REPORT DOCUMENTATION PAGE

Public reporting burden for this collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing the burden to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302 and to the Office of Management and Budget, Paperwork Reduction Project (0704-01881, Washington, DC 20503)

1. AGENCY USE ONLY (Leave blank)	2. REPORT DATE	3. REPORT TYPE AND DATES COVERED
	Dec. 2, 2005	Performance (Technical)

4. TITLE AND SUBTITLE OF REPORT	5. FUNDING NUMBERS
Undergraduate Research Experience in Ocean and Marine Science	N00014-01-1-0529

6. AUTHOR(S)

Dr. Linda Hayden, Principal Investigator

7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)	8. PERFORMING ORGANIZATION REPORT NUMBER:
Elizabeth City State University 1704 Weeksville Road Box 672 Elizabeth City, NC 27909	CAGE : OJLK0 EDI/EFT: 2148AK

9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)	10. SPONSORING/MONITORING AGENCY REPORT NUMBER:
Office of Naval Research Suite 1425 One Liberty Center 875 North Randolph Street Arlington, VA 22203-2903	ONR 321SR

11. SUPPLEMENTARY NOTES:

12a. DISTRIBUTION AVAILABILITY STATEMENT	12b. DISTRIBUTION CODE
unlimited	

13. ABSTRACT (Maximum 200 words)

REport contains highlights from the summer 2005 Undergraduate Research Experience in Ocean and Marine Science Program.

14. SUBJECT TERMS	15. NUMBER OF PAGES:
	16. PRICE CODE

17. SECURITY CLASSIFICATION OF REPORT:	18. SECURITY CLASSIFICATION OF THIS PAGE	19. SECURITY CLASSIFICATION OF ABSTRACT	20. LIMITATION OF ABSTRACT

ONRCHI COMPUTER V.1.0 11/94

STANDARD FORM 298 (REV 2-89)

The URE OMSS program objective is to promote the professional development of minority undergraduate students through their participation in ocean, marine and space science research. Each student is assigned to a specific research team where they worked closely with the faculty. In addition, seminars, swimming, and boating safety classes were held to promote professional development and water safety. The projects were conducted for eight weeks during summer 2005 with on-line mentoring and follow-up during academic year 2005-06. Primary support for the URE program comes from the Office of Naval Research through grant #N00014-01-1-0529. Additional funds were provided by the National Aeronautics and Space Administration (NASA) and the National Oceanic and Atmospheric Administration (NOAA).

Migratory Bottlenose Dolphin Movements Along the Mid-Atlantic Coast and Their Correlation with Remotely Sensed Chlorophyll-a and Sea Surface Temperatures.
Chenise Arthur, Patrice Armstrong, Chakara Murray   **Mentor: Mr. Kevin Foss**

Along the Mid-Atlantic coast of the United States, there are different subpopulations, or stocks of bottlenose dolphins. The bottlenose dolphin, *Tursiops truncatus*, has both resident and migratory stocks. The focus of this study is the northern migratory population. This group of animals moves north and south along the coast in response to seasonal changes. The need for study arises from this mobile nature. Determination of the environmental cues that may be used to predict the presence or absence of these animals will aid in efforts to avoid disturbance to this protected species. This stock was also greatly affected during the 1987-1988 epizootic event that killed an estimated 50% of the migratory stock. This disease event was likely worsened by exposure to environmental toxins. The main areas of the field work, the lower James and Elizabeth Rivers of Virginia, are of interest due to their high toxin loads and frequent usage by bottlenose dolphins. The Elizabeth River is largely developed along its length. It also has a very high level of traffic: commercial, military and recreational.

