



APPENDIX D: Pre-Meeting Partnership Project Templates

NOAA Goals: E = Ecosystem, W = Weather/Water, C = Climate, T = Transportation/Commerce, O = Outreach/Education

First PI	Title*	NOAA Goal**	Page #
Bandy	NOAA in the Carolinas Web site	O	D-2
CSC	GIS Training/Partnership on Future Projects	E	D-3
Currin	Island-wide Plan to reduce stormwater and aquaculture impacts to estuarine waters	E,W	D-4
Fletcher*	Carolinas Coast: A One-Stop Shop for Marine Observations in the Carolinas	W	D-5
Fletcher*	Carolinas Coastal Ocean Observing and Prediction System (CaroCOOPS)	All	D-6
Hohn*	Assessing the health of populations of dolphins and sea turtles along the coast of the Carolinas	E	D-7
Kelleher*	Coastal Inland Flood Observation and Warning Project	W	D-8
Kriehn	NOAA Traveling Exhibit: NC Seafood Festival	O	D-9
Larkin	NOAA @ Nauticus	O	D-10
Mitchell	Implementing the National Height Modernization System in NC	W,T,O	D-11
Moss*	Coastal Ocean Research and Monitoring Program (CORMP)	W,E,O	D-12
Payne & Bales*	Coastal Hazards and Climatologies: Integration Potential in the Carolinas	All	D-14
Pietrafesa*	Climate & Weather Impacts on Society & the Environment (CWISE) and Inter-Actively coupled NOAA Programs in the Carolinas	E,C,W	D-15
Rebach	Bycatch Reduction of Marine Mammals in Mid-Atlantic Fisheries	E	D-16
Rebach	Bottlenose Dolphin Take-Reduction Gear Research Program	E	D-17
Thigpen	Educating Anglers About Catch-and-Release in Highly Migratory Species Fisheries	E, O	D-18
Whitfield	Status and Risk posed by the invasive Indo-Pacific lionfish to North Carolina Hard bottom Communities	E	D-19

- - Oral presentation at meeting—note Fletcher/Moss presentations are coordinated.

NOAA IN CAROLINAS 2005 PARTNERSHIP PROJECTS

PROJECT TITLE: *NOAA in the Carolinas Webpage*

COLLABORATING PROGRAMS/ CONTACTS:

- NWS Newport, NC (Rich Bandy, ITO, and webmaster 252-223-5122)
- NOAA in Carolinas Steering Committee

BROAD NOAA CATEGORY:

Climate; Water and Weather; Ecosystems; Commerce/Transportation; Outreach and Education

PROJECT SUMMARY:

A NOAA in the Carolinas webpage has been created by the Information Technology Officer (ITO) at the National Weather Service Office in Newport, NC. The Forecast Office also hosts the website. The website serves two purposes: 1. First, it serves as an internal information exchange portal for NOAA entities involved in the NOAA in the Carolinas initiative. It contains a description of the NOAA in the Carolina initiative, its mission, and information concerning upcoming meetings and projects. 2. Second, the webpage serves as a point of entry for the public to learn about the various NOAA entities in the Carolinas with links to each one. It contains a map depicting the various NOAA entities in the Carolinas. The webpage also provides a regional perspective on the four main NOAA goals. The website can be viewed at

<http://www.erh.noaa.gov/mhx/NOAACarolinas/NOAACarolinas.html>

NOAA IN CAROLINAS 2005 PARTNERSHIP PROJECTS

PROJECT TITLE: *GIS Training/Partnership on Future Projects*

COLLABORATING PROGRAMS/ CONTACT:

- NOAA Coastal Services Center (Contact: Cindy Fowler)
- NWS Charleston, SC (Contact: Frank Alsheimer)

BROAD NOAA CATEGORY:

Climate; Water and Weather; Ecosystems; Commerce/Transportation; Outreach and Education

PROJECT SUMMARY:

NOAA Coastal Services Center is providing week long GIS training for the Charleston WFO Science Operations Officer at no cost to the NWS. NWS will likely participate in future GIS related projects with CSC, including those requiring translation of tabular data to a geospatial framework, and map based services for disseminating information.

NOAA IN CAROLINAS 2005 PARTNERSHIP PROJECTS

PROJECT TITLE: *Island-wide Plan to reduce stormwater and aquaculture impacts to estuarine waters*

COLLABORATING PROGRAMS/ CONTACTS:

- Dr. Carolyn Currin, NOAA/NOS Center for Coastal Fisheries and Habitat Research (252)728-8749
carolyn.currin@noaa.gov
- Mike Lopazanski, NC Division of Coastal Management (919) 733-2293, mike.lopazanski@ncmail.net
- Dr. Bill Kirby-Smith, Duke University Marine Lab
- Doug Coker, Education Coordinator, NOAA North Carolina National Estuarine Research Reserve

BROAD NOAA CATEGORY:

Climate; Water and Weather; Ecosystems; Commerce/Transportation; Outreach and Education

PROJECT SUMMARY:

The project will develop a plan to implement innovative technologies to reduce stormwater runoff and aquaculture effluent into estuarine waters, and reduce potential adverse environmental impacts of marine laboratory operations on Pivers Island. The project will also develop a public education program showcasing the technologies and approaches used.

This project directly addresses the NOAA mission to protect, restore and manage the use of coastal and ocean resources through ecosystem-based management. Stormwater runoff is a major source of pollution and decreases water quality in estuaries and the coastal ocean, which in turn can have negative effects on living marine resources and ecosystem production. Continued human development of coastal areas means that the stresses on the coastal ocean from stormwater runoff will increase unless new strategies are developed to reduce its impact. By addressing processes occurring on the land and their impact on stormwater delivery to the ocean, this project supports an ecosystem-based management approach to the problem of maintaining and improving estuarine water quality.

NOAA partners on this project will provide scientific expertise in developing and evaluating innovative approaches to limiting the impacts of stormwater runoff. Duke University Marine Lab will contribute scientific expertise and contribute to education efforts. NC DCM will contribute staff for public outreach and education activities associated with this project. Both NOAA and Duke will contribute facility support for the installation of stormwater and aquaculture effluent mitigation projects.

