



**Quality Assurance Report for
Coastal and Aquatic Managed Areas
2011 Quality Assurance Activities**

Florida Department of Environmental Protection

3900 Commonwealth Boulevard

Tallahassee, Florida 32399

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Coastal and Aquatic Managed Areas

Executive Summary for 2011 Quality Assurance Activities

The DEP Office of Coastal and Aquatic Managed Areas (CAMA) manages 41 Aquatic Preserves and in coordination with NOAA, three National Estuarine Research Reserves (NERR), the Florida Keys National Marine Sanctuary (FKNMS), and the Southeast Florida region of the Florida Reef Tract (Coral Reef Conservation Program (CRCP), totaling over four million acres of submerged lands and select coastal uplands. In managing these areas CAMA focuses on a comprehensive, ecosystem-based approach that takes into account the unique attributes and challenges presented by each individual area. Quality assurance and quality control processes are routinely integrated into a wide variety of environmental monitoring, data collection and analysis by CAMA staff and contractors. In many cases CAMA is the only entity performing comprehensive monitoring in these managed areas.

The CRCP oversees a variety of projects including the Southeast Florida Coral Reef Evaluation and Monitoring Program (SECREMP) and the Southeast Florida Coral Reef Water Quality Monitoring Program (SECRWQMP). QAQC processes are integrated into all project aspects with every person performing field sampling and/or lab testing set by Standard Operating Procedures, project-specific requirements and other instructions to ensure samples collected are of acceptable quality and legally defensible. Also FDEP CRCP staff annually participate in the Florida Reef Resilience Program (FRRP) as in-field researchers for our region.

Each Aquatic Preserve has multiple monitoring programs within its specific region including water quality, listed species monitoring and seagrass transect monitoring. Each program undergoes a variety of quality assurance (QA) and quality control (QC) procedures to ensure staff and equipment are collecting the most accurate data possible. QA protocols may vary among the Aquatic Preserves based upon unique site requirements found at each Aquatic Preserve.

As part of a national system-wide project entitled “Synthesis of Ecological and Socio-demographic Data to Categorize Reserve Sensitivity to Climate Change”, each of the three Florida NERRs updated minimum detection level (MDL) data reporting criteria in their nutrient and chlorophyll long-term datasets to facilitate the inclusion of these long-term data in the national synthesis. These long-term datasets are part of the nationally-integrated, NOAA funded System-Wide Monitoring Program (SWMP) that is conducted at all 28 NERR sites.

NOAA invitational travel is offered annually to Reserve staff for SWMP training. This comprehensive training covers operation and maintenance of water quality datasondes and meteorological stations as well as nutrient/chlorophyll collection and handling methods. The training also covers data management, metadata creation and stringent QAQC procedures that are required at all NERR sites. Factory representatives conduct some of the training sessions and are available for consultation with staff in attendance. Due to travel restrictions CAMA staff has not attended this training since February 2009. Maintaining adequate compliance and proficiency in the nationally-integrated SWMP procedures and data management is a requirement of the annual NOAA grant funding received by each NERR in Florida and is critical to the continued success of this program in Florida.

The CAMA staff at the three NERR sites submit annual SWMP datasets and metadata to the NOAA Central Data Management Office (CDMO). Data undergo extensive QAQC by CAMA staff following NERRs protocol prior to submission; additional QAQC is performed by CDMO staff prior to public dissemination of data. SWMP data consist of long-term continuously monitored meteorological, water quality, nutrient and chlorophyll data collected by CAMA staff at each NERR. SWMP data is publicly available at <http://nerrsdata.org/>.

CAMA staff follows FLDEP SOP's for Quality Assurance when applicable, in addition to complying with applicable QA requirements from project-specific funding sources and research partners.

As part of NERR SWMP QAQC, laboratory unknowns were sent to all laboratories performing nutrient and chlorophyll analysis for all NERR sites in October 2011. Results are pending. All laboratories performing nutrient and chlorophyll analysis for the NERR SWMP are certified by the National Environmental Laboratory Accreditation Program (NELAP).

Apalachicola NERR Quality Assurance Activities

1. Training

Apalachicola NERR (ANERR) staff are trained in the various monitoring programs conducted by the reserve, usually by other staff experienced in the particular sampling or monitoring program. Training methods are usually "hands-on" with the trainee observing the trainer. Then the trainee is expected to perform the activity while being observed by the trainer. Training is performed as needed for new staff or in the process of cross training existing staff, depending upon assigned work projects. Training is also done when any changes are made to sampling techniques or equipment. Identification keys and reference collections are maintained and are used in training. Identification keys are also carried in the field for use as needed during sampling and monitoring activities.

Detailed classroom and hands-on training is offered annually by NOAA CDMO for staff involved in the nationally integrated NERR SWMP long-term monitoring and is a valuable tool. Factory representatives are easily accessible during these training sessions and are an in-depth source of information regarding calibration and maintenance of instruments used in the NERR SWMP. Training sessions detailing the QAQC process necessary for the generation of standardized and quality long-term data are presented to attendees. CAMA staff attending prior invitational SWMP training sessions visited Aquatic Preserve sites to pass on information learned at the annual SWMP training. These onsite training activities have been especially helpful in promoting consistent calibration and operation of datasondes collecting water quality data in both Florida's AP and NERR sites. Due to travel restrictions Florida staff have not attended CDMO SWMP training since 2009.

