Quality Plan for

Guana Tolomato Matanzas
National Estuarine Research Reserve (GTMNERR)
Research Program

Florida Department of Environmental Protection (DEP)

505 Guana River Road
Ponte Vedra Beach, FL 32082

(904) 380-8600

Prepared by
GTMNERR Research Program
December 2024

Effective Date: December 20, 2024

Signature Page

The undersigned have read and understood this Quality Plan, are charged with managing and improving the quality system, and are responsible for ensuring that all staff properly execute the procedures discussed in the plan.

_____   12/19/2024

GTMNERR Manager

_____   12/19/2024

GTMNERR Research Coordinator

_____   12/19/2024

GTMNERR Quality Assurance Officer

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Introduction

The DEP Quality Assurance (QA) program involves the implementation of a management system (planning, review, training, and assessment) to ensure that data collection, generation, interpretation, reporting, evaluation and archiving of data are of sufficient quality to support Department decisions. The effectiveness of the DEP QA program is dependent upon the actions of all DEP staff throughout the entire organization. One aspect of the QA program is to ensure that Department QA activities are carried out according to commitments made to the Environmental Protection Agency as enumerated in the DEP Quality Management Plan (QMP) (Revision 8, March 2018).

The DEP Secretary is committed to implementation of the quality assurance requirements in the QMP and as authorized at Section 403.0623, F.S., and Chapter 62-160, F.A.C. (the DEP QA Rule). It is the Secretary's intent to carryout these obligations and requirements as described in the Department's QA Directive, Directive 972 (Revision 11/1/2016).

In order to execute the components of the DEP QA Directive, the GTMNERR Research Program has developed a quality system. This document describes the steps the GTMNERR takes to ensure the scientific and legal defensibility of the environmental data we generate or use. It details the process of planning, training, execution, assessment, and corrective action we undertake to ensure that environmental data meets our established quality criteria and scientific objectives for each project. The GTMNERR is committed to following good quality assurance (QA) and quality control (QC) management practices to produce data.

Quality Plan Elements

This Quality Plan explains both the process and criteria by which the quality system is managed. The plan is utilized as an instrument of internal communication to inform our staff of current and future quality assurance activities. It discusses how specific QA duties are assigned to responsible staff. The GTMNERR will revise our Quality Plan as needed and will ensure the consistent application of procedures and criteria for the generation or use of our environmental data. The Quality Plan will also be used as a training document for new staff and as a reference for experienced personnel. The plan and its revisions also serve as an archival record of our formal quality system.

The elements of our plan are consistent with the Department's QMP, QA Directive, and QA Rule (Chapter 62-160, F.A.C.). Our plan addresses all activities associated with sampling, field testing, and data management (review and entry).

Where appropriate, we cite existing internal and external documents, including training materials, checklists, and standard operating procedures (SOPs) throughout the quality plan. We expect all research staff to read, understand, and follow the procedures and criteria as discussed in this plan, and to carry out their assigned responsibilities for effective utilization of our quality system.

Statement of Policy

This Quality Plan for the GTMNERR Research and Monitoring Program headquartered in Ponte Vedra Beach, Florida, states the procedures used in the Research program to ensure that data generated by

the GTMNERR is of verifiable quality and meets required scientific objectives for each project. The GTMNERR is committed to following good quality assurance (QA) and quality control (QC) management practices to produce data.

Data Quality Objectives

The following list of quality objectives provide a reference framework for the GTMNERR research program. Through the implementation of this plan the GTMNERR strives to:

- Maintain a high level of accuracy and consistency in collecting scientifically valid and legally defensible short- and long-term monitoring data (water quality, weather, biological systems, habitat, etc.)
- Ensure that sampling and data management procedures follow program/project SOPs
- Ensure that research personnel are adequately trained to perform their designated monitoring and analysis functions
- Evaluate data collected and ensure that it meets program requirements
- Qualify data collected to ensure that it is usable, accurate, and defensible
- Implement corrective actions if data quality objectives are not met
- Ensure that GTMNERR research contracts are appropriately managed and reviewed in order to maintain that data collected is of a comparable usability to that of GTMNERR managed programs
- Review non-GTMNERR generated data and metadata used in GTMNERR projects and ensure that they meet program quality standards prior to use
- Generate and summarize results for reports and meetings

Ethics Statement

All DEP employees and contract employees of GTMNERR are held to high professional ethical standards in the performance of their duties. All employees are required to read and understand an 'Ethics Statement' attesting to their commitment to honesty and integrity in performance of their duties. In addition, all employees are required to attend an annual ethics training class. Improper, unethical or illegal actions will be dealt with according to the published Administrative Directives of DEP.

Organization and Responsibilities

Organization

The GTMNERR is one of 30 National Estuarine Research Reserves that were established under Section 315 of the Coastal Zone Management act (CZMA) of 1972 for long-term research, education, and stewardship. The GTMNERR is administered by the National Oceanic and Atmospheric Administration (NOAA) in cooperation with Florida's DEP Office of Resilience and Coastal Protection (RCP) which resides within DEP's Water Policy and Ecosystem Restoration Division. The GTMNERR Research program is located at GTMNERR Visitor Center, 505 Guana River Road, Ponte Vedra Beach, FL 32082. The telephone number is (904) 380-8613.

The function of the GTMNERR research program is to perform research and monitoring activities that identify and track short-term variability and long-term changes in the estuary. Research and Monitoring program personnel are responsible for following research and monitoring activities that are guided by national and/or state plans that identify goals, priorities, and implementation strategies. The quality system and technical requirement described in this document are applicable to the following programs managed by the GTMNERR:

- System-Wide Monitoring Program (SWMP)

  SWMP was initiated in 1995 and was developed in consultation and partnership with several other national monitoring efforts including NOAA, the National Status and Trends Program, the US Environmental Protection Agency (EPA) Environmental Monitoring and Assessment Program, the National Park Service (NPS) Inventory and Monitoring Program, and the National Science Foundation (NSF) Long Term Ecological Research Program (LTER).

  SWMP is an issue-driven long-term monitoring program that uses the NERRS as a network of coastal and estuarine reference sites for evaluating ecosystem function and change. A primary goal of SWMP is the collection and analysis of long-term data that have relevance to management issues and can improve understanding and inform decisions affecting estuaries and coastal watersheds. SWMP data are collected using standardized approaches across the national system and data collection is designed to provide a high degree of spatial coverage and temporal resolution (NERRS System-Wide Monitoring Program Plan, 2011).

  Water Quality

  Continuous water quality monitoring procedures conducted by GTMNERR are done in accordance with the nationally coordinated and standardized SWMP. The goal of the SWMP is to develop quantitative measurements of short-term variability and long-term changes in the water quality, biotic diversity, and land-use or land-cover characteristics of estuaries and estuarine ecosystems for the purposes of contributing to effective nationwide coastal zone management. The SWMP water quality provides valuable long-term data on water quality at 15-minute time intervals using Xylem/YSI data sondes to obtain readings. The GTMNERR maintains four long-term water quality stations in Northeast Florida, Pine Island (PI), San Sebastian (SS), Fort Matanzas (FM), and Pellicer Creek (PC).