NOAA IN CAROLINAS 2005 PARTNERSHIP PROJECTS

PROJECT TITLE: *Carolinas Coast: A One-Stop Shop for Marine Observations in the Carolinas*

COLLABORATING PROGRAMS/ CONTACTS:

- University of South Carolina - Dr. Madilyn Fletcher, 803.777.5288, fletcher@biol.sc.edu
- Univ. of North Carolina (Wilmington) - Dr. Lynn Leonard, 910.962.2338, lynnl@uncw.edu
- NOAA NWS, Wilmington WFO – Steven Pfaff, 910-762-8724, steven.pfaff@noaa.gov
- Southeast Coastal Ocean Observing Regional Association – Sandy Bernard, 843.727.6497, sandy.bernard@scseagrant.org
- SC Sea Grant Consortium, Rick DeVoe, 843.727.2078, Rick.DeVoe@scseagrant.org
- NC Sea Grant Consortium, Jack Thigpen, 919.515.3012, jack_thigpen@ncsu.edu

BROAD NOAA CATEGORY:

Climate; X Water and Weather; Ecosystems; Commerce/Transportation; Outreach and Education

PROJECT SUMMARY:

Because up-to-date information on marine conditions is available from a variety of sources, there is a need for clear, coordinated delivery of this information to a general user community of mariners, educators, beach-goers, and other prospective ocean and coastal user groups in the Carolinas. The Carolinas Coastal Ocean Observing and Prediction System - a partnership effort led by the University of South Carolina with NC State and UNCW (www.caro-coops.org) - and the Coastal Ocean Research and Monitoring Program (CORMP) of the University of North Carolina at Wilmington (www.cormp.org), in cooperation with the Southeast Atlantic Coastal Ocean Observing System (SEACOOS; www.seacoos.org) and the Southeast Coastal Ocean Observing Regional Association (SECOORA; www.secoora.org), are now working with the NOAA National Weather Service Forecast Office in Wilmington, NC, to design, develop, and implement a "Carolinas Coast" website (draft: <http://nautilus.baruch.sc.edu/carolinas/carolinascoast.php>). The website will serve as the new template for the Wilmington Office's "Marine" page (www.erh.noaa.gov/er/ilm/marine/). The proposed website will include current/recent weather and ocean conditions, forecasted conditions (including hazard alerts), and oceanographic models. This partnership between NOAA's NWS and the Carolinas coastal and ocean observing community builds on each group's strengths in meeting the needs of the maritime community.

NOAA IN CAROLINAS 2005 PARTNERSHIP PROJECTS

PROJECT TITLE: *The Carolinas Coastal Ocean Observing and Prediction System (Caro-COOPS)*

COLLABORATING PROGRAMS/ CONTACTS:

- University of South Carolina: Dr. Madilyn Fletcher, 803-777-5288, fletcher@sc.edu
- North Carolina State University: Dr. Leonard Pietrafesa, 919-555-7777, len_pietrafesa@ncsu.edu
- University of North Carolina at Wilmington: Dr. Lynn Leonard, 910-538-4945, lynnl@uncw.edu
- South Carolina Department of Natural Resources: Dr. Robert Van Dolah, Marine Resources Research Institute, SC Department of Natural Resources, 843-953-9819, vandolahr@dnr.sc.gov
- NOAA NOS Center for Operational Oceanographic Products and Services (CO-OPS) National Water Level Observation Network (NWLON): Thomas Landon, 301-713-2897 x191, Thomas.Landon@noaa.gov
- National Data Buoy Center (NDBC): David Gilhousen, 228-688-2840, dave.gilhousen@noaa.gov
- National Estuarine Research Reserve System: Laurie McGilvray, 301-713-3155 x158, Laurie.McGilvray@noaa.gov
- NWS Wilmington Weather Forecast Office: Steven Pfaff, 910-762-8724, steven.pfaff@noaa.gov
- NWS Raleigh Weather Forecast Office: Kermit Keeter, 919-515-8209, Kermit.Keeter@noaa.gov
- NOAA Coastal Services Center: Dr. Geno Olmi, 843-740-1230, Geno.Olmi@noaa.gov

BROAD NOAA CATEGORY:

Climate; X_Water and Weather; X_Ecosystems; Commerce/Transportation; Outreach and Education

PROJECT SUMMARY:

The coastal ocean of the Carolinas is one of the most ecologically diverse and economically important systems in the Nation. The Carolinas Coastal Ocean Observing and Prediction System (Caro-COOPS) is monitoring and modeling estuarine and coastal ocean conditions in the Carolinas to establish a capability to provide real-time predictions and ultimately forecasts for decision-makers that deal with (1) response to major storms; (2) water quality and transport of pollutants; (3) sediment transport and shoreline stability; and (4) the state of the fisheries.

A fully operational Caro-COOPS will reduce the costs and risks to people, the economy, and natural resources from natural and human-induced hazards and increase coastal communities' ability to adapt to changing conditions, resulting in a balance of environmental and economic benefits. Caro-COOPS is directly relevant to NOAA's mission and its strategic goals, which address environmental assessment and prediction and environmental stewardship (<http://www.spo.noaa.gov/>).

Caro-COOPS is a partnership among the University of South Carolina's Belle W. Baruch Institute, North Carolina State University, and the University of North Carolina at Wilmington. The program is designed to integrate real-time monitoring of hydrologic and meteorological conditions with state-of-the-art computer models to characterize and predict complex coupled air-land-sea processes. At the heart of Caro-COOPS are a real-time instrumentation network, a sophisticated data acquisition and management system, and a set of advanced numerical models.

In July-August 2003, the first components of the observational network were deployed, and real-time data on ocean, coastal, and/or meteorological conditions can be observed at www.carocoops.org. To facilitate open access and fast distribution of Caro-COOPS data, an integrated data management and analysis system was developed to provide customized search, retrieval, analysis, and visualization of data through an intuitive web interface. The Caro-COOPS modeling system consists of a connected, fully three-dimensional, time dependent, continental margin and estuary coupled hydrodynamic model. The backbone model, developed at NCSU, is an adaptable grid Coastal and Estuarine Modeling and Environmental Prediction System (CEMEPS), which is initially being used for the development of real-time analyses of storm surge and flooding before and during landfall of coastal storms. We are now working directly with the SC Emergency Management Division to construct model output products that can be used in their decision-making process during extreme storm events.

We have established a working relationship with the NOAA National Ocean Service (NOS) Water Level Observation Network and established three additional NWLON stations. Our water level data are streamed directly into their system and are part of the federal backbone of water level measurements. Caro-COOPS oceanographic data are also being transmitted to the NOAA National Data Buoy Center, which has included them in their data distribution capabilities. More recently, Caro-COOPS personnel were identified to assist the National Estuarine Research Reserve System in metadata management for the System Wide Monitoring Program. Furthermore, Caro-COOPS and UNC-W's Coastal Ocean Research and Monitoring Program have been working with the Wilmington Weather Forecast Office on a collaborative web interface project called Carolinas Coast, and Caro-COOPS personnel work with the Raleigh Weather Forecast Office to provide storm information.