In 2011 three ANERR staff members attended a one-day FWC Sea Turtle Nesting Beach Survey Workshop. The workshop serves as an educational tool and refresher on FWC's standardized nesting survey activities, and imparts information about recent trends in sea turtle nesting data and any changes to protocols. In order to retain one's sea turtle permit attendance is required yearly by the principle permit holder, and bi-annually by all authorized individuals listed on the permit by FL Administrative Code Rule 68E-1. In addition to permit holder Megan Lamb, six members of ANERR's research and resource management staff participate in sea turtle nesting on Little St. George Island.

2. Audits

On-site internal data reviews occur as data from various sampling projects are manually entered into Excel or Access by ANERR staff. Once data are entered they are reviewed for accuracy and completeness. Data received from outside laboratories are reviewed upon receipt for accuracy and completeness.

ANERR staff maintains QAQC of the trawling database, consisting of 11 years of data. The trawling program is conducted monthly at 12 sites in Apalachicola Bay, where five, two-minute tows are completed at each location. All fish and invertebrates are identified and the first twenty of each species are measured. Identifications are verified by staff possessing extensive training and experience in the identification of marine and estuarine fishes and benthic invertebrates. Identification keys are available in the field and a reference collection is maintained in the ANERR laboratory. Data entered into the database are reviewed by qualified staff.

GIS shapefile data received from external sources has been reviewed for accuracy as the data is prepared for use by ANERR staff. Accuracy is determined by comparing landcover and feature shapefiles with up-to-date aerial imagery and by ground-truthing. Corrections to the shapefile coverages are performed by ANERR staff as needed.

On-site internal data review also occurs as electronic data are downloaded from meteorological stations and water quality datasondes maintained by ANERR staff. NOAA SWMP protocols involving the use of QAQC Excel macros to review both electronic data and manually-entered data are followed when applicable. The original "raw" data files are saved electronically in files separate from those files having undergone QAQC.

3. Issues

As part of a national system-wide project entitled "Synthesis of Ecological and Socio-demographic Data to Categorize Reserve Sensitivity to Climate Change", each of the three Florida NERRs updated minimum detection level (MDL) data reporting criteria in their nutrient and chlorophyll long-term datasets to facilitate the inclusion of these long-term data in the synthesis. MDL values had been expressed in the disseminated datasets as a -9999 and coded as such in a separate flag column adjacent to each analyte column of the dataset. The NERR

Data Management Committee (DMC) determined that the presence of the -9999 could potentially affect data synthesis by effectively excluding many low data values from statistical operations. DMC decided that in cases where an analyte was below detection limit the MDL value in use for that analyte at the time of laboratory analysis should replace the -9999. In all cases any value that is below detection limit is given a code, in an adjacent column of the dataset to identify the value as being below detection limit. In cases where a value is obtained via a calculation, if any constituent of the calculation is coded as below detection limit, then the resulting value is also coded as below detection limit. The updates of data for years 2002 through 2007 was performed by ANERR staff in November 2011. These long-term datasets are part of the NOAA funded System Wide Monitoring Program that is conducted at all 28 NERR sites.

GIS shapefiles obtained from outside sources were examined for accuracy by ANERR staff. In some cases these external files were in need of extensive correction due to the large scale at which they were originally processed. ANERR staff were able to redigitize the shapefiles using ArcMap and up-to-date aerial imagery. Ground-truthing is also performed by ANERR staff to verify GIS data such as habitat and land cover shapefiles.

4. Data Submissions

The annual submission of long-term monitoring data collected by ANERR staff occurred in the first six months of 2011. All three NERR sites successfully submitted their 2010 yearly data sets and associated metadata for meteorological, water quality, nutrient and chlorophyll data to the NERR CDMO for additional QAQC and public dissemination.

Provisional data is also submitted to NERR CDMO on a monthly and quarterly basis for the CAMA NERR sites as it is downloaded from their water quality and meteorological stations. Provisional data has undergone a primary QAQC at each site prior to submission. Provisional data is made available to the public, via the CDMO site. All provisional monthly and quarterly datasets undergo secondary QAQC at each NERR site and are then appended into a yearly file. Yearly files are also submitted to CDMO, and undergo additional QAQC prior to public dissemination as authenticated data. Authenticated and provisional data with corresponding annual metadata for all NERR sites can be viewed and /or downloaded at <http://cdmo.baruch.sc.edu/>.

5. Proficiency Testing

As part of NERR SWMP QAQC, laboratory unknowns were sent to all laboratories performing nutrient and chlorophyll analysis for all NERR sites in October 2011. Results are pending. All laboratories performing nutrient and chlorophyll analysis for NERR SWMP are NELAP certified.

Charlotte Harbor and Estero Bay Aquatic Preserves Quality Assurance Activities

Summary

Both Estero Bay Aquatic Preserve (EBAP) and the Charlotte Harbor Aquatic Preserves (CHAP) have multiple monitoring programs within the region, including: water quality, colonial wading and diving bird nest monitoring and seagrass transect monitoring. Each program undergoes a variety of quality assurance (QA) and quality control (QC) procedures to ensure staff and equipment are collecting the most accurate data possible. The CHAP and EBAP monitoring programs each have their own protocols and QA standards.

The CHAP Seagrass Monitoring Program has been ongoing since 1998 and staff ensures accurate Braun-Blanquet measurements with each other throughout the year. The EBAP Seagrass Monitoring Program began in 2002 and 5 transects are measured twice annually to look at seasonal changes within the grass beds. Two observers conduct counts to ensure accurate measurement within each other. The staff from CHAP and EBAP ensure accurate measurements through an annual hands-on field training session with other agencies and local seagrass monitoring staff. Standard field techniques and upgrades to the database have improved this program. This season EBAP protocols were modified to become consistent with survey techniques preformed by CHAP and other local agencies.