Since this species represents the highest level on its food chain, our hypothesis is that the movement north represents can be correlated with the movements of their prey species. These prey species are known to be themselves migratory with temperature. As a surrogate for the in situ detection of the prey species, we feel that sea surface temperature (SST) and chlorophyll-a levels can be used. Both of these factors can be sensed remotely, removing the need for local observations. Sea surface temperature can serve to represent the movement of the prey species, and chlorophyll-a levels can be used to show the primary productivity, and thus the total food energy available in the ecosystem. The presence and absence data on these animals is then to be compared with the remotely sensed SST and chlorophyll-a data.
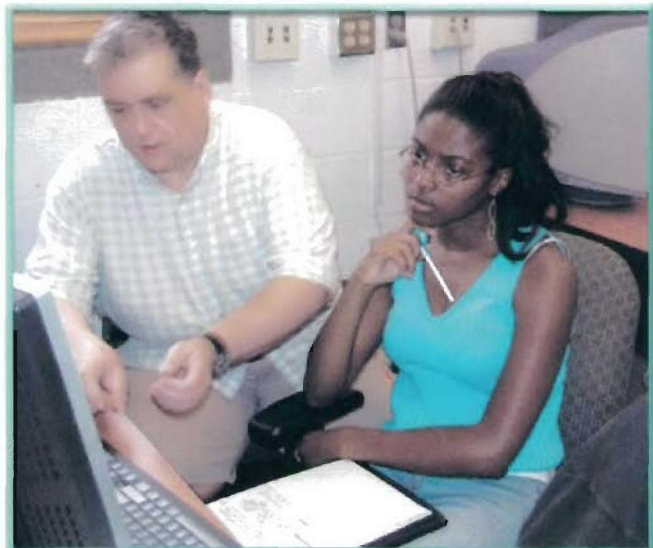
Spatial-Explicit Growth Rate Model of Young Striped Bass in the Albemarle Sound: Implications on Essential Fish Habitat (EFH) Using GIS

Brittany Green, Quinton Moore, Jameson Gibbs

Mentor: Dr. Anthony S. Overton

Striped Bass, a sport fisher's favorite, has been seen less and less due to territorial loss, pollution, and over fishing. The research used several models, methods, and data to determine the best placement for Striped Bass in the Albemarle Sound. Our research and efforts will hopefully assist the Division of Marine Fisheries to avoid the factors that cause the depletion of the Striped Bass population. Production dynamics of fish may depend on local processes and can be strongly influenced by the physical habitats which they live. These habitats are often patchy which inhibits the use of system-wide models to examine fish production. We examined the growth rate potential of juvenile striped bass in Albemarle Sound, North Carolina, to identify essential fish habitat (EFH) for striped bass during the summer and early-fall months. Growth rate potential integrates a physiological-based model (bioenergetics) of fish growth with the physical environment. We integrated the growth rate potential model with Global Information Systems (GIS) to spatially map the growth rate potential of individual juvenile striped bass in Albemarle Sound. Water temperatures during the modeled period were within the "preferred" range 19°

and 27° C, of juvenile striped bass except during June when water temperatures were above 28° C. Dissolved oxygen and salinity levels were at levels suitable for striped bass throughout the modeled period. Mean growth rate (g/g/d) was 0.023 during the modeled period. This model predicts that areas in the north Albemarle Sound, particularly in the Chowan River, the North River, and the mouth of the Roanoke River provided physical habitats (based on water temperature) to support high growth rates of striped bass. These areas may be defined as EFH areas. This approach shows the usefulness of integrating two technologies to predict fish production.
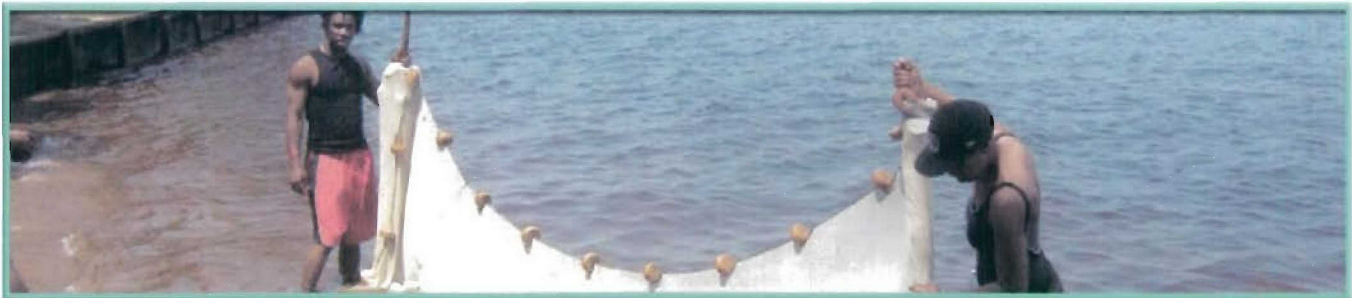
Using Ensemble Learning for Detecting Data Abnormalities in Databases

