@unity.ncsu.edu).



Shoreline Restoration Project Continues

The CMAST campus, and the shoreline alongside the building, continues to be the beneficiary of a collaboration of the Coastal Federation, Carteret Community College (CCC) and CMAST. Middle-school classes working with the Coastal Federation have spent another year growing marsh grasses (*Spartina alterniflora)* and planting them along the banks of Bogue Sound all the while learning basic estuarine ecology. At least four groups of students have visited this spring to take part in planting hundreds of grass plugs, and also seining for fish and crustaceans to learn more about estuarine ecology.

Meg Rawls, a biology instructor with CCC and restoration project coordinator, leads tour groups on the project and has also scheduled a public planting day on June 19th to replant marsh grasses.

Other classes visit the area to analyze water quality and study the fouling community. Graduate students also gain from the near water access - several have had projects which involve monitoring fish populations, water quality and more. Two students will be working with Rawls this summer to monitor plant growth and fish communities.

The Coastal Federation is working on two signs to erect on the project site. One sign will explain the project and the other will offer photos and brief descriptions of a few of the important estuarine species found at the site. The signs will be erected in Summer 2008.

MMRI Facility Near Completion

The North Carolina Marine Magnetic Resonance Imaging Spectroscopy Facility (MMRISF), the first facility of its kind dedicated to the study of marine life in the United States, is near

completion.The facility, located on Piver's Island in Carteret County, is designed to facilitate multi-university, industry, and government collaborative investigations and is administered through NCSUs CMAST.

The facility, over two years in the making, utilizes a 40 cm bore 4.7 Tesla instrument that is specially equipped to look at living marine creatures. Special equipment upgrades funded by the North Carolina Biotechnology Center allow marine scientists to use the magnet much as if it were a microscope combined with a chemical analyzer to look at changes in the state of hydrogen, carbon, phosphorous, and fluorine atoms in relation to extremely detailed anatomy. The potential applications of the MMRISF are nearly boundless, ranging from identification of spoilage products in seafood that might lead to better treatments for extending shelf life, to determining the effects of pollutants on the metabolic pathways of marine organisms to better identify lethal and sub-lethal effects of contaminants in the marine environment.

The facility provides support to scientists wanting to apply this technology to their own research. Magnet time will also be made available for student research projects.

For further information about the facility contact Dr. Michael Stoskopf, CVM Clinical Studies, at michael_stoskopf@ncsu.edu.

CMAST OUTREACH

Rebuilding a Zoo - From 6,000 Miles Away

by Tracey Peake, CVM News Services

As Iraq's Baghdad Zoo regains its popularity with the public, veterinarians from North Carolina State University and the North Carolina Zoo are offering advice and assistance via a virtual link to classes and experts both on campus and in the field.

This past semester, veterinarians at the Baghdad Zoo were able to participate in the "Advanced Topics in Zoological Medicine" course offered by NCSUs College of Veterinary Medicine (CVM). The course met every Thursday at 4 p.m. - or midnight Baghdad time - and allowed the Iraqi veterinarians to interact with instructors, students and experts from the NC Zoo, CMAST and CVM via satellite link and televideo conferencing.

"It is our hope that this course will provide our fellow veterinarians with access to high-level continuing education and professional advice during and after their zoo's recovery," says Dr. Michael Stoskopf, professor of wildlife and aquatic medicine at NC State (and CMAST).

The effort was initiated by NC State alumnus and US Army Maj. Dr. Scott Willens. With the assistance of the US Army and the support of the NC Zoological Society, the necessary equipment was delivered and set up for use by the veterinarians at the Baghdad Zoo.

In addition to being able to take courses at the CVM, the telecommunicating Iraqi veterinarians will be able to connect directly to the NC Zoo Hospital for consultations and advice from a staff of veterinarians experienced in zoological medicine. The NC Zoo is the coordinating node for all US assistance to the Baghdad Zoo and has been instrumental in both raising funds for and overseeing the zoo's rehabilitation since the 2003 coalition takeover of Iraq.

Editors note:
Dr. Craig Harms, Assistant Professor, CVM Clinical Studies, at CMAST participated weekly in the videoconferencing from a connection in the CMAST building. Veterinary residents Dr. Eric Anderson, Dr. Karen Wolf, and Dr. Sathya Chinnadurai from CVM also participated. Regular videoconferencing is being planned for the summer. While the Baghdad Zoo doesn't have a large collection of aquatic animals, the CMAST veterinarians were able to assist in discussions on various reptile medicine topics during the conferences. In addition, CMASTs IT Coordinator, Linda Dunn was instrumental in establishing the connections for all videoconference locations.

CMASTers Volunteer with Blue Heron Bowl

Last February, CMAST volunteers, Dr. David Eggleston, Dr. Jeff Buckel and Warren Mitchell assisted with the Blue Heron Bowl held this year in Morehead City.

The Blue Heron Bowl is the regional competition for the National Ocean Sciences Bowl (NOSB®). NOSB is a national academic competition for high schools on topics related to the study of the oceans. It is coordinated by the Consortium for Oceanographic Research and Education CORE, representing leading oceanographic institutions universities and aquaria.Participants compete for college scholarships, research trips, computers, and the chance to attend the NOSB. Questions for the competition are based in biology, chemistry, geology, physics, mathematics, and nautical lore.

This year's NC winners were from East Carteret High School, who went on to place 8th in the National competition in Seward, Alaska. We are happy to report that the captain of the East Carteret High School's winning team, Mr. Matt Joyner, will be attending NC State University in Fall '08 and majoring in Marine Chemical Oceanography.