The Charlotte Harbor Estuaries Volunteer Water Quality Monitoring Network (CHEVWQMN) program consists of highly trained volunteers that collect and sample various water quality parameters. The volunteers also attend two QA training sessions each year to ensure they are following the protocols and data collection is accurate. Hanna instruments are used for dissolved oxygen and pH; calibration and verification values are assessed following FDEP protocols to ensure data validity.

The CHAP Matlacha Pass Datasonde Program entails rigorous QA/QC standards set by the YSI manufacturing company and NOAA Central Data Management Office (CDMO). The data is entered, reviewed and analyzed in house by CHAP staff and includes monthly water quality collection. EBAP QA/QC procedures for the EBAP Continuous Water Quality Monitoring Program previously consisted of visual inspection and manual flagging of erroneous data by EBAP staff based on NOAA CDMO procedures. In 2011, EBAP staff utilized the NOAA System-Wide Monitoring Program (SWMP) QA/QC macros to review and qualify data collected between 2007 and 2011. Training on the use of the NOAA SWMP QA/QC macros was provided by the RBNERR SWMP Manager. Depth calibrations were improved through the purchase and use of a barometer for real-time data. Increases in probe breakage were addressed as they were encountered. The maintenance and costs of these aging datasondes will continue to be a factor in collecting accurate data.

EBAP staff and volunteers began monitoring nesting, wading and diving bird colonies in 1977 and initiated monthly counts throughout the nesting season in 2008. In 2008, CHAP staff adopted EBAP methodologies and began surveying rookery islands. A double observer

technique is used to conduct surveys in an effort to reduce the chances of double counting or excluding active nests; however detection probability has not been calculated for each of the observers. Detection probability should be calculated for each observer in order to provide direct estimates of population size.

CHAP and EBAP Seagrass Monitoring Programs

1. Training

Once a year before the annual monitoring occurs, CHAP holds a training session with other local seagrass monitoring agencies' staff to 'calibrate' Braun-Blanquet abundance measurements. Each staff member compares abundance and density results with each other in the field during these sessions while looking at the same quadrat. Discussions of field techniques and issues are also addressed at this annual session and throughout the monitoring period. All new CHAP and EBAP staff are trained in the monitoring protocols while in the field.

2. Audits

On-site internal data reviews occur as data from various sampling projects are manually entered into MS Access by CHAP staff. Once data are entered they are reviewed for accuracy and completeness. A complete audit, review and upgrade of the database occurred in September, in order to ensure the accuracy of the data being entered into CAMA's geodatabase.

3. Issues

Locations of each station along the transects were identified as lacking the necessary GPS accuracy to determine the exact location. During review of the entire database for a grant report, data were missing for early years (1998-1999) and some typographical errors were found. EBAP shoot counts were not conducted following the same protocol as local agencies making data analysis and comparison difficult. The CHAP/EBAP QA Officer needs to better manage his time in order to conduct field audits and better assist EBAP staff.

4. Corrective Actions

The seagrass database was redesigned to include additional field observations (i.e. whether stake was found or not), the name of agency collecting data, and the GPS locations of the sites for analysis purposes. Up-to-date and more accurate GPS measurements of each station along the transects were recorded. These GPS locations will help with geo-referencing of each station, as well as aid in future analyses of the seagrass beds' annual variation. Datasheets from the 1998-1999 time period were found and data were entered into database. Typographical errors were addressed and corrected, as well. EBAP protocols and datasheets were updated to follow the same shoot count procedures as other local agencies.

Charlotte Harbor Estuaries Volunteer Water Quality Monitoring Program (CHEVWQMN)

1. Training

New volunteers are trained in the classroom and field according to the June 2010 protocols. Each volunteer attends two QA sessions per year to review protocols on collection of each water quality monitoring parameter, including the calibration and verification process of the instruments. During these QA sessions, volunteers receive additional training, as well.

2. Audits

Each datasheet submitted by the volunteers is reviewed for completeness and for quality assurance (i.e. passing verifications and recording calibrations). On-site internal data reviews occur as data from various sampling projects are manually entered into MS Access by CHAP staff. Once data are entered they are reviewed for accuracy and completeness. A complete audit and review of the database occurred in September, in order to ensure the accuracy of the data being entered into CAMA's geodatabase. In addition, these data are further reviewed by FDEP STORET staff and USF WaterAtlas staff for entry into their respective databases.

3. Issues

Each month, certain datasheets submitted do not pass verification for dissolved oxygen and pH, due to probe failures or verification values not recorded. Water samples were routinely late to the FDEP Central Laboratory in Tallahassee due to problems with the courier, and were qualified.

4. Corrective Actions

The volunteer is contacted to address the reason why they are not passing or recording verifications. A new probe is given to them if probe failure was the reason. During the QA sessions, calibrations and verifications are clarified with each volunteer, as well inspection of the probes and its maintenance to ensure accuracy. A new courier was contracted for shipping CHEVWQMN water samples.

EBAP Continuous Water Quality Monitoring Program

1. Training

EBAP staff receives annual training from the RBNERR SWMP Manager on QA/QC procedures for the continuous water quality monitoring program. The training provides staff with updated macros, handouts and information regarding changes to the NOAA CDMO based on annual trainings provided to NERR staff. The SWMP Manager provides hands-on training of macro use for EBAP staff and identifies any new codes being utilized. Questions regarding calibration, deployment procedures and equipment operation area also addressed at training sessions. EBAP staff attends YSI webinars on probe maintenance, calibration and data management when trainings are available. YSI technical support is contacted for assistance when specific issues arise.