NOAA IN CAROLINAS 2005 PARTNERSHIP PROJECTS

PROJECT TITLE: *Assessing the health of populations of dolphins and sea turtles along the coast of the Carolinas*

COLLABORATING PROGRAMS/ CONTACTS:

- NMFS Southeast Fisheries Science Center at the NOAA Beaufort (NC) Lab; Contact – Dr. Aleta A Hohn, NMFS, 252-728-8797, aleta.hohn@noaa.gov
- NOS, Cooperative Center for Marine Animal Health (CCMAH), Charleston, SC; Contact – Dr. Lori Schwacke, NOS, 843-762-8541, lori.schwacke@noaa.gov
- NOS, Center for Coastal Environmental Health and Biomolecular Research, Charleston, SC; Contact – Wayne McFee, NOS, 843-762-8592, wayne.mcfree@noaa.gov;
- NIST, Hollings Marine Lab, Charleston, SC; Dr. John Kucklick, 843-762-8866, John.Kucklick@noaa.gov
- NCSU College of Veterinary Medicine at Center for Marine Science and Technology, Morehead City, NC; Dr. Craig Harms, 252-222-6339, craig_harms@ncsu.edu
- NC Maritime Museum, NC Dept. of Cultural Resources, Beaufort, NC; Keith Rittmaster, 252-504-2452, krittmaster@ec.rr.com
- NC Dept of the Environment and Natural Resources, Beaufort, NC; Dr. Matthew Godfrey, 252-728-1528, godfrey@coastalnet.com
- SC Dept of Natural Resources, Beaufort, SC; Dr. Al Segars, 843-252-4244, SegarsA@dnr.sc.gov
- Department of Biochemistry and Molecular Biology Laboratory, Medical University of SC, Hollings Marine Lab, Charleston, SC; Dr. Gregory Warr, 843-762-8869, warrgw@musc.edu

BROAD NOAA CATEGORY:

Climate; Water and Weather; Ecosystems; Commerce/Transportation; Outreach and Education

PROJECT SUMMARY:

As NOAA refocuses its objectives toward ecosystem management, the health of protected species has become an increasing priority. Within the PPBES Capability “Protected Species Research –Structure and Function” is a mandate to incorporate sublethal natural and human impacts into Tier III Assessments. Furthermore, through the MMPA, NMFS has been mandated to coordinate the collection of health data on marine mammal populations, to correlate health trends with biological, physical and chemical environmental variables, and to conduct effective investigations into the cause of mortality events. These mandates require research on etiology and prevalence of disease, as well as exposures to biotoxins, pollutants, and pathogens that address the health of protected species and the quality of their habitats. We are conducting research to elucidate the health of populations of dolphins and sea turtles along the coast of the Carolinas. Goals of this research are to (a) collect data to help with development of models that incorporate sublethal effects into populations assessments, (2) use large marine vertebrates as sentinels of ecosystem health, and (3) define health parameters in free-ranging populations for use in classifying condition and disease states. Data are collected from temporarily caught dolphins and turtles, from live or dead stranded animals, or from remote dart biopsies that collect blubber and skin samples. An essential component of these studies is to define stock structure, animal movements, and habitat use. To this end we rely on VHF radio and satellite-linked telemetry.

This research is an obligate partnership. NMFS coordinates much of the overall research program, conducts most of the field work in NC and other sites, provides stranding response in NC, and is involved in various laboratory components and data analysis. NOS in SC provides stranding response and conducts life-history research related to protected species along the SC coast. Research veterinary expertise is provided by the Environmental Medicine Consortium at NCSU and SC DNR. In addition, various laboratory tests, such as for antibiotic resistance, are conducted at the NC College of Veterinary Medicine. Contaminant analyses are conducted by NIST; biotoxin analyses at NOS in Charleston. The Medical University of SC collaborates with us to investigate new functional genomic methods for evaluating the health status of dolphins. Health and risk assessment models are being developed by the CCMAH in Charleston. Both the NC DENR and SC DNR are partners in the turtle health assessments and mammal strandings. The NC Maritime Museum is an important partner in the marine mammal stranding network. In addition to the collaborating programs listed above, we use the ARGOS system on NOAA satellites managed by NESDIS and NOAA’s CoastWatch sea-surface temperature data. And, of course, we depend on the NWS to inform us about safe weather conditions for our field work.

NOAA IN CAROLINAS 2005 PARTNERSHIP PROJECTS

PROJECT TITLE: *CI-FLOW – Coastal Inland Flood Observation and Warning Project*

COLLABORATING PROGRAMS/ CONTACTS:

- Kevin Kelleher, NOAA National Severe Storms Laboratory, kevin.kelleher@noaa.gov, 405.366.0423
- George Smith, NOAA NWS Office of Hydrologic Development OHD, 301-713-0640 x 117, George.Smith@noaa.gov
- Robert Bacon, SC Sea Grant, robert.bacon@scseagrant.org, 843.727.2075
- Len Pietrafesa, North Carolina State University, ljpietra@unity.ncsu.edu
- Jack Thigpen, NC Sea Grant, jack_thigpen@ncsu.edu, 919.515.3012

BROAD NOAA CATEGORY:

Climate; Water and Weather; Ecosystems; Commerce/Transportation; Outreach and Education

PROJECT SUMMARY:

The National Severe Storms Laboratory (NSSL), National Sea Grant (NSG) College Program, University of Oklahoma (OU), North Carolina State University (NCSU), National Weather Service's Office of Hydrologic Development (OHD), and the North and South Carolina Sea Grant programs participate in a joint project centered in North Carolina areas affected by Hurricane Floyd. The primary demonstration area is the Tar-Pamlico River basin. This project, called CI-FLOW (Coastal, Inland Flooding Observation and Warning), was originally conceived in February 2000 at a meeting arranged by the OAR Director between NSSL and Sea Grant designed to leverage NSSL's capability with Sea Grant Extension's outreach capability. The goal of Project CI-FLOW is to establish a research and demonstration program for the evaluation and testing of new remote sensing technologies and multi-sensor techniques to identify inland and coastal floods and flash floods higher spatial and temporal resolution than is currently available.

Previously funded activities of Project CI-FLOW have been 1) implementation in the Tar River Basin of QPE-SUMS (Quantitative Precipitation Estimation and Segregation Using Multiple Sensors; Gourley et al. 2001), a cutting edge multi-sensor precipitation estimation technique, 2) implementation of a physics-based distributed hydrologic model Vflo (Vieux 2001), and coupling with QPE-SUMS, and 3) coupling of the NCSU Estuary-Lower River Flood model (Xie and Pietrafesa 1999) with output from both QPE-SUMS and the HL-RMS.

