



**Performance Report for Cooperative Agreement No: NA06OAR4810164**

**March 1, 2009 to August 31, 2009**

**Submitted by:**

**Florida Agricultural and Mechanical University (Lead Institution)**

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Morgan State University, Texas A&M University-Corpus Christi, the University of Miami;  
and the University of Nebraska-Lincoln

**National Oceanic and Atmospheric Administration  
Environmental Cooperative Science Center**

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## **Executive Summary**

This report highlights the efforts of Environmental Cooperative Science Center (ECSC) faculty, staff and students during the period of March 1, 2009 through August 31, 2009. It also reflects the valuable input received from the NOAA Advisory Committee (NAC) and the Science Advisory Committee (SAC).

The Environmental Cooperative Science Center on-site evaluation was conducted March 30-April 1, 2009 at Florida A&M University. Partner institutions and NERR Primary Investigators (PIs) were in attendance. The ECSC prepared Thematic Area, Technical and Student presentations. The evaluation team had separate meetings with FAMU administrators, the ECSC Center Management Team, faculty, and ECSC students and post-doctoral fellows.

Overall, the evaluation of the Environmental Cooperative Science Center was very favorable. The NOAA EPP evaluation team pointed out that the ECSC students were the highlight of the evaluation. The NOAA EPP Evaluation Team consisted of David Campbell-Chair (National Science Foundation), Nora Savage (U.S. Environmental Protection Agency), Paul Sandifer (NOAA National Ocean Service), and Steve J. Drescher (NOAA Acquisitions Grants Office). NOAA Observers included Jacqueline Rousseau (NOAA Educational Partnership Program), Gary Matlock (National Centers for Coastal Oceanic Science & ECSC Technical Monitor) and David Johnson (NOAA National Ocean Service and Chair of ECSC Advisory Committee).

The ECSC student involvement in education, research, and outreach continue to be the Center's most notable accomplishments. There are approximately 32 funded students at various levels across ECSC institutions. The success of the K-12 efforts are reflected in the following: The ECSC hosted over 300 elementary/middle school students during the 2009 Environmental Awareness Poster Competition; the ECSC Ocean Science Bowl Teams placed third during NOBCCChE in April; The ECSC hosted 32 high school students during the Environmental Sciences Institution Summer Camp; and the ECSC hosted 12 middle and school teachers during the TAMU-CC Teaching Environmental Science Camp.

## **Section I: Status of Award Tasks**

The ECSC has been structured into a set of integrated Thematic Areas of research and education, providing an organized approach to activities that cut across the institutional partners in the Center.

### **ECSC Thematic Areas:**

- I:1) Ecological Processes and Indicators of Ecosystem Health**
- I:2) Geospatial Analyses and Data Development**
- I:3) Integrated Assessment in Support of Environmental Decision Making**
- I:4) Integrated Social Sciences**
- I:5) Education and Outreach**

### **I:1) Ecological Processes and Indicators of Ecological Health Jennifer Cherrier and Elijah Johnson, Thematic Area Leaders**

The research activities in the Ecological Processes and Indicators of Ecosystem Health Thematic Area (EPIEH-TA) are designed to effectively engage EPIEH-TA students in advanced research that is relevant to NOAA's overarching mission with the ultimate goal of ensuring that these students complete their degrees and are well prepared to pursue careers with NOAA or in NOAA-related fields. Accordingly then, the two main objectives for EPIEH-TA activities are:

- 1. To engage students in advanced environmental, coastal and ocean science research by providing a focused and rigorous training program.*
- 2. To provide a scientific basis for improved forecasting capabilities of the impact of natural and anthropogenic stressors on the health and function of the targeted ECSC estuarine ecosystems*

where both activities-student training and research- are integral to ensuring success of the other.

The research in the EPIEH-TA is aligned with NOAA's ecosystem approach to management. Specifically, the research foci are a) Ecosystem Status and Health and b) Integrated Ecosystem Modeling. Work carried out in the Ecosystem Status and Health research focus incorporates studies in the two broad topical areas of biogeochemistry and bioindicators and the work carried out in the second research focus, Integrated Ecosystem Modeling, incorporates studies in several topical areas including, for example, estuarine transport processes and ecological modeling. The research areas in the EPIEH-TA were intentionally selected such that they could conform to changes in NOAA's mission and focus. The 2 research foci of the EPIEH-TA are designed to be interactive and continuously draw on and support the other. The empirical data generated from laboratory and field studies is meant to populate ecosystem response models which in turn are intended to drive models of risk assessment. Ultimately all of this data can then be used to inform coastal zone policies.

As listed in the EPIEH-TA implementation plan that was generated in year one, below are the 2 EPIEH-TA objectives. Following each objective are the accompanying performance indicators (or measures), the respective indicator target goals for year 3, and the accomplishments for each indicator for the reporting period.

**EPIEH-TA Objective 1:** *To engage students in advanced environmental, coastal and ocean science research by providing a focused and rigorous training program*

**Performance Indicators for Objective 1**

- 1) Number of ECSC partners engaged in EPIEH research activities that have developed and implemented a core competency training program to ensure that students are effectively prepared to embark on their research activities. Core competencies in: a) coastal and marine ecosystem dynamics (classroom based) and b) field research methodologies (field based). Goal for Yr 3- All  
*-There are 4 ECSC partner institutions (FAMU, JSU, MSU, and DSU) whose faculty and students are engaged in EPIEH-TA research and all of these institutions have developed and implemented both classroom based and field based student core competency training in year 3.*
- 2) Percentage of EPIEH-TA institutional partners whose students are able to demonstrate classroom based and field based core competencies. Goal for Yr 3- 100%  
*- 100% of the EPIEH-TA students trained in year 3 can demonstrate core competency knowledge base-see performance report summary below*
- 3) Percentage of EPIEH-TA B.S. students who develop a senior thesis or capstone report based on their ECSC research activities. Goal for Yr 3- 100%  
*- 100% of all EPIEH-TA B.S. students graduating in year 3 were required to develop a senior thesis or capstone report on their research.*
- 4) Percentage of EPIEH-TA B.S. students who present their research findings at the University seminar level. Goal for Yr 3- 100%  
*- 100% of all year 3 graduating EPIEH-TA students at all participating partner institutions were required to presented their research findings at the University seminar level*
- 5) Percentage of EPIEH-TA B.S. students who present their research findings at one or more national meeting. Goal for Yr 3- 50%  
*- 50% for all EPIEH-TA B.S. students presented their research findings at one or more national meetings during year 3*
- 6) Percentage of EPIEH-TA M.S. and Ph.D. students who participate in the development of an EPIEH- TA research proposal. (this measure is dependent on when the student is recruited into the ECSC- i.e. before or after the EPIEH-TA proposal is written. Regardless, however, this measure is captured by the fact that all graduate students are required to write and defend a research thesis/dissertation prospectus so all students have the opportunity to develop a proposal). Goal for Yr 3- 100%  
*-100% EPIEH-TA graduate students are required to develop a research proposal*
- 7) Percentage of EPIEH-TA graduate student committees with NOAA/NERR members. Goal for Yr 3- 100%  
*-100% of all EPIEH-TA graduate students research committees have NOAA/NERR scientists- See student project section in Appendix 1-F)*
- 8) Percentage of EPIEH-TA M.S. and Ph.D. students who develop a thesis and dissertation, respectively, based on their ECSC research activities. Goal for Yr 3- 100%  
*-100% of all EPIEH-TA graduate student research is based on their EPIEH-TA research activities*

9) Percentage of EPIEH-TA graduate students who present their research findings at one or more national meeting. Goal for Yr 3- 100%

*- 100% for all EPIEH-TA M.S. and Ph.D. students at all participating partner institutions presented the findings of their research at one or more national meetings during year 3.*

10) Percentage of EPIEH-TA graduate students who to publish their research findings in a peer-reviewed journal. (this measure should be either re-worded to 'try to publish' or scaled back to <100%). Goal for Yr 3- 100%

*-100% of EPIEH-TA graduate students tried to publish their research in a peer-reviewed journal during year 3 and 50% of these students were successful within current reporting cycle*

**Performance Summary:** Two sets of core competencies and associated learning outcomes have been identified that all EPIEH-TA students must possess to ensure that they are effectively prepared to embark on their research: a) coastal and marine ecosystem dynamics (classroom-based) and b) field research methodologies (field based). These core competencies and associated learning outcomes were again addressed in year 3 at each of the ECSC partner institutions engaged in EPIEH-TA research (FAMU, JSU, DSU, and MSU). Core competency content information and training was delivered by ECSC faculty/ staff and NERR scientists either in traditional semester long courses, special topics short courses, or arranged internships at NERR sites.

ECSC students and faculty from multiple universities, including FAMU, JSU, Bethune-Cookman, Creighton, and UNL participated in a joint remote sensing and groundtruthing project at the Grand Bay, MS NERR site in early June 2009. This ground truthing effort provided an invaluable training opportunity for EPIEH-TA students. Briefly, an aircraft fitted for hyperspectral imaging collected high-resolution spectral data while groups EPIEH-TA researchers and students collected physical, chemical and biological data at aquatic and marsh sites within the reserve. Water samples were collected at approximately 25 stations, to measure a variety of parameters including pH, salinity, DOC, DIC, nutrients, phytoplankton, bacteria, and trace metals. Measurements were made of composition and cover of benthic macrophytes, and samples of sediments and benthic biota were collected for chemical analyses. Optical measurements for correlation with the aircraft data were also collected at each station. In the marshes, transects were established and measurements made of plant diversity, ground cover and biomass. Approximately 25 students and faculty, lead by Drs. Jagoe and Smith, were involved in the groundtruthing effort. Analyses of the samples and data are continuing at the participating universities.

Finally, EPIEH-TA student progression (core competency training, prospectus submission and defense outcome, and thesis/dissertation submission and defense outcome, research presentation, research publication, and career placement) has been tracked at all ECSC partner institutions. All EPIEH-TA student publications, presentations, and project information is listed in the Appendix 1 B, C, & F respectively.

**EPIEH-TA Objective 2:** *Provide a scientific basis for improved forecasting capabilities of the impact of natural and anthropogenic stressors on the health and function of the targeted ECSC estuarine ecosystem.*

## **Performance Indicators for Objective 2**

1) Percentage of EPIEH-TA scientists who submit a research proposal to carry out EPIEH-TA related research. Goal for Yr 3- 100%

*- In year 3 100% of all EPIEH-TA scientists either had submitted research proposals or are preparing to submit research proposals - see performance report summary below*

2) Percentage of EPIEH-TA research proposals that demonstrate formal collaboration with a NOAA or NERR scientist. Goal for Yr 3- 100%

*- 100% of all EPIEH-TA proposals demonstrate a formal collaboration with either a NOAA or NERR scientist*

3) Percentage of EPIEH-TA research proposals peer reviewed by EPIEH-TA committee. Review process- 1. NERR Ranking-where applicable, 2. ECSC Internal Review, 3. NOAA Relevance Ranking. Goal for Yr 3- 100%

*-100% of EPIEH-TA research proposals submitted in year 3 were vetted through a formal review process- see proposal submission guidelines in Appendix 1-G*

4) Number of ECSC partners engaged in EPIEH research activities whose projects are informed by the Integrated Assessment Conceptual Model for their respective ECSC collaborating NERR site. Goal for Yr 3- 100%

*-where applicable, 100% of those EPIEH-TA research proposals submitted in year 3 were informed by ECSC Integrated Assessment Conceptual Models for their respective NERR study sites*

6) Percentage of EPIEH-TA funded research projects that include a student training component. Goal for Yr 3- 100%

*-100% of all EPIEH-TA research proposals submitted in year 3 demonstrated a student training component*

7) Percentage of EPIEH-TA funded research project PI's who submit an annual progress report for continued funding. Goal for Yr 3- 100%

*-A process for submission of annual progress reports for EPIEH-TA funded research is still being developed. Once developed we expect 100% of all funded EPIEH-TA project PI's will submit these annual research reports.*

8) Percentage of EPIEH-TA funded research project results posted on the ECSC website. Goal for Yr 3- 100%

*-We are still in the process of developing a format for project PI's to post their research results on the ECSC website. Once developed, we expect that 100% of all project PI's will post their results on the website.*

9) Percentage of EPIEH-TA institutional partners who establish and maintain a required database according to ECSC standard. Goal for Yr 3- 100%

*-50% of EPIEH-TA institutional partners maintain required ECSC standardized data base. This is currently being addressed such that 100% participating EPIEH-TA partners will maintain required data base in a standard format by year.*

10) Percentage of EPIEH-TA funded research project results disseminated to NCCOS and NOAA. Goal for Yr 3- 100%

*-50% of EPIEH-TA funded research project results disseminated to NERR, NCCOS, and NOAA (we're still working to improve this!)*

11) Percentage of EPIEH-TA products (tools/models) that improve the forecasting capability for predicting potential impacts of stressors on estuarine ecosystem. Goal for Yr 3- 100%

*-We don't know. We need to identify a process by which this can be assessed.*

12) Capability of integrated hydrological-biological-ecological modeling for forecasting estuarine responses to stressors. Goal for Yr 3- 100%

*- By working in collaboration with scientists and students from the Integrated Assessment thematic area we have just begun to assess by this in some of our partner NERR sites (i.e. ANERR). We are however working towards doing this for all partner NERR sites where EPIEH-TA research is being carried out.*

13) Percentage of EPIEH-TA funded research projects whose results will be disseminated at national meetings. Goal for Yr 3- 100%

*-100% of all EPIEH-TA funded research results are disseminated at national meetings*

14) Percentage of EPIEH-TA funded research projects whose results will be published in peer-reviewed journals. (this measure should be either re-worded to 'try to publish' or scaled back to <100%). Goal for Yr 3- 100%

*-70% EPIEH-TA funded research results are published in peer-reviewed journals*

**Performance Summary:** All ECSC partner institutions who are engaged in EPIEH-TA research have now submitted proposals (a total of 11 so far) which have been vetted or are in the process of being vetted through the ECSC proposal review process (see Appendix 1-A). All of the proposals demonstrate a student training component. Half of these proposals have NOAA scientist collaborators and half have NERR scientist collaborators. Two additional proposals are currently under development (see Appendix 1-A). In addition to her work on the EPIEH-TA proposal entitled 'Drought, Reduced River Flow and Sea Level Rise: Exploring Climate Impacts on Carbon and Nitrogen Cycling in the Apalachicola Bay System' EPIEH-TA postdoctoral research scientist Dr. S. Smith is also working with NOAA scientists Dr. D. Apeti and Dr. K. Kimbrough examining oyster and mussel histopathology data collected as part of the NOAA's Mussel Watch Program. Dr. G. Lauenstein manages the Mussel Watch program. ECSC-EPIEH-TA students and faculty from FAMU & JSU participated in a center-wide joint remote sensing and groundtruthing project at the Grand Bay, MS NERR site in early June 2009. Data collected from this effort will be compared to that data collected from the previous remote sensing groundtruthing effort at the GB-NERR as well as the data collected from other NERR systems where these efforts have been carried out by the ECSC. NOAA/ECSC/EPIEH-TA relevant publications, presentations, and leveraged funding information for the current review cycle are listed in Appendix 1 B-E, respectively.