2. Audits

Water quality data collected by the YSI 6600EDS sondes are reviewed and audited on-site by EBAP staff as electronic data are downloaded. The staff visually inspect data during primary review and where deployment data overlap occurs between files, the data produced by the newly calibrated datasonde are generally accepted as being the most accurate. Readings from a hand-held water quality meter are also used to verify accuracy of data at deployment and retrieval times. NOAA SWMP protocols are followed including the use of QA/QC macros to review both electronic data and manually-entered data. "Raw" data files are preserved electronically and copies of the data undergo QA/QC procedures. A complete audit and review of the database is currently underway.

3. Issues

YSI 6600EDS non-vented depth/level sensors were calibrated to read 0 meters at a barometric pressure of 1013.25 mb (760 mm/hg) based on the NERR SWMP standard calibration protocol. Non-vented sensor depth measurements can be corrected if accurate atmospheric pressure data are available. This year a large number of pH probes broke during deployment causing gaps in pH data. EBAP staff follows NOAA CDMO procedures for initial QA/QC but data does not undergo additional review by CDMO or other outside staff prior to public dissemination of data. Data is collected at 15 minute intervals and currently no data management site accepts large quantities of data such as this, so data are not available to the public unless requested.

4. Corrective Actions

A traceable calibration barometer was purchased in order to calibrate equipment using accurate atmospheric pressure readings. The dataset is being merged from the MS Excel spreadsheets into a MS Access database, and will be incorporated into CAMA's geodatabase. A complete audit and review of the database is currently underway in order to analyze the dataset.

Matlacha Pass Datasonde Program

1. Training

CHAP staff are trained by other staff experienced in the program. Training methods is "hands-on," with the trainee observing then performing the activity, while being observed by the trainer. Training is performed as needed for new staff or in the process of cross training existing staff, depending upon assigned work projects. Training is also done when any changes are made in sampling techniques or operation of sampling equipment and gear. CHAP staff also attends YSI webinars on probe maintenance and data management and contacts the company for assistance with particular issues.

2. Audits

On-site internal data reviews occur as data from various sampling projects are manually entered into MS Access by CHAP staff. Once data are entered they are reviewed for accuracy and completeness. A complete audit and review of the database occurred in September, in order to ensure the accuracy of the data being entered into CAMA's geodatabase.

3. Issues

Calibration problems occurred when calibrating to pH of 10 for many of the datasondes as they are approaching 8 years old. The value was out of range and could not be calibrated even with a new pH probe. Many of the sites did not have pH recorded each month as this issue occurred frequently.

4. Corrective Actions

YSI was contacted for technical assistance and each sonde, as the budget allowed, was sent in for repair. The bulkhead was replaced and the pH was able to calibrate correctly allowing pH to be recorded in the field every 15 minutes. Some of these sondes have had their bulkheads replaced several times and new sondes are needed to replace these aging instruments.

EBAP and CHAP Colonial Wading and Diving Bird Nest Monitoring Programs

1. Training

EBAP staff provides training seminars for staff and volunteers annually and include classroom activities, MS PowerPoint presentations and hands-on field training. Volunteers who are unable to attend the annual training are provided with a protocol prior to the start of surveys and staff assists with detection and identification of nests during the survey. CHAP staff provides hands-on training to volunteers and staff, with the trainee observing then performing the activity, while being observed by the trainer. Training is performed as needed for volunteers or in the process of cross training existing staff, depending upon assigned work projects.

2. Audits

Two observers, one staff member and one volunteer (or a second staff member) conduct individual counts and the average of the two counts is used to estimate the number of active nests per species; this reduces the number of birds that are not counted and the probability of double-counting birds. EBAP and CHAP colonial wading and diving bird nest monitoring data are entered into a MS Excel spreadsheet by the primary observer at the end of each survey. A second staff member performs an initial audit and review to ensure no errors were made in the calculation of nests or during data input. Annually, CHAP staff performs a secondary QA/QC review and audit of the data. The entire CHAP dataset was audited, reviewed, and entered into a MS Access database for entry into CAMA's geodatabase.

3. Issues

Detection probability is not calculated for observers. The CHAP/EBAP QA Officer needs to better manage his time in order to conduct field audits and better assist EBAP staff.

4. Corrective Actions

Typographical errors in the CHAP database were identified and corrected, and the locations and names of the CHAP nesting islands were confirmed and corrected as necessary.

Coral Reef Conservation Program Quality Assurance Activities

Summary

The CRCP oversees a variety of projects including, the Southeast Florida Coral Reef Evaluation and Monitoring Program (SECREMP) and the Southeast Florida Coral Reef Water Quality Monitoring Program (SECRWQMP). QA/QC processes are integrated into all project aspects with every person performing field sampling and/or lab testing set by Standard Operating Procedures, project specific requirements and other instructions to ensure samples collected are of acceptable quality and legally defensible. Also FDEP CRCP staff annually participate in the Florida Reef Resilience Program (FRRP) as in-field researchers for our region.

1. Training

FDEP CRCP staff undergoes annual classroom training by The Nature Conservancy's staff for FRRP as a refresher and new staff shadow experienced staff in-water and compare data sheets.

CRCP project contractors, for example those that undertake SECREMP and SECRWQMP, start QA/QC in the project planning stage with the principal investigator (PI), working with DEP and the project team, designing data collection and analysis techniques appropriate for the objectives of each project. All projects are coordinated and managed by the principle investigator (PI), who ensures all researchers understand project objectives, methods, schedule and their responsibilities before project implementation. Annual formal training by contractors is required for the proper use of equipment in the field and laboratory and for sample custody and data entry. QA/QC for data collection and entry starts with well-designed field data collection sheets and data entry worksheets.

