



“Nacote Creek” Marine Science and Environmental Field Station

*Mullica River-Great Bay Estuary
Port Republic, NJ*



Activities Report

**Academic Years
09/10 and 10/11**

**Steve Evert
Field Station Manager
steve.evert@stockton.edu
609-652-4486**

www.stockton.edu/marine

OVERVIEW

The “Nacote Creek” Marine Science and Environmental Field Station has experienced its most rapid growth in activities and resources in the past two years since its original opening in September 1993. Facility renovations, a new research vessel, significant equipment acquisitions and a marked increase in undergraduate and graduate research activities have increased the associated programs’ visibility and reputation statewide and beyond. A significant increase in open house visitors to the Field Station has been one result. Increases in prospective student visitations have been mirrored by enrollments in the Marine Science program, indicating our success in promoting the College, its specific programs and their impressive resources. The pristine and convenient location of our Field Station, a dedicated group of faculty and staff and a comprehensive list of resources separates our Marine and Environmental Studies programs from similar Institutions. Based largely on available resources and unique teaching and research approaches, the faculty and staff of the Marine Field Station consistently challenge Stockton students to go one step beyond what similar-sized Institutions only hope they could offer.

Highlights of the past two Academic Years include the completion of the Nacote Creek Rehabilitation and Upgrade Project, the replacement of an aging research vessel, marked increases in faculty and student research activities and significant equipment acquisitions through both internal and external funding sources. Associated faculty have several grant opportunities either funded, under review or in the proposal development stage. The management of the Field Station will continue working closely with these active faculty members to support their research endeavors and continue to offer Stockton students advanced research opportunities. The coming year holds much promise and advancement opportunity for the Marine Science and Environmental Field Station and its stakeholders.

TABLE OF CONTENTS

| | |
|---|--------------------|
| Introduction | pg. 1 |
| Academic Course Support | pgs. 1 - 3 |
| Faculty and Student Research Activities | pgs. 3 - 7 |
| Partnerships, research contracts and grants | pg. 7 |
| Outreach programs, visiting groups and student recruitment | pgs. 7 - 8 |
| Facilities and resources | pgs. 8 - 10 |
| Summary | pg. 10 |

For more Information on the Nacote Creek Marine Science and Environmental Field Station please visit...

www.stockton.edu/marine
or type "field station" in the keyword box on the College's homepage

Introduction

The Marine Science and Environmental Field Station is entering its 19th year of academic service to the College. Building on suggestions from the Moreland and Novodoff 2006 self study (NAMS laboratories and field facilities), Field Station management staff and Directors have taken steps to increase awareness of the Facility's resources and activities both internally and externally. Increased awareness of the Facility's capabilities by NAMS faculty have in turn lead to marked increases in research and teaching activities. The long-standing program users of Marine Science, Biology and Environmental Studies have increased their use of the facility through course development and increased faculty research. Other NAMS programs and faculty have found that the resources for superior field teaching and research activities are in place at the Field Station. As a result, several new programs and courses have begun to utilize the Field Station. Faculty-led research has reached an all-time high with an increase in funded research generated by new users, arriving faculty and successful grantsmanship. The Coastal Research Center, located at the Marine Field Station, has become a stand-alone entity within the College and academic programs at the Facility have enjoyed their own successes with several research and instrumentation grants awarded in the past two years. These advancements have been made possible by the leadership and vision of the NAMS Administration and the Field Station management. Continuing on this path over the next academic year and beyond will allow the Field Station to further establish its nation-wide reputation as a small and intimate undergraduate facility with a large and far-reaching list of resources and research programs.

Academic course support

The Field Station continues to make available the facilities, research vessels, sampling equipment, and staff to provide Stockton students with hands-on learning experiences in a marine environment second to none. Located within the Jacques Cousteau National Estuarine Research Reserve (JC NERR), one of the most pristine marine environments in the Northeast United States, the Field Station is well situated to provide superior field teaching opportunities. There are just a few undergraduate facilities on the East Coast (closest being Coastal South Carolina) that can offer these types of teaching and research opportunities. Central to these unique offerings are the staff positions at the Field Station – a manager and two 60% support positions (proposed increase to 75%, 2009 - current) that provide significant faculty support and co-teaching services. With a combined local experience pool of 35+ years, the Field Station staff is uniquely situated to steer faculty teaching goals in the right direction. The staff's experience with wind, tides, currents, site specifics and seasonality is extremely beneficial to the efficiency of field teaching activities, the success of research projects and most importantly to the safety of the marine operations. In the past two years over 500 students have departed from the Field Station for boat-based activities in the bays and near-coastal waters of Southern New Jersey – all endeavors have been without incident.