In 2004, Vflo was replaced by the OHD's Hydrology Laboratory Research Modeling System (HL-RMS), a distributed model, along with their FLDWAV channel model (Koren et al., 2004). HL-RMS performed very well in the NWS-sponsored Distributed Model Intercomparison Project (DMIP) (Smith et al., 2004; Reed et al., 2004). DMIP garnered participation from 12 leading distributed modeling researchers in Canada, Denmark, New Zealand, China, and the US. DMIP was the first extensive comparison of distributed hydrologic models amongst themselves and to traditional lumped models.

At the present, the NCSU CI-FLOW team is working with OHD and NSSL to demonstrate the utility of using NSSL's real-time precipitation products now called Q2 (an upgrade to QPE-SUMS) and OHD's hydrologic model in watershed-estuarine, storm surge, and water quality modeling. Details on CI-FLOW can be found at <http://www.nssl.noaa.gov/wrd/wish/iflow/>.

NOAA IN CAROLINAS 2005 PARTNERSHIP PROJECTS

PROJECT TITLE: *NOAA Traveling Exhibit: 2005 NC Seafood Festival*

COLLABORATING PROGRAMS/ CONTACTS:

- Tom Kriehn, NOAA Weather Service-Newport, tom.kriehn@noaa.gov

BROAD NOAA CATEGORY:

Climate; Water and Weather; Ecosystems; Commerce/Transportation; Outreach and Education

PROJECT SUMMARY:

Staff members from various National Oceanic and Atmospheric Administration (NOAA) office throughout North and South Carolina manned a “NOAA in the Carolinas” booth at the 2005 North Carolina Seafood Festival. The booth was set up in the “Coastal Yesterday and Today Education Tent in the parking lot at the south end of 9th Street in along the Morehead City waterfront. The theme for the education tent was “Life at the Edge of the Sea.” The NOAA booth featured interactive children’s learning activities, teacher resources and various NOAA partner program descriptions. Offices represented included NOAA’s Undersea Research Center at the University of North Carolina at Wilmington, North Carolina Sea Grant, NOAA’s National Ocean Service, NOAA’s Marine Fisheries Service, and NOAA’s National Weather Service. The booth was manned from 10 am until 6 pm on Saturday October 1st and from 10 am until 5 pm on Sunday October 2nd.

NOAA IN CAROLINAS 2005 PARTNERSHIP PROJECTS

PROJECT TITLE: *NOAA @ Nauticus*

COLLABORATING PROGRAMS/ CONTACTS:

- Primary Contact—Andrew Larkin, NOAA@Nauticus Project Coordinator, (757) 627-3823, andrew.w.larkin@noaa.gov
- Rich Conti, Executive Director, Nauticus-The National Maritime Center, (757) 664-1000, rich.conti@norfolk.gov
- Michelle Fox, Outreach Coordinator, NOAA Chesapeake Bay Office, (757) 267-3823, michelle.fox@noaa.gov
- John Broadwater, Office of Nat'l Marine Sanctuaries, (757) 599-3122, john.broadwater@noaa.gov
- Jim Dixon, NOAA Office of Coast Survey, (757) 627-7072, jim.dixon@noaa.gov
- Ron Gird, Nat'l Weather Service Outreach Manager, (301) 713-0090

BROAD NOAA CATEGORY:

Climate; Water and Weather; Ecosystems; Commerce/Transportation; Outreach and Education

PROJECT SUMMARY:

NOAA @ Nauticus is an exciting partnership between the National Oceanic and Atmospheric Administration (NOAA) and Nauticus, The National Maritime Center to promote scientific and environmental literacy and to inform the public about NOAA's programs and activities. Nauticus is a maritime-themed science and education center that attracts over 350,000 visitors a year with special programs and exhibits focused on exploring the power of the sea. NOAA staff from the Office of Coast Survey, the Chesapeake Bay Office and the National Marine Sanctuary Program all work on site at Nauticus. NOAA and Nauticus staff work together on a wide variety of education and outreach projects including exhibits, lecture series, teacher training and the creation of a NOAA Science Camp for summer 2006. Nauticus is becoming a major education and outreach center for the NOAA.

Recent highlights include:

In June of 2005, NOAA opened a new Education Resource Center at Nauticus where educators and interested members of the public can obtain information and educational materials (including curricula) on weather, marine biology, oceanography, the Chesapeake Bay, and atmospheric sciences and related topics.

In June 2005, NOAA's Science on a Sphere, was unveiled at Nauticus as a permanent exhibit. Science On a Sphere (SOS) is an innovative system that uses high-speed computers, projectors and advanced imaging techniques to create the illusion of a 6', rotating Earth suspended in mid-air. NOAA staff work to train Nauticus staff on how to use the Sphere in educational programs for school children and the general public.

In summer 2005, the NOAA @ Nauticus team completed work on a master plan for a suite of new NOAA exhibits entitled "Signals from the Shore, Sea and Sky" that will be located on the museum's third floor. The first phase of these exhibits will focus on NOAA's Chesapeake Bay and Maritime Heritage activities. Installation of these first exhibits will begin in January 2006.

NOAA and Nauticus staff are currently working together on the design of a new exhibit "Treasures of NOAA's Ark" that will debut in the center's changing gallery in March 2006. The exhibit will feature many interesting historical artifacts from NOAA's two hundred year history.

NOAA IN CAROLINAS 2005 PARTNERSHIP PROJECTS

PROJECT TITLE: *Implementing the National Height Modernization System in NC*

COLLABORATING PROGRAMS/ CONTACTS:

- National Geodetic Survey, Gilbert Mitchell, 301 713 3228 x 114, gilbert.Mitchell@noaa.gov
- North Carolina Floodplain Mapping Program, Department of Crime Control and Public Safety/ Division of Emergency Management, John Dorman, 919 715 5711, John.dorman@ncmail.net
- Federal Emergency Management Agency, Laura Algeo, laura.algeo@dhs.gov
- North Carolina Department of Transportation, Survey and Location Division, Charlie Brown, 919 250 4107, charliebrown@dot.state.nc.us

BROAD NOAA CATEGORY:

Climate; Water and Weather; Ecosystems; Commerce/Transportation; Outreach and Education

PROJECT SUMMARY:

Throughout the United States, government entities and businesses have annually spent hundreds of millions of dollars to correct engineering problems caused by subsidence, earthquakes, floods, and other land surface changing phenomena. In North Carolina, the problem has been with hurricanes. The state has been the target of numerous hurricanes that have caused devastating floods not only in the expected tidewater counties, but also unanticipated floods throughout the coastal plain counties. Consequently, the State government recognized the need for updated Flood Insurance Rate Maps (FIRMs) and signed an agreement with Federal Emergency Management Agency to begin the first Cooperating Technical State (CTS). As a FEMA CTS, North Carolina created the North Carolina Floodplain Mapping Program (NCFMP) to update these maps for the entire state. In order to efficiently produce accurate, up-to-date Digital FIRMs, the NCFMP collects elevation data using Light Detection And Ranging (LIDAR) technology, and works with the National Geodetic Survey (NGS) to implement the National Height Modernization System (NHMS) in North Carolina. North Carolina needs the NHMS to be implemented throughout the state to meet NCFMP needs, and many other regional users, for example:

