



Quality Plan for

Florida Keys National Marine Sanctuary and Florida Keys Aquatic Preserves

Florida Department of Environmental Protection

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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.

X

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X

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X

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X

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Introduction

Basic Elements of Our Quality Plan

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 are of sufficient quality to support Department decisions. The effectiveness of our QA program is dependent upon the actions of all DEP staff, from “front line” employees to management, meaning QA is a function distributed throughout our organization. One aspect of our 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 the implementation of the quality assurance requirements in the QMP and as authorized in Section 403.0623, F.S., and Chapter 62-160, F.A.C. (the DEP QA Rule). The Secretary intends to carry out these obligations and requirements as described in the Department’s QA Directive, Directive 972 (Revision 11/1/2016).

To execute the components of the DEP QA Directive, **the Florida Key National Marine Sanctuary (FKNMS) and Florida Keys Aquatic Preserves (FKAP)** have developed a quality system. This document describes the steps we take to ensure the scientific and legal defensibility of 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 meet our established quality criteria.

Our 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. We 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 (Chapters 62-160, F.A.C.). In addition, we ensure that our plan for all sampling activities, including field-meter testing, is consistent with DEP SOP FA 3300. Our plan addresses all activities associated with sampling, field testing, lab analysis, and data review of any type. Our plan also discusses how decisions about data use are made based on data quality assessments.

Where appropriate, we cite existing internal and external documents, including training manuals, guidance documents, standard operating procedures (SOPs), rules, tables, etc.

We expect all staff to read, understand, and follow the procedures and criteria as discussed in this plan, and to carry out their assigned responsibilities for the effective utilization of our quality system.

Policy Statement

It is our unit's policy to:

- Use scientifically valid and legally defensible data for our decisions affecting the protection of the environment.
- Have and implement the Quality System described in this document.
- Adaptively manage our Quality System to be consistent with provisions of the DEP QMP.
- Ensure that each individual is properly trained to execute their assigned functions.
- Implement procedures to evaluate the quality of the data we use and to implement corrective actions when data do not meet our Data Quality Objectives.
- Periodically audit the performance and record-keeping practices of data generators we have responsibility for.
- Implement quality assurance procedures for the management of our data repositories.
- Perform a yearly systematic assessment of our quality assurance activities, including any corrective actions, with the findings submitted to the Aquatic Ecology and Quality Assurance Section.

Ethics

All employees of the DEP **Florida Keys National Marine Sanctuary** and **Florida Keys Aquatic Preservers** are held to high professional ethical standards in the performance of their duties. All employees are required to read, understand, and sign an 'Ethics Statement' attesting to their commitment to honesty and integrity in the 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 the Florida Department of Environmental Protection.

Organization and Responsibilities

Our unit resides within the **Department of Environmental Protection, Office of Resilience and Coastal Protection, Southeast Region**. Refer to Figure 1 for the staff organizational chart.

The function of this unit is to manage the **Florida Keys National Marine Sanctuary and Florida Keys Aquatic Preserves** by the management plans developed through public input and co-management agreements which were agreed upon by the State of Florida and corresponding federal agencies.

Responsibilities for existing staff are as follows:

Project Manager (PM)

FKNMS Manager

- Responsible for the overall operation:
 - Oversees and coordinates project activities including work plans, quality assurance plans, data quality objectives, standard operating procedures, and scheduling.
 - Fiscal year resource management: ex. ensures there is adequate personnel, resources, equipment, and time to complete the specified quality program.
 - Acts as a liaison with other DEP units, data providers, data consumers, and/or other external parties concerning QA matters.
 - Reviews project data prior to the final report to assure it (field and laboratory) is acceptable and within specified project objectives.
 - Ensures QA policies and procedures are consistent with, and activities are conducted according to, the established quality system, quality manual, and standard operating procedures.
- Conduct management reviews at regularly scheduled intervals, not to exceed 12 months:
 - Program reviews include, but are not limited to:
 - Policy and procedures review.
 - Outcome of internal and external audits.
 - Corrective and preventative actions.
 - Reports from managerial and supervisory staff.
 - Changes in volume and type of work.

- Complaints and resolution.
- Staff training.