Staff experience and a perfect location cannot alone provide the resources necessary for a successful teaching and research facility. Physical resources are also required. Fortunately, as a result of active internal and external campaigning and grant seeking the list of resources available at the Field Station is impressive for a predominantly undergraduate facility. Students from the Marine Science (MARS), Biology (BIOL), Environmental Studies (ENVL), Chemistry (CHM), Geology (GEOL), Physics (PHY), General Studies (GNM) and Professional Science Masters (PSM) programs benefit from these resources. Some program highlights are listed in the following section.



The **MARS program** has long been the traditional and greatest user of the Field Station. MARS students spend several semesters at the Field Station throughout their academic career at Stockton. Many become even more involved in the numerous research opportunities (see “Faculty and student research”). In the past two years several courses have been revamped and are once again regular offerings

within the Marine Science/Geology program. Other courses have been recently developed around equipment acquisitions in the area of marine technology.



The **BIOL program** now offers several courses and research opportunities at the Field Station, including Scientific Diving. An increase in the number of BIOL students taking courses at the Field Station has been noted – in the summer of 2011 BIOL 3465 (Tide Marsh Ecology) ran as a full offering (24 students) and was predominantly BIOL majors.



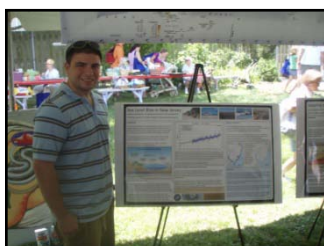
The **ENVL Program** has many faculty and students who are interested in the marine environment. ENVL faculty are utilizing the facility to support research in or near the estuarine systems of southern New Jersey and are finding the Field Station staff’s expertise in water quality monitoring a great benefit to their programs.



The **CHEM program** has developed closer ties with the Marine Science and Environmental Field Station through the cross-listing of several courses with marine interests, including chemical oceanography and research projects under the direction of Drs. Gordon Grguric, Tait Chirenje and Doreena Patrick.



The **GEOL/MARS program** has been revamped thanks to the addition of a faculty line and increased student interest (generated by increases in the job market for physical coastal sciences majors). Marine Geology I and II labs are now regular Field Station offerings that have reaching capacity each of the past two years. Sedimentology and Stratigraphy (GEOL 3231) and Coastal Processes (MARS 3305) are two coastal geology courses that have not been offered in many years. In 2010 and spring 2011 these courses were run with a large field-based component supported by Field Station staff. Many of these offerings are benefitting from the acquisition of remote sensing instruments for coastal studies (i.e. side scan sonar, magnetometer, ROV).



The **PSM program** is now offering field and marine-oriented courses at the Field Station. Graduate level teaching at the Field Station is proving to be an option due largely to major equipment acquisitions in the past few years. In the summer of 2010 Field Methods (ENSC 5100) provided a condensed introduction to the theory, technique, synthesis, and application of field collected environmental data. The

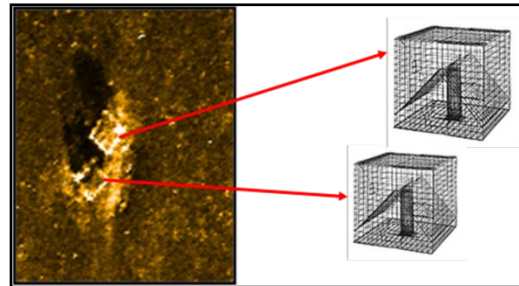
Summer 2011 PSM offering was Ocean Sustainability (ENSC 5320), a course that provides an in-depth overview of current issues related to ocean sustainability. Major topics covered included the state of the world's fishery resources (species at risk, management options), the ocean's critical role as a moderator of climate change (and, by extension, sea level rise), ocean acidification, and pollution.