- Support Professional Surveyors and Engineers in NC
- Airport zero visibility landing systems
- Coastal and harbor navigation systems
- Precision agriculture
- Road construction

The ability to utilize accurate real-time heights will save money and lives. Positioning applications need real-time accuracy that cannot be met by classical line-of-sight techniques of measuring heights from precisely located, monumented vertical control points (i.e. benchmarks). Implementing the NHMS in North Carolina will also support the following applications:

- **Floodplain mapping and Geographic Information Systems (GIS) applications**
 - Efficient completion and maintenance of the NC DFIRMs
 - Decreased survey costs associated with floodplain mapping and other mapping/GIS activities
 - More accurate modeling of storm surge and pollution plume trajectories
 - Improved disaster preparedness
 - More accurate digital elevation models (DEMs), better floodplain analysis, and determination of floodplain needs
 - More accurate determination of coastal erosion rates and floodplain boundaries
 - Support the development of the NC Flood Warning system
 - Improved natural resource management decision making through the use of reliable GIS
- **Support the activities of Professional Land Surveyors in NC**
 - Provide vertical control to support activities related to the NCFMP
- **Airport zero visibility landing systems**
 - Improved aircraft navigational aids, obstruction surveys, and other support activities that can enable safer approach and landing procedures
- **Coastal and harbor navigation systems**
 - Improved coastal and harbor navigation systems that can enable safer and more cost-effective shipment of goods
 - Accurate heights to minimize dredging and reduce time that ships wait to unload cargo at North Carolina ports
- **Precision agriculture**
 - Enhanced agricultural practices that can reduce fertilizer use and subsequent pollution run-off
- **Road construction**
 - Increased field survey time savings.

NOAA IN CAROLINAS 2005 PARTNERSHIP PROJECTS

PROJECT TITLE: *Coastal Ocean Research and Monitoring Program (CORMP)*

COLLABORATING PROGRAMS/ CONTACTS:

- University of North Carolina—Wilmington, Dr. Marvin Moss, mmoss@uncw.edu, 910-962-2465; Dr. Lynn Leonard, leaonardl@uncw.edu, 910-962-2338
- US Marine Corps Camp Lejeune: Dan Egge, 910-451-7567, Daniel.Egge@usmc.gov
- NWS Wilmington Weather Forecast Center: Michael Caropolo, Steve Pfaff, 910-762-8724
Michael.caropolo@noaa.gov
- NWS Newport NC Weather Forecast Office: Thomas Kriehn, Thomas.Kriehn@noaa.gov
- NOAA National Data Buoy Center: Don Conlee, David Gilhousen, 228-688-2840, dave.gilhousen@noaa.gov
- National Underwater Research Program@ UNCW: Andy Shepard, 910-962-2446, sheparda@uncw.edu
- US Army Corps of Engineers: John McCormick, 910-251-4766, John.W.McCormick@saw02.lusace.army.mil
- NOAA NC Sea Grant: Ron Hodson, Spencer Rogers, Jr. 910-962-2461, rogerssp@uncw.edu
- NOAA Coastal Services Center: Geno Olmi, 843-740-1230, Geno.Olmi@noaa.gov
- Cape Fear River Estuary Program: (New Hanover County, City of Wilmington, UNCW) Michael Mallin, 910-962-2358, mallinm@uncw.edu
- National Estuarine Research Reserve System: Anthony Snider, 910-350-2022, snidera@uncw.edu
- NC Department of Marine Fisheries: Jess Hawkins, 252-726-7021
- NOAA/NMFS/Rutgers Cooperative Marine Education and Research Bluefish Program: Thomas Lankford, 910-962-2381, lankfordt@uncw.edu
- NOAA Center for Coastal Monitoring and Assessment: Tim Wynne, Varis Ransi, Rick Stumpf
- NOAA/Coastal Services Center - Coastal Climatology Products for Recreation and Tourism End Users in SE NC; Pace Wilber (NOAA CSC) or Douglas Gamble, 910-962-3778, gambled@uncw.edu, pace.wilber@noaa.gov
- NC State Ports Authority: Steve Jackson, 910-763-1621
- University of South Carolina: Madilyn Fletcher, 803-777-5288, fletcher@sc.edu
- North Carolina State University: Leonard Pietrafesa, 919-555-7777, len_pietrafesa@ncsu.edu
WeatherFlow, Jay Titlow (info requested is private), see CORMP buoys at sailflow.com

BROAD NOAA CATEGORY:

Climate; Water and Weather; Ecosystems; Commerce/Transportation; Outreach and Education

PROJECT SUMMARY:

The economically important and ecologically diverse Carolinas coastal ocean is one of the most dynamic and complex interactions of the ocean, atmosphere and land anywhere in the nation. This region is vulnerable and its resources--including finfish, shellfish, recreational infrastructure, commercial ports—face serious risk from natural and human induced impacts. There is compelling need to understand and predict coastal maritime conditions in the region, which is made possible only through establishment of observational networks providing reliable and real-time data on ocean and weather conditions. The Coastal Ocean Research and Monitoring Program (CORMP, www.cormp.org) is playing a leading role not only in achieving these ends but, concomitantly, in bringing together important user-based groups and formal partnerships in the region who have need for the data and information derived from the data that is being carefully collected, analyzed, used and archived.

CORMP consists of four focus areas: a series of diverse Ocean Observations; Data Management; Ecosystem Research and Modeling related to fisheries; and Outreach and Education. These areas operate synergistically to: 1) provide a regional hub in a developing national observing system (IOOS); 2) collect and disseminate physical and ecological data; and 3) engage regional partners, stakeholders and end-users in the development and implementation of a sustainable coastal-ocean observing program. CORMP capitalizes on a combination of instrumented moorings, remote sensing and ecosystem models, and traditional ship-based observations to establish baseline conditions, identify responses to stochastic events, predict and verify long-term trends, and identify linkages among coastal ocean ecosystem components.

CORMP has established a series of coastal ocean moorings, four now reporting in real-time and two additional being readied for real-time deployment. In addition, scheduled periodic transects for horizontal measurements between fixed vertical moorings, now further complemented by autonomous WEB glider cruises, all derive data for the extensive CORMP fisheries/coastal ecological program. All data is rapidly becoming available on line, and models are being constructed at NCSU to produce products useful in ecological studies related to fisheries and sediment transport as well as application to models of extreme storm events which so frequently occur along Carolinas coasts. CORMP data is compatible with and shared with USC and NCSU in the extensive Caro-COOPS modeling efforts.