  Meteorological

  The GTMNERR operates a meteorological station, Pellicer Creek (PC), adjacent to Pellicer Creek in Princess Place Preserve, Flagler County, Florida. Meteorological conditions are measured in 15-minute intervals in accordance with the nationally coordinated and standardized SWMP. The principal objective is to measure short-term variability and long-term change in meteorological conditions in the GTMNERR with the goal of integrating meteorological data with water quality and habitat data to study the relationships among these parameters within the GTMNERR.

Nutrients

The GTMNERR collects water samples monthly in accordance with the nationally coordinated and standardized SWMP to quantify nutrient, chlorophyll *a,* and bacteria concentrations at the same long-term water quality monitoring stations where the SWMP data sondes are located. Grab water samples are collected during an ebb tide at all four stations, while an intensive diel sampling using an automated sampler is conducted at the Pellicer Creek station only.

Laboratory-based chemical analyses are performed on the monthly water samples collected at each of the stations. The objective of this effort is to quantify the spatial/temporal variability of nutrients, carbon, bacteria, phytoplankton biomass, and other water quality indicators within the Reserve and to explore how these are related to concurrently generated data sonde and meteorological data.

- Oyster Monitoring

    GTMNERR intertidal oyster monitoring began as a baseline assessment in 2014. The main objectives were to evaluate the status of intertidal oyster populations in the area; provide abundance and size estimates to inform the quantification of ecosystem services provided by oysters; provide baseline estimates of reef, population, and community structure metrics for future assessments; and evaluate methods for long-term monitoring. The baseline assessment was completed in 2016 and, in partnership with local university researchers, non-profit organizations, and other federal, state, and county entities, methods were refined and updated to provide a standardized system of metrics that could apply to spatial and temporal scales to address issue-driven short- and long-term monitoring for intertidal oysters.

    The GTMNERR oyster monitoring is performed yearly in December – March. Sampling areas or zones are broken down into three components: northern, central, and southern. Sampling efforts are rotated amongst the components each sampling season using the following sampling schedule:

    - 2022-23 Central Component
    - 2023-24 Southern Component
    - 2024-25 Northern Component
    - 2025-26 Central Component
    - 2026-27 Southern Component

    Data are collected on both reef and population metrics. Reef metrics include percent cover (live, box, shell, substrate, other), shell cluster counts, large gastropod counts (live, total shells), mangrove seedling counts, reef height, and mapping and elevation.

    Population metrics include bivalve density (oyster, clam, mussel), barnacle density, and bivalve shell height (oysters and mussels) and length (clams).

- ### Vegetation Monitoring

    The GTMNERR conducts long-term monitoring of emergent intertidal vegetation at eight permanent monitoring locations. The primary goal of this monitoring is to document ecological characteristics and discern the impacts of local and global environmental changes on the estuarine ecosystem.

    GTMNERR's vegetation monitoring program uses a combination of the NERRS Biological Monitoring protocols and the National Park Service Southeast Coast Network (NPS SECN) Salt Marsh Monitoring protocols. The monitoring consists of two complementary methods: 1) NPS-based marsh edge plots and 2) NERRS-based shore-to-upland transects. Monitoring objectives are to quantify change in species composition, cover, and height; contribute to regional and national syntheses; support remotely sensed mapping of vegetation communities; and support education, stewardship, and restoration efforts.

    The GTMNERR vegetation monitoring program was initiated in 2011 and data collection began in 2012. NPS-based marsh edge plots were established at six sites (Pine Island, Hat Island, East Creek, Moses Creek, Pellicer Creek, and Washington Oaks) and transects were established at four sites (Moses Creek, Pellicer Creek, North Matanzas, and Big Mama). Transects in Pellicer Creek were established in different salinity zones to meet NERRS Wetlands and Water Levels Monitoring program objectives ([SSAM-1 plan](#)), while transects in North Matanzas and Big Mama were established to monitor changes in mangrove structure over time and across an elevation gradient from shore to upland. Marsh edge and transect-based sites both include emergent vegetation and elevation monitoring, but only the marsh edge sites include the use of surface elevation tables (SET) to track relative elevation change over time.

    Sampling of the NPS marsh edge plots occurs in fall at the end of the wet season (September/October). Shore-to-upland transects at Pellicer Creek are sampled annually in June when there is peak biomass and flowering plants. Sampling of the transects at Moses Creek, North Matanzas, and Big Mama occurs in the fall every three to five years. Additionally, the elevation of the plots and transects are resurveyed every three to five years.

Responsibilities of Key Personnel

Alex Reed, B.S., Office of Resilience and Coastal Protection Director
(Director)
The Office of Resilience and Coastal Protection is led by the Director, who oversees the administrative direction of the office.

Scott Eastman, M.S., Office of Resilience and Coastal Protection Northeast Florida Regional Administrator
(Program Administrator)

The Northeast Regional Administrator is responsible for the administrative direction of the GTMNERR and Aquatic Preserves from the Indian River Lagoon to the Georgia line.

Lia Sansom, M.B.A., GTMNERR Manager
(Environmental Manager)

The GTMNERR Reserve Manager is responsible for overseeing and coordinating all programmatic and administrative functions of the GTMNERR including contract management, research, education, stewardship, resource management, and stakeholder collaboration on the programmatic side and budgets, grants, contracts and personnel on the administrative side. The Reserve Manager also serves as the liaison for the citizen support organization, Friends of the GTM Reserve, and is the Aquatic Preserve Manager for the Pellicer Creek Aquatic Preserve and Guana River Marsh Aquatic Preserve.

Nikki Dix, Ph.D., GTMNERR Research Director
(Contract Employee)

The GTMNERR Research Director oversees the research and monitoring programs within the reserve and provides the technical and scientific background to maintain quality assurance, and updates monitoring programs when necessary. The Research Director is responsible for assigning project management responsibilities to project managers, designates the Quality Assurance Officer, evaluates the Data Quality Objectives and Data Quality Indicators to ensure they meet program needs, and meets with program managers to evaluate the effectiveness of staff's data quality activities. The program managers and the Research Director evaluate corrective action policies and procedures to be implemented when data do not meet program Data Quality Objectives and discuss findings with the QA Officer.

Kathryn Petrinec, B.S., GTMNERR SWMP Data Specialist/ QA Officer
(OPS Environmental Specialist II)

The SWMP Data Specialist is responsible for data management for the water quality, meteorological and nutrient components of the SWMP. The SWMP Data Specialist also serves as the GTMNERR QA Officer and is responsible for the production and revisions of the GTMNERR Quality Manual, providing quality assurance oversight to ensure that personnel adhere to proper sampling collection and analysis methods. The QA Officer and program directors may delegate some QA responsibilities toproperly trained and qualified staff, when appropriate. The QA Officer assists program managers in the development of program quality systems. Additionally, the QA Officer is responsible for documenting program QA activities, including trainings, audits and corrective actions and provides this information to the DEP Aquatic Ecology and Quality Assurance Section on a periodic basis.