Faculty and student research

A major objective of the School of Natural Sciences and Mathematics is to involve undergraduate students in faculty and staff - led research to demonstrate their ability to contribute to the field. At the Marine Science and Environmental Field Station associated faculty and staff focus on providing unique marine-related research opportunities through independent studies projects, summer research experiences, research contracts and grants. Major equipment acquisitions in 2009 and 2010 have redirected research efforts toward coastal observations and remote sensing of coastal and estuarine habitats. Many research efforts initiated in the past 5-10 years are still underway while newer projects over the past two years have begun to focus on marine debris in estuaries, artificial reef ecology, and monitoring submerged aquatic vegetation. Research data and summaries are being made available to the public via the Field Station website, to the scientific community through published papers and regional conferences and to prospective students through open house presentations.

Marine Debris in the Mullica River Great Bay Estuary

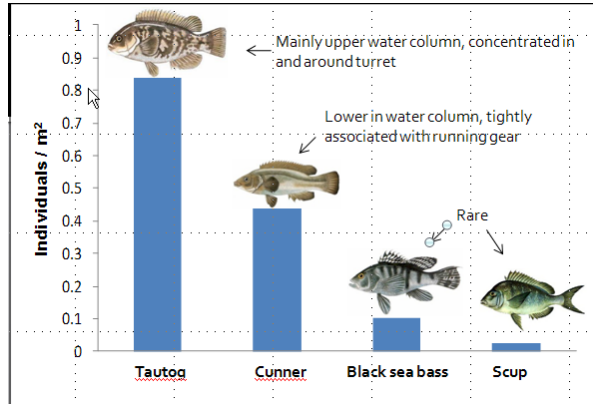
The Mullica River–Great Bay Estuary (MRGB) drains ~915 km² of New Jersey pinelands and is considered one of the most pristine estuaries on the east coast of North America. It supports a unique blend of organisms / habitats as well as recreational / commercial fishing interests which form the backbone of the Jacques Cousteau National Estuarine Research Reserve.



From an effort standpoint, commercial blue crab fishers dominate the latter group (fishing an average of 2460 traps / year) and rely heavily on a productive ecosystem to make a living. Unfortunately, the dynamic nature of the estuary (boat traffic, bottom currents, and seasonal weather conditions) renders a substantial proportion of gear (potentially > 700 traps) lost each year - forming an overlooked, but substantial, source of bycatch (see sonar images of lost pots above). The potential consequences of derelict gear are two-fold: 1) potential negative ecological impacts on non-target and / or threatened and endangered species and their associated habitats and (2) loss of product, time, and income for the commercial fishing community.

In 2009 PI M. Sullivan along with co-PI's S. Evert, M. Reding (JC NERR) and P. Straub applied to the NOAA Marine Debris Removal Program for restoration funding to work with community partners to identify (via side scan sonar surveys) and subsequently remove lost fishing gear in the MRGB estuary. Though not funded, reviewers strongly encouraged another application which will be made for the FY12 funding cycle (October 2011 submission). Recent field activities have gathered additional data since the PI's last submission, strengthening the proposal for the 2012 funding submission.

Underwater survey and mapping of temperate artificial and natural reef habitats for modeling of productivity and trophic linkage to black sea bass and tautog fisheries.



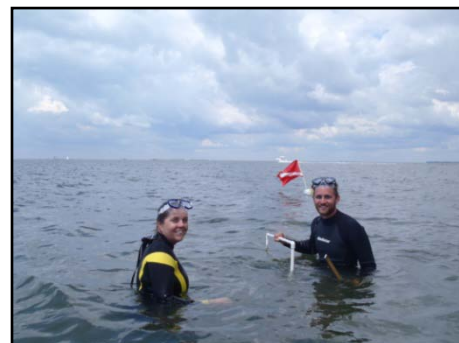
PI Pete Straub, along with co-PI's S. Evert, T. Luke and M. Sullivan were awarded a development grant from the NJ Sea Grant Consortium in 2010. One of the main functions for artificial reef development in New Jersey and throughout the country is to enhance sport fisheries. The goal of this pilot project was to survey and map artificial reef habitats for the purpose of developing an ecological model for use in evaluation of reef functions. Surveys were undertaken using side scan sonar and a remotely operated vehicle (ROV) with sonar and video capability (see still image above). Accurate distribution of organisms (see graph above) and habitat utilization maps will facilitate the development of an ecological model that can be used to assess the function of artificial reefs of varying structure. Development and testing of an ecological model will allow comparison of different types of artificial reefs and assess the idea that they enhance local productivity. To view video collected by this research project please visit www.stockton.edu/marine and follow the link titled "[ROV operations on artificial reef habitats](#)".