2. Audits

FDEP CRCP contractor research teams will discuss the work completed at the end of data collection days, and record issues that need to be addressed prior to the next field day; questions concerning methods can be addressed and suggestions for improving methods can be implemented.

3. Data Submissions

FDEP CRCP contractors are required to write project reports while working with the lead and data analysis researchers who review all draft reports in detail including CRCP staff. QAQC ends with the PI submitting data and reports which provide the information DEP requires.

Guana Tolomato Matanzas NERR Quality Assurance Activities

1. Training

- a. Fouling Community Survey - May 2011, Research staff (W. Eash-Loucks) participated in invertebrate identification course with Steve Kent, Environmental Specialist II, of DEP Central District; June 2011, Research staff (W. Eash-Loucks) discussed project protocols with Richard Osman, a fouling community specialist from the Smithsonian Environmental Research Center in Maryland, and subsequently contacted Richard for assistance with species identification.
- b. Invasive Crab Survey - May 2011, Research staff (W. Eash-Loucks) participated in invertebrate identification course with Steve Kent, Environmental Specialist II, of the DEP Central District.
- c. Sea Turtle Nesting Survey – In March of 2011, Research staff (S. Eastman) and all volunteers who participate attended the mandatory FWC Marine Turtle Nesting Beach Survey Workshop where FWC imperiled species staff educated marine turtle nesting survey personnel on the protocols outlined in the FWC Marine Turtle Guidelines. In April of 2011, Research staff and all volunteers who participate attended the St. Johns County mandatory Habitat Conservation and Protected Species Training where the Habitat Conservation section educated marine turtle monitoring personnel on their Incidental Take Permit and the requirements outlined in the associated Habitat Conservation Plan. April 2011, Research staff and all volunteers who participate in strandings attended the Sea Turtle Stranding and Salvage Network workshop held by FWC and the Wildlife Research Institute, where staff explained the protocols for handling and documenting live and dead stranded marine turtles.
- d. Native Bee Survey - January 2011, Research staff (J. Pawelek) received training from research professor, Dr. Glenn Hall at the University of Florida on how to use keys to identify native bees to the species level. On February 25, 2011, Research staff (J. Pawelek) conducted a training workshop at the GTMNERR for five volunteers focusing on general biology and ecology of native bees, overview of the project survey, and how to collect bees and fill out data sheets.
- e. Gopher Tortoise Burrow Survey - October 14, 2011, Research staff (J. Pawelek) attended the Gopher Tortoise Council annual meeting in Orlando, FL to learn more about sampling techniques and other research within the field. In November of 2011, Research staff (J. Pawelek) learned how to utilize a Trimble GPS device for field use to mark and record gopher tortoise burrows. November 2011, Research staff (J. Pawelek) trained volunteers at the GTMNERR how to identify gopher tortoise burrows and to assess activity status.

f. Water Quality Monitoring - January 2011, Research staff (K. Petrinec, M. Welsh) provided assistance and training to the University of North Florida Engineering Department staff on water quality instrument deployment methods and procedures used in the GTMNERR System-Wide Monitoring Program for use with the University of North Florida Advanced Buoy project. February 2011, Research staff, (M. Kimball, Research Coordinator and Assistant Research Professor, University of North Florida) enabled solely by affiliation with the University of North Florida, attended the annual NERRS System-Wide Monitoring Program Technician Training Workshop to learn Standard Operating Procedures and increase proficiency in water quality and nutrient data collection and deployment procedures, data processing, quality assurance/quality control and data submittal procedures required by the NOAA grant for the nationally-integrated System-Wide Monitoring Program (SWMP). September 2011, Research staff (M. Welsh) provided training to GTMNERR staff on deployment procedures for a water quality monitoring project located in Guana River and Guana Lake. November 2011, Research staff (K. Petrinec) provided training for a new research technician at the GTMNERR on the Standard Operating Procedures used in both the System-Wide Monitoring Program and the GTMNERR Dam Water Quality Project.

g. Meteorological Monitoring - February 2011, Research staff (M. Kimball, Research Coordinator and Assistant Research Professor, University of North Florida) enabled solely by affiliation with the University of North Florida, attended the annual NERRS System-Wide Monitoring Program Technician Training Workshop to learn Standard Operating Procedures and increase proficiency in meteorological data collection and instrument deployment procedures, data processing, quality assurance/quality control and data submittal procedures required by the NOAA grant for the nationally-integrated System-Wide Monitoring Program (SWMP) In July of 2011, Research staff (K. Petrinec) provided training and assistance to researchers at The Harbor Branch Oceanographic Institute on the SWMP Meteorological component's Standard Operating Procedures.

h. Phytoplankton Survey - June 2011, GTMNERR staff (L. Flynn) received training on the Phytoplankton Monitoring Network (PMN) program protocols from Matthew Brim of the National Oceanographic and Atmospheric Administration (NOAA) Biotoxins Division. August 2011, GTMNERR staff (L. Flynn) received training on the biology and identification of harmful algal blooms from Cliff Ross at the University of North Florida. December 2011, GTMNERR staff (L. Flynn) conducted a training workshop on NOAA PMN program protocols for volunteers at GTMNERR.