Jerome Mitchell

Mentors: Drs. P. Gogineni, C. Tsatsoulis, and Miss. D. Lee

Software engineers at the University of Kansas have developed SmartXAutofill, an intelligent data entry assistant for predicting and automating inputs for eXtensible Markup Language (XML) and other text forms based on the contents of historical documents in the same domain. SmartXAutofill utilizes an ensemble classifier, which is a collection of a number of classification algorithms where each individual internal classifier predicts the optimum value for a particular data field. As the system operates, the ensemble classifier learns which individual internal classifier works better for a particular domain and adapts to the domain without the need to develop special classifiers. The ensemble classifier has proven that it performs at least as well as the best individual internal classifier. The ensemble classifier contains a voting and weighting system for inputting values into a particular data field.

Because the existing technology can predict, suggest and automate data fields, the investigator tested whether the same technology can be used to identify incorrect data. Given existing data transmitted by sensors and other instruments, the investigator studied whether the ensemble classifier technology can identify data abnormalities and correctness in future sensor data transmission. The solution would be applied in a project funded by the National Science Foundation, Polar Radar for Ice Sheet Measurements (PRISM), using innovative sensors to measure the thickness and characteristics of the ice sheets in Greenland and Antarctica, with the goal of understanding how the ice sheets are being affected by global climate change.

PRISM sensors continuously send information that is collected and catalogued. The ensemble classifier will check the data for correctness by predicting which values should be there, and if the actual values are different, it will flag the data as possibly corrupted, and allow an operator to later study it and determine if it is correct or not. This technology will allow the PRISM intelligent systems to automatically determine the correctness of sensor and other data, and contributes to the PRISM project by adding a level of intelligence and prediction to the sensor suite.
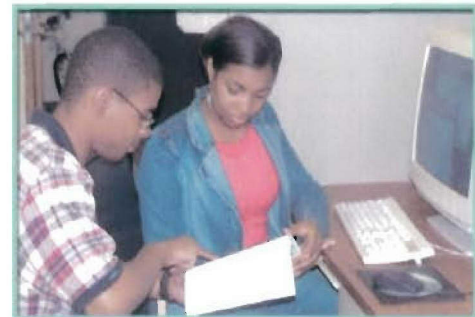
Characterization of Environmental Attributes of Potential Lost Colony Archeology Sites using Satellite Based Optical Sensors, Synthetic Aperture Radar, Aerial Lidar, and Ground Penetrating Radar

Malcom Mathis, Ronesha Lucas, Eunice Smith
Mentors: Dr. Anne Garland, Dr. Malcom LeCompte, Dr. Francisco San Juan, Mr. Fred Willard, Dr. Lei Zhang

Historical maps and records identify at least four sites in North Carolina's Dare, Hyde, and Tyrell Counties (just west of Roanoke Island) as locales with Contact Period Native American Habitation. There is reason to suggest one or more of these locations as providing sanctuary for refugees from the ill-fated colony established on Roanoke Island in 1587. The results of prior study of high-resolution satellite imagery of two of the sites to identify environmental characteristics (factors) conducive to habitation and to search for the presence of cultural features possibly related to either Native American or European habitation were inconclusive. This effort indicated that the use of satellite or aerial multispectral imagery at visual or infrared wavelengths, and at even the highest conceivable spatial resolution would yield limited results due to the considerable vegetative canopy that obscures the ground at these sites.