*Visit **www.unc.edu/ims/blueheronbowl** or **www.nosb.org** for more information and outcomes of the competition.*

CMAST EDUCATION

New Coastal Ecology Week Class

What normally is a month of studies in the piedmont and mountains of North Carolina now includes a week-long adventure at the coast. CMAST professors, Dr. John Miller and Dr. Jeff Buckel, are co-teachers of a new "Coastal Ecology Week"

segment added to the annual Fisheries and Wildlife Summer Camp, offered through the Fisheries and Wildlife Department at NCSU.

The camp is based out of Hill Forest near Durham and is a required part of the Fisheries and Wildlife Program curriculum. For the new coastal week held in May, students were housed at the Duke Marine Lab in Beaufort. Coursework included trips aboard fishing boats to sample inshore and offshore fish species, a day-long bird/wildlife/coastal flora hike in the Croatan National Forest, studying turtle and bird species, a night-time sampling of larval fish, and an evening lab which included work on plankton, functional morphology of fishes, and more. Students are required to write a detailed report on their activities in order to receive course credit.

For more information about this course offering, contact Dr. John Miller at john_miller@ncsu.edu or Dr. Jeff Buckel at jeff_buckel@ncsu.edu.

CMAST OPPORTUNITIES

No Skeletons in These Closets

But maybe in the CMAST lobby . . .

A fund-raising effort is underway to preserve, mount and display the skeleton of a striped dolphin for the CMAST lobby. In February a lone adult male striped dolphin (*Stenella coeruleoalba*) washed up on shore near Avon, NC. Its body was recovered by personnel from the National Marine Fisheries Beaufort Laboratory and then stored for examination and eventual use in a teaching laboratory for a Marine Mammal Medicine class taught by Dr. Michael Stoskopf at the NCSU College of Veterinary Medicine in April.

Striped dolphins are cousins to the familiar bottlenose dolphins (*Tursiops truncatus*) more commonly observed along the coast of North Carolina. Unlike the bottlenose, striped dolphins bear a striking color pattern that includes a thin full-body stripe and a light blaze from the shoulder towards the dorsal fin. Usually they frequent temperate and tropical offshore waters worldwide, traveling in large groups. It was an unusual find along the Carolina coast.

Although this dolphins time has ended, his journey has not. Through the fundraising effort, It is hoped that his skeleton can continue to teach and inspire. During the teaching lab in April, the dolphins' bones were carefully collected and labeled. It is the purpose of this fund-raising project to have the bones meticulously cleaned and prepared, and then re-articulated into a museum-quality display as a centerpiece in the lobby of NCSUs CMAST building. While on display, the skeleton will provide a valuable teaching resource, as well as a visually-appealing symbol of the important work in marine sciences carried out daily by CMAST faculty and graduate student researchers.

For information on the dolphin skeleton project, contact Dr. David Eggleston, CMAST Director, at eggleston@ncsu.edu.

CMAST STAFF NEWS

Brandon Puckett, a Ph.D. student in Marine, Earth, and Atmospheric Sciences (MEAS) and based at the CMAST has recently been awarded the prestigious National Marine Fisheries Service (NMFS) – Sea Grant Population Dynamics Graduate Fellowship for 2008. The NMFS – Sea Grant Graduate Fellowship Program supports highly qualified Ph.D. students interested in careers related to population dynamics of living marine resources and the development and implementation of quantitative methods for assessing their status. The three-year award provides for the fellow's stipend, tuition and fees, health insurance, travel, and research expenses. Mr. Puckett will be working under the supervision of Dr. David Eggleston (CMAST) and Dr. Kyle Shertzer (NOAA-Beaufort).

Congratulations to Dr. Craig Harms for his promotion to Associate Professor, with tenure, effective July 1, 2008. Dr. Harms specialty is zoological medicine with an aquatics emphasis with the Department of Clinical Sciences, CVM, located at CMAST in Morehead City.

Dr. Craig Harms and Dr. Greg Lewbart visited Rome, Italy in May to speak at the International Association for Aquatic Animal Medicine. Dr. Harms presented "Electrocardiograms of bottlenose dolphins (Tursiops truncatus) out of water: habituated collection versus wild post-capture dolphins." Dr. Lewbart presented "A comparison of heavy metal concentrations in the Asian clam (Corbicula fluminae) from Florida and North Carolina and the importance of bivalve mollusks as bioindicators." At the conference Harms was elected President-Elect for the 2009 meeting, which will be held in San Antonio, Texas.

Notes from Dr. Patricia McClellan-Green and the Environmental/Molecular Toxicology Laboratory:
The lab hosted the Annual Meeting for the Carolina Chapter of the Society for Environmental Toxicology and Chemistry on April 3-5, 2008 with 48 participants attending. Michelle Blickley received 3rd place honors in the platform competition for her talk "Investigating the eco-toxicity of CdSe/ZnS quantum dots in Fundulus heteroclitus." Sarah Wickman, a new graduate student in the Department of Environmental and Molecular Toxicology, will rotate through the laboratory this summer.

WHERE ARE THEY NOW?

Dr. Allison Tuttle, former CMAST CVM resident in aquatic medicine, is now staff veterinarian for Mystic Aquarium in CN.

Dr. Heather Henson-Ramsey, former Ph.D. graduate student at CMAST, is now an assistant professor at Lewis and Clark College in Lewiston, ID.

CMAST Goes Home
Remember the one about the injured sea turtle who was in the right place at the right time - rescued by Dr. Craig Harms, a veterinarian and sea turtle specialist who happened to be kayaking in the waters behind CMAST? Well there's another happy end to the story. After recovering at the Sea Turtle Rescue and Rehabilitation Center at Topsail Beach for the past 10 months, the turtle (aptly named 'CMAST') was released to the oceans on June 3.

Right: A very healthy and recovered 'CMAST' prior to release, whose weight doubled while in rehabilitation. Chris Butler, CVM Research Assistant at CMAST, assists with the release.