An outstanding element of CORMP is its partnerships and its educational and outreach efforts. Strong partnerships have been established with the U.S. Marine Corps at Camp Lejeune, where CORMP and Camp Lejeune have jointly funded a mooring built by NDBC and located five miles off the New River Inlet in the midst of the Marine coastal training area. NDBC QA/QC assured data is available to both parties in real time, including waves. The Wilmington Office of the National Weather Service and the U.S. Army Corps of Engineers are strong allies with CORMP. CORMP real-time mooring data is used by the NWS Office in its marine forecasts, and the Corps is working with CORMP's coastal ocean and pier based wave data in its beach renourishment program for SE NC. Other CORMP data is being used by the NC Division of Marine Fisheries as, for example, in the opening and closing of the shrimp season for SE NC. The CORMP educational emphasis is on middle and high school teachers, bringing them into the program on actual cruises, and into laboratories during data analysis for data take-back into classrooms. Twenty such educators participated in the CORMP program this past summer (2005).

NOAA IN CAROLINAS 2005 PARTNERSHIP PROJECTS

PROJECT TITLE: *Coastal Hazards and Climatologies: Integration Potential in the Carolinas*

COLLABORATING PROGRAMS/ CONTACTS:

- USGS, Water Resources Division, Raleigh, Jared Bales, jdbales@usgs.gov, 919-571-4080
- FEMA Region IV, Laura Algeo, laura.algeo@dhs.gov, 770-220-5515
- NOAA/NWS:
 - Southeast River Forecast Center, John Feldt (HIC), john.feldt@noaa.gov, 770-486-0028
 - Hydrologic Services Division (NWS HQ), Glenn Austin and Tom Graziano, glenn.austin@noaa.gov, 301-713-0006 x150
 - Office of Hydrologic Development (NWS HQ), George Smith, george.smith@noaa.gov, 301-713-0640 x117
 - Raleigh Weather Forecast Office, Jeff Orrock (WCM), jeff.orrock@noaa.gov, 919-515-8205 x223
 - Greenville Weather Forecast Office, Tom Kriehn (MIC), thomas.kriehn@noaa.gov, 252-223-5122
- NOAA/NESDIS/NCDC, Pete Steurer, Tom Karl, Sharon LeDuc, David Levinson
- NOAA Coastal Services Center, Main POC: Stephanie Fauver, 843-740-1287, stephanie.fauver@noaa.gov; also pace.wilber@noaa.gov, kirk.waters@noaa.gov, jeff.payne@noaa.gov
- North Carolina Floodplain Management Program, David Herlong, dherlong@ncem.org, 919-715-5711 x 107
- North Carolina Center for Geographic Information and Analysis, Tim Johnson, tim@cgia.state.nc.us, 919-715-0725
- University of North Carolina, Wilmington, Dr. Lynn Leonard, Principal Investigator, CORMP, 601 S. College Station Road, Wilmington, NC 28403 ph: 910-962-2338 lynnl@uncw.edu; Doug Gamble, Director Laboratory for Applied Climatology Research dougg@uncw.edu
- University of South Carolina, Madilyn Fletcher, Caro-COOPS, Baruch Institute, University of South Carolina, Columbia, SC 29208 ph: 803-777-5288 fletcher@biol.sc.edu; Braxton Davis, Outreach Coordinator
- University of Georgia, David Stooksbury, Georgia State Climatologist
- Florida State University, James O'Brien, Florida State Climatologist
- North Carolina State University, Len Pietrafesa, Al Riordan, Lian Xie

BROAD NOAA CATEGORY:

Climate; Water and Weather; Ecosystems; Commerce/Transportation; Outreach and Education

PROJECT SUMMARY:

NOAA's North Carolina flood warning enhancement project was an example of leveraging across NOAA resources and a host of federal and state partners to meet the needs of the State of North Carolina after the flooding disaster caused by Hurricane Floyd in 1999. The partnership between NWS and NOS brought about enhanced graphical **flood forecast information**, built on the USGS National Stream Gauging program backbone and the data and models available from the FEMA Map Modernization Program, part of the National Flood Insurance Program. The existing **observation network and its data** were used as input into enhanced modeling and mapping methods and ultimately provided enhanced flood forecasts to customers. The State of North Carolina also developed enhanced on-line mapping capability to deliver this system to emergency managers and the public. Additional work in the future may include **climatological analysis** to determine future flood risk based on ensemble streamflow prediction.

The NOAA Cooperative Program for Climate & Weather Impacts on Society and the Environment (CWISE), a collaboration between NOAA's National Climatic Data Center, NOAA's Coastal Services Center, NC State University and its partners, will produce in 2006 a new statistically-driven mechanism for **forecasting hurricane climatologies** in the southeast. The method uses five easily obtainable ocean/atmosphere indices to predict the relative frequency of landfall hurricanes in the southeastern U.S. The forecast period can be a month to a whole hurricane season. Upcoming CWISE discussion will focus on making this new climatological index operational. CWISE will also develop a system for forecasting the spatial extent and strength of the seabreeze system. The research for developing this forecast focuses on the areas between Wilmington, NC, and Savannah, GA. Results will be relevant to utility industries, human health agencies, and homeland security planners.

The CWISE program in 2005, with funding from NOAA Coastal Services Center and other assistance from NOAA National Climatic Data Center, has partnered with CORMP to develop a Web site focused on the climate and weather needs of the recreation and tourism industry of coastal North Carolina; and with State Climatologists from Georgia and Florida and Georgia Sea Grant to develop a Web site focused on the climate and weather needs of recreational fishermen from North Carolina to Alabama. Both of these pilot studies also were called for during a user needs workshop held in 2003, a partnership between the Coastal Services Center, NCDC, and the SC Department of Natural Resource's Southeastern Regional Climate Center.