In February 2000 NASA flew an Interferometric Synthetic Aperture RADAR (ISAR) aboard the Space Shuttle Endeavor to accurately map the Earth's topography. Since that time, data from the Shuttle RADAR Topography Mapping Mission (SRTM) has become publicly available providing 30 meter spatial resolution for the entire United States. The major advantage of the dual band being that obscuration by vegetative canopy would be minimized providing more reliably accurate data than by optical techniques. The primary disadvantage of this technique is that the resolution is insufficient to detect the features at the scales most likely to pertain to the search for the lost colony.

Since 2003, very high spatial resolution (approximately 1 meter) Light Detection and Ranging (LIDAR) instrument was flown to collect elevation data across the entire state of North Carolina and used to derive maps to improve flood insurance rates and assist Federal Emergency Management Agency (FEMA) planning. These data have fortuitously become publicly available within the past year as a result the North Carolina Flood Plain Mapping Program. While this data provides improved coverage at appropriate spatial scales, and was collected during minimal leaf conditions, there is a statistical component to the data that produces invalid elevations.

To improve the accuracy of the North Carolina elevation data, the two data sets (SRTM and NCFPMP) were combined in this study. Thus the use of both new data sets provided an opportunity to determine environmental and cultural features beyond the limitations of either. Moreover, the proximate location of both sites to ECSU yields an opportunity to establish ground truth for measurements made remotely through the use of ground penetrating radar devices.

Determining the Correlation between Sea Surface Temperature, Chlorophyll Concentrations, QuikSCAT Wind Data and the Presence of *Caretta caretta* and Chelonia Mydas in the Mid-Atlantic

Santou Dabo, Clarice Thomas   Mentor: Mrs. Keisha Wilkins

The long distance movement of marine turtles is one of the wonders of the natural world, with recapture techniques showing how some species move thousands of kilometers across the ocean (Meylan, 1995). The Mid-Atlantic serves as a host environment for a number of sea turtle species that encompasses their seasonal migration routes. Currently, out of the six turtle species all are labeled as either threatened or endangered under the Endangered Species Act. Previous research suggests that migration routes are strongly influenced by two factors: sea surface temperature and chlorophyll concentrations. Studies in the past that investigate sea turtles and their correlation with Advanced Very High Resolution Radiometer (AVHRR) sea surface temperature (SST) and chlorophyll concentration have only focused on one turtle species, the Caretta caretta (loggerhead turtle). This study included two species of sea turtles, the Caretta caretta and Chelonia mydas (green turtle). These turtles were tracked along the Mid-Atlantic to determine if a correlation exists between migration routes, sea surface temperature, chlorophyll concentrations, and wind data. Archived AVHRR sea surface temperature and OrbView-2 SeaWiFS chlorophyll data were derived, processed, and analyzed at the Center of Excellence in Remote Sensing Education and Research (CERSER) located on the campus of Elizabeth City State University. CERSER has a TeraScan 1.5m System that is configured to ingest data from polar orbiting satellites. The system contains a suite of software which was utilized for the processing and analysis of the data. In addition, AVHRR sea surface temperature and QuikSCAT wind data were utilized from the Jet Proportions Laboratory. This project was a continuation of the paper "A Determination of Temporal and Spatial Distribution, Migratory Patterns, and Habitats for Sea Turtles using AVHRR".
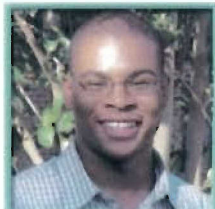
Karitsa Williams, ECSU - CS - SR
Mentors: Dr. D. Field, Dr. J. Kenworthy
NOAA Center for Coastal Fisheries and
Habitat Research Beaufort, NC