Dissemination of findings has been accomplished through several public events as well as regional science conferences. In March of 2011 co-PI Steve Evert provided a presentation to the public at the Long Beach Island Arts and Sciences Foundation "[Science Saturdays](#)" series. In Fall 2010 PI Pete Straub presented at the Atlantic Estuarine Research Society meeting in Kitty Hawk, NC. The [full report](#) can be found on the Stockton Underwater Science website.

In the spring of 2011 the PI's were invited to submit a full proposal for FY12 Omnibus funding. The full proposal (170K) is now under review with a notification date by October 1, 2011.

Monitoring and Quantifying *Zostera marina* (common eelgrass) in the Barnegat Bay estuary

Stockton College was selected to beta test a boat-based digital hydroacoustic vegetation detection and mapping system developed by the United States Army Corps of Engineers (USACE) Engineer Research and Development Center (ERDC). Dr. Jessie Jarvis (left in picture with student Sean Towers) worked with several



students throughout the summer in 2011 to establish a baseline dataset of *Zostera marina* and *Ruppia maritima* distribution and abundance using the Submerged Aquatic Vegetation Early Warning System (SAVEWS) in Barnegat Bay-Little Egg Harbor Estuary.

Stockton junior Sean Towers and senior Jennifer Fitzgerald worked with Dr. Jarvis to quantify changes in seagrass cover and density at three sites using both SAVEWS mapping and traditional diver transect methodologies. Dr. Jarvis and her students worked directly with ERDC engineers to standardize data collection and processing. This ongoing project is funded by the Partnership for Barnegat Bay Student Grant program and a Stockton College Research and Professional Development grant. To date results of this research have been presented to the public at the Partnership for Barnegat Bay Student Research Session (05 August 2011). Additional dissemination will occur at the spring 2012 Atlantic Estuarine Research Society Meeting and at the School of Natural Science and Mathematics poster session in April 2012. The final beta testing results will be submitted as a technical report to the USACE and as a peer reviewed paper to the journal *Estuaries and Coasts*.

American eel research



This past summer saw the completion of the NJ Sea Grant funded project: “An unwelcome guest? Is the presence of the invasive swim-bladder parasite, *Anguillicola crassus*, influencing American eel (*Anguilla rostrata*) recruitment in New Jersey estuaries?” PI for this project was Dr. Mark Sullivan. A significant portion of the sample processing for this project was conducted at the Nacote Creek Field Station. The project

represents a collaborative effort between investigators within Stockton (M. Sullivan – prevalence of *A. crassus* in NJ eels, E. Pollock – biochemical pathways of parasite infection, T. Chirenje – trace metals in the American eel) and between institutions (Rutgers U. – eel predator / prey interactions, Saint Mary’s University, Halifax Nova Scotia – parasite genetics, NJ Department of Environmental Protection (NJDEP) - provisioning of additional eel samples).

Overall, the project supported 17 Stockton undergraduates (many of which were paid as student workers off of the grant) and 4 graduate students from various institutions (mainly through the sharing of data and/or samples). Three Stockton undergraduates used data from this project to complete Biochemistry and Molecular Biology (BCMB) senior theses under the supervision of Elizabeth Pollock (B. Zoppel, J. Nguyen, A. Clifford). The project also contained a significant general public outreach effort via teacher workshops and public lectures. On the Field Station website see Research>>[American Eel Ingress](#).

Underwater sound attenuation using Nitrogen bubble curtains

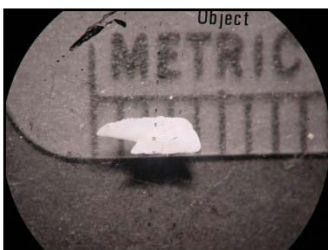
Dr. Neil Aaronson conducted a study on the potential of using bubble curtains in an underwater environment to absorb sound, especially at high frequencies (>8 kHz). Nitrogen gas was bubbled via two concentric arcs of PEX tubing into a 600 gallon fish tank. Recordings of broadband white noise (18th order maximum length sequences recorded at a sample rate of 50 kHz) were made in the presence and absence of the noise and their spectra were compared. Significant attenuation ($p < 0.05$) was observed across all frequencies, and was quite large at frequencies above 8 kHz. This work has important implications for the preservation of hearing ability for animals in captivity,

especially *Orcinus orca*. The work was funded by the US Navy and a Stockton Research and Professional Development grant. The results were presented at a conference of the Acoustical Society of America and are currently being prepared for publication.