2. Audits

a. Fouling Community Survey - October 2011, Research staff (W. Eash-Loucks, M. Kimball) reviewed sampling protocol and identified a number of issues that needed to be addressed; December 2011, Research Staff (W. Eash-Loucks) reviewed identifications and created electronic database for backup data recording.

b. Invasive Crab Survey - May 2011, Research staff (W. Eash-Loucks, K. Petrinec) reviewed all electronically-entered data against hard-copy data (2002-2010 samples). Suspicious identifications were checked and corrected if necessary.

c. Sea Turtle Nesting Survey - May-November 2011, Research staff (S. Eastman) received and reviewed all data during this period then submitted weekly marine turtle nesting temporal and spatial data to SJC via a supplied spreadsheet, submitted monthly marine turtle nesting data to FWC, and submitted annual marine turtle nesting data to both FWC and USFWS.

d. Native Bee Survey - March 2011, Research staff (J. Pawelek) observed volunteers as they conducted native bee surveys to ensure sampling guidelines were being followed. Data sheets were reviewed immediately following sample dates.

e. Gopher Tortoise Burrow Survey - Research staff (J. Pawelek) downloaded and reviewed all data from field surveys collected with the GPS unit and in field notebooks after each survey date, then entered data into an electronic database.

f. Water Quality Monitoring - February-November 2011, Research staff (K. Petrinec) collected and downloaded all raw data for the System-Wide Monitoring Program and uploaded them to the CDMO within one week of instrument retrieval. After data was returned to GTMNERR, a secondary QAQC process was conducted where data were edited and processed using a Microsoft Excel macro where QAQC flags and codes were applied. Secondary QAQC files were then exported to the CDMO for a final, tertiary QAQC process; September-October 2011, Research Staff (K. Petrinec) performed an audit of all data collected in the Guana River and Guana Dam sampling sites for the last 2.5 years.

g. Meteorological Monitoring - February-November 2011, Research staff (K. Petrinec) collected and downloaded all raw data for the System-Wide Monitoring Program and uploaded them to the CDMO within one week of instrument retrieval. After data was returned to GTMNERR, a secondary QAQC process was conducted where data were edited and processed using a Microsoft Excel macro where QAQC flags and codes were applied. Secondary QAQC files were then exported to the CDMO for a final, tertiary QAQC process.

h. Phytoplankton Survey - January-December 2011, GTMNERR staff (L. Flynn) monitored (monthly) volunteer field personnel for sampling performance and proficiency and conducted manual data reviews on plankton identification and entry into NOAA PMN data portal.

3. Issues

a. Fouling Community Survey - Issues with sampling protocol were identified as follows: Tile (slate) would flake off and specimens would be lost; Zip ties interfered with settlement; Three sites did not fully reflect diversity of GTMNERR environments; Collection of plates by boat was difficult and limited by weather; All animals were counted to assess density, which was very time-consuming.

- b. Invasive Crab Survey - Issues with sampling protocol were identified as follows: Data had not been recorded electronically in a consistent format; Survey had been completed but crabs had not been measured, sexed, or identified in several years.
- c. Sea Turtle Nesting Survey - Nothing to report.
- d. Native Bee Survey - Research staff (J. Pawelek), after observing volunteers during sampling periods, addressed several issues including how collections were being labeled and the completeness of data sheets. The initial protocol called for pan traps to be suspended above the ground using bent wires, but during the first survey the wires were problematic and could not hold the pans securely.
- e. Gopher Tortoise Burrow Survey - Nothing to report.
- f. Water Quality Monitoring - Research staff (K. Petrinec) received 2007 GTMNERR water quality data from CDMO after their review; CDMO recommended adding and changing some of the QAQC codes for dissolved oxygen and turbidity data; Issues with GTMNERR Guana River Dam Water Quality data for Specific Conductivity/Salinity were deemed possibly inaccurate which was attributed to the datasonde deployment method.
- g. Meteorological Monitoring - Research staff (K. Petrinec) received 2008 GTMNERR Meteorological data from CDMO after their review; CDMO recommended adding additional QAQC flags and codes for some of the Photosynthetic Active Radiation (PAR) data (GTMNERR is one of two Reserves experiencing elevated night-time PAR values).
- h. Phytoplankton Survey - Nothing to report.

4. Corrective Actions

- a. Fouling Community Survey - November 2011, Research staff (W. Eash-Loucks) made several changes to the sampling protocol including: Stone tiles were replaced with PVC tiles; New settlement plates made so zip tie will not interfere with settlement; The number of study sites was expanded to seven sites to cover a broader area; Collection devices are now deployed from docks for easy access (vehicle/walking rather than boat); 100-point sampling method now used for assessing diversity/density on individual settlement plates.
- b. Invasive Crab Survey - Research staff (W. Eash-Loucks, K. Petrinec) made several changes to the sampling protocol including: May-April 2011, All data were transferred to the same format for consistency and data previously only in hard copy were entered electronically; February-March 2011, Backlogged samples were identified, measured, sexed, and data were entered electronically.
- c. Sea Turtle Nesting Survey - Nothing to report.

- d. Native Bee Survey - Research staff (J. Pawelek) met with each volunteer to demonstrate exactly how data sheets should be completed and the exact information to be included with each collection. Instead of using wires to hold the pans they were instead placed directly on the bare ground.
- e. Gopher Tortoise Burrow Survey - Nothing to report.
- f. Water Quality Monitoring - Research staff (K. Petrinec) made the CDMO recommended changes to the 2007 GTMNERR Water Quality data; Research staff (K. Petrinec, T. Harding), in an effort to correct the Specific Conductivity/Salinity data problem, altered the position of the deployment tube as well as the orientation of the water quality instrument inside the PVC tube.
- g. Meteorological Monitoring - Research staff (K. Petrinec) made the CDMO recommended changes to the 2008 GTMNERR Meteorological data.
- h. Phytoplankton Survey - Nothing to report.