Vacant Position, GTMNERR Water Quality Program Manager
(Contract Employee)

The GTMNERR SWMP Manager reports to the Research Director and is responsible for overseeing the water quality, meteorological and nutrient components of the SWMP and programs of local interest. Responsibilities include instrument calibrations, maintenance, and deployments, coordinating and conducting sample collections and assists in other research projects as directed by Research Director.

The manager also oversees three positions, the SWMP Technician and the SWMP Data Specialist and the Water Quality Technician, carries out required supervisory duties including performance evaluations, collecting and managing data, handling data reviews, visualizing and analyzing data, translating findings into communication products, and training new personnel, interns, and/or volunteers.

Hans Prevost, M.S., Lead Biologist
(Biological Scientist II)
The GTMNERR Lead Biologist reports to the Research Director and is responsible for overseeing the SWMP Biological Emergent Vegetation project, the oyster monitoring, and the coastal wetland monitoring project. The lead biologist is also responsible for collecting and managing data, handling data reviews, training new personnel and volunteers, provides general care and maintenance for the GTMNERR laboratory and field equipment and serves as the GTMNERR Laboratory Safety Officer. This position oversees the Biologist and Water Quality Technician positions and carries out all required supervisory duties such as time approvals and performance evaluations.

Megan Howkins, B.S., GTMNERR SWMP Technician
(Contract Employee)
The GTMNERR System-Wide Monitoring Program Technician reports to the GTMNERR SWMP Manager and is responsible for monthly nutrient sample collections, including scheduling, washing and labeling sample containers and deployment/retrieving the automatic water sampler (ISCO). The SWMP Technician also assists in biological monitoring field work, including captaining boats and assists with other assigned projects.

Jacob Berna, B.S., Biologist
(Environmental Specialist I)
The Biologist reports to the GTMNERR Lead Biologist and is responsible for implementing field sampling protocols, including monitoring water quality, oysters, and coastal wetlands, coordinating with and training volunteers, data processing including compiling and entering raw data and conducting QA/QC, providing routine care and maintenance for the GTMNERR laboratory and field equipment and facilitating research led by visiting investigators within the reserve.

Vacant Position, B.S., Water Quality Technician
(Biological Scientist I)
The GTMNERR Water Quality Technician reports to the GTMNERR Water Quality Program Manager and is responsible for implementing the Guana Water Quality Monitoring project and other non-SWMP water quality projects. Key responsibilities include coordinating and training volunteers for environmental monitoring, collaborating with the Florida Fish and Wildlife Conservation Commission (FWC), and executing field sample collections and lab filtering. Additional duties involve systematic collection and entry of environmental data, maintaining and calibrating scientific equipment, scheduling sample collections with laboratories, and data management, including the compilation, QA/QC, visualization, and analysis of collected data to ensure accuracy.
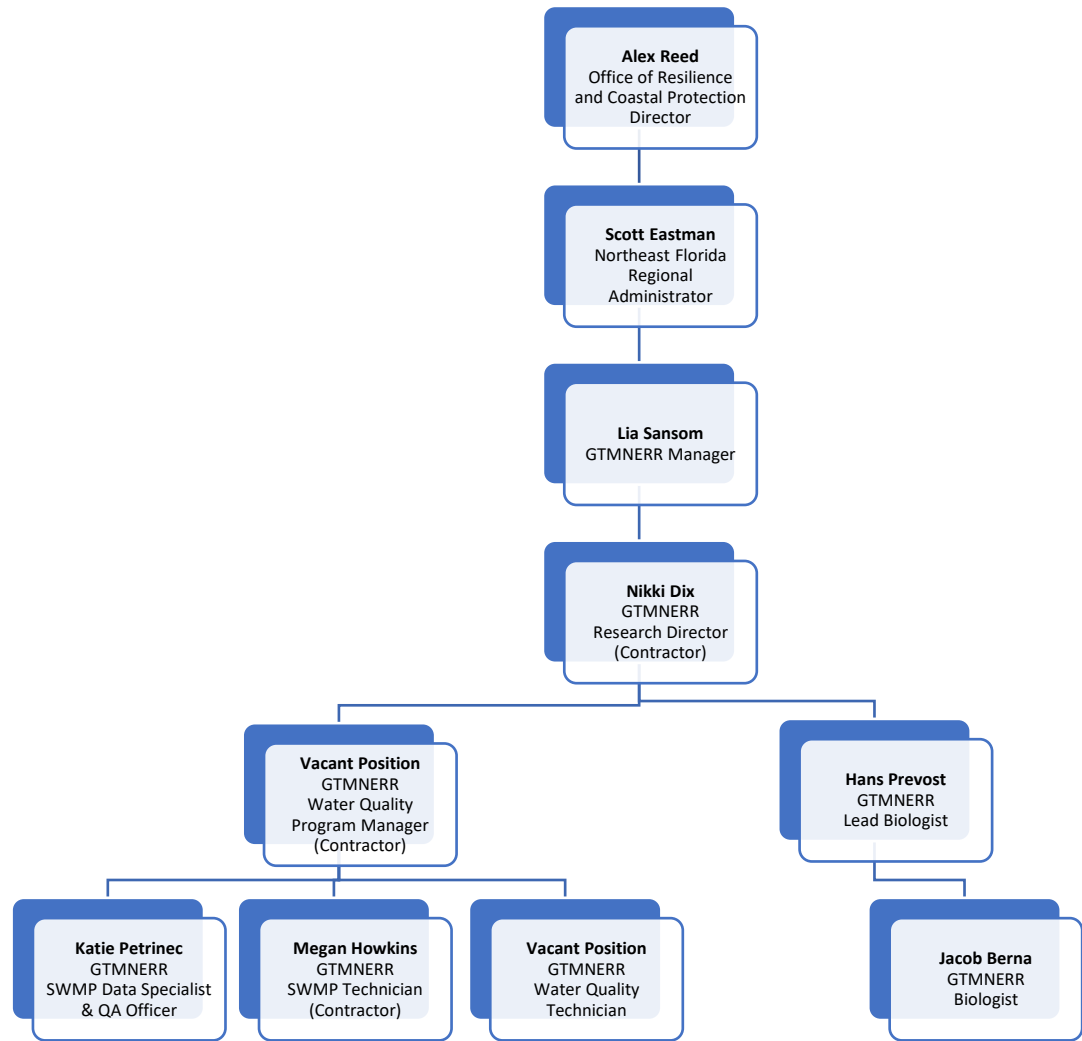
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                          Alex Reed
                     Office of Resilience
                   and Coastal Protection
                          Director

                        Scott Eastman
                     Northeast Florida
                          Regional
                        Administrator