NOAA IN CAROLINAS 2005 PARTNERSHIP PROJECTS

PROJECT TITLE: *Climate & Weather Impacts on Society & the Environment (CWISE) and Interactively coupled NOAA Programs in the Carolinas*

COLLABORATING PROGRAMS/ CONTACTS:

- North Carolina State University, Dr. Len Pietrafesa, (919) 515-7777, leonard_pietrafesa@ncsu.edu
- NOAA/NESDIS/NCDC/Dr. Tom Karl (Director)
- NOAA/NOS/CSC/Ms. Margaret Davidson (Director)
- NOAA/OAR/NSGCP/Dr. Ron Baird_(National Director)
- NOAA/NWS/NSSL/Dr. Kevin Kelleher_(Assoc. Director)
- NOAA/NMFS/Dr. Bill Hogarth (Assistant Administrator)

BROAD NOAA CATEGORY:

_X_Climate; _X_Water and Weather; _X_Ecosystems; _Commerce/Transportation; _X_Outreach and Education

PROJECT SUMMARY:

The Climate & Weather Impacts on Society & the Environment (CWISE) addresses phenomena ranging from the frequency of occurrence and paths of Tropical Cyclones and Extra-Tropical Cyclones to precipitation variability and mapping to wind and wave field temporal and spatial variability to Sea Surface Temperature mapping and space and time history to sea level rise variability to the impacts, past, present and future of these and other events and phenomena on the communities and ecological systems of the Carolinas specifically in the context of national trends and on the global temperature trend. All of these issues are of direct relevance to NOAA's four goal areas and three are highlighted. NCDC and CSC have determined the thrust areas of interest and faculty, staff and students are working with their federal center partners to produce new information, products and services. Examples of the progress and status on all of the above are presented. Also, couplings to other NOAA programs, such as Caro-COOPS, CI-FLOW, CORMP and A-FISH are presented.

NOAA IN CAROLINAS 2005 PARTNERSHIP PROJECTS

PROJECT TITLE: *Bycatch Reduction of Marine Mammals in Mid-Atlantic Fisheries*

COLLABORATING PROGRAMS/ CONTACTS:

- Dr. Steve Rebach, Associate Director, North Carolina Sea Grant, Box 8605, 101-E 1911 Building, Raleigh, NC 27695-8605, Phone: 919-515-9104, Fax: 919-515-7095, e-mail: srebach@ncsu.edu
- Stacey Carlson, NOAA Fisheries, Southeast Regional Office, 263 13th Avenue South, St. Petersburg, FL 33701, (727) 551-5780 Stacey Carlson, NOAA Fisheries, Southeast Regional Office, 263 13th Avenue South, St. Petersburg, FL 33701, (727) 551-5780

BROAD NOAA CATEGORY:

Climate; Water and Weather; Ecosystems; Commerce/Transportation; Outreach and Education

PROJECT SUMMARY:

This program will provide competitive funding for innovative and practical proposals that seek to reduce incidental takes (bycatch) of the Western North Atlantic coastal bottlenose dolphin under the BDTRP process and the short- and long-finned pilot whale under the PLTRP process. Bycatch of bottlenose dolphins occurs in coastal gillnet fisheries targeting various species in the mid-Atlantic region, primarily in North Carolina and Virginia. Bycatch of short- and long-finned pilot whales occurs in the pelagic longline fishery targeting swordfish, tuna, and shark in the mid-Atlantic region, primarily in offshore waters from North Carolina to New Jersey. NMFS is specifically interested in receiving gear research proposals for the coastal gillnet and pelagic longline fisheries, but is also interested in receiving gear research proposals involving other fisheries in which bycatch of these species occurs along the mid-Atlantic and southeast Atlantic coast. This competition will be open to investigators primarily in the mid-Atlantic region, but we will also accept well-crafted proposals from other east coast investigators capable of performing their research in areas where such bycatch exists.

This gear research program will fund projects with a strong likelihood of reducing potential bycatch of coastal bottlenose dolphins and short- and long-finned pilot whales. Projects must comply with applicable regulations under the Magnuson-Stevens Fishery Conservation Management Act and the Marine Mammal Protection Act.

NOAA IN CAROLINAS 2005 PARTNERSHIP PROJECTS

PROJECT TITLE: *Bottlenose Dolphin Take-Reduction Gear Research Program*

COLLABORATING PROGRAMS/ CONTACTS:

- Dr. Steve Rebach, Associate Director, North Carolina Sea Grant, Box 8605, 101-E 1911 Building, Raleigh, NC 27695-8605, Phone: 919-515-9104, Fax: 919-515-7095, e-mail: srebach@ncsu.edu
- Stacey Carlson, NOAA Fisheries, Southeast Regional Office, 263 13th Avenue South, St. Petersburg, FL 33701, (727) 551-5780

BROAD NOAA CATEGORY:

Climate; Water and Weather; Ecosystems; Commerce/Transportation; Outreach and Education

PROJECT SUMMARY:

Gillnet operations along the Atlantic coast, specifically North Carolina, are known to experience dolphin bycatch in their gear. North Carolina Sea Grant has partnered with the National Marine Fisheries Service to offer a competitive funding opportunity that supports collaborative research among the commercial fishing industry, scientists and other interested parties. to provide conservation recommendations to reduce bycatch. Recommendations included various gear research projects that can be compiled into a Bottlenose Dolphin Take Reduction Plan.

Gear research in gillnet fisheries will have priority. However, the committee also will consider gear research proposals in other fisheries experiencing bottlenose dolphin bycatch along the mid-Atlantic and southeast Atlantic coast. Projects must be consistent with applicable regulations of the Magnuson-Stevenson Act and the Marine Mammal Protection Act. Proposals also must target gear research or animal behavior related to interactions with commercial fisheries. Individual awards can be up to \$50,000.

NOAA IN CAROLINAS 2005 PARTNERSHIP PROJECTS

PROJECT TITLE: *Educating Anglers about Catch-and-Release in Highly Migratory Species Fisheries*

COLLABORATING PROGRAMS/CONTACTS:

- North Carolina Sea Grant: Jack Thigpen, jack_thigpen@ncsu.edu, 919-515-3012; Sara Mirabilio, saram@csi.northcarolina.edu, 252-475-3663; Scott Baker, bakers@uncw.edu, 910-962-2491; Brian Efland, brian_efland@ncsu.edu, 252-222-6314; Ann Green, agcarver@unity.ncsu.edu, 919-515-9070; Ronald Hodson, ronald_hodson@ncsu.edu, 919-515-2455.
- N.C. Division of Marine Fisheries: Mike Marshall, NC Division of Marine Fisheries, Morehead City, NC; Louis Daniel, NC Division of Marine Fisheries, Morehead City, NC.
- National Marine Fisheries Service: Bill Price (now retired); Jack Dunnigan; Chris Rogers, NMFS, HMS Division, Green Belt, MD; Russell Dunn, St. Petersburg, FL; John Merriner, NMFS, NOAA Lab, Beaufort, NC.
- N.C. Charterboat Captains and Private Anglers: Frank Gromadzki, fisherman, Smyrna, NC; Dennis Heine, boat captain, Smyrna, NC; Donnie Lee, Boat Captain, Atlantic Beach, NC; Crystal Watters, Blue Rock Marlin Tournament, Morehead City, NC; Heather Maxwell, Pirate's Cove Marina, Manteo, NC; Donald Gergely, Swansboro, NC.
- South Carolina Sea Grant: Amber Van Harten, Fisheries Specialist, Beaufort, SC.
- Virginia Sea Grant: Jon Lucy, Virginia Institute of Marine Science, Gloucester Point, VA.
- Coastal Conservation Association: Harris Huddle, New Bern, NC.
- North Carolina State University: Steve Smutko, Raleigh, NC.