Indian River Lagoon Aquatic Preserve Quality Assurance Activities

Shoreline Restoration Project Summary

The Indian River Lagoon (IRL) Shoreline Restoration Project (SRP) started in 1995 through the Environmental Learning Center with a goal of re-establishing fringing mangrove habitat along the IRL. FDEP CAMA's Indian River Lagoon Aquatic Preserves (IRLAP) field office began managing the IRL SRP in February 2008. Prior to 2008, 11,719 red mangroves, *Rhizophora mangle*, were planted at 58 sites along the IRL in polyvinyl-chloride (PVC) encasements. As of September 2011, 404 of the original 11,719 mangroves were alive at 29 of the original 58 sites (3.4% survivorship).

In 2008, FDEP CAMA decided to conduct an experiment to test two other mangrove planting methods against the PVC encasement method; a multi-stem individual and a mature. The three planting methods were planted along three elevations starting at the annual high water line and continuing 1.5 m waterward, generating a 3 x 3 grid (9 plants each)(Johnson et al 2008). A total of 85 grids were established in either late summer or spring. Results after 36 months indicate that the success of propagules placed in PVC encasements have been the most successful when planted in late summer (25% survival). However, 27 months of data on sites planted in the spring show mature individuals to have the greatest success (10% survival). There is no difference thus far in survival of the three different planting methods established during the three fiscal years based on three elevations (a, b, c) (G-test less than $c^2_{[0.05]4} = 9.49$).

In 2010 the SRP shifted its focus to looking at restoring ecosystem function overtime by transitioning from saltmarsh habitat to mangrove-dominated shorelines. Two pilot projects were implemented during 2010 on U.S. Fish and Wildlife Service Archie Carr National Wildlife

Refuge properties (Vaughn et al 2010). Both sites received similar treatments of *Spartina patens* and *S. alterniflora*. Results after one year has shown: natural recruitment of red mangroves, seeding of grasses, rhizome spreading and sediment trapping. Seven additional sites were planted in spring 2011.

IRL currently manages 49 sites, which include 29 sites with PVC encasements, 10 experimental grid sites, 3 supplemental mangrove planting sites, and 7 saltmarsh grass sites. Data collected in 2011 indicate that 702 m³ (0.57 acre-feet) of canopy volume and 661 m² of saltmarsh habitat have been added to the IRL shoreline through the SRP since 1995 (Owen et al 2011).

1. Training

Staff and volunteers are taken to each of the planting sites according to a regimented monitoring schedule. Individuals are trained in using GPS coordinates to find planting sites. Once in the field staff and volunteers are trained in using monitoring tools that are site specific; i.e. calipers, ruler, transect tape. Datasheets are produced by the IRL SRP Coordinator and are distributed to collect monitoring results. The coordinator explains datasheet prior to data collection.

2. Audits

Once data is collected the IRL SRP Coordinator verifies results prior to leaving field site. Results are subjective depending on the person collecting the data. Upon uploading the data electronically the IRL SRP Coordinator checks the validity a second time according to data collected during prior site visits.

3. Issues

The dynamics of the shorelines of the IRL make assessing survivability sometimes tricky. Monitoring which takes place immediately following extreme frost or storm events sometimes shows complete loss of plantings. In circumstances such as these sites should be assessed for a minimum of six months post events to assure new growth is accounted for.

References

Johnson, L.K. and Herren, L.W. 2008. Re-establishment of fringing mangrove habitat in the Indian River Lagoon. Shoreline restoration project final report FY 2007-2008. Prepared for St. Johns River Water Management District Contract # 24860 and FDEP Grant # FC411.

Owen, J.L. and Sharpe, B.T. 2011. Indian River Lagoon Shoreline Restoration Project FY 2010-2011 Final Report. Prepared for St. John's Water Management District Contract #26625 and FDEP Grant #FC427.

Vaughn, J.L. and Herren, L.W. 2010. Indian River Lagoon Shoreline Restoration Project FY 2009-2010 Final Report. Prepared for St. John's Water Management District Contract #25447 and FDEP Grant #FC417.

Indian River Lagoon Aquatic Preserve Spoil Island Coastal Bird Monitoring Summary

Spoil Islands of the Indian River Lagoon were created from dredge material during the creation of the intracoastal waterway (ICW) in the 1940's and 1950's. Since their creation they have become established with native and exotic plant species, serve as habitat for a variety of animals and a recreation destination for humans. Coastal bird species in particular have taken to utilizing certain islands as roosting/nesting habitat, with several islands serving as large scale rookeries. Most of these islands were identified in the Spoil Island Management Plan (SIMP 1990) as conservation islands and do not provide for public access or recreation. Spoil islands are becoming increasingly important to coastal bird species for nesting areas as a habitat on the mainland and barrier island are destroyed by development. Many state or federally listed bird species use spoil islands for nesting/roosting including: Least Terns (*Sternula antillarum*), Wood Storks (*Mycteria americana*), American Oystercatchers (*Haematopus palliatus*), and Roseate Spoonbills (*Ajaja ajaja*). The Indian River Lagoon Aquatic Preserves Field Office (IRLAP) staff conducts all of the monitoring but are sometimes assisted by volunteers or other government agencies' personnel. IRLAP staff monitors islands within their range during nesting season for species, number, and behavior of birds present.

1. Training

IRLAP Staff are typically trained in a "hands on" manner for conducting bird surveys. Before a survey, the trainee is shown the data sheet and instructed on proper way of recording information. They are also shown aerial maps of the sites that will be visited to as well as the route which will be taken around each island. Then the trainee engages in an actual survey in which both trainer and trainee participate. Field guides, binoculars, and a telephoto camera are provided to assist in surveys. The trainee's results are compared against the trainer, who observes and offers feedback.