                         Lia Sansom
                      GTMNERR Manager

                          Nikki Dix
                          GTMNERR
                       Research Director
                        (Contractor)

      Vacant Position                          Hans Prevost
        GTMNERR                                 GTMNERR
      Water Quality                           Lead Biologist
     Program Manager
       (Contractor)

 Katie Petrinec    Megan Howkins   Vacant Position      Jacob Berna
   GTMNERR           GTMNERR          GTMNERR             GTMNERR
 SWMP Data        SWMP Technician   Water Quality        Biologist
 Specialist        (Contractor)      Technician
 & QA Officer
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Figure 1. Staff Organizational Chart

Approved Signatories

Approved signatories within the GTMNERR are stated as:
Kathryn Petrinec, GTMNERR QA Officer
Scott Eastman, Northeast Florida Regional Administrator
Lia Sansom, Manager
Nikki Dix, Research Director

Laboratories
The Chemistry and Biology sections of the DEP Laboratory perform the analyses for the NERRS SWMP Nutrient Monitoring. Please refer to the DEP Laboratory Quality Manual 2024 for details on laboratory organization, responsibilities, and QA/QC methods.

Employee Training

Trained personnel are responsible for research and monitoring programs and ensure that data produced adhere to program protocols and address Quality Assurance/Quality Control (QA/QC) activities. Personnel are responsible for field assessments, sample collections, data management, data analysis, and the review of projects. Additionally, personnel are responsible for compiling sampling results for federal and state reporting requirements. Reports are available for public distribution.

Staff are provided with a variety of training opportunities to improve their skills and knowledge of their position as well as to stay up to date on changes in DEP policies, safety, or quality standards.

All staff are required to complete the following list of DEP trainings within the first 6 months of employment:

- Equal Employment Opportunity (EEO) and Preventing Discrimination in the Workplace
- DEP Sexual Harassment Prevention
- Bridging the Diversity Gap
- DEP Violence-Free Workplace
- Defensive Driving
- Distracted Driving
- Slips, Trips, and Falls
- DEP Code of Ethics
- DEP Public Records
- Sprains and Strains
- DEP Information Security Awareness
- Shared Savings Program Annual Training
- People First LMS Learner Tutorial Video

Annually, staff are also required to complete DEP refresher courses – a series of courses that combine some of the training topics listed above. The following list of DEP refresher courses are required annually:

- DEP Annual Compliance Training

All GTMNERR employees are required to review sampling protocols (and/or provide technical assistance in editing and updating protocols) annually. DEP Staff, contract employees, and volunteers who are responsible for field sampling are required to have training specific to the program they are sampling for (Table 1). Individuals conducting field sampling must train with qualified staff, contract employees, and/or volunteers and demonstrate competency and exercise good judgment prior to performing sampling activities on their own.

Program managers participate in field sampling collection methods and/or regularly meet with field staff to discuss program needs. Staff are evaluated annually for performance and are

offered opportunities for additional trainings. All completed trainings are recorded in Peoplefirst LMS.

Table 1. GTMNERR required program trainings and frequency for GTMNERR research programs.

Program	Safety Trainings	Safety Frequency	Sample Collection or Measurement Trainings	Sample Collection or Measurement Frequency	Data Review Trainings	Data Review Frequency
SWMP Water Quality	DEP Boater Safety (for Vessel Captain)	Once	CDMO SWMP Technician Training Workshop and DEP Field Testing	Annually	CDMO SWMP Technician Training Workshop and DEP Basic Data Review	Annually
SWMP Meteorological	—	—	CDMO SWMP Technician Training Workshop	Annually	CDMO SWMP Technician Training Workshop	Annually
SWMP Nutrient	DEP Boater Safety (for Vessel Captain)	Once	CDMO SWMP Technician Training Workshop and DEP Field Testing	Annually	CDMO SWMP Technician Training Workshop DEP Basic Data Review	Annually
Oyster Monitoring	DEP Boater Safety (for Vessel Captain)	Once	Field and Laboratory procedures	Each sampling event until proficient Annually	N/A	N/A
Vegetation Monitoring	DEP Boater Safety (for Vessel Captain)	Once	Field and Laboratory procedures	Each sampling event until proficient Annually	N/A	N/A

Sampling Design and Procedures

The sampling design, techniques and procedures used in the GTMNERR research program are developed and/or adopted by the Research Director and program managers. All procedures and methods are reviewed for compliance with our quality assurance plan and requirements and reviewed by the quality assurance officer. Successful implementation of our research programs relies on valid data. Staff evaluate program data using program Data Quality Objectives (DQOs) and program specific Data Quality Indicators (DQIs) (TABLES 2-7) and implement corrective actions as directed by the program manager and/or the Research Director.

All research personnel are responsible for planning, scheduling, field assessments, sample collections, compiling sampling results, data management, data analysis, and reporting as assigned by project managers. Reports are reviewed for errors and completeness by project managers and/or by the Research Director. Suggested modifications to sampling procedures or proposals for new projects and/or procedures are also handled by project managers and Research Director.

Data Quality Indicators

The GTMNERR uses data quality indicators in a continuing effort to collect data that are sufficiently precise, accurate, representative, complete, and comparable to meet the program objectives. The following tables provide an overview of program indicators.

Table 2. Data quality indicators for EXO2 data sondes used in the SWMP water quality program.

Parameter	Matrix	Data Quality Indicators (DQIs)	Measurement Performance Criteria	QC Sample and/or Activity Used to Assess Measurement Performance	QC Sample Assesses Error for Sampling (S), Analytical (A) or both (S&A)
Temperature	Estuary	Accuracy	**CT2 Probe; Thermistor** (Model # 599870) Range: -5 to 35°C, Accuracy: +/- 0.01°C Range: 35 to 50°C, Accuracy: +/- .005°C **Wiped Probe; Thermistor** (Model # 599827) Range: -5 to 50°C Accuracy: ±0.2°C	• Verified with NIST traceable thermometer before calibration and after deployment • Verified at 3 points, ice water, room temperature, and warm water ~ 35°C (annually only)	(A)
Specific Conductance	Estuary	Accuracy	**CT2 Probe; 4-electrode cell with autoranging** (Model # 599870) Range: 0 to 200 mS/cm Accuracy: 0 to 100: +/- 0.5% of reading or 0.001 mS/cm **Wiped probe; 4-electrode cell with autoranging** Model#: 599827 Range: 0 to 100 mS/cm Accuracy: ±1% of the reading or 0.002 mS/cm, whichever is greater	• Verified by confirming dry air reading is < 2 uS/cm • Passing temperature check • Passing QC score (Green or Yellow) • Passing cell constant: CT2 = 5.1 +/- 0.2 Wiped CT = 0.47 +/- 0.1 • Passing post deployment accuracy check	(A)
Salinity	Estuary	Accuracy	**CT2 probe, Calculated from conductivity and temp.** Range: 0 to 70 psu Accuracy: +/- 1.0% of reading pr 0.1 ppt, whichever is greater **Wiped probe; Calculated from conductivity and temperature** Range: 0 to 70 ppt Accuracy: ±2% of the reading or 0.2 ppt, whichever is greater	• Passing temperature check • Passing specific conductance checks • Passing post deployment accuracy check	(A)
Dissolved Oxygen	Estuary	Accuracy	**% saturation** Optical probe w/ mechanical cleaning Mode l#: 599100-01 Range: 0 to 500% air saturation Accuracy: 0-200% air saturation: +/- 1% of the reading or 1% air saturation, whichever is greater **mg/L (Calculated from % air saturation, temperature, and salinity)** Range: 0 to 50 mg/L Accuracy: 0-20 mg/L: +/-0.1 mg/l or 1% of the reading, whichever is greater	• Passing temperature check • Passing QC score (Green or Yellow) • Passing DO Gain: 0.87 – 1.25 • Passing post deployment accuracy check	(A)
pH	Estuary	Accuracy	**Guarded or Wiped pH probe (glass combination electrode)** Model #: 599701 (guarded) or 599702 (wiped) Range: 0 to 14 units Accuracy: +/- 0.1 units within +/- 10°C of calibration temperature, +/- 0.2 units for entire temperature range	• Passing temperature check • Passing QC score (Green or Yellow) • Passing pH slope: ideal range 160 – 180 mV; if <155 mandatory coding as suspect • Passing post deployment accuracy check	(A)