BROAD NOAA CATEGORY:

Climate; Water and Weather; Ecosystems; Commerce/Transportation; Outreach and Education

PROJECT SUMMARY:

For several years, North Carolina Sea Grant, NOAA's National Marine Fisheries Service and the N.C. Division of Marine Fisheries have been working with the recreational fishing community – and in particular the charter boat industry, to increase the education level regarding highly migratory species – such as billfish and tunas – and to increase the use of appropriate gear for sportfishing that focuses on catch and release.

North Carolina Sea Grant collaborated with the Highly Migratory Species (HMS) Management Division of the NOAA Fisheries on a pilot project to better understand recreational anglers information needs regarding highly migratory species in Atlantic and Gulf of Mexico waters.

A professionally facilitated workshop was conducted on February 18 and 19, 2004 in New Bern, North Carolina and brought together a purposively selected group of opinion leaders from the following communities: offshore charter boat captains, private offshore recreational anglers, offshore fishing tournament organizers, Sea Grant fisheries extension specialists, NMFS fisheries managers and fisheries management staff from the North Carolina Division of Marine Fisheries. They were led through a facilitated process to determine the best ways for NMFS to reach recreational anglers with information on highly migratory species and identify the communications issues related to new regulations affecting these species. This group discussed challenges and developed solutions for improving communications between NMFS HMS Division and recreational anglers.

The primary focus of the panel members was on finding ways to improve the collection and dissemination of information on recreational fisheries management for blue fin tuna and billfish. Quotas, permitting, gear requirements, and data collection and reporting were discussed at length. The panel completed its task by developing a set of eleven recommendations for improving NMFS communications, and two recommendations related to improvements in management and enforcement.

Activities so far include:

- The facilitated workshop.
- A feature story in *Coastwatch* magazine, for which 10,000 copies of the article were reprinted and distributed at tournaments and expos.
- A 23-page report that describe the process and outcomes.
- A PowerPoint presentation that describes the process and outcomes.
- A poster presentation at the 2005 American Fisheries Society annual meetings.
- Joint booths at major fishing shows and tournaments, such as XXX.
- A DVD being developed to demonstrate proper gear selection and rigging.
- A poster outlining the partnership presented at the 2005 American Fisheries Society meeting.

NOAA IN CAROLINAS 2005 PARTNERSHIP PROJECTS

PROJECT TITLE: *Status and Risk posed by the invasive Indo-Pacific lionfish to North Carolina Hard bottom Communities*

COLLABORATING PROGRAMS/ CONTACTS:

- NOAA Center for Coastal Ocean Science and Service, Paula Whitfield, paula.whitfield@noaa.gov, (252) 728-8714
- NOAA Undersea Research Center at the University of North Carolina--Wilmington, Andrew Shepard, 910 962-2446, sheparda@uncw.edu
- NOAA/NMFS Beaufort Laboratory, Roldan Munoz 252 728-8613
- NOAA/NMFS Panama City Laboratory, Andy David 850 234-6541 ext 208
- University of North Carolina Wilmington (UNCW/CMS), Wilson Freshwater, 910 962-2375
- The Florida Aquarium, Tampa, FL, Casey Coy, (813) 367-4019
- NOAA/NMFS Narragansett, RI, Jonathan Hare (401) 782-3295

BROAD NOAA CATEGORY:

Climate; Water and Weather; Ecosystems; Commerce/Transportation; Outreach and Education

PROJECT SUMMARY:

Since August 2000 the invasive Indo-Pacific lionfish has been reported along the East Coast of the United States from Florida to Cape Hatteras North Carolina including Bermuda and more recently the Bahamas. The impact of this venomous predator to native Atlantic communities is just beginning to be examined. In 2004 and 2005 the first NOAA led research surveys were conducted along the coast of North Carolina, a partnership between NOAAs Undersea Research Center in Wilmington and the NOAA laboratory in Beaufort North Carolina. These data revealed not only the widespread distribution of lionfish but densities of lionfish that now rival that of many native grouper species.

Our primary objective is to continue and expand our research on the invasive lionfish distribution, abundance, biology and ecology in the Atlantic in order to determine the impact that the lionfish invasion will have on native communities. We have developed baseline lionfish density estimates which will allow future population trends to be determined. We also have preliminary life history and genetic data from the specimen collections of August 2004 and Feb 2005. But more specimens are needed especially from the southern extent of the invasion. We will also continue to examine lionfish temperature tolerances, and to study lionfish ecology by conducting in-situ tagging studies at selected locations. Specifically, we propose four main research objectives:

- Objective 1: Quantify lionfish, grouper (Serranid:epinephaline) and native tropical species abundance at 12 sites off the North Carolina shelf to compare with baseline data for assessment of trends in population size.
- Objective 2: Provide genetic, life history, and ecological information to describe population demographics, trophic role, and behavior of NC lionfish and specimens at the southern extent of their range (i.e. Florida, Bahamas)
- Objective 3: Determine the inshore (continental shelf) limit of lionfish through in-situ bottom water temperature collections and field observations.
- Objective 4: Increase education and public awareness about the threat of invasive species through a formal partnership and public outreach effort with two aquariums and other AZA member facilities.

All of this work is facilitated in partnership with NURC at UNCW. First, they provided advanced technical dive training for qualified NOAA divers, a necessity due to the relatively deep diving depths where lionfish are found (> 90ft). Second, NURC also assists in the scientific data collection including temperature sensor deployment and retrieval, video and still photo documentation. They also have been exclusively authorized by NOAA to conduct oversight of decompression diving activities to insure the safety of all divers and support personnel. Their role in this research cannot be overstated because without the support of NURC conducting deep water diving research for NOAA would not be possible.

NMFS partnerships have also been formed at the NOAA laboratories in Beaufort, NC and Panama City, FL. Other partnerships include the University of North Carolina in Wilmington and The Florida Aquarium in Tampa, FL.

NOAA has identified invasive species as one of the five main threats to coastal ecosystems today. This research directly supports NOAA goals as well as several other legislative mandates, such as Non-indigenous Aquatic Nuisances Species Prevention and Control Act of 1990, The National Invasive species Act of 1999 and the invasive species executive order no.13112.