The Nacote Creek Water Quality Research program has now collected over twelve years worth of year-round water quality data on the Nacote Creek. Under the direction of Field Station staffer Elizabeth Zimmerman YSI 6000 series monitoring instruments are used to measure temperature, salinity, pH, DO, tide level and turbidity every fifteen minutes (24/7). Data is used throughout Field Station courses and made available to the public via the Field Station website. Data being collected during the 2011 summer season will be used to compare to biofouling on test paints applied to Stockton research vessels via a cooperative arrangement with Akzo Nobel/Interlux companies. On the Field Station website see Research>>[Long term monitoring programs](#).

The JC NERR/Stockton Nacote Creek Meteorological Station continues to collect 24/7 data on atmospheric conditions including; temperature and relative humidity, barometric pressure, wind speed and direction, photo synthetically active radiation and precipitation. This research is funded by the NOAA National Estuarine Research Reserve program via an annual research contract awarded to Field Station Manager Steve Evert. Additional water quality data sites in the Mullica River (similar to the data site at Nacote Creek) are monitored by Stockton interns under this research contract. Data is made available to the public through the Field Station website and on the NERR website.

The Marine Geochemistry Research team (Dr. Gordan Grguric) has been performing chemical analyses on seawater samples from the Great Bay/Mullica River estuary. The analyses include major seawater ions such as sodium, potassium, calcium and magnesium, as well as chloride and sulfate. In addition, analyses of pH and alkalinity and some nutrients (e.g. phosphate) have been performed. Students analyzed the results of chemical measurements by plotting correlations of these elements with salinity in the estuary. In this way, chemical behavior - conservative, enriched or depleted - in the estuary can be assessed and concentrations of some other elements predicted. Students have presented posters at NAMS poster days as well as regional conferences. On the Field Station website see Research>>[Marine Geochemistry](#).



The New Jersey Seal Study has continued to focus on Atlantic harbor seals, a seasonally migratory species that have been documented overwintering in Great Bay, NJ since 1994. From 1996 until the untimely passing of Dr. Carol Slocum in 2010, Stockton students and Nacote Creek Field Station staff collected scat samples from known haul-out sites in Great Bay. The recovery of fish otoliths (“ear bones”, pictured to left) from scat samples is a common technique used to determine the diet of marine mammals. In the winter/spring of 2011, 573 otoliths were extracted from previously unprocessed NJ Seal Study frozen samples. A photo database consisting of recovered otoliths was created and images assigned to order, family, and, where possible,

the genus species level using a reference collection and identification manuals. Otolith lengths were measured with an image analysis system and used as a proxy for fish length. While fishes in the order gadiformes (cod-like fishes) were dominant prey during most months, there was a seasonal shift to clupeiformes (herrings) during the month of May. Field observations in 2010-2011 reported a maximum of 160 harbor seals at Great Bay haul out sites - representing a 45% mean annual increase since the project began in 1994.

In 2011, this project benefitted from exceptionally hard work by two Stockton students – Linda Dotts and Sarah Tanedo. Linda was supported through the Stacy Moore Hagan Estuarine Science Internship Program and awarded second place in the annual NAMS Research Day for her project. Sarah earned a Certificate of Distinction in the Honor's Program for her project. Everyone involved in these efforts is honored to carry on Dr. Carol Slocum's legacy at Stockton and within Great Bay. On the Field Station website see Research>>[NJ Seal Study](#).

Freshwater chemistry research at select sites in southern New Jersey and Pennsylvania is being conducted by Dr. Tait Chirenje utilizing ENVL students and monitoring equipment and technical support provided by the Field Station. His projects include research at Hammonton Lake (NJDEP funded), vernal pool monitoring (RPD project), Tacony-Franford Creek (funded by the Philadelphia Water Dept) and Crosswicks Creek (funded through the R&PD grants).