Depth/Level	Estuary	Accuracy	**Stainless steel strain gauge** Range: 0 to 33 ft (10 m) Accuracy: +/- 0.013 ft (0.004 m)	• Passing QC score (Green or Yellow)	(A)
Turbidity	Estuary	Accuracy	**Optical sensor, 90-degree scatter** Model#: 599101-01 Range: 0 to 4000 FNU Accuracy: 0 to 999 FNU: 0.3 FNU or +/- 2% of reading (whichever is greater); 1000 to 4000 FNU +/-5% of reading	• Passing QC score (Green or Yellow) • Passing post deployment accuracy check	(A)

Table 3. Data quality indicators for SWMP meteorological program.

Parameter	Matrix	Data Quality Indicators (DQIs)	Measurement Performance Criteria	QC Sample and/or Activity Used to Assess Measurement Performance	QC Sample Assesses Error for Sampling (S), Analytical (A) or both (S&A)
Temperature	Air	Accuracy	**Pt1000 Class A Temperature and Relative Humidity Probe** Model #: EE181 Operating Temperature: -40°C to 60°C Range: -40°C to 60°C Accuracy: ±0.2°C @ 23°C	• Calibrated annually • Verified monthly; compared to Kestrel hand-held readings	(A)
Relative Humidity	Air	Accuracy	**Temperature and Relative Humidity Probe HC101** Model #: EE181 Range: 0-100% non-condensing Accuracy: −15 to 40 °C: ≤90% RH ± (1.3 + 0.003 • RH reading) % RH −15 to 40 °C: >90% RH ± 2.3% RH −25 to 60 °C: ± (1.4 + 0.01 • RH reading) % RH −40 to 60 °C: ± (1.5 + 0.015 • RH reading) % RH Temperature dependence of RH measurement: typically, 0.03% RH/°C ***Note:*** This sensor caps relative humidity values at 100%, measured values >100% are altered to 100%	• Calibrated annually • Verified monthly; compared to Kestrel hand-held readings	(A)
Barometric Pressure	Air	Accuracy	Vaisala Barocap © silicon capacitive pressure sensor Model #: CS-106 (PTB110) Operating Range: Pressure: 500 to 1100 mb; Temperature: -40°C to +60°C; Humidity: non-condensing Accuracy: ± 0.3 mb @ 20°C; +/- 0.6 mb @ 0°C to 40°C; +/- 1 mb @ -20°C to 45°C; +/- 1.5 mb @ -40°C to 60°C Stability: ± 0.1 mb per year	• Calibrated every 2-years • Verified monthly; compared to Kestrel hand-held readings	(A)
Wind Monitor	Air	Accuracy	18 cm diameter 4-blade helicoids propeller molded of polypropylene Wind Monitor Model #: R.M. Young 05103 **Wind Speed** Range: 0-60 m/s (134 mph); gust survival 100 m/s (220 mph) Accuracy: +/- 0.3 m/s **Wind Direction** Units: degrees Sensor type: balanced vane, 38 cm turning radius	• Calibrated every 2-years • Wind Speed verified monthly; compared to Kestrel hand-held readings • Wind Direction verified by technician observation	(A)

Photosynthetically Active Radiation (PAR)	Air	Accuracy	**Apogee Quantum Sensor anodized aluminum with cast acrylic diffuser** Model #SQ110 Light spectrum waveband: 410 to 655 nm Temperature dependence: 0.06+/-0.06% per °C Stability: <±2% change over 1 yr Operating Temperature: -40°C to 70°C; Humidity 0 to 100% Cosine Response: 45° zenith angle: +/- 2%; 75° zenith angle: +/- 5% Sensitivity: 0.2mV per µmol s-1 m-2	• Calibrated every 2-years	(A)
Precipitation	Water	Accuracy	**Tipping Bucket Rain Gauge** Model #: TE525 Rainfall per tip: 0.01 inch Operating range: Temperature: 0° to 50°C; Humidity: 0 to 100% Accuracy: +/- 1.0% up to 1 in./hr; +0, -3% from 1 to 2 in./hr; +0, -5% from 2 to 3 in./hr	• Calibrated annually • Verified by technician observation	(A)

Table 4. Data quality indicators for SWMP nutrient program. The DEP laboratory has an established quality control program for monitoring the performance of test methods. The laboratory QA/QC procedures for the State of Florida Department of Environmental Protection Bureau of Laboratories FDOH Certification Number E31780 are as prescribed in the Quality Manual (https://floridadep.gov/dear/florida-dep-laboratory/content/dep-laboratory-quality-assurance-manual-and-sops) and test SOPs.