Mapping the Seagrass Resources of North Carolina's Back Sound

Jerome Mitchell, ECSU - CS - JR
Mentors: Dr. P. Gogineni, Dr. C. Tsatsoulis,
Miss D. Lee
University of Kansas
Department of Computer Science and
Electrical Engineering

Using Ensemble Learning for Detecting Data Abnormalities in Databases

Tiffany Fogg, FSU - Biology - SR
Mentor: Jacob I. Trombka
Laboratory for Extraterrestrial Physics
NASA Goddard Space Flight Center

Elemental Analysis of Forensic Material with the NASA and NIJ X-Ray Fluorescence Detector

Anthony Anderson, ECSU - CS - SR
Kaiem Frink, ECSU - CS - SO
Mentor: Dr. M. Prager
NOAA Center for Coastal Fisheries and Habitat Research, Beaufort, NC

National Oceanic and Atmospheric Administration Stock Assessments

DeQuincy Faulcon, VSU - CS - Grad
Mentor: Arvin Agah
University of Kansas
Department of Computer Science and
Electrical Engineering

Developing and Implementing a Virtual Dashboard for MARVIN II Rover Polar Robot

Rodolfo Bernal, NCAT - Math - SR
Mentors: Dr. P. Kanagaratnam, Dr. P. Gogineni
University of Kansas
Department of Computer Science and
Electrical Engineering

Signal Processing and Thickness Calculation For the Greenland Ice Sheet

Garry Cameron, ECSU - MathEd - JR
NASA Goddard Space Flight Center

Pre-Service Teacher Evaluation of NASA Educational Resources

Schools participating from 2000-2005

Dillard University
Elizabeth City State University
Fayetteville State University
Hampton University
Norfolk State University
North Carolina A&T
North Carolina State University
NOVA University
South Carolina State University
St. Augustine's College
Tennessee State University
University of Arkansas at Pine Bluff
University of Florida
University of Maryland
University of North Carolina at Pembroke
Virginia State University
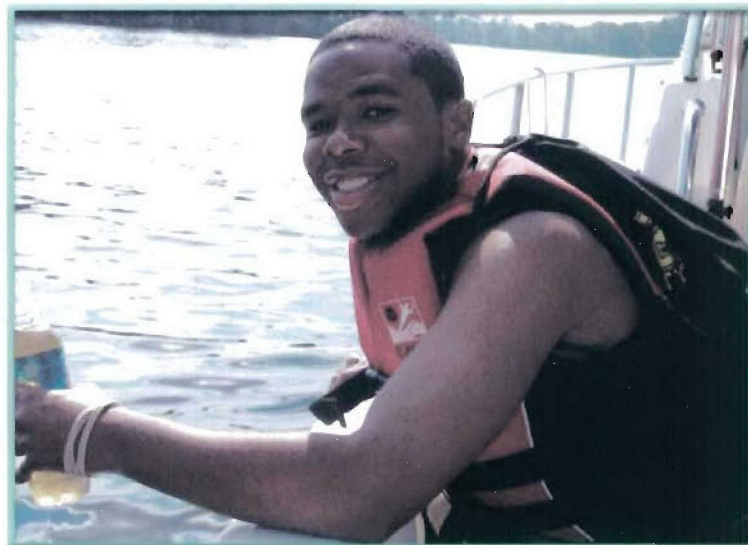
Other URE Participants

Brittany Green
SCSU - Chemistry - SO

Quinton Moore
SCSU - Biology - JR

Jameson Gibbs
ECSU - CS - SR

Chakara Murray
NCAT - Math - SR

Patrice Armstrong
TSU - Biology - JR

Cheniece Arthur
ECSU - CS - SO

Ronesha Lucas
ECSU - Biology - JR

Malcom Mathis
UAPB - Chemistry - SR

Eunice Smith
ECSU - Math - GRAD

Clarice Thomas
SCSU - Math ED - SR

Santou Dabo
ECSU - Math/Chem - SO

Napoleon Paxton
ECSU - CS - GRAD