Partnerships, research contracts and grants

The Field Station continues to form beneficial partnerships with regional agencies and institution's through cooperative agreements, research contracts and grants. NAMS faculty and staff working out of the Field Station have continued or developed agreements with numerous agencies and institutions, including; Jacques Cousteau National Estuarine Research Reserve (JC NERR), Rutgers University Marine Field Station, NJDEP Division of Fish and Wildlife (NJDFW), Marine Mammal Stranding Center (MMSC), Mordecai Island Land Trust (MLT), NJ Marine Education Association (NJMEA), Marine Academy of Technology and Environmental Science (MATES), Marine Academy of Science and Technology (MAST) and the Army Corps of Engineers (ACOE). Each of these partnerships benefit the faculty and students of Stockton's science programs by exposing researchers and students to field-related work being conducted by similar agencies in the region.

Outreach programs, visiting groups and student recruitment

The Field Station has become the primary provider of the outreach activities conducted by NAMS in the area of marine and environmental science public education. Under the direction of Steve Evert, associated staff, faculty and students have attended several venues to provide basic marine and environmental science education to their visitors. At each of these events staff and faculty also promote the College's science programs, specifically the marine, environmental studies and biology programs. In the past two years these events included;



- NJ Marine Science Consortium Events (Ocean Fun Days in May and Coast Days in October)
- Jersey Shore Science Fair held at the College in March of each year

- Cape May Harbor Fest in support of a new exhibit entitled “Cape May Harbor and Commercial Fishing, a Century of Prosperity and Progress” (PSM Ocean Sustainability Course)

These events reached over 10,000 visitors and helped to fulfill the College’s role as a community service leader in the area of marine and environmental education in New Jersey. Each year the Marine Science and Environmental Field Station also host a variety of visitors on site, including special academic programs, scientific conference attendees, teacher workshops and prospective students. In the past two years these visitors included;

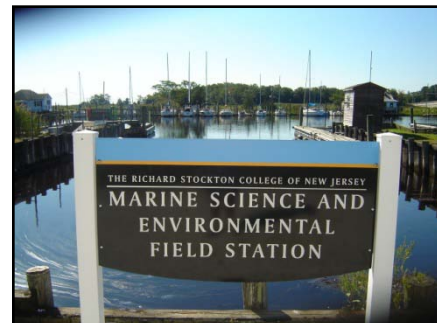
- 2009 American Fisheries Society annual meeting (final day and field trip)
- 2009 JC NERR public workshop – “Wetlands in the JC NERR”
- 2010 Atlantic Estuarine Research Society annual meeting (final day and field trip)
- Collingswood Middle School, 2010 and 2011
- Cinnaminson High School, 2010
- Stockton Summer Sustainability and Environmental Academy, 2011
- Greater Egg Harbor Regional High School District – Professional Development Workshop, June 2011
- Several hundred prospective students through Open House events and private tours.

Of particular interest is NAMS’ continuing development of articulation agreements with high schools in the State – including Marine Academy of Science and Technology (Monmouth County), Marine Academy of Technology and Environmental Science (Ocean County), and most recently the Greater Egg Harbor Regional High School District (Atlantic County). In June 2011 the Field Station hosted a Professional Development Workshop (pg 12, [The Current](#), 9/15/11) for these teachers that provided them with insight to Stockton science programs and tools for preparing their students for pursuing marine and environmental sciences at the College level.

Open House events at the Marine Science and Environmental Field Station are hosted in conjunction with the College’s Admissions Department events. Tours of the facilities and a presentation featuring students engaged in lab and field work are included. Private tours are increasingly popular and appear to attract families that have a strong commitment to evaluating their choices for undergraduate studies. The Field Station management plays an important role in making sure these families receive more than just a campus tour when they visit during the week. Without a visit to the Field Station these tours lack specific information on the programs and resources. Many prospective students indicate that the Field Station and the program’s commitment to field studies and undergraduate research is what initially attract them to Stockton. This holds true in cases where these students are also considering much larger Institutions – it is without question the field facility and resources that allow us to compete for students at this level.

Facilities and Resources

In light of the Field Station’s broad service to the School’s programs, NAMS Administration and Management have committed to a reasonable level of continuous development of the facility and maintenance/replacement of the research vessel (R/V) fleet. Since its 1993 establishment numerous in-house improvements have been made. These improvements have been geared at maximizing available space of the once residential buildings on site and maintaining the



research vessels to high standards. In 2009 the Nacote Creek Rehabilitation and Upgrade Project was completed to begin addressing site limitations to program growth. A new research vessel was also commissioned in 2009 to replace an aging member of the fleet. These types of continued advancement efforts are the backbone to the Facility's ability to offer such unique and effective programs.