Parameter	Matrix	Data Quality Indicators (DQIs)	Measurement Performance Criteria	QC Sample and/or Activity Used to Assess Measurement Performance	QC Sample Assesses Error for Sampling (S), Analytical (A) or both (S&A)
Chemistry and Biology Samples	Estuarine Water	Precision	Field variability	• Two successive grab samples are collected at each site • Replicate (N=2) samples are collected using a pole sampler lowered to the approximate depth of the data sonde probes in closed position and then opened to draw water from the specified depth • One field blank is included in each monthly collection.	(A)
Chemistry and Biology Samples	Estuarine Water	Precision	Laboratory variability	• Method blanks and duplicate samples are run with every sample batch • A batch of samples consists of 20 or fewer samples (with the exception of microbiology) that are prepared and/or analyzed in a single run • Microbiology samples are batched by day, so that all samples received and processed on a given day are in the same prep and analysis batch • Saline matrices are batched separately where the test is impacted by high conductivity samples • Replicate analyses are used to evaluate precision (with the exception of microbiology). • Microbiology precision is evaluated according to Standard Methods 9020	(A)
Chemistry and Biology Samples	Estuarine Water	Accuracy / Bias	Sample spikes	• Sample spikes are performed with each sample batch. The acceptance limits for sample or spike duplicates	(A)

				• is a RPD of less than 20% if both results are above the PQL. Laboratory fortified blanks are run with each sample batch, acceptance limits for recovery are 85-115%	
Chemistry and Biology Samples	Estuarine Water	Accuracy / Bias	Standard Reference Material Analysis	• Check standards are included in each batch and at the beginning and end of each run. Check standard acceptance limits for recovery are 85-115%.	(A)
Chemistry and Biology Samples	Estuarine Water	Accuracy / Bias	Cross calibration exercises	• DEP laboratory participated in two rounds of performance testing (PT) in 2020. The studies are performed by many labs around the nation to and are required to maintain the lab's TNI certification	(A)
Chemistry and Biology Samples	Estuarine Water	Representativeness	Field Representativeness	• Samples are fully representative of sampling location • Same tidal cycle • 72-hour dry period prior to collection	(S)
Chemistry and Biology Samples	Estuarine Water	Data Completeness		• # of valid samples	(A)

Table 5. Data quality indicators for Xylem/YSI hand-held instruments used in the SWMP nutrient program. The GTMNERR uses DEP protocols for discrete water quality sampling.

Parameter	Matrix	Data Quality Indicators (DQIs)	Measurement Performance Criteria	QC Sample and/or Activity Used to Assess Measurement Performance	QC Sample Assesses Error for Sampling (S), Analytical (A) or both (S&A)
Temperature (SOP: FT 1400)	Estuary	Accuracy	**CT2 Probe; Thermistor** (Model # 599870) Range: -5 to 35°C, Accuracy: +/- 0.01°C Range: 35 to 50°C, Accuracy: +/- .005°C	• Verified with NIST traceable thermometer before calibration and after deployment • Verified at 3 points, ice water, room temperature, and warm water ~ 35°C (annually only) • Acceptance Criteria: + 0.5°C of NIST-traceable value (with correction factors)	(A)
Specific Conductance (SOP: FT 1200)	Estuary	Accuracy	**CT2 Probe; 4-electrode cell with autoranging** (Model # 599870) Range: 0 to 200 mS/cm Accuracy: 0 to 100: +/- 0.5% of reading or 0.001 mS/cm	• Verified by confirming dry air reading is < 2 uS/cm • Passing temperature check • Passing QC score (Green or Yellow) • Passing cell constant: CT2 = 5.1 +/- 0.2 Wiped CT = 0.47 +/- 0.1 • Passing post deployment accuracy check • Acceptance Criteria: + 5% of standard value	(A)

Dissolved Oxygen (SOP: FT 1500)	Estuary	Accuracy	**% saturation** Optical probe w/ mechanical cleaning Mode l#: 599100-01 Range: 0 to 500% air saturation Accuracy: 0-200% air saturation: +/- 1% of the reading or 1% air saturation, whichever is greater **mg/L (Calculated from % air saturation, temperature, and salinity)** Range: 0 to 50 mg/L Accuracy: 0-20 mg/L: +/-0.1 mg/l or 1% of the reading, whichever is greater	• Passing temperature check • Passing QC score (Green or Yellow) • Passing DO Gain: 0.87 – 1.25 • Passing post deployment accuracy check • Acceptance Criteria + 0.3 mg/L of theoretical value (see Table FT 1500-1 in SOP)	(A)
pH (SOP: FT 1100)	Estuary	Accuracy	**Guarded or Wiped pH probe (glass combination electrode)** Model #: 599701 (guarded) or 599702 (wiped) Range: 0 to 14 units Accuracy: +/- 0.2 units for entire temperature range	• Passing temperature check • Passing QC score (Green or Yellow) • Passing pH slope: ideal range 160 – 180 mV; if <155 mandatory coding as suspect • Passing post deployment accuracy check • Acceptance Criteria + 0.2 Standard pH Units of buffer or more stringent program criteria	(A)
Turbidity (SOP: FT 1600)	Estuary	Accuracy	**Optical sensor, 90-degree scatter** Model#: 599101-01 Range: 0 to 4000 FNU Accuracy: 0 to 999 FNU: 0.3 FNU or +/- 2% of reading (whichever is greater); 1000 to 4000 FNU +/-5% of reading	• Passing QC score (Green or Yellow) • Passing post deployment accuracy check • Acceptance Criteria 0.1-10 NTU: + 10% of standard value; 11-40 NTU: + 8% of standard value; 41-100 NTU: + 6.5% of standard value; >100 NTU: + 5% of standard value	(A)

Table 6. Data quality indicators for the GTMNERR oyster monitoring program.

Parameter	Matrix	Data Quality Indicators (DQIs)	Measurement Performance Criteria	QC Sample and/or Activity Used to Assess Measurement Performance	QC Sample Assesses Error for Sampling (S), Analytical (A) or both (S&A)
Percent Cover	Estuary	Accuracy	**1-m² percent cover quadrat (point intercept method (100 points))** Accuracy: 90% or greater	• Trainees complete a percent cover quadrat. • Percent cover results of trainees are compared with the results of the field lead. • Trainees with 90% or greater accuracy are promoted to field crew member and are permitted to sample cover quadrats for the season. • Random inspections by the field lead are performed on random quadrat rows to check	(S)

				that accuracy is maintained through the season for each field crew member.	
Cluster Density	Estuary	Accuracy	**1-m² quadrat** Accuracy: 95% or greater	• Trainees count clusters within a quadrat. • Cluster counts are compared to field lead counts. • Trainees with accuracy over 95% are promoted to field crew member and can count clusters for the season. • Random checks on field crew are performed by the field lead through the season to ensure accuracy is maintained.	(S)
Oyster Counts	Estuary	Accuracy	**0.0625-m² collection quadrat** Accuracy: within 5%	• Trainees are given a sample of oysters to count. • Count results of each trainee must be within 5% of the results of the crew lead. • Trainees that pass are permitted to count for the season. • Crew members are randomly checked by the crew lead to ensure accuracy is maintained.	(S)
Oyster Measurements	Estuary	Accuracy	**0.0625-m² collection quadrat** **6" Digital Caliper (Pittsburgh)** **Uncertainty: ±0.03mm** Accuracy: 90% within +/-2mm	• Trainees are given a test set of ~30 oysters to measure. • Trainees measurements are compared to crew lead measurements. • No more than 10% of trainee's measurements should differ greater than ±2mm when compared to crew lead measurements. • Trainees who pass are promoted to crew member and are permitted to take measurements for the season. • Measurements taken by crew members are randomly inspected by the crew lead.	(S&A)
Reef Height	Estuary	Accuracy	**Stadia Rod (Metric)** Accuracy: within 5%	• Trainees measure the reef height of the highest point of a reef. • Trainees measurements must be within 5% of the measurements of the crew lead. • Trainees who meet the criterion are promoted to field crew and are	(S)

				permitted to measure reef height for the season.	