2. Audits

Monitoring for each site is done redundantly, with each observer confirming readings before moving on. Photographs are taken of any controversial identification and noted on the data sheet. They are then reviewed back at the office by staff for consensus on ID.

3. Issues

Since each area is monitored once per month, there is a high degree of variability to potential results due to weather and irregularities in seasonal climate trends. Early or delayed onset of cold temperatures can sometimes throw off the start of typical nesting season. High winds may also drive birds from one side of an island to another, or another island altogether.

4. Corrective Actions

When unusual events (change in nesting area, large mortalities, etc.) are observed during surveys, the instance is recorded on the data sheet and logged. Depending on the type and severity of the event, monitoring frequency in the area may be increased.

Appendices & References

Florida Department of Natural Resources. 1990. Indian River Lagoon Spoil Island Management Plan. The Bureau of Submerged Lands and Preserves.

St. Martins Marsh and Big Bend Aquatic Preserves Quality Assurance Activities

Water Quality Monitoring

Water quality monitoring using YSI dataloggers began within the Aquatic Preserves in early 2004. APs constructed stations where YSI 6600 EDS data sondes have been deployed to continuously monitor selected abiotic parameters (temperature, specific conductivity, salinity, dissolved oxygen, pH, depth, and turbidity). The positions of these water quality stations allow for comparisons between relatively pristine versus more urbanized drainage basins as well as higher versus lower salinity regions of the estuary. Historically, all data were recorded at 30-minute intervals; however, a 15-minute interval is currently employed to increase data resolution. The objective of this effort is to quantify the spatial/temporal variability and trends, both seasonally and as a function of tidal forcing, of selected abiotic parameters (e.g. establish baseline data) within the APs.

Sonde exchanges at the 6600 EDS sites are made at approximately two week intervals. At the end of a sampling period, sondes are returned to the laboratory where post-deployment readings and reconditioning take place in accordance with the methods outlined in the YSI Operating and Service Manual. The results of these post-deployment readings are used to evaluate the validity of data. Data are compiled and processed by various MS Excel macros created by Aquatic Preserve staff and the National Estuarine Research Reserve's Central Data Management Office (CDMO). Data storage and dissemination is site-specific, as a data management office or FTP web site has not been created or is available for the Aquatic Preserve program.

Habitat Assessment - Seagrass

1. Training

Sensitive habitat assessment is relatively subjective and quality control must be exercised during sampling events. Evaluation requires personnel have a level of taxonomic expertise. Ongoing standardization of observers is achieved by on-site refreshers of standard percentage covers by all observers prior to monitoring. Standard coverage estimate calibrations are performed at the beginning of each sampling event to ensure precision and consistency between observers. At each sampling station two individuals independently conduct coverage estimates to validate the

assessment results. For the most part however uncertainties in percentage cover or species identification are mitigated in the field via direct communication. In addition, cross training with FWRI staff occurs as needed.

2. Field Data Base Management

Management of data in the field is of paramount importance. Without proper data management the quality of the data generated is questionable. Field data management consists of two categories; written data sheets and electronic data. In general all data will be recorded on hard-copy datasheets while on-station, and entered into a computer in the field office.

3. Electronic Data Entry / Audit

All information recorded on the datasheets must be entered into a computer for eventual transfer to the database. This should be done as soon as possible, while the sampling event is “fresh” in the crew’s mind. Once the data are entered they are reviewed and audited by another staff member.

Wekiva River Aquatic Preserve Quality Assurance Activities

Bird Surveys

The surveys (conducted from the river) are led by at least one experienced birder (with a high level of local knowledge) usually accompanied by one or two spotters and a boat driver (who acts as another spotter). The leads agree on species (by sight, call, or both) and a count/estimate of numbers (if more than one bird is seen, and flock numbers can run into the 1000's). We carry binoculars and several field guides to aid with species identification. When possible, less known or unusual birds are photographed for later review. We have former SJRWMD staff, state park biologists, volunteers from environmental consulting firms, and very capable Audubon Society members who occasionally assist during the surveys.

Field data is tabulated by one individual on sheets created in-house. To simplify field work, commonly seen species are listed alphabetically on the sheet. Tabulators are briefed before they begin on proper procedures for filling out the data sheets, and that is their primary responsibility for the day.

We partition the river system into a series of segments (approximately 1.0 to 1.5 miles per segment) using readily identifiable landmarks. One or more members of the group usually has specific knowledge of the segments. Segments are identified on the worksheet. A set of aerial maps with the segment end points is on the boat, and there is at least one GPS unit (usually a Garmin GPS 76) with the waypoints loaded on the boat.

The GPS unit is also used to record points of interest, including limpkins (one of our indicator species), nesting wading birds, and bald eagles.

The data are entered into an Excel spreadsheet by staff at the Aquatic Preserve office. We send the species list and numbers to the observers to verify the data.

The data have been used to compile an up-to-date species list for the Aquatic Preserve (177 species and counting) that is distributed to the general public upon request and at various festivals in which we participate. The limpkin data (often collected using recorded calls) has been used to establish the stability of the local limpkin population over 15 years or so. During a chance meeting, I briefly described the dataset to the chair of the UCF Biology Department, and he seemed interested in trying to assist us in data analysis, possibly using a graduate student (We'll be pursuing that next month). Our goal is to establish regular surveys of the entire system (but like everyone else, it is a matter of too little time and too many projects). We have approximately 60 linear miles of rivers (including backwaters and tributaries) within the Aquatic Preserve.