The School of Natural Sciences and Mathematics, along with the Offices of Facilities Planning and Grants are actively seeking opportunities for external funding to construct an interdisciplinary research laboratory on the Nacote Creek site. The envisioned facility would meet the growing demands of several focus areas including geospatial analysis, fisheries, remote sensing, coastal ecology and genetics. These disciplines, though they contain field components and access needs, are currently only supported by campus laboratories. The lack of these services at the Field Station may inhibit growth in related research activities at the Nacote Creek site. Additional facilities and their capabilities would open up many new funding opportunities to the active faculty as well as attract new faculty from within NAMS and open up additional partnership opportunities with regional agencies (i.e. NJDEP, ACOE, NMFS, etc.).

Teaching space at the Field Station was becoming a limiting factor for additional and concurrent course offerings prior to the 2009 completion the Nacote Creek Rehabilitation and Upgrade project. The primary academic space, Building 501, has now been expanded to include more teaching space and allow for additional and concurrent course offerings.

Elsewhere on site Building 504 underwent exterior and HVAC renovation. Previously co-occupied by the Coastal Research Center and the Field Station Management staff, the second floor of Bldg. 504 now houses the office space for the management team as well as a dedicated area for the data management and computer systems required of current marine technology instruments. The staff of the Coastal Research Center has been relocated to Bldg. 508, a 1200 sf office trailer established during the renovation project.

The College's Research Vessel (R/V) fleet was expanded in 2009 with the addition of the *R/V Gannet*, a 28' Chesapeake style workboat. The vessel replaced an aging platform from the mid-1980's. Outfitted by Field Station staff, this vessel has been customized to meet the growing demands of the marine technology activities taking place throughout many

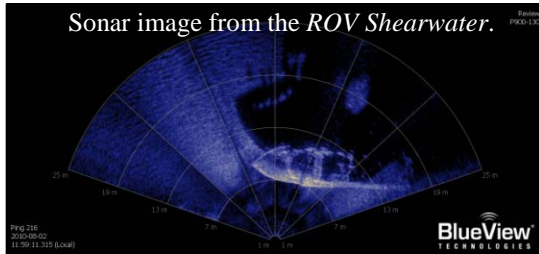


courses and research projects. In the years leading up to the specifications for this vessel various sectors of the programs grew exponentially, most notably the use of oceanographic instrumentation and diving activities. While the R/V Gannet serves small groups of researchers in near-coastal conditions, the added activities calling for oceanographic work are already demanding a larger platform. Research vessel planning in FY12 will focus on complementing this vessel with a larger platform that could ease many logistical issues, provide greater opportunities to students and faculty, and increase collaborative research opportunities and funding possibilities.



Equipment acquisitions through internal and external funding have been significant in recent years. In 2009 PI Pete Straub, along with co-PI's S. Evert, T. Luke, W. Phoel and M. Sullivan, were awarded a \$120,000 NSF major research instrumentation grant to acquire a remotely operated vehicle (ROV) for use in coastal studies. Capital funding was used to leverage this award and upgrade the

instrumentation to include forward scanning sonar, integrated water monitoring instrument and magnetometer capabilities. These instruments, alongside of the previously acquired side scan sonar, are paving the way for expanded underwater survey activities.



Video image from the *ROV Shearwater*.

Summary

In the past several years a clear transition from a basic field support facility to an advancing teaching and research site has occurred at the Nacote Creek Marine Science and Environmental Field Station. Funded faculty research has more than doubled and the number of undergraduates contributing to this research has steadily risen as evidenced by increasing scientific presentations at regional conferences and internal NAMS Poster Days. Along with these advancements is a sense that Stockton is now competing at a national level for undergraduate students in the marine sciences, due largely to the resources in place at the Field Station.

The Field Station's ability to offer unique research and educational experiences at the undergraduate level helps to place Stockton science programs apart from others. The Field Station experiences are the ones our students remember, the ones they build upon, and the ones that place them a step ahead of their competition when approaching the job market or advanced degree admission. In the coming year NAMS Administration and Field Station management will continue to support active faculty, to seek grants for equipment and facility upgrades, and to provide research and teaching opportunities that engage our students in the scientific process and provide them with the tools to contribute to their fields well beyond their time at Stockton.