Table 7. Data quality indicators for the GTMNERR vegetation monitoring program.

Parameter	Matrix	Data Quality Indicators (DQIs)	Measurement Performance Criteria	QC Sample and/or Activity Used to Assess Measurement Performance	QC Sample Assesses Error for Sampling (S), Analytical (A) or both (S&A)
Percent Cover	Estuary	Accuracy	**1-m² vegetation quadrat** Accuracy: ±5% for vegetation cover with a minimum of two repetitions	• A vegetation quadrat is placed in the marsh by the field lead/expert. • Trainees evaluate the quadrat for species presence and cover. • Field lead evaluates the same quadrat. • Results of trainees are compared to results of field lead. • If there are discrepancies the process is repeated until evaluations are within ±5% with a minimum of two repetitions.	(S)
Stem Density	Estuary	Accuracy	**0.0625-m² stem density quadrat** Accuracy: 85% for stem density with a minimum of two repetitions	• A stem density quadrat is placed in the marsh by field lead/expert. • Trainees evaluate the quadrat for stem counts for all species rooted in the quadrat. • Field lead evaluates the same quadrat. • Results of trainees are compared with the results of the field lead. • If there are discrepancies the process is repeated until evaluations are within 85% accuracy with a minimum of two repetitions.	(S)
Plant Identification	Estuary	Accuracy	Plant identification validation	• SJRWMD provides post-monitoring plant identification validations for NERRS Marsh Monitoring plots. • Plots are re-assessed if failed validation with external party present (preferably).	(S)
Surface Elevation	Estuary	Accuracy	Pre-Monitoring Certification Measurement accuracy standards ±1.5mm	• New and back-up SET readers must successfully read elevation measurements from an artificial rSET station that has known elevations. • Measurements are considered successful when the measurements are with the acceptable accuracy standards ±1.5mm.	(S)

Data Review

The GTMNERR understands the need to evaluate the quality and usefulness of environmental data prior to making decisions. We conduct the following review procedures to determine the usability of data:

- Are the data consistent with GTMNERR Data Quality Objectives and Data Quality Indicators?
- Do the data collection methods meet program requirements and SOPs?
- Do the data meet concepts and criteria found in DEP's "Process for Assessing Data Usability", DEP-EA-001/07?
- Are the data analyzed using approved methods?
- Is the laboratory that analyzed samples certified (if applicable)?
- Do the results make sense?
- Are QC problems reported?

Staff evaluate program data using the review procedures and implement corrective actions as directed by the program manager and/or the Research Director. Research staff provide feedback to the Quality Assurance Officer for improving the program quality system.

Existing data must also meet GTMNERR's data quality objectives and pass criteria for data quality indicators. Program managers and/or the Research Director review data by checking for completeness and ensuring that the data meet quality standards and review metadata reports prior to using existing data in project reports.

Data Repositories

The GTMNERR does not directly manage any data repositories, however, some project data are uploaded into data repositories managed by other groups.

CDMO's Online Data Information Server (ODIS)

All SWMP data are served through the NERR's [CDMO](#) ODIS. The CDMO is responsible for the development, implementation, and management data infrastructure and establishes protocols to support the assimilation and exchange of data and metadata for the SWMP.

The GTMNERR SWMP staff are responsible for uploading raw SWMP water quality and/or meteorological data biweekly and/or monthly into the CDMO's ODIS and nutrient data annually. Staff also perform quality control (QC) checks on the SWMP data and upload QC'd data quarterly and annually. Detailed information regarding the procedures for data uploads are found in the CDMO's Data Management Manual and GTMNERR internal SWMP SOPs.

Annually, the CDMO provides the GTMNERR with a Submission Report that provides the status of the raw file uploads to the CDMO with a percentage grade.

Watershed Information Network (WIN) Environmental Database

In addition to the CDMO, GTMNERR SWMP nutrient data are also served through the DEP [WIN](#) environmental database; a repository for environmental data from non-regulatory data sources from data providers across Florida.

The GTMNERR SWMP Data Specialist is responsible for reviewing the authorized nutrient files using the Laboratory Information Managemnet System (LIMS) and the Data Merge Tool (DMT) and performs the following for each sampling event:

- Assigns the Org ID: 21FLGTM and sampling agency DEP Guana Tolomato Matanzas National Estuarine Research Reserve
- Edits project ID to 'NERR-SWMP'
- Verifies Sample_Field_ID is matched with correct Station_ID
- Renames the field blank(s) to Sampling Date_FB (MMDDYYYY_FB)
- Removes depth from field blanks
- Batch field blanks
- Verifies field data using GTMNERR Nutrient Field Data Sheets, DEP Laboratory Submittal Forms, calibration logs, and data sonde data
- Adds salinity data into WIN_Data_Form
- Adds DEP qualifier codes to field data (if necessary)
- Adds comments to qualifier code in the Field_Comment field (if necessary)
- Applies updates once all edits have been made
- Assigns collection type to samples
- Assigns Master_Activity_ID to all duplicates/replicates (Grab samples only)
- Generates WIN Form

After LIMS review, the data are ready for migration into the Watershed Information Network (WIN) database. Data are exported from LIMS DMT into a WIN ready .txt file. Prior to migration, WIN performs built-in Quality Assurance checks and notifies the data specialist to evaluate errors. Errors are corrected and the file is then migrated into the WIN database.

New data are generally entered into WIN as it is received by the GTMNERR (monthly) and no later than three months (quarterly).

Statewide Ecosystem Assessment of Coastal and Aquatic Resources (SEACAR) Data Discovery Interface (DDI)

The SEACAR DDI houses a variety of scientific data obtained from research and monitoring programs conducted within the DEP Office of Resilience and Coastal Protection (RCP) managed areas around the state of Florida.

GTMNERR Research program managers are responsible for regularly updating project data housed in SEACAR DDI. Staff upload all documents, including SOPs, metadata, and data into the SEACAR DDI annually after completing QC checks. Documents and data that are available are for the following GTMNERR programs: oyster monitoring (Program 4000, last updated 07/09/2024), vegetation monitoring (Program 4017, last updated 05/01/2024), and SWMP Water Quality and Nutrient (Program 4054, last updated 11/15/2024).

Documentation and Records

To ensure appropriate documentation is maintained, the GTMNERR research program carries out record-keeping procedures for the following activities:

- sampling
- field-testing

- data review
- calculation checks
- data archiving
- data entry verification
- document control and maintenance
- record generation, retention, and storage procedures

All documents and data records are reviewed, retained, and stored in project folders for at least 5 years after the completion of a project. Sampling documentation is specific to each project and are listed in project SOPs.