## **I:2) ECSC Geospatial Analysis and Development**

### **John F. Schalles, Thematic Area Leader**

The Geospatial Thematic Area continued its emphasis this period on student training, planning and execution of a hyperspectral remote sensing campaign at the Grand Bay NERR, and professional activities of faculty and students that included publications, presentations, and proposal submissions. Individual accomplishments are listed in *Appendix 2*.

Our thematic area section maintained an emphasis in the past 6 months on student training, planning and execution of a hyperspectral remote sensing campaign at the Grand Bay NERR, and professional activities of faculty and students that included publications, presentations, and proposal submissions. Individual accomplishments are listed in the appendix at the end of this section.

**Goal 1:** *Geospatial science training will be provided to all ECSC funded students to achieve a set of core competencies (GPS measurements, GIS, image analysis, and field spectroscopy)*

Ground survey work at Grand Bay was successful in meeting the planned objectives of the project and served as a substantive training activity for our students. Students learned the use of and then employed field spectroradiometers (Ocean Optics and ASD Field Spec equipment from Creighton, Florida A&M, Jackson State, and University of Nebraska) to collect spectral library data from both water and vegetation survey sites. All sampling included differential-correction GPS data collected by our students using Trimble and Thales-Magellan instruments and post-processing procedures. Students are also using ARC-GIS and ENVI imagery analysis software for their own projects linked to the survey work. Thus, all the principal training approaches for ECSC core competencies in geospatial training were utilized in this project.

Core competency training modules were developed for web based instruction in Year 2 by our former Geospatial Analyst, Sudhir Shrestha. Since Mr. Shrestha departure last December, the geospatial analyst position at Florida A&M University remains unfilled. A search was conducted last spring to fill the Geospatial Analyst, one finalist withdrew before an offer was made, and the second finalist declined the offer. The position was re-advertised in the summer and two applicants are scheduled for interviews this September. Because of the vacancy in this position, we have not had the ability to fully implement and assess the training modules. However, students continue to receive training in geospatial procedures and practices in appropriate courses at our partner institutions.

**Goal 2:** *Students undertaking research in the Geospatial thematic area will complete a final, summary report (undergraduates) or thesis and present their work in a local, regional, or national meeting.*

Nine graduate students at four ECSC partner schools are receiving advanced training and most have thesis work underway within the umbrella of our diverse geospatial projects (*see Appendix 2:F for student projects*). Students were prominent in the list of publications and presentations in the past six months. Of the 14 papers published or in press, nine included student authors and coauthors. Of the eight papers presented at meetings, 6 were papers with students at first author. (*Appendix 2*) Although there were no student thesis projects were completed in this reporting period, two graduate students (Paul Merani at University of Nebraska and Drew Seminara at Creighton) plan to use the

new Grand Bay data for their thesis. After the large group survey work at Grand Bay was conducted the first week of June, Paul and Drew stayed until late June to continue salt marsh survey work.

**Goal 3:** *Acquire additional AISA hyperspectral data in support of Center research and to provide products for NERR managers.*

The flyover mission and related ground survey activities at the Grand Bay NERR in southern Mississippi in late May and June was the dominant activity of our group. This activity was a key component of proposed geospatial analysis activities for the current 5 year award for ECSC, along with the previous AISA flyover mission at the Mission-Aransas NERR in Texas in 2008. Planning began with a series of teleconference calls in the winter and spring period, and a meeting with most lead participants at the ECSC Annual Meeting in Jacksonville last February. Christina Mohrman (Grand Bay NERR) and John Schalles were co-leaders of this project. A decision was made during the planning period to acquire imagery for the entire Grand Bay reserve at 1 m spatial resolution, pending our ability to leverage ECSC funds budgeted for this funding year, with additional funds. The total cost for imagery acquisitions was estimated at 38K, which included 20K from ECSC and an additional 18K of additional funds. Efforts to secure the 18K in additional funds were successful, thanks to the work of Mark Woodrey at Grand Bay NERR and J. Cho at Jackson State University. Other funds were brought to the project to directly support student researchers in the field surveys: Larry Robinson contributed additional NOAA-ECSC funds and John Schalles obtained funding from the NASA Nebraska Space Grant Mini-Grants program. ECSC travel funds from partner schools were also used. The University of Nebraska AISA Eagle airborne spectrometer onboard a Piper Saratoga aircraft was brought to coastal Mississippi on May 29. The flight crew, led by Rick Perk at University of Nebraska-CAMIT, took advantage of favorable weather and flew the entire reserve (20 flightlines) on May 30 and 31. Approximately 30 students and faculty from Jackson State, Florida A&M, Bethune-Cookman, Creighton, and the University of Nebraska participated. The field survey work included vegetation surveys of salt marsh and sea grass communities and measurements and sampling at 22 water stations.

The group was informed in August that substantial problems were encountered with the AISA Eagle flight imagery. In processing the imagery, Rick Perk (University of Nebraska-CALMIT) discovered that numerous individual data lines within the pushbroom sensor's flight line swaths were missing and, or corrupted. After strenuous efforts to identify and correct the problem, Rick discovered an inadvertent problem with the instrument's computer used to download and store the instrument's data in near real time during the imagery acquisitions. Security software used during updates of the computer's software prior to the 2009 AISA field season had been left on the computer, and significantly slowed the writing of new data files during AISA operations. The problem was not immediately evident during the flying, when the operator is able to observe raw data display at coarse spatial resolution. The problem was only observable once processed data were examined closely. Unfortunately, the problem is so severe that most of the acquired data cannot be used for broad, synoptic mapping purposes, which was a major goal of the project and intended use of the imagery at Grand Bay. Once the problem was identified, the Geospatial Analysis thematic group discussed the implications and how we might collectively proceed. The University of Nebraska-CALMIT will re-fly the entire mission at their own expense.

A conference call was held August 18 which involved most of the project's investigators and Grand Bay staff. After detailed discussions of the nature of the AISA imagery data problem and the issues

involved with repeat flyover in 2009 or 2010, the group decided to direct CALMIT to schedule the revisit for spring, 2010. The current plan is to use an April-May window, with exact dates dependent on the availability of favorable weather conditions. This decision was based on a number of factors, including the state of plant phenology (especially for sea grass work), as well as the availability of student researchers to participate in follow-up ground surveys. One of the major issues was the impact on the two graduate students (Paul Merani and Drew Seminara) who planned to use Grand Bay data for their thesis projects. The problem is less severe for Paul Merani, who is working on a more extensive Ph.D. dissertation, than Drew Seminara. In an attempt to keeping Drew's project and anticipated graduation date on schedule, John Schalles (Drew's advisor) and the Grand Bay staff are working with him to help identify and pursue the best possible options.

**Goal 4:** *Prepare and distribute a suite of baseline research products for each NERR site from previous and planned flyover missions.*

Imagery data from the Grand Bay NERR flyover, although comprised (see discussion in Goal 3 above) was distributed via portable hard drive, to each investigator group in August. Even though the data cannot be used to produce synoptic mapping projects, they will be used in interim work, including spectral library construction and attempts to correlated field survey classification data with respective, non-degraded imagery content.

All imagery data from the 2008 flyover was distributed to partner research teams and is being used in current assessment and product development. The major project components are mapping of seagrass, mangrove, and salt marsh within large tracts of the MANERR, and mapping of uplands and freshwater wetlands at the Fennessey Ranch tract in the MANERR watershed.

**Goal 5:** *Enhance and sustain research productivity of ECSC faculty, post-doctoral scientists, and students.*

Papers, presentations, and proposal activity are summarized in *Appendix 2* of this section. Fourteen papers were published or are in press, and eight presentations were made at local, national, and international conferences. Two faculty members in our group gave invited presentations: Tennessee State University (Cho) and South Dakota State University (Schalles).

The Geospatial Thematic area continues to demonstrate an ability to leverage their ECSC funding with other extramural awards. There were 10 new or continuing awards listed for the current reporting period, which total \$1,660.8K. An additional 4 proposals were submitted and are in review. (*Appendix 2:D-E*)

**Goal 6:** *Disseminate geospatial data and products to the wider public, with an emphasis on educational outreach. Principal activities will include the production of posters and fact sheets (letter size) that display and explain our geospatial techniques, data analysis, products, and applications (via printed and electronic media, utilizing the Center's server capabilities).*

As products become available, maps and posters are being distributed electronically and in print form for educational outreach. The University of Nebraska-CALMIT group serves as the clearing house for these activities. Because data analysis and product development for the two flyovers

within the past calendar year are in progress, no new distributions occurred in the present reporting period.

**Goal 7:** *Establish and sustain collaborations with other NOAA and NERR partner scientists for joint research projects.*

Our thematic group has active collaborations with other thematic groups and NERR partners within our center, as well as a number of collaborations with other EPP Centers and academic and government research laboratories and centers. These collaborations are very evident in the co-authorships as listed in *Appendix 2*. Examples of these collaborations include J. Cho's (Jackson State) work on seagrass mapping with Patrick Biber at the Gulf Coast Research Laboratory, Don Rundquist's work with on harmful algae bloom detection with the Water Center at the University of Nebraska and the Nebraska Department of Environmental Quality and coral reef mapping with the Roatan Institute of Marine Science, John Schalles's collaborations in marsh mapping with the Georgia Coastal Ecosystem's LTER and water optics and algal bloom detection with the NOAA CREST with Alex Gilerosn and Sam Ahmed's water remote sensing group at City University of New York, and TAMU-CC doctoral candidate John Wood's work as a co-PI with the Texas Benthic Habitat Mapping Project -

(<http://www.harterresearchinstitute.org/newsletter/summer2009/article4.html>)

John Scxhalles and Alex Gilerson wrote a section of a proposal in May and June for a large, multi-investigator project headed by Andrew Tyler at the University of Stirling in the U.K. (Global-Scale Reconnaissance of Cyanobacterial Blooms in Lake Ecosystems).

### **I.3) Integrated Assessment in Support of Environmental Decision Making** **Michael A. Reiter, Thematic Area Leader**

The ECSC Integrated Assessment in Support of Environmental Decision Making (IA) thematic area's goal is to train students in integrated resource management, risk assessment, and decision-making methodologies identified as being of key importance in the recent strategic plans for NOAA, NOS, and NCCOS while providing both useful tools for NERR and NOAA decision makers. Our approach involves active participation in the creation and use of integrated conceptual models for partner NERR sites to be used as tools to communicate coastal system risks, to guide ECSC research across the entire center including work in other thematic areas, and to link scientific and social information to enhance decisions for achieving coastal management goals. The ECSC's distinctive capabilities allow us to develop and assist with integrated assessment methodologies as well as transfer integrated assessment methodologies to our students, NOAA, other stakeholder groups or locations, and other agencies. The ECSC faculty has the capability to integrate interdisciplinary information and expertise across agencies and geographic areas, and has built upon its existing record of providing resource information and management tools to its stakeholders and the general public (including a large underserved population).

As listed in the recently revised IA implementation plan (for details, refer to the previous semi-annual report), below are the IA objectives for Year 3, the accompanying performance indicators (or measures), the respective indicator target goals, and the accomplishments for each indicator to date.

**IA Goal 1:** *Develop variations of the qualitative conceptual models for different habitats and levels of aggregation as appropriate for use in site-specific decision making*

#### **Performance Indicators for Objective 1, Year 3**

- 1) Completed Modified 2C model available to GBNERR. Goal for Yr 3- Completion  
*-Model delivered to GBNERR personnel*

#### **Performance Summary:**

The newly revised models based on the new data obtained during this grant year's workshop was completed during this reporting period and turned over to GBNERR personnel during the summer 2009 Grand Bay NERR flyover. GBNERR personnel are now using it to develop their research plan.

**IA Goal 2:** *Prioritize risks at partner NERR sites utilizing decision-analysis methodologies (ex. fuzzy set theory, sensitivity analysis) to address specific NERR management issues and begin the transition from the current qualitative conceptual models to a ranked list of priorities to be addressed*

#### **Performance Summary:**

All year 3 measures were completed or adjusted based on requests from NERR partners during the previous reporting period.

**IA Goal 3:** *Use the risk priorities to assess current conditions at each site and objectively identify research and management needs at that site*

**Performance Summary:**

All year 3 measures were completed or adjusted based on requests from NERR partners during the previous reporting period.

**IA Goal 4:** *Develop quantitative forecasting models at ANERR for assessing stress-response relationships of concern*

**Performance Indicators for Objective 4, Year 3**

- 1) Use of the quantitative models in the ANERR IA trial. Goal for Yr 3- Completion for ANERR  
*-Model forecasts obtained*

**Performance Summary:**

The quantitative models, which were developed in the previous year, are being used to obtain the first of the scenario outputs. All baseline model runs have been completed, including boundary model forecasts and a suite of more complex model outputs related to the range of conditions identified in the USACE Interim Management Plan for the James Woodruff Dam. Simulations for Apalachicola have been run for low and high river flow scenarios and, for sea level rise, +1.0 m in ocean boundaries for both low and high flow conditions, and +0.5 m in ocean boundaries for both low and high flow conditions. Tidal height results have been calculated from all of these simulations, and the combined results have been entered into salinity and pore water models to add to the upstream flow model results. The IA modelers had to change parameters and recalibrate some models for the Apalachicola marshes in order to prepare pore water models for the estuary. Model simulation forecasts have been obtained for freshwater high and low flow conditions, as well as Apalachicola Bay oyster projections at Middle Bay, East Bay, Dry Bar, and Cat Point. Geoff Scott has suggested that we might want to consider coliforms as another important variable once this modeling has been completed, as coliform levels would impact ability to harvest oysters, use of the bay, etc. The modelers will consider this issue once the forecasts have been developed.

**IA Goal 5:** *Conduct targeted risk assessments at the ANERR, focusing on water management of the ACF system and/or navigation issues of maintaining the commercial barge traffic up the Apalachicola River into Alabama*

**Performance Summary:**

All Year 3 measures were completed during the previous reporting period.

**IA Goal 6:** *Initiate assessments at MANERR focused on characterizing habitat changes, navigation and port issues, and Large Marine Ecosystem (LME) studies on the Gulf of Mexico*

**Performance Indicators for Objective 6, Year 3**

- 1) Run 2C modeling workshop for MANERR (as requested by MANERR personnel). Goal for Yr 3- completion of workshop

*-Workshop completed as scheduled*

3) Personnel involved in the Harte/LME development program per year. Goal for Yr 3- 2

*-Three people involved, plus student participation and support from the Geospatial thematic area*

### **Performance Summary:**

The MANERR workshop was held this past April, with IA team personnel traveling to Texas to direct the workshop. The workshop was also used as an IA methodology training exercise for TAMUCC students as well as students from other ECSC institutions. Work proceeds as of this report date on the development of the matrices and models from this workshop, a Year 4 deliverable.

During this reporting period, Philippe Tissot continues to optimize and implement additional real-time water level models for coastal locations on the Gulf of Mexico, adding to the locations completed during the previous reporting period. By the end of this summer, 15 locations along the Texas coast will benefit from real-time water level predictions. Year 4 will focus on the extension of this predictive model to Florida. Another portion of the work involved steps toward implementing the hydrodynamic model FVCOM to the Corpus Christi area and MANERR. Student work focused on learning how to run the code, build and implement local grids, and implement the model for Oso Bay (a portion of the overall area of interest). Student Angelica Villarreal succeeded in running FVCOM examples on one of the Texas Advanced Computing Center clusters in Austin. Use of a high speed computer cluster is an important step to potentially run the model several times per day for real-time implementation. Philippe is scheduling a late fall visit at NOAA CO-OPS to present the work and seek further feedback for the projects and the graduate student thesis. A review paper of worldwide LME's, including a recommendation to update the LME model, was published along with several other manuscripts and presentations completed or in review. The TAMUCC modeling group for Fall 2009 will consist of one graduate student (Yelena Nevel) and three undergraduate students (Sergie Reid, Cindy Valencia, and Samantha Quisenberry).

Work continued on digital data improvement including participating in a workshop that would integrate our mapping efforts with that of Texas Parks & Wildlife ecosystems mapping project. As recommended by Mission-Aransas NERR, we completed an intensive groundtruthing project within City of Rockport evaluating NWI 2004 data. U.S. Fish & Wildlife Service (FWS) has recently remapped the area using 2007 data, and we will be assisting in groundtruthing that data within our study area. Many projects are underway in the Texas Coastal Bend intended to quantify natural resources functions and values; we participated in ecosystem services workshops for barrier islands in Texas Coastal Bend, with the intention to extend the work into our project area in the future. This effort will be integrated with the development of regional NWI enhanced attributes for NERR area amending FWS protocols established in Northeast regions.

Land Use/Land Cover (LULC) analyses continued during this period, focusing on developing an integrated approach to assessing landscape changes using landscape metrics (fragstats, vegclass) at various spatial scales. Liz Smith and her students were contacted by FWS to join in an upcoming effort to develop a SLAMM model for the Aransas National Wildlife Refuge (ANWR) area. Working with FWS and The Nature Conservancy, TAMUCC IA team members are identifying areas subject to inundation by relative sea level rise using our groundtruthed LULC dataset and elevation data. The historical LULC map which was developed in the first period of FY09 was discussed at the TPW Ecosystems workshop, and Liz and her students will be collaborating with TPW GIS specialists in combining their model into their next version.

Incorporation of biodiversity components into the LULC analyses also continued at TAMUCC, with ECSC graduate fellow Rosaleen Baluyot conducting bird surveys during the spring migration in several sites on three barrier strandplain peninsulas. After learning the standardized protocol to develop a Secretive Marsh Bird Sampling Plan for Texas Coastal Bend and applying for the permit to conduct research within ANWR, they were able to receive permission to conduct the survey on several private sites with the objective of encouraging biodiversity management on these sites. They are also working on a proposal to study the distribution and environmental requirements of the federally endangered Black Lace Cactus, which has only been located on three private lands.

In addition to our collaboration with Mission-Aransas NERR through the IA Conceptual Model Workshop in April, Liz Smith also enrolled in a three-day workshop sponsored by Mission-Aransas NERR in April 2009 to become familiar with three decision-support tools customized with regional data. Workshop attendees developed interactive models of the Live Oak Peninsula area within Aransas County using Community Viz, NatureServe Vista, and N-SPECT that depicted the current environmental conditions, evaluate development patterns, and develop alternative strategies for future growth planning. The NERR project was completed in June, and Liz Smith met with community planners to identify specific data needs that could be developed during ECSC YR 4 to support the continued use of these models in planning efforts.

To facilitate our current research results to the public, IA team members also conducted Riparian ecology training for the Master Naturalists Program at Fennessey Ranch conservation easement in March 2009, and led a Learning to Read Topo and Habitat Maps Field Trip (5<sup>th</sup> -6<sup>th</sup> graders from South Texas) for a summer camp hosted by the University of Texas Marine Science Institute at the Ranch CE in June 2009.

Sandra Arismendez is working on her PhD in Coastal and Marine System Science at Texas A&M University-Corpus Christi (under co-advisors Paul Montagna and Wes Tunnell) and has completed all core course requirements this past spring. Sandra's dissertation topic is "Effect of Land-Water Nutrient Coupling on Central Texas Estuaries". Sandra also submitted a dissertation chapter to her Graduate Advisory Committee in April (and simultaneously submitted it in manuscript form to the journal *Ecological Informatics*, see in press publication below) and is currently finalizing a second chapter which will also be simultaneously submitted in manuscript form to the *Journal of Environmental Management*.

In addition, Sandra led a research team on a nutrient water quality expedition to the Sian Ka'an Biosphere Reserve, Quintana Roo, Mexico on June 5-21, 2009. The goal of the expedition was to quantify nutrient concentrations and loads, identify potential nutrient sources and processes, and determine potential impacts of nutrient enrichment on coral reef systems resulting from anthropogenic activities. Sandra was accompanied by Krystal Alvarado and Mitch Winters, both undergraduate ECSC summer intern students at TAMU-CC in 2008, and worked under the direction of IA team member Liz Smith.

The Harte Research Institute-Large Marine Ecosystem Model paper that was submitted to the journal *Ocean and Coastal Management* in January of 2009 was returned for revision in June, and is expected to be resubmitted by late August.

All other Year 3 measures were completed during the previous reporting period.

**IA Goal 7:** *Transfer ECSC IA methodology to NOAA sites and other stakeholders dealing with coastal resource management issues*

**Performance Indicators for Objective 7, Year 3**

1) Number of trained students employed by NOAA and/or NERRs. Goal for Yr 3- 3

*-One student is employed (reported last period)*

2) Number of newly trained students employed by state or private resource management agencies. Goal for Yr 3- 3

*-Three students have been employed (reported last period)*

3) Number of graduates moving to graduate school or postdocs in coastal resource management. Goal for Yr 3- 3

*-Three students have moved into programs (+ 3 reported last period)*

4) Number of NERR and other NOAA site personnel involved in ECSC activities. Goal for Yr 3- 4

*-Three have participate directly, and more have been involved indirectly (+5 reported last period)*

5) Number of ECSC-related workshops and activities at partner, NERR, and other NOAA sites. Goal for Yr 3- 2

*-Three workshops were held (at GBNERR, MANERR, and DNERR) plus planning meeting (+1 reported during last period)*

6) Number of non-ECSC sites utilizing ECSC resources, personnel, or methodologies. Goal for Yr 3- 2

*-Two such groups have utilized IA resources and personnel (+1 reported last period)*

7) Number of published IA manuscripts derived from ECSC activities. Goal for Yr 3- 1

*-Three publications were accepted during this period (+1 reported last period)*

8) Number of briefings, presentations, or requests focused on ECSC data and activities. Goal for Yr 3- 2

*-This measure was exceeded substantially (+10 reported last period)*

**Performance Summary:**

In this difficult job environment, we were only able to place one student into NOAA or the NERRs this year, but we have many past and new IA students advancing their education. In addition to the three students listed during the previous reporting period, Suraida Nañez-James, a TAMUCC student previously supported by ECSC funds, is continuing her higher education at the University of Louisiana at Lafayette. She is pursuing her PhD in Environmental and Evolutionary Biology and is conducting benthic ecology and freshwater diversion research at the NOAA Fisheries, SEFC/Estuarine Habitats and Coastal Fisheries Center in Lafayette, LA. Also, Cary Bleasdale (a Stetson University intern) and Rashan Moss (a BCU Biology major), two students partially supported by ECSC funds during this reporting period to perform field research in a service learning program at BCU directed by Dr. Reiter, have both chosen to enter the MS program in Integrated Environmental Science at BCU for 2009-2010 as ECSC IA students. In addition, Robyn Ball (a TAMUCC Mathematics/Modeling MS graduate student supported by the ECSC) returned to

TAMUCC for the summer 2009 to continue working with the FVCOM model. A new master's student, Yelena Nevel, started in June 2009 and is carrying on the work of modeling the Corpus Christi area and MANERR with the hydrodynamic model FVCOM. The area initially modeled this year, Oso Bay, was a part of this system studied by another ECSC student. The longer term goal of this project and the focus of the student MS thesis are to integrate water level prediction information into FVCOM through the data assimilation feature of the program. Additionally two new undergraduate students, Cindy Valencia and Samantha Quisenberry have joined the team and are optimizing water level prediction models.

During this reporting period, IA team leaders held a modeling workshop at GBNERR to revisit the site's conceptual model in view of new data obtained by the site staff since the original model was developed, working with Christina Mohrman, Mark Woodrey, and the local modeling team for GBNERR. The revised models were developed, completed, and delivered to GBNERR personnel. A review of the new Blackbird models was also held at DNERR in August with Robert Scarborough to discuss the matrices, review the model output as it stands, and discuss next steps. The meeting had not yet taken place as of the compilation of this report, but will be completed within this reporting period.

In addition to the developing collaborative work involving ECSC methods that was reported last period, the IA lead is also a Co-PI in a collaborative group of researchers from Texas A&M University (lead by Dr. Jeryl Mumpower), the University at Albany, State University of New York, Rensselaer Polytechnic Institute, and Bethune-Cookman University which has submitted a grant to NSF proposing to study and support local and regional level decision making concerning climate change and uncertainties as they affect a segment of the coastal zone of the United States along the northern Gulf of Mexico (viz., parts of the states of Texas and Louisiana.) Should the collaboration be funded, the four-component methodology developed by ECSC IA personnel will play a significant role in the conceptual modeling work for the project. There was also extensive interaction between IA team members and both MANERR and Fennessey Ranch in TX during this reporting period. Refer to IA Goal 6 for details.

Regarding publications, the manuscript on the development of a watershed-scale conceptual model for use at DNERR written by Dr. Reiter and colleagues has been published electronically in the Journal of Resource Management, with the print version to follow shortly. This adds to the book chapter by Dr. Tissot and colleagues reported last period. Several other manuscripts are in preparation, review, or revision.

The IA team has held a large number of briefings and presentations during Year 3. In addition to those reported last period and the requests associated with the development of the two collaborations described above under non-ECSC site activities, highlights from this reporting period included a summary of ECSC methodology presented at the Florida Academy of Science meeting, a presentation given by the IA postdoc for the OneNOAA seminar series and at the Hollings Marine Lab, and a summary of data layer results presented for IA work in coastal Texas.

### **Future Measures and Notable Contributions:**

Notable progress has also been made during this reporting period on the following upcoming Goals and Measures:

*IA Goal 1: Develop variations of the qualitative conceptual models for different habitats and levels of aggregation as appropriate for use in site-specific decision making*

During this period, the IA team continued its preliminary discussions on developing a 4C model for the site given initial interest from site personnel to expand this summer's 2C model (a Year 5 measure by request). Also, initial contacts have also been made with Dr. Kevin Hopkins of the University of Hawaii at Hilo and Karen Frutchev of NOAA's Joint Institute for Marine and Atmospheric Research at Honolulu concerning the modeling workshop for Hilo's watershed (a Year 4 or 5 measure by request), with interest expressed by both individuals.

*IA Goal 5: Conduct targeted risk assessments at the ANERR, focusing on water management of the ACF system and/or navigation issues of maintaining the commercial barge traffic up the Apalachicola River into Alabama*

Further model stages for the ANERR issue were completed during this reporting period, putting us well on track to complete this Year 4 measure (and the associated options analysis) on time.

*IA Goal 6: Initiate assessments at MANERR focused on characterizing habitat changes, navigation and port issues, and Large Marine Ecosystem (LME) studies on the Gulf of Mexico*

GIS-based data files for MANERR are nearly completed, making it likely that we will be able to meet the Years 4 and 5 measures early, if not to exceed them.

*Other Notable Contributions:*

Philippe Tissot has been involved with science teach preparation in recent years, and has a book on teaching physical science scheduled to be released this August in time for the fall semester. Also, three funded proposals totaling \$102,720 were leveraged from ECSC work by three IA team members during this reporting period. The projects are listed in *Appendix 3* of the report.

#### **I:4) Integrated Social Sciences**

**Anthony Wilbon, Thematic Area Leader**

Through the Integrated Social Science thematic area, the ECSC provides NOAA and its partnering agencies a unique source of expertise. Our goal is to train students about the increasing public sensitivity to the issues of equity and economic efficiency in the allocation of environmental services and natural resources. More importantly, this thematic area exposes students to the methodologies needed to understand the human/ecosystem linkages that lead to the expected outcome in the NOAA's strategic Ecosystem Mission Goal of "A well-informed public that acts as stewards of coastal and marine ecosystems." While the science data needed to develop the conceptual models are critical, we consider providing students an understanding of the social and economic factors that affect management strategies as equally important.

In this thematic area, the ECSC's distinctive capability includes a multidisciplinary faculty representing natural resource/agricultural economics, community planning, sociology (demography, environmental sociology), history and management. Together our research expertise encompasses the use of various methodologies, including qualitative (e.g., ethnographic research, participatory action research, and oral and visual history) and quantitative (e.g., cost/benefit analysis, environmental valuation) techniques to assess social values and attitudes, policies for efficiency, equity and/or sustainability.

Following are the Goals listed in the ISS implementation table for Year 3 of the grant period, along with accomplishments in these areas to date.

***ISS Goal 1: Demonstrate expertise of faculty and students in areas of social science and management research.***

The following items for this period are presented as a status of current activities:

#### **Performance Indicators for Goal 1:**

1) Number of ISS research projects approved by ECSC. Goal for Year 3 - 2 projects.

Morgan State University's proposed project to develop a prototype of an alternative business model for the Maryland oyster industry has been ongoing and will continue through this period. The overall goal of the project is develop an integrated model for a stable, sustainable oyster industry through development of a micro-hatchery.

#### **Evaluating the Use of Off-Bottom Cages for Oyster Aquaculture in Maryland**

MSU's initial efforts have been to identify the equipment needs and to secure the participation of local watermen to participate in the project. We have been working with two watermen from the Patuxent River (members of the Calvert County Watermen's Association) who have volunteered to work on the project.

After a site visit to a regional supplier of aquaculture equipment, a list of equipment and materials was finalized and most has been purchased. These purchases included such items as cages, spat bags, power washer, and assorted ropes, line and fittings. We also ordered 120,000 oyster spat from a regional hatchery that consisted of a combination of diploid and triploid native oysters (*C. virginica*). These have put into the small mesh bags and then placed into 20 cages that were put overboard on a private lease bed in the Patuxent River. As the spat grow, more cages will be required to accommodate the larger oyster. We anticipate that there will be a total of 50 cages.

During the summer, MSU had the opportunity to work with a computer model created by the University of Maryland Sea Grant program that looked at projecting profitability of aquaculture businesses based upon user provided input. Assuming an annual harvest of 120,000 oysters sold at \$0.25 each, it was estimated that the watermen would generate on average annual profit business of \$23,500. The other results of the intern's analysis were that:

- Forecasting revenue and costs is possible for cage aquaculture businesses.
- After five years, total revenue should exceed \$150,000.
- At present the labor input is the biggest unknown.
- Forecasted revenue is not high enough for bottom cage culture on this scale to be a full time job.
- The overall feasibility of cage aquaculture initially depends on labor requirement being equivalent to an alternative part time or seasonal job.

There are several other pieces of equipment that are being purchased and some continuing supplies. The initial batch of oyster spat is in the water but we will need to work out a better system of bagging small oyster spat and getting them overboard. We will continue to monitor the amount of effort required to cull and sort that spat as they grow and modify the size of the mesh bags as necessary.

### **Environmental justice in Port St. Joe, Florida**

The ISS also proposed a new project that was approved in the last period. Led by Dr. Dreamel Worthen at FAMU, the study will involve faculty and students at FAMU and examines the social, economic and environmental justice implications of waste disposal by the St. Joe Company (St. Joe--formerly the St. Joe Paper Company) in Port St. Joe, Florida (Gulf County). The objectives are to estimate how perceptions of an environmentally toxic community (technological stigma) circumscribe residents' everyday interaction with urban green space at their residences and in their wider communities. This project will also involve Dr. Susan Lovelace who is a social scientist with NOAA's Center for Human Health Risk at the Hollings Marine Lab.

### **Other Projects**

The second project submitted for this period was to develop an economic modeling analysis using Regional Input/Output Economic Assessment. MSU plans to develop an economic model using oyster project as a baseline and apply it to all ECSC regions. The proposal that was

submitted is currently under revision. MSU is currently identifying the resources and will be resubmitting the proposal before end of 2009.

2) Number of conference presentations by faculty and /or students resulting from ECSC-approved ISS projects. Goal for Year 3 -

ISS is currently identifying conferences for the fall 2009 and awaiting acceptance of proposals for others. We expect to meet this objective before end of the reporting year.

3) Number of publications by faculty and/or students in refereed journals based on ECSC-approved ISS research. Goal for Year 3 – 1 journal article

We exceeded our goal for this period.

1) Morgan State's research in environmental and sustainably entrepreneurship related to the oyster harvesting project in Chesapeake Bay was submitted to the International Journal of Case Studies in Management:

- Wilbon, A.D., Bundy, M. and Clark, K. (submitted). Case Study: Entrepreneurship in the Chesapeake Bay Oyster Industry. *International Journal of Case Studies in Management*.
- Wilbon, A.D., Bundy, M. and Clark, K. (submitted). Teaching Notes: Entrepreneurship in the Chesapeake Bay Oyster Industry. *International Journal of Case Studies in Management*.

We are currently waiting for responses from the editor resulting from the peer review

**ISS Goal 2:** *Enhance the academic performance and placement of underrepresented minority students in fields related to social science and management.*

During Year 3, the ISS proposed the following measures to meet its goal:

**Performance Indicators for Goal 2:**

1) Percentage of students working on ECSC-approved ISS research that present at conferences and/or publish in recognized journals. Goal for Year 3 - 100% of the students working on ISS related projects present at conferences and/or publish journals.

- 1) We have students working on all ISS projects and plan to have them prepare presentations for conferences in the upcoming year. A doctoral student at MSU who is doing research in bioenvironmental science has a public health component related to her research. She is interested in presented some of her findings at social science

related conferences and in NOAA colloquiums. We are planning to identify opportunities for this in early fall 2009.

2) Percentage of students working on ECSC-approved ISS projects receiving internships at NOAA or related agencies/firms. Goal for Year 3 - 25% of the students working on ISS related projects receiving internships at NOAA.

1) To date there have been no internship opportunities presented. We will continue to explore opportunities for internships with NOAA to address this area.

3) Percentage of students working on ECSC-approved ISS projects employed by NOAA or related agencies/firms. Goal for Year 3 - 50% of the students working on ISS related employed by NOAA.

1) To date we have not had any student graduate and qualify for full time employment with NOAA.

***ISS Goal 3: Collaborate with the researchers within cooperative institutions and with NOAA social scientists.***

Our goal during this period and the remainder of Year 3 is to strengthen opportunities to partner with NOAA affiliated agencies.

**Performance Indicators for Goal 3:**

1) Percentage of ECSC-approved ISS projects that include partnerships with NOAA affiliated agencies. Goal for Year 3 - 75% of the projects will have NOAA collaborations during Year 3.

Currently all ISS projects have a NOAA collaboration. The MSU Oyster Harvesting project has collaboration with the NOAA Aquaculture Division. Also, the new approved project that will examine the social, economic and environmental justice implications of waste disposal by the St. Joe Company collaborates with a social scientist with NOAA's Center for Human Health Risk at the Hollings Marine Lab.

2) Percentage of ECSC-approved project results/findings presented at NOAA sites by ISS faculty and /or students. Goal for Year 3 - 50% of the projects will be presented at NOAA sites by ISS faculty and students.

As mentioned earlier, we plan to identify an opportunity in early fall to present a colloquium at NOAA headquarters on one of MSU doctoral student's research. There may also be opportunities to make presentations on the oyster harvesting project as well. We will finalize these presentation dates in September 2009.

## I:5) Education and Outreach

**Larry Robinson and Michael Abazinge, Thematic Area Leaders**

The primary accounting of ECSC student activities is contained in the EPP Student Tracker Data Base. Although detailed student data are reported separately it is important to note other educational activities herein.

During this period the ECSC has engaged in focused recruitment activities that have served to both attract highly competitive students and increase the visibility of the Center's accomplishments in research and outreach (see Table 5-A).

**Table I:5-A: Select ECSC Recruitment Activities March 2009 – August 2009**

<b>Conference</b>	<b>Location</b>	<b>Dates</b>
FAMU President Tour	Gainesville, FL	March 12-13, 2009
NOBCCChE Annual Conference	St. Louis, MO	April 15-17, 2009
EPP Undergraduates Program	Silver Springs, MD	July 31, 2009

**The Florida A&M University/Environmental Cooperative Science Center (FAMU/ECSC) Annual Environmental Awareness Poster Competition was held March-May, 2009.** The ECSC hosted more than 300 Elementary/Middle School students during the 2009 Environmental Awareness Poster Contest. Participants included students from Sealey Elementary Math and Science Magnet School, and Nims Middle School. (*Appendix 4:A*)

**The Florida A&M University/Environmental Cooperative Science Center (FAMU/ECSC) National Ocean Science Bowl team finished third at NOBCCChE Annual competition April 15-17, 2009.** We are extremely proud of these five high school students along with the ECSC and FAMU Environmental Sciences Institute (ESI) students, staff and faculty who contributed to this remarkable achievement.

**The Florida A&M University/Environmental Cooperative Science Center (FAMU/ECSC) Annual Environmental Sciences Institute Summer Camp was held June 8-27, 2009.** The ECSC hosted 32 High School students for Leon and surrounding counties. (*Appendix 4:B*)

**The Texas A&M University-Corpus Christi/Environmental Cooperative Science Center (TAMU-CC/ECSC) Annual Teaching Environmental Sciences Summer Camp was held July 13-17, 2009.** The camp hosted 12 teachers, 5 high school science teachers; and 7 middle school math and science teachers. (*Appendix 4:C*)

**The Environmental Cooperative Science Center establishes a Social Network.** The camp hosted 12 teachers, 5 high school science teachers; and 7 middle school math and science teachers. (*Appendix 4:D*)

## **Bethune-Cookman University initiates a Department of Integrated Environmental Science.**

The Department of Integrated Environmental Science began operations August, 2009, under the leadership of ECSC Integrated Assessment (IA) Thematic Area Lead, Dr. Michael A. Reiter.

(Appendix 4:E)

## **Section II: Success Stories**

**Natasha Magee** (Jackson State University) received her doctoral degree in Environmental Science, August 2009. Her dissertation is titled, “*Patterns of Abundance and Distribution of Groundfish and their Relation to Environmental Factors in the Northern Gulf of Mexico*”.

**Cinda P. Scott** (University of Miami - Rosenstiel) received her doctoral degree in Biomedical Science, May 2009. Her dissertation is titled, “*The genetic basis for the evolved differences in gene expression in *Fundulus heteroclitus**”. Dr. Scott has been an ECSC-funded doctoral student in Marine Biology and Fisheries at the University of Miami’s Rosenstiel School for Marine and Atmospheric Science since 2002, working on advanced techniques using cDNA microarrays to characterize gene variability in the common mummichog. A peer-reviewed paper in *PLoS One* is in press on the topic, and other papers from her dissertation are under review. She has also presented her work at several conferences, including recently at the Society for Molecular Biology and Evolution Annual Meeting in Barcelona, Spain, and in 2007 at a Gordon Research Conference in Newport, RI. Dr. Scott also was a recipient of a National Action Council for Minorities in Engineering-Alfred P. Sloan Scholarship. She has been active in the Big Blue and You Foundation, working with local youth with emphasis on human impacts on the oceans, marine conservation, and environmental stewardship.

**Eric Evans** (Jackson State University) received her Master’s of Science degree in Environmental Science, August 2009. His thesis is titled, “*Effects of Hurricane Katrina on Land Cover within the Grand Bay NERR*”.

**Ariana Marshall** (Florida A&M University) Environmental Science, August 2009. Thesis: “Policy Response to Coastal Erosion through Construction Permitting Trends Near Apalachicola National Estuarine Research Reserve”. Ariana is admitted into the Environmental Science Ph.D. Program at Florida A&M University.

**Jonathan Watkins** (Jackson State University) received his Master’s of Science degree in Environmental Science, May 2009. His thesis is titled, “*Seasonal and Spatial Variations of Macrobenthic Invertebrates in Three Mississippi Gulf Coast Bayous*”. Jonathan is admitted into the Environmental Science Ph.D. Program at Jackson State University.

**Sheritta Commey** (Florida A&M University) received her Bachelor of Science degree in Environmental Science, May 2009. Her undergraduate thesis is titled “*Chemical Contamination Assessment of the Hudson Raritan Estuary as a Result of the Attack on the World Trade Center: Analysis of Trace Elements*”

**Adrienne George** (Delaware State University) received her Bachelor of Science degree in Environmental Science, May 2009.

**Nwanakaku Onwunli** (Florida A&M University) received her Bachelor of Science degree in Environmental Science, May 2009.

**Judith Sarkodee-Adoo** (Florida A&M University) received her Bachelor of Science degree in Environmental Science, May 2009. Judith is admitted into the Environmental Science M.S. Program at Florida A&M University.

**Malissa Schutte** (Delaware State University) received her Bachelor of Science degree in Environmental Science, May 2009. She has been admitted to the M.S. degree program in Natural Resources at DSU and will be working on wetland restoration.

**Angelica Villareal** (Texas A&M University- Corpus Christi) received her Bachelor of Science degree in Mathematics, August 2009. Angelica plans to attend TAMUCC Graduate program in Mathematics Fall 2009.

**Lorielle Jackson** (Florida A&M University) successfully completed the summer 2009 EPP Undergraduate Scholars Internship Program at NOAA EPP.



**Appendix 1**  
**Ecological Processes and Indicators of Ecological Health**  
**Supporting Information**

## ***Appendix 1:A***

**Proposal Titles and EPIEH-TA Project Scientists** for proposals submitted to date are as follows:

- “Integrated Hydrological and Ecological Modeling for Apalachicola River and Bay System” W. Huang, E. Johnson, and Y. P. Hsieh *\*approved*
- “Drought, Reduced River Flow and Sea Level Rise: Exploring Climate Impacts on Carbon and Nitrogen Cycling in the Apalachicola Bay System” J. Cherrier, S. Smith, P. Hsieh and J. Caffrey *\*approved*
- “Ecological Succession of Wetlands Restored from Agricultural Uses” M. Gao & A. Deshpande *\*approved*
- “The Use of Agricultural Tools to Study the Effects of Environmental Change on Weakfish (*Cynoscion regalis*)” D. McIntosh *\*approved*
- “Benthic Diatom Assemblages as Environmental Indicators in Blackbird Watershed, Delaware” G. Ozbay & K. Coyne *\*approved*
- “Estimation of Survival, Emigration, and Fishing Mortality Rates of American Eel Through a Combined Use of Telemetry and Mark-Recapture” D. Fox, L. Brady, and K.W. Shertzer *\*approved*
- “Ecological modeling of potential habitat for submerged aquatic vegetation at Grand Bay National Estuarine Research Reserve, Mississippi” H.J. Cho *\*approved*
- “Ecotoxicology & Risk Assessment of Mercury in the GB-NERR” P. Tchounwou & Y. Anjaneyulu *\*approval pending*
- “Source Tracking and Assessment of Bacteriological Water Quality at the Grand Bay National Estuarine Research Reserve” I. Farah & P. Tchounwou *\*approved*
- “Assessing the vulnerability of the Chesapeake Bay and Northern Gulf of Mexico to Impacts from Hurricanes” C.L. Fan & J. Anderson *\*pending approval*
- “Deciphering Spatial and Temporal Water Quality Changes Through the Use of Continuous Monitoring, Dataflow Monitoring, and Box Models” C.L. Fan & J. Anderson *\*pending approval*
- “Impacts of environmental and hydrological changes on contaminants and bacterial communities in oysters in Gulf Coast estuaries” C.H. Jagoe, E. Johnson, & A. Chauhan *\*under development*
- “Biomarkers to assess effects of mercury and other pollutants on the biota and ecosystems of estuaries in the southeastern US” Jagoe, C.H., other collaborators to be identified *\*under development*

## ***Appendix 1:B***

### **NOAA/ECSC/EPIEH-TA Publications**

*Student publications are denoted with an asterisk \**

Branch, J.\*, Martinez, J., Akpovo, C., Jagoe, C.H., Johnson, E. and L. Johnson. Bioaccumulation modeling of heavy Metals using LIBS. Second North American Symposium on Laser Induced Breakdown Spectroscopy, New Orleans, Louisiana, July 13-15, 2009.

Nica, C. \* and H.J. Cho. 2009. A study of seagrass, *Ruppia maritima* and *Halodule wrightii*, at Grand Bay National Estuarine Research Reserve. The 2009 Mississippi Water Conference, Aug 5-7, 2009, Tunica, MS.

Smith, S., Branch, J.\*, Sarkodee-Adoo, J.\*, Robinson, L., Cherrier, J., Johnson, E. 2009. Enhancing Sustainability through Environmental Education and Outreach to Under-represented Communities. Ecological Society of America Meeting, August 2-7, 2009, Albuquerque, NM.

## ***Appendix 1:C***

### **NOAA/ECSC/EPIEH-TA Presentations**

*Student publications are denoted with an asterisk \**

Collaborative Research: Outwelling of dissolved organic carbon from salt marshes. Co-PI J. Cherrier (FAMU) with B. Chen (UMass-B), J. Cable (LSU), and C. Meile (UGA). National Science Foundation. \$979,000 for 3 years.

Ecological Modeling of Potential Seagrass Habitat at Grand Bay National Estuarine Research Reserve- NERR Graduate Research Fellowship. PI C. Nica\* (JSU- with H.J. Cho as faculty advisor). National Oceanic and Atmospheric Administration (NOAA). \$40,000 for 2 years.

Experiencing Chesapeake Bay: pathway from high school to geosciences. PI C. Fan (MSU). National Science Foundation. \$198,823 for 3 years.

Habitat Suitability Index for Submerged Aquatic Vegetation of the Mississippi Coast. Cho, H.J. (JSU) and P. Biber (JSU). MS-AL Sea Grant Consortium. \$47,302 for 1 year.

Instructional cruise to support marine ecosystem studies at Florida A&M University. PI J. Cherrier (FAMU). State of Florida-Florida Institute of Oceanography. \$21,600 for 1 year.

Microbial and chemical contaminants in processed catfish for food safety. Co-PI's G. Ozbay (DSU), D. McIntosh (DSU) and B. McCrea (DSU). USDA. \$500,000 for 2 years.

Website for aquatic plants and their habitats of the Mississippi Coast. PI H.J. Cho (JSU). Gulf of Mexico Alliance Environmental Education. \$7,600 for 1 year.

## ***Appendix 1:D***

### **NOAA/ECSC/EPIEH-TA Leveraged Funded Proposals**

Advanced oxidation methods for removal of cyanotoxins from water. Co-PI C.H. Jagoe with M.A. Watts (FSU), W.T. Cooper (FSU), K. Atasi, K (FSU) ,Submitted to Water Research Foundation ,total \$ 306,600 for 2 years

Center for the integrated study of coastal ecosystem processes and dynamics in the Mid-Atlantic Region. P.I: P. Chigbu (UMES), Co-PI: C. Fan (MSU). submitted to the National Science Foundation CREST program Feb. 2009. Total requested funding \$5,000,000. (Note\*: proposal represents a cross center collaboration between two NOAA EPP centers).

Evaluation of microbial ecology, contaminants and dermo disease as a function of increased salinity and mitigation strategies to reduce oyster pathogens. Co-PI C.H. Jagoe C.H. (FAMU) with A. Chauhan (FAMU). Submitted to US Dept of Agriculture, total \$147,866 for 2 years

Monitoring natural and restored SAV beds at Grand Bay NERR. Cho, H.J. (JSU) and P.Biber (JSU). Mississippi Department of Marine Resources (MS-DMR). \$85,238 for 1 year.

Southeast Regional Integrated Sciences and Assessments (SE-RISA). Co-PI L. Robinson (FAMU) with J. Curry (PI, GA-Tech) et al. and FAMU participants J. Cherrier, E. Johnson, W. Huang and T. Islam. Submitted to National Oceanographic and Atmospheric Administration. \$3,500,000 for 5 years.

Renovation of the Research Vessel *Joseph Leidy* at Morgan State University Estuarine Research Center for Research and Education in Marine Science. PI K. Clark (MSU) & C. Fan (MSU). National Science Foundation. \$392,146 for 1 year.

## ***Appendix 1:E***

### **NOAA/ECSC/EPIEH-TA Leveraged Pending**

Advanced oxidation methods for removal of cyanotoxins from water. Co-PI C.H. Jagoe with M.A. Watts (FSU), W.T. Cooper (FSU), K. Atasi, K (FSU) ,Submitted to Water Research Foundation ,total \$ 306,600 for 2 years

Center for the integrated study of coastal ecosystem processes and dynamics in the Mid-Atlantic Region. P.I: P. Chigbu (UMES), Co-PI: C. Fan (MSU). submitted to the National Science Foundation CREST program Feb. 2009. Total requested funding \$5,000,000. (Note\*: proposal represents a cross center collaboration between two NOAA EPP centers).

Evaluation of microbial ecology, contaminants and dermo disease as a function of increased salinity and mitigation strategies to reduce oyster pathogens. Co-PI C.H. Jagoe C.H. (FAMU) with A. Chauhan (FAMU). Submitted to US Dept of Agriculture, total \$147,866 for 2 years

Monitoring natural and restored SAV beds at Grand Bay NERR. Cho, H.J. (JSU) and P.Biber (JSU). Mississippi Department of Marine Resources (MS-DMR). \$85,238 for 1 year.

Southeast Regional Integrated Sciences and Assessments (SE-RISA). Co-PI L. Robinson (FAMU) with J. Curry (PI, GA-Tech) et al. and FAMU participants J. Cherrier, E. Johnson, W. Huang and T. Islam. Submitted to National Oceanographic and Atmospheric Administration. \$3,500,000 for 5 years.

Renovation of the Research Vessel *Joseph Leidy* at Morgan State University Estuarine Research Center for Research and Education in Marine Science. PI K. Clark (MSU) & C. Fan (MSU). National Science Foundation. \$392,146 for 1 year.

## ***Appendix 1:F***

### **ECSC/EPIEH-TA Student Projects**

E. Bautista (B.S., MSU). *Effects of CDOM and TSS on water reflectance spectra in estuarine waters*. Expected graduation date May, 2010 (Advisor Dr. C. Fan-MSU, rest of committee to be formed)

John Branch Jr. (PhD, FAMU): *Novel analytical methods to assess metal contaminants in shellfish*. Expected graduation, April 2012 (Advisor Dr. E. Johnson-FAMU, Dr. C. Jagoe-FAMU, Dr. L. Robinson- FAMU, L. Johnson-FAMU, K. Jackson-FAMU, NOAA committee member to be chosen)

Mike Cinelli (M.S., DSU): *The use of aquaculture tools to study the effects of environmental change on weakfish (*Cynoscion regalis*)*. Expected graduation date May 2011. (Advisor Dr. D. McIntosh-DSU,

committee members Dr. D. Fox-DSU, Dr. Barczewski-DSU, Dr. Scarborough-DE NERR, Dr. Anoruo-DSU, and Dr. Richards-ARS Seafood Safety Lab)

Sherritta Commey (BS, FAMU): *Chemical Contamination Assessment of the Hudson Raritan Estuary as a Result of the Attack on the World Trade Center: Analysis of Trace Elements.*

Graduated April 2009 (Advisor Dr. L Robinson-FAMU, committee members, Dr. D. Apeti-NOAA and Dr. M. Abazinge-FAMU)

Keyana Dickens (MS, DSU): *Uptake and colonization of Vibrio parahaemolyticus in Eastern oysters (Crassostrea virginica) in relation to phytoplankton presence.* Expected graduation date May 2010. (Advisor Dr. G. Ozbay-DSU, and committee members Dr. Coyne-UD, Dr. Barczewski-DSU, Dr. Scarborough-DE-NERR, Dr. Anoruo-DSU, and Dr. Richards-ARS Seafood Safety Lab)

Amy F. Drohan (Ph.D., MSU): *Deciphering how Chl A, turbidity, and nutrient concentrations change as they move downstream of the Potomac River using data flow and dynamic computer modeling.* Expected graduation date Sept. 2012. (Advisor Dr. C. Fan-MSU and committee members Dr. J. Anderson-MSU, and Dr. D. Hill- MSU, Dr. S. Bricker- NOAA, and Dr. P. Tango-USGS)

Chukwuemeka.Ebube (Ph. D., FAMU): *Atmospheric Deposition of Nutrients to the Apalachicola Basin.* Expected graduation date 2014. (Advisors Dr. E. Johnson-FAMU, Dr. W. Huang-FAMU, rest of committee to be formed)

A. Ector-Joseph (B.S., MSU): *Dilution and grazing experiments in the Mackall Cove – predicting the occurrence of algal blooms.* expected graduation date May, 2010. (Advisors Dr. C. Fan-MSU and Dr. J. Anderson-MSU, rest of committee to be formed)

Zakiya Hoyett (Ph.D., FAMU): *Effects of Pharmaceuticals and Personal Care Products on Freshwater Phytoplankton (tentative),* expected graduation, April 2012 (Advisor Dr. L. Robinson-FAMU, committee to be formed).

Tiffini Johnson (B.S., DSU): *Evaluating the Effects of Silver Lake on Water Quality in the St. Jones Watershed.* Expected graduation date May 2011. (Advisor Dr. C. Heckscher-DSU, committee members Dr. Barczewski-DSU, Dr. Scarborough- DE NERR, and Dr. Anoruo-DSU)

Amari Jones (BS, FAMU): *The Investigation of Flood Simulation from Dam Failure using the Hydrologic Engineering Centers River Analysis System,* expected graduation date April 2010 (Advisor Dr. L. Robinson-FAMU, committee to be formed).

Philemon Kirui (Ph.D., JSU): *Genetic and Ecological Variation in *Ruppia maritima*,* expected graduation, May 2011 (Advisor Dr. Hyun Jung Cho - JSU, committee to be formed)

Stephen Kishinhi (Ph.D., JSU): *Assessment of microbiological quality of water in selected Grand Bay NERR Ecosystems.* Expected graduation date August 2010 (Co-Advisors Dr. I. Farah-JSU and Dr. P. Tchounwou - JSU and committee members Dr. P. Tchounwou- JSU, Dr. Woodrey-NOAA/NERR and Mr. D. Ruple-NOAA/NERR)

Akia Laurant (MS, FAMU): *Cumulative impacts of DOM and salinity on *Karenia brevis*: Implications for Apalachicola Bay FL.* expected graduation date December 2009 (Advisors Dr. J. Cherrier-FAMU, Dr. S. Morton-NOAA, and committee members Dr. L. Robinson and Mr. L. Edmiston-NOAA/NERR)

Natasha Magee (Ph.D., JSU): *Patterns of abundance and distribution of Groundfish of the northern Gulf of Mexico*. Expected graduation date April 2012 (Advisor Dr. P. Tchounwou-JSU, Dr. C. Addison-JSU, Dr. M. Hardy-JSU, Dr. T Sturgis-ASU, Dr. P.C. Yuan-JSU, and Dr. Woodrey- NOAA/NERR)

Melanie McHenry-Johnson (Ph.D, JSU): *Ecotoxicology and risk assessment of mercury in the Grand Bay National Estuarine Research Reserve*. Expected graduation date May 2011. (Advisor Dr. P. Tchounwou-JSU, Dr. Arslan-JSU, Dr. M. Woodrey-NOAA/NERR, Mr. D. Ruple-NOAA/NERR, and Dr. W. Luke-NOAA)

C.A. Monuazinge (B.S., MSU). *Estimating phytoplankton biomass and group composition by reflectance spectra in Mackall Cove, MD*. Expected graduation date May, 2010 (Advisor Dr. C. Fan-MSU, rest of committee to be formed)

Cristina Nica (Ph.D., JSU): *Scientific habitat assessment for seagrass restoration*. Expected graduation date April 2012 (Advisor Dr. H.J. Cho-JSU, rest of committee to be formed)

Amanda Pappas (M.S., DSU): *Evaluation of benthic diatoms as water quality indicators in the Blackbird Creek Watershed, Delaware*. Expected graduation date May 2011 (Advisor Dr. G. Ozbay-DSU, committee members Dr. Coyne-UD, Dr. Barczewski-DSU, Dr. Scarborough- DE NERR, Dr. Anoruo-DSU, and Dr. Richards- ARS Seafood Safety Lab)

T.R. Santos (B.S., MSU). *Evaluating the mesozooplankton population and grazing rates in Mackall Cove*. graduated August 2009. (Advisors Dr. J. Anderson-MSU and Dr. M. Olson-MSU, rest of committee to be formed)

Judith Sarkodee-Adoo (B.S., FAMU). *Sex ratio as a function of size in Crassostrea virginica in Delaware Bay*. graduated April 2009. (Advisor Dr. J. Cherrier-FAMU, and committee members Dr. F. Hamilton-FAMU, Dr. D. Apeti-NOAA, Dr. E. Hoffman-ODU)

Judith Sarkodee-Adoo (M.S., FAMU): *Drought, Reduced River Flow and Sea Level Rise: Exploring Climate Impacts on Apalachicola Bay Fisheries*, expected graduation date Aug 2012 (Advisors Dr. J. Cherrier-FAMU, Dr. L. Robinson-FAMU, Dr. S. Smith-FAMU, rest of committee to be formed)

Melissa Schutte (MS, DSU): *Ecological succession on wetlands restored from agricultural uses*. Expected date of graduation May 2011. (Advisor Dr. M. Guo-DSU, and committee members Dr. Barczewski-DSU, Dr. Anoruo-DSU, Dr. Deshpande-NOAA)

Ramona Turner (M.S., FAMU): *A model for using authentic ocean science research to teach global climate change at the secondary level*. Expected graduation date December 2009 (Advisors Dr. J. Cherrier-FAMU and Dr. B. Kelley-FAMU and committee member Dr. M. Abazinge-FAMU)

Venkatramreddy Velma (Ph.D. JSU): *Biomarkers of Hexavalent Chromium Toxicity in Goldfish, Carassius auratus*, graduated - August 01, 2009 (Advisor Dr. Paul Tchounwou – JSU, Dr. Zikri Arslan -JSU, Dr. Elgenaid Hamdain – UMMC, Dr. Anita Patlolla - JSU, Dr. Anjaneyulu Yerramilli – JSU, Dr. P.C. Yuan - JSU)

Jonathan Watkins (M.S., JSU): *Seasonal and Spatial Variations in Macrobenthic Invertebrates in Three Mississippi Gulf Coast Bayous*, graduated – May 08, 2009 (Advisor Dr. Hyun Jung Cho - JSU, Dr. Hafiz Ahmed –JSU, Dr. Dmitri Sobolev – JSU, Dr. Paul Tchounwou - JSU)

Aaron White (Ph.D., FAMU): *The Use of Satellite Telemetry to Identify Sites for the Uptake of Mercury in the Loggerhead Sea Turtle*. Expected graduation December 2009 (Advisor Dr. L. Robinson-FAMU, committee members Dr. M. Abazinge-FAMU, Dr. D. Evans-NOAA, and Dr. R. Carthy-MOTE)

Jessica Wise (M.S., FAMU). Effect of alterations in pH on otolith microchemistry and its impact on fish. Expected graduation date April 2011. (Advisor Dr. M. Abazinge-FAMU, and committee members Dr. J. Cherrier-FAMU, Dr. T. Gerard-NOAA, and Dr. L. Robinson-FAMU)

## ***Appendix 1:G***

### **ECSC Proposal Submission Guidelines:**

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All ECSC proposals must include the following sections in the order presented:

- a complete proposal face page
- a project summary (not to exceed 1 page)
- a project description (not to exceed 5 pages)
- a references section
- a budget (standard federal form)
- a budget justification (template provided)
- NSF-style 2-page curriculum vitas for each project participant (excluding students)
- contact information for a suggested non-affiliated reviewer (i.e. someone at another institution who carries out research in the same thematic area)
- letters of support

Proposals should be double spaced using 2.5 cm (1 inch) margins and Arial size 10 font. Project summary, references, budget, budget justification, curriculum vitas, and letters of support are not included in the project description 5 page total. All of the above listed proposal components must be merged into one file and submitted electronically (as an email attachment, preferably pdf to avoid any computer software compatibility issues). The title of the proposal (i.e. email attachment) must include the last name of the PI, the thematic area, and the date of submission- for example ' jones EPIEH oct 15 08'.

Before the proposal can be submitted to the ECSC Center Director it must first be vetted through the following process:

1. It must first be submitted to and approved by the institutional thematic area (TA) point person. The institutional TA point person must certify whether or not the proposed work is relevant to the TA research focus and the overall NOAA mission. If not relevant, the institutional TA point person should send the proposal back to the project PI for revision. If deemed relevant, the institutional TA point person should then send the full proposal to the ECSC Institutional Principal Investigator for review.
2. The ECSC Institutional PI must verify whether the budget for the proposed work is acceptable and can be covered by the institutional ECSC budget. If the budget is out of line then ECSC Institutional PI should provide input to the institutional TA point person and project PI and the budget should be revised accordingly. If the budget is approved, the ECSC Institutional PI should send the proposal back to the institutional TA point person so that it can be sent to their NERR partner for review.
3. The NERR Research Coordinator (RC) will then review and rank the proposal (they have a standardized form for this) for its relevancy to the NERR mission. Once reviewed the NERR RC will send the form (electronically) to the institutional TA point person.
4. The institutional TA point person will then send the full proposal back to the ECSC Institutional PI along with the NERR ranking sheet. The ECSC Institutional PI will then forward the proposal and ranking sheet on to the ECSC program coordinator (Ms. Linda Miller) along with an email note indicating the thematic area to which the proposal is being submitted, the title of the proposal and names of the project PI's. The note should also indicate that the proposal has been fully vetted by the above process and that the budget has been approved.

After the ECSC Coordinator receives the email with the proposal and NERR ranking sheet she will forward it

all on to the appropriate thematic area lead and TA reviewer for review (It will also be sent to the Center Director at this time).

Proposals will be scored according to the following criteria:

- 1) Intellectual merit of the proposed activity. **(20%)** A) Is the proposed activity applicable to NOAA's overarching mission to "understand and predict changes in the earth's environment and conserve and manage coastal and marine resources to meet the Nation's economic, societal, and environmental needs". B) Would the proposed study advance the current knowledge of the discipline? C) Have the authors demonstrated currency within the field?
- 2) Quality and applicability of the proposed study to the Thematic Area's research focus. **(40%)** A) Is the project consistent with the Integrated Assessment Conceptual Model for the respective NERR site? B) Is the rationale for carrying out the proposed research clearly outlined and compelling? C) Is the project aligned with one of the research foci of the Thematic Area? D) Are the proposed experiments well thought out and aligned with research goals and objectives? E) Are standard QA/QC and/or established procedures being employed for proposed field, laboratory, and modeling activities? F) Does the proposal delineate a plan for how data generated from the study will inform management strategies for the respective NERR site or any on-going modeling studies related to research focus of Thematic Area?
- 3) Qualification of PI to A) carry out proposed research and B) supervise student research. Letters from NERR partner and NOAA collaborator in support of the proposed study. **(10%)**
- 4) Student participation **(10%)**: A) demonstrated student involvement in proposed research activity B) if student has been identified- student's academic record and statement of career objectives, and C) demonstration of student's core competencies for respective ECSC thematic area or a plan for student training in these core competencies.
- 5) Appropriateness of proposed budget to meet project goals and objectives. **(20%)**  
(i.e. budget and budget justification)



## **Appendix 2**

### **Geospatial Analysis and Data Development Supporting Information**

## ***Appendix 2:A***

### **Publications Published**

Cho, H.J. 2009. <http://jcho.masgc.org/> Website of The Mississippi Aquatic Plants. (website).

Cho, H.J. (Ed.) 2009. Aquatic Plants of the Mississippi Coast. Jackson, MS. 136 p. (Book)

Cho, H.J., P. Biber, and C. Nica\*. 2009. The Rise of *Ruppia* in Seagrass Beds: Changes in coastal environment and research needs. Chapter (In) Handbook on Environmental Quality (Eds.) Evan K. Drury and Tylor S. Pridgen. Nova Science Publishers, Inc. Hauppauge, NY. (ISBN: 978-1-60741-420-9).

Shayron Nicoles\*, Hyunju Kim, Ali A. Humos, and Hyun Jung Cho. 2009. A performance evaluation on discrete cosine transform and wavelet-based compression methods for remote sensing images based on image content. Proceedings of the 17<sup>th</sup> International Conference on Geoinformatics 2009. Fairfax, Virginia, USA.

Bhatti, A., D. Rundquist, J. Schalles, L. Ramirez, S. Nasu, and M. Takagi, 2009. A comparison between above-water surface and subsurface spectral reflectances collected over inland waters. GeoCarto International, 24: 2, 133-141.

Gitelson, A., G. Dall'Olmo, W. Moses, D. Rundquist, T. Barrow, T. Fisher, D. Gurlin, and J. Holz, 2008. A simple semi-analytical model for remote estimation of chlorophyll-a in turbid waters: validation. Remote Sensing of Environment, 112, 3582-3593.

Gitelson, A., D. Rundquist, G. Dall'Olmo, B. Leavitt, and W. Moses, 2008. Real-time proximal sensing of water quality. In Heiskary, S. (Ed.), Remote Sensing Methods for Lake Management: A Guide for Resource Managers and Decision Makers, North American Lake Management Society.

Perk, R., D. Rundquist, and A. Gitelson, 2008. Airborne hyperspectral remote sensing: the CALMIT system. In Heiskary, S. (Ed.), Remote Sensing Methods for Lake Management: A Guide for Resource Managers and Decision Makers, North American Lake Management Society.

Rundquist, D., A. Gitelson, M. Lawson, G. Keydan, B. Leavitt, R. Perk, J. Keck, D. Mishra, and S. Narumalani, 2009. Proximal sensing of coral features: spectral characterization of *Sidastrea siderea*. GIScience and Remote Sensing, 46:2, 139-160.

Schill, S., D. Rundquist, A. Fillippi, K. Kvamme, J. Cothren, and J. Tullis, In Press. In situ sensors and field methods. Manual of Remote Sensing, American Society for Photogrammetry and Remote Sensing. 65 pp.

Walker, S., J.C. Lund, D.G. Schumacher, P.A. Brakhage, B.C. McManus, J.D. Miller, M.M. Augustine, J.J. Carney, R.S. Holland, K.D. Hoagland, J.C. Holz, T.M. Barrow, D.C. Rundquist, and A.A. Gitelson. 2008. Nebraska Experience. Cyanobacterial Harmful Algal Blooms: State of the Science and Research Needs. In K. Hudnell (ed.), Advances in Experimental Medicine and Biology. pp. 139-152. Springer Science.

## ***Appendix 2:B***

### **Publications in Press or Submitted**

Cho, H.J. and P. Biber (Submitted). Protocol to involve the public in seed propagation of wigeongrass (*Ruppia maritima* L.) for submerged plant restoration. *Ecological Restoration*

Cho, H.J. and D. Lu. (Accepted). A water-depth correction algorithm for submerged vegetation spectra. *International Journal of Remote Sensing*

Wang, H., C.M. Hladik, H. Wuang, K. Milla, L. Edmiston, M. Harwell, and J. Schalles. Mapping Chlorophyll-a and TSS in Apalachicola Bay, Florida Using MODIS Terra 250 m Imagery. *International Journal of Remote Sensing* (In Press).

### ***Appendix 2:C***

#### **Presentations**

Admiraal, D., D. Alexander, D. Rundquist, J. Stansbury, J. Guo, and M. Drain, 2009. Thermal imaging for discharge and velocity measurements in open channels. 33<sup>rd</sup> IAHR Congress on Water Engineering for a Sustainable Environment. Vancouver, BC. August, 2009.

Altrichter, A.E, J.F. Schalles, T.L. Craven, and M.T. Monahan. Coastal wetland mapping and aquatic chlorophyll prediction using hyperspectral aircraft imagery in Redfish Bay, Texas. Nebraska Academy of Science Annual Meeting, Lincoln, NE. April, 2009.

Cho, H.J. Role of Remote Sensing Research and Education in Intelligence Studies. The 2009 TSU PCAEIS (Pilot Center for Academic Excellence in Intelligence Studies) Spring Academic Colloquium. Tennessee State University, Nashville, TN. April, 2009. (Invited Seminar)

Kwembe, T. and H.J. Cho, 2009. Interdisciplinary training of undergraduates in biological and mathematical sciences with emphasis on marine and coastal science. The Mathematical Association of America (MAA)-SE. Belmont University, Nashville, TN. March, 2009.

Nica, C. \* and H.J. Cho. 2009. A study of seagrass, *Ruppia maritima* and *Halodule wrightii*, at Grand Bay National Estuarine Research Reserve. The 2009 Mississippi Water Conference, Tunica, MS. August, 2009.

Nicoles, S., H.Kim, A. Humos, and H.J. Cho. 2009. A performance evaluation on DCT and Wavelet-based Compression methods for remote sensing images based on image content. 17<sup>th</sup> International Conference on Geoinformatics 2009. Fairfax, VA. August, 2009.

Schalles, J.F. Mapping wetland vegetation and phytoplankton distributions in coastal ecosystems using AISA hyperspectral imagery. Geographic Information Sciences Center for Excellence. South Dakota State University, Brookings, SD. April, 2009 (Invited Seminar)

Washington, M. \* and H.J. Cho. 2009. Development of water correction algorithm for underwater vegetation signals. The 2009 Mississippi Water Conference, Tunica, MS. August, 2009.

### ***Appendix 2:D***

### **Proposals Currently or Newly Funded**

Anoruo, A., and Z. Yang. Integrating research into two Delaware undergraduate institutions' curricula through the Center for Integrated Biological and Environmental Research. NASA. September, 2009 – August, 2012. \$445.3K.

Cho, H.J. Gulf of Mexico Alliance Environmental Education. Website for aquatic plants and their habitats of the Mississippi Coast. March, 2009 - March, 2010; \$7.6K.

Cho, H.J., H.J. Kim, and C.Wafo-soh. National Geospatial-Intelligence Agency. NGA University Research Initiatives. Hyperspectral algorithm development and dimension reduction for improved detection of shallow coastal submerged vegetation. June, 2008 -May, 2010; \$300K.

Cho, H.J., H.J. Kim, and C.Wafo-soh. Hyperspectral algorithm development and dimension reduction for improved detection of shallow coastal submerged vegetation. National Geospatial-Intelligence Agency. NGA University Research Initiatives. June, 2008 - May, 2010. \$299.9K

Cho, H.J. (P.I.) *Ruppia maritima* Restoration using Seedlings in Bayou Cumbest, Grand Bay NERR, MS. Mississippi-Alabama Sea Grant Consortium (MASGC). April, 2008 - September, 2009. \$10K.

Cho, H.J. (P.I.) Strengthening Geospatial Education and Research Capabilities through Remote Sensing Courses that Focus on Hands-on Training and Scientific Applications, National Geospatial-Intelligence Agency (NGA). June, 2007 - October, 2009. \$140K.

Fan C., J. Anderson, R. Lacouture, and M. Reiter. National Science Foundation Enhancing Diversity Track 1: Hyperspectral remote sensing in coastal waters: Increasing research opportunities for underrepresented African American students in marine sciences. July, 2007 - June, 2009. \$84.7K.

Kwembe, T. and Cho, H.J. Co-PI's) UBM: Interdisciplinary Training of Undergraduates in Biological and Mathematical Sciences with Emphasis on Fisheries Stock Assessment. National Science Foundation. October, 2005 - September, 2009. \$300K.

Rundquist, D., PI. Remote Sensing of Algal Chlorophyll and Phycocyanin. Nebraska Department of Environmental Quality. April - December, 2009, \$68.9K

Schalles, J.F. National Aeronautics and Space Administration. AISA hyperspectral imagery for change detection in coastal Mississippi wetlands impacted by Hurricane Katrina. Nebraska Space Grant Office of the NASA National Space Grant College and Fellowship Program. January, 2009 - December, 2009; \$4.4 K.

### ***Appendix 2:E***

#### **Proposals Pending**

Cho, H.J. and M. Deepak. Strengthening Global Climate Change Education through Remote Sensing Application in Coastal Environment using NASA satellite Data and Models. National Aeronautics and Space Administration (NASA). May, 2010 -May, 2013. \$321K.

Cho, H.J. and P.Biber. Monitoring natural and restored SAV beds at Grand Bay NERR Mississippi Department of Marine Resources (MS-DMR). February, 2011 – February, 2012. \$85.3K..

Cho, H.J. and D. Mishra. Geospatial Modeling for Salt Marsh Stress Monitoring and Restoration. 2009 NGA University Research Initiatives (NURI). National Geospatial Intelligence Agency. 2 years \$30K.

Cho, H.J. and P. Biber. Habitat Suitability Index for Submerged Aquatic Vegetation of the Mississippi Coast. MS-AL Sea Grant Consortium. February, 2010 – January, 2011. \$47.3K.

## ***Appendix 2:F***

### **Student Projects**

Edwards, Desiree. M.S. Thesis Student, Texas A & M University – Corpus Christi. Freshwater wetland changes on Live Oak Peninsula, Texas, from 1992-2004 since SWANCC decision using National Wetland Inventory data. [Elizabeth Smith, thesis advisor]

Kirui, Philemon. Ph.D. candidate, Jackson State University. Feature selection and dimension reduction for improved detection of shallow coastal SAV [H.J. Cho: dissertation advisor].

Merani, Paul. Ph.D. candidate. University of Nebraska. Remote estimation of biophysical parameters in selected coastal salt marshes. [Don Rundquist and Sunil Narulamani, co-dissertation advisors].

Morgan, Nikki. M.S. Thesis Student, Texas A & M University – Corpus Christi. Riparian Species composition and distribution along the upper tidal segment of the Mission River, Texas using Hyperspectral Imagery. [Elizabeth Smith, thesis advisor]

Nica, Christina. Ph.D. candidate, Jackson State University. ). Ecological Modeling of Potential Seagrass Habitat at Grand Bay National Estuarine Research Reserve [Hyun J. Cho, dissertation advisor]

Seminara, Drew. M.S. Thesis Student, Creighton University. Thesis topic pending, project will involve imagery classification at the Grand Bay NERR [John Schalles, thesis advisor]

Washington, Marvin. M.S. Thesis Student, Jackson State University. Hyperspectral algorithm development for water effects. [H.J. Cho, thesis advisor].

Wayant, Nicol. M.S. Thesis Student, University of Nebraska-Lincoln. Thesis topic pending [Don Rundquist, thesis advisor].

Wood, John. Ph.D. Candidate, Texas A&M University - Corpus Christi. Seagrass mapping with hyperspectral AISA Imagery in the Mission Aransas NERR [Wes Tunnell, dissertation advisor].



**Appendix 3**  
**Integrated Assessment**  
**in Support of Environmental Decision**  
**Supporting Information**

## ***Appendix 3:A***

### **IA Publications**

(**bold:** IA team member. *Italics:* student member)

*Arismendez, S.S.*, H. Kim, J. Brenner and P.A. Montagna. 2009 (In press). Application of watershed analyses and ecosystem modeling to investigate land-water nutrient coupling processes in the Guadalupe Estuary, Texas. *Ecological Informatics*.

Brenner, J., *S.S. Arismendez*, and **J.W. Tunnell, Jr.** (Undergoing revision). Assessment model for the Gulf of Mexico large marine ecosystem: a proposal. Manuscript submitted to *Ocean and Coastal Management*.

Kim, H., *S.S. Arismendez*, J. Brenner, and P.A. Montagna. 2009. Analyses of historical data and ecosystem modeling in the Guadalupe Estuary, Texas, USA. *Data and Information Management of the Gulf of Mexico* (e-journal), Texas A&M University – Corpus Christi, Texas.

*Nañez-James, S.E.*, G.W. Stunz and S.A. Holt. 2009. Habitat Use Patterns of Newly Settled Southern Flounder, *Paralichthys lethostigma*, in Aransas–Copano Bay, Texas. *Estuaries and Coasts* 32:350-359.

**Reiter, M., M. Saintil, Z. Yang, and D. Pokrajac.** 2009 (In press). Derivation of a GIS-based watershed-scale conceptual model for the St. Jones River Delaware from a habitat-scale conceptual metamodel. *J. Environ. Manag.*

*Also:*

Reid, G. and **P. Tissot.** 2009. *A Teacher’s Guide to Physical Science*. Kendall Hunt, Dubuque, Iowa. ISBN 978-0-7575-6268-6.

## ***Appendix 3:B***

### **IA Presentations**

(**bold:** IA team member. *Italics:* student member)

Charleston, SC 2009. NOAA Hollings Marine Lab Seminar: “Origin, Distribution, and Timing of Texas Hurricanes and ECSC Integrated Assessment Activities.” **T. Islam.**

Corpus Christi, TX 2009. Data Integration and Management on the Gulf of Mexico Workshop: “A Comparative Discussion of Machine Learning and Physical Models for Coastal Ocean Observation Networks.” **P. Tissot,**

Corpus Christi, TX 2009. Data Integration and Management on the Gulf of Mexico Workshop: “On Demand Neural Network Based Water Level Prediction System.” N. Durham, **P. Tissot,** J. Davis and S. Duff.

Madison, WI 2009. Society of Wetland Scientist Annual Meeting: “Identifying Causes of Palustrine Wetland Conversion on a Barrier Strandplain Peninsula in Coastal Texas.” D. Edwards and **E. Smith.**

New Orleans, LA. 2009. Gulf of Mexico Alliance Nutrient Criteria Research Framework Workshop: “Nutrient Flux and Hypoxia in Oso and Corpus Christi Bays, Texas.” *S. Arismendez*, K. Nelson, H. Kim, and P.A. Montagna.

New York, N.Y. 2009. NASA Project Principal Investigator Meeting: “Using Satellite and Fully Coupled Regional Hydrologic, Ecological, and Atmospheric Models to Study Complex Coastal Environmental Processes.” Z. Yang, G. Niu, S. Hong, D. Maidment, C. David, P. Montagna, H. Kim, *S. Arismendez*, J. McClelland, and H. Xie.

Port Aransas, TX 2009. Texas Bays and Estuaries Conference: “A neural network spatial model for salinity in Bahia Grande.” A. Reisinger, **P. Tissot**, D. Hicks, and J. Gibeaut.

Silver Springs, MD 2009. National Ocean Service (NOS) OneNOAA Science Discussion Seminar: “Climatology and Scenarios of Texas Hurricanes and Other Current Activities at ECSC.” [http://www.nodc.noaa.gov/General/NODC-About/Outreach/NODC-seminars09.html#OneNOAASeminar\\_22July2009\\_Islam](http://www.nodc.noaa.gov/General/NODC-About/Outreach/NODC-seminars09.html#OneNOAASeminar_22July2009_Islam). **T. Islam**.

St. Leo, FL 2009. 2009 Annual Meeting of the Florida Academy of Sciences: “An Integrated Assessment and Ecosystem Management Protocol for Decision Making in Coastal Habitats.” **M. Reiter**, **J. Gentile**, and **M. Harwell**.

Tallahassee, FL 2009. NOAA ESI Summer Camp: “Integrated Environmental Assessment.” **T. Islam**.

Washington D.C. 2009. International Marine Conservation Congress: “The Harte Model: An Ecosystem-Based Management Tool for Large Marine Ecosystems.” J. Brenner, *S. Arismendez*, and **J.W. Tunnell, Jr.**

Woods Hole, MA 2009. Ocean Carbon and Biogeochemistry Workshop: “Data Synthesis and Modeling along the Gulf of Mexico Coast: Two Case Studies in Texas Estuaries.” *A. Arismendez*, H. Kim, P.A. Montagna, and **J.W. Tunnell, Jr.**

### ***Appendix 3:C***

#### **IA Leveraged Funded Proposals**

(**bold:** IA team member. *Italics:* student member)

Cooner and Associates, Fort Myers FL 2008-2009, \$47,720. Project: “Tidal or Non-Tidal Nature for Set of Florida Keys Shallow Water Stations” **P.Tissot** and D. Martin.

Southern Regional Coalition and Tuskegee University 2009, \$5,000. Project: “Assessing Socio-economic Vulnerability of African Americans to Hurricanes in the Gulf States using GIS.” **T. Islam**.

US Forest Service, USDA 2009-2011. Southern Research Station Director’s Initiative, \$50,000. Project: “Developing an Integrated Environmental Science Program to Train Bachelors and Masters Students from Under-Represented Groups for Careers in Natural Resource Management”. **M. Reiter**.

### ***Appendix 3:D***

#### **IA Leveraged Pending Proposals**

(**bold:** IA team member. *Italics:* student member)

In review, NSF 2010-2015. Decision Making Under Uncertainty Collaborative Groups (DMUU), \$11,500,000 (BCU \$594,200). Project: "Collaboration for the Study and Support of Local and Regional Level Decision Making Concerning the Impacts and Uncertainties of Climate Change on the U.S. Gulf Coast". **M. Reiter** Co-PI (Consortium of five universities lead by TAMU, PD J. Mumpower).

### ***Appendix 3:E***

#### **IA Student Projects**

***Rosaleen Baluyot***, M.S. Biology student (TAMUCC), completed her thesis proposal and began her spring fieldwork surveying neotropical bird species as they migrated through the Ingleside Barrier Strandplain. This information will provide the basis for her evaluation of the resource management plan and a modified land use/land cover dataset developed within this project in 2007 with the Coastal Change Analysis Program (C-CAP) data provided by NOAA.

***Desiree Edwards***, M.S. Environmental Science student (TAMUCC), completed a non-thesis research paper evaluating the 2004 National Wetland Inventory (NWI) data on Live Oak Peninsula. She presented her results at Society of Wetland Scientists annual meeting in Madison, Wisconsin, in June 2009.

***Nikki Morgan***, M.S. Biology student (TAMUCC), began her first semester in January 2009, and completed her thesis proposal by May. She will be groundtruthing the riparian corridor of Mission River specifically the area with Mission-Aransas NERR conservation easement on Fennessey Ranch. These data will be used to assist Mission-Aransas NERR in developing a long-term management plan for the easement, as well as provide a model for other landowners within the Mission River riparian corridor.

***Yelena Nevel***, M.S. Mathematics (TAMUCC), just started as a ECSC student. Yelena is learning about Kalman filters and the hydrodynamic mode FVCOM. The topic of her thesis will be related to the use of Kalman filters to data assimilate real-time ocean observation (TCOON) data into FVCOM runs.

***Kim Nowells***, M.S. Integrated Environmental Science student (BCU), began her first semester this Spring and has begun work on the MANERR conceptual models as her thesis topic. She participated in the conceptual modeling workshop at MANERR in April, and has been involved in matrix development since the workshop ended.

***Samantha Quisenberry***, B.S. Education (TAMUCC), learned how to optimize neural network models for water level predictions and is optimizing stations along the Texas coast.

***Sergey Reid***, B.S. GIS (TAMUCC), learned how to build grids for hydrodynamic models with the software SMS. He adapted a large grid for Corpus Christi Bay and is working on a detailed grid for Oso Bay, a smaller water body within the area. Sergey also started working on an undergraduate research project applying statistical techniques to identify the type of patterns that generate the largest errors in the water level predictive models and which other available observable may improve model performance.

*Cindy Valencia*, B.S. Biomedical Science (TAMUCC), B.S. Education (TAMUCC), learned how to optimize neural network models for water level predictions and is optimizing stations along the Texas coast.

*Angelica Villarreal*, B.S. Mathematics & Computer Science. During the second part of the year, Angelica helped with the set-up of the hydrodynamic and succeeded in running FVCOM examples on one of the Texas Advanced Computing Center clusters in Austin. Use of a high speed computer cluster is an important step to potentially run the model several times per day for real-time implementation.

### ***Appendix 3:F***

#### **IA Workshops Led or Hosted**

2009. MANERR Modeling Workshop, Initial Matrices Development

2009. DNERR Modeling Meeting, Development of Blackbird Matrices and Models



**Appendix 4**  
**Education and Outreach**  
**Supporting Information**

## Appendix 4:A

### Elementary School Environmental Awareness Poster Competition

Lenita J. Joe



On May 27, 2009, all Sealey students in third, fourth and fifth grade were presented with awards for participation in an environmental awareness poster contest. The contest was sponsored by Florida A&M University Environmental Sciences Institute, NOAA Environmental Cooperative Science Center. During the months of April and May, students did research with media specialist Lenita Joe, listened to a presentation from FAMU graduate students which included a terrific DVD about carbon and global climate change, and worked with art teacher Jean McGoogan to design their posters. All of this paid off for the students as they gained knowledge and understanding of the importance of our environment.

The school received gift certificates to be used to purchase supplies for the school. The winners of the contest were: First Place Overall, Nande DeGraff; Second Place Overall, Miranda Vandenberg and Caroline Zapert ; and Third Place Overall, Josh Ira and Aaron Proctor. Students were also awarded 1st, 2nd, and 3rd place in each grade level. They were 3rd grade, Ellis Chaires, Adrianna Griffin, Amalie Ostertag and Maya Morgan. In 4th grade the winners were, Miranda Vandenberg, Caroline Zapert, Aditya Hota, Laura Hill and Shyanne Kephart. Fifth graders were Nande Degraff, Josh Ira, Aaron Proctor, Brittany Thompson, Elise Gay, Zara Stein, Ram Manickam and Daniel Volya.

Sealey Elementary Math and Science Magnet School is grateful to FAMU, to Dr. Larry Robinson, ECSC Director and Vice President for Research, Linda Miller ECSC Program Coordinator, John Branch, Jr., ECSC graduate student, Shereitte Stokes, ESI graduate student, and Dr. Tanveer Islam, ECSC research associate for providing this opportunity for our students. (Article courtesy of the Tallahassee Democrat)

## Appendix 4:B

### FAMU 2009 Environmental Science Summer Camp *The Uninvited: Investigating the Effects of Invasive Species*

NOAA ECSC hosted the 2009 Environmental Sciences Institute Summer Camp at Florida A&M University on June 8-27, 2009. Thirty-four students were selected to participate in the year's camp. Participants were given the opportunity to be exposed to science in a variety of settings including classroom, field trips, seminars, and laboratory. The classes provided by the summer camp included Discovering Environmental Science, Ocean Science, Geographic Information Systems (GIS), Laboratory Experiments, and Creative Projects.

The theme of the summer camp was: *"The Uninvited: Investigating the Effects of Invasive Species"*. In addition to learning about this "grand challenge" in the classroom, the summer camp participants were exposed to diverse ecosystems where they learned how to identify invasive plants and animals, and how these invasive species affect other organisms in the ecosystem. The summer camp also combined field analysis work with laboratory experiments to address the importance of the invasive species topic.



The invasive species investigation field trips included: Leon Sinks Geologic Area (Crawfordville, FL), guided by FAMU School of Architecture's Matthew Powers; Myers Parks (Tallahassee, FL), guided by Matthew Powers; Apalachicola National Estuarine Research Reserve/Tour of Fort Gadsden Historic Site, hosted by Erik Lovestrand and Alan Knothe; Wakulla Springs State Park; and St. Marks National Wildlife Refuge, hosted by Barney Parker.

The Summer Camp participants presided over their Summer Camp Awards Banquet on June 24, 2009 in Florida A&M University's Rattlers Den. Parents and Guardian were invited to attend so that they would witnessed first-hand the accomplishment of the camp participants.

The End of the Camp trip took place June 25-27 and included: a tour of Arthur R. Marshall Loxahatchee National Wildlife Refuge, hosted by Serena Rinker and Donatto Surratt (FAMU EPP Graduate); a tour of NOAA Southeast Fisheries Science Center, hosted by Effie Duffy (FAMU Graduate), Trika Gerald (FAMU EPP Graduate), and Theo Brainerd (ECSC SAC) [Also, Jacqueline Rousseau, director of NOAA EPP visited the Southeast Fisheries so that she would meet and have discussions with the summer camp participants]; a tour of the Orlando Science Center, and a visit to Sea World.

## *Appendix 4:C*



## TAMU-CC Teaching Environmental Science Summer Camp

“Teaching Environmental Science” is a graduate course designed for those teaching in the K-12 setting. The goal is to provide balanced information and to promote partnerships among teachers, government agencies, businesses, and community organizations in order that their K-12 students may become knowledgeable environmental citizens of the future.

Teaching Environmental Science 2009 was held July 13-17, 2009. A total of 12 teachers enrolled in the course: 5 high school science teachers, and 7 middle school math and science teachers. Funding for the course came from the Texas Higher Education Coordinating Board and the NOAA Environmental Cooperative Science Center. All tuition and fees for the teachers were provided, as well as many resources for their classrooms. The resources provided to the teachers this year included environmental resource materials, seine nets, aerators, hydrometers, and saltwater aquaria; and the class was provided sets of binoculars, compasses, and GPS units. Teachers not only received graduate credit towards a Masters degree, but they also received 45 hours of Continuing Professional Education credit.

## *Appendix 4:D*

### ECSC Social Network

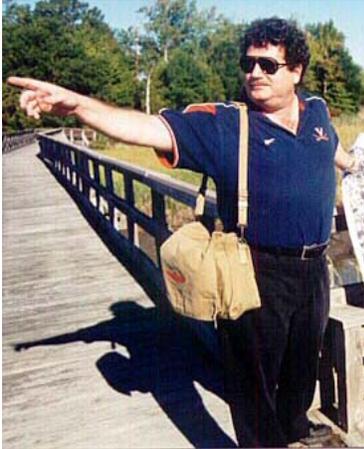
In an effort to increase communication and collaboration across the NOAA Environmental Cooperative Science Center (ECSC), the Education and Outreach Thematic Area of the ECSC has established a Facebook page for all students, faculty, and post-doctoral participants. The Facebook page will be used to make announcements about research activities and opportunities across the ECSC and within NOAA. In addition, plans are being made to offer webinars that will highlight the research and educational activities of the center. The ECSC Education and Outreach Thematic Area leads are Drs. Larry Robinson, Michael Abazinge, and Bernadette Kelley. Dr. Kelley serves as the liaison for the ECSC Social Network.



Dr. Kelley joined the faculty of Florida A&M University in 1995 and is an associate professor of education and technology in the College of Education. She was awarded the “FAMU 1997-1998 Teacher of the Year” award and the “FAMU 1999-2000 Advanced Teacher” award. Her research interest includes incorporating technology into the classroom, teaching via distance learning, and educational reform. Dr. Kelley was recently awarded a consultant contract to work with the educational system in Namibia, South Africa to improve mathematics and science teaching. She collaborated with Dr. Jennifer Cherrier of the Environmental Sciences Institute (ESI) on a Center for Ocean Science Education Excellence (COSEE) grant. In addition, she is collaborating with the ESI on the HBCU RISE, a National Science Foundation funded project. Dr. Kelley’s expertise also provided her with an opportunity to be selected as a Summer Research Fellow for the American Society for Engineering Education (ASEE) in 2001. During this assignment, Dr. Kelley worked with Navy engineers on several projects related to organizational change and performance.

Dr. Kelley is currently collaborating with the ECSC to systemize the education and outreach efforts of each thematic area. She brings with her a dearth of experience and excitement, and she is poised and ready to collaborate once more as the Environmental Cooperative Science Center employ it new social network. Please join the ECSC Facebook group: ECSC-NOAA!

## *Appendix 4:E*



### **Bethune-Cookman University Initiates the Department of Integrated Environmental Science**

The Environmental Cooperative Science Center's Integrated Assessment (IA) Thematic Area Lead, Dr. Michael A. Reiter Chairs a new initiative "the Department of Integrated Environmental Science" at Bethune-Cookman University (BCU). Integrated Environmental Science focuses on interdisciplinary environmental issues that are important to ecological sustainability and human quality of life. The new department started operations fall semester 2009 under the direction of its Chair Dr. Reiter and Dr. Herbert Thompson the Dean of the School of Science, Engineering, and Mathematics. The department of Integrated Environmental Science and its programs represent a culmination of years of faculty interest, administrative support, and feasibility studies. Course offerings in this field are at the bachelors and masters level, they provide students with a strong scientific core and they expose students to other disciplines necessary to address broadly-based issues (such as economics, political science, ethics, etc.) plus the ability to merge these perspectives.

Dr. Reiter used his background and experience to assist in developing the Integrated Environmental Science curriculum. He obtained significant experience in program design during his tenure at prior intuitions,, he worked on the Interdisciplinary Environmental Association's Roundtables on Environmental Science and Study (an effort working toward accreditation/certification standards for college-level interdisciplinary environmental programs), and he has been reviewed by personnel at several national resource management agencies for scope and functionality.

Some of Dr. Reiter's major goals include: using the new programs in the department of Integrated Environmental Science to produce students who pursue careers in Integrated Assessment and Resource Management, and to obtain the background necessary to become involved in the Integrated Assessment efforts of the Environmental Cooperative Science Center.