All GTMNERR generated SOP documents contain the SOP name, version number, effective date, review/revision date and author. The draft watermark is removed from final SOP documents, and they can only be edited by the program manager or by the QA Officer.

The following list of SOP documents that are used by the GTMNERR for the projects listed in this quality plan:

- The *NOAA NERRS SWMP YSI/Xylem EXO Multi-Parameter Water Quality Monitoring SOP* is maintained by the CDMO and includes the SOP name, version number, effective date, author, reviewers and copyright date. The SOP is updated annually and is distributed by the CDMO during the annual technician training workshop.
- The *GTMNERR SWMP Water Quality SOP* is maintained by the GTMNERR and includes the SOP name, version number, effective date, author, and revision date. The SOP is updated annually and is available on the GTMNERR server.
- The *NOAA NERRS SWMP Nutrient and Chlorophyll Monitoring Program and Database Design SOP* is prepared by the NOAA/NERRS Nutrient Monitoring Committee and includes the SOP name, version number and revision date. The SOP is updated as needed and is distributed by the CDMO during the annual technician training workshop.
- The *GTMNERR SWMP Nutrient SOP* is maintained by the GTMNERR and includes the SOP name, version number, effective date, author and revision date. The SOP is updated annually and is available on the GTMNERR server.
- The *NOAA NERRS SWMP Campbell Scientific CR1000/1000X Meteorological Monitoring Station SOP* is maintained by the CDMO and includes the SOP name, version number and effective date. The SOP is updated as needed and is distributed by the CDMO during the annual technician training workshop.
- The *GTMNERR SWMP Meteorological SOP* is maintained by the GTMNERR and includes the SOP name, version number, effective date, author and revision date. The SOP is updated annually and is available on the GTMNERR server.
- The *NOAA NERRS SWMP Telemetry Systems for Real Time SWMP Data Delivery SOP* is maintained by the CDMO and includes the SOP name, version number, effective date, author, reviewers and copyright date. The SOP is updated as needed and is distributed by the CDMO during the annual technician training workshop.

- The *NOAA CDMO NERR SWMP Data Management Manual* is maintained by the CDMO and includes the SOP name, version number and effective date. The SOP is updated as needed and is distributed by the CDMO during the annual technician training workshop.
- The *EXO User Manual* is maintained and distributed by YSI and includes detailed information about the data sondes and sensors used in SWMP. The manual is updated as needed and contains an item reference number and revision number to identify version information.
- The *CR1000 Datalogger Operator's Manual* is maintained and distributed by Campbell Scientific, Inc. and is used in SWMP. The manual is updated as needed and contains a revision number to identify version information.
- The *6712 Portable Samplers Installation and Operation Guide* is maintained and distributed by Teledyne Isco and is used in SWMP. The guide is updated as needed and contains a revision number, month and year to identify version information.
- The *GTMNERR Oyster Monitoring SOP* is maintained by the GTMNERR and includes the SOP name, version number, effective date, author(s), and revision date. The SOP is updated annually and is available on the GTMNERR server.
- The *GTMNERR Vegetation Monitoring SOP* is maintained by the GTMNERR and includes the SOP name, version number, effective date, author(s), and revision date. The SOP is updated annually and is available on the GTMNERR server.
- The *NERRS SWMP Vegetation Monitoring SOP* is maintained by the NERRS Vegetation Monitoring Workgroup for the and includes the SOP name, author, and last updated date. The SOP is updated as needed and is distributed by the CDMO.
- The *Photoplot-based Monitoring of Salt Marsh Vegetation SOP* is maintained by the National Park Service Southeast Coast Network and includes the SOP name, revision number, author(s), and revision date.
- The *Salt Marsh Elevation Monitoring SOP* is maintained by the National Park Service Southeast Coast Network and includes the SOP name, revision number, author(s), and revision date.
- *The Requirements for SECN Salt Marsh Elevation and Vegetation Community Monitoring Field Season Preparation, Equipment and Training SOP* is maintained by the National Park Service Southeast Coast Network and includes the SOP name, revision number, author(s), and revision date.
- The *General Field Testing and Measurement (FT 1000)* and *Specific Field Testing Procedure SOPs (FT 1100, FT 1200, FT 1400, FT 1500, FT 1600)* are maintained by Florida DEP's Division of Environmental Assessment and Restoration (DEAR) and include the SOP names, revision numbers, and revision dates.
- The *WIN User Manual for WIN Phase I Version 2.0 SOP* is maintained by Florida DEP's Division of Environmental Assessment and Restoration (DEAR) and includes the SOP name, revision number, and revision date.
- The *GTMNERR LIMS-WIN SOP (Draft) SOP* is maintained by the GTMNERR and includes the SOP name, version number, effective date, author(s), and revision date. This SOP is currently a draft document is available on the GTMNERR server.

All records and documents generated by GTMNERR are public records and may be subject to disclosure according to guidelines and exceptions published in Chapter 119 of Florida Statutes.

Contract Management

The GTMNERR ensures that the DEP contracts that we administer are properly managed to assure appropriate data quality. We attach either the Standard or Research QA Exhibit to any agreement that includes sample collection or analysis and require a copy of their QA Plan and SOPs. Data collected or analyzed through a contract are held to the same high standards and must meet the GTMNERR data quality objectives as data collected and/or analyzed by DEP.

Audits and Corrective Actions

Field and laboratory procedures conducted in accordance with GTMNERR research program SOPs are subject to audits and data validation. At this time, internal audits are not required for GTMNERR research staff. Individual project managers may elect to perform audits or request the quality assurance officer to perform audits as needed.

If a project manager or quality assurance officer elects to perform an audit they are responsible for assessing each quality control measure, initiating corrective action (if needed) and compiling an audit report. Notification to research staff of problems and corrective actions can occur in oral communication and written communication. Corrective actions involving field equipment and/or methods are incorporated immediately. Official memoranda between project managers and/or Research Director, may occur if corrective action is not properly implemented.

Informal complaints and other reports from data users or the public concerning data quality are directed to the appropriate supervisor for resolution. If resolution cannot be attained by the supervisor, the complaint or suggestion is passed to the regional administrator.

Report Compilation

Data sets are analyzed at regular intervals to summarize and simplify trends across spatial and temporal scales, identify the impacts of unusual or storm events, and evaluate the relative contributions of natural variability and anthropogenic impacts on ecosystem function, as they relate to relevant management issues.

Information and research product reports generated may be translated and disseminated to relevant audiences including coastal resource decision makers, academic investigators, educators, and students. Project managers and the Research Director review reports written to satisfy project and/or grant requirements. Further review of reports may be provided by regional program administrators if necessary.

Annually, the GTMNERR provides the Aquatic Ecology and Quality Assurance Section of DEP with information regarding QA activities. The information is then compiled into an annual report and provided to the Secretary of DEP.

Future adaptive management concerning our QA program is based on findings from data reviews, audits (when applicable) and report feedback and is used for enhancing staff performance and needs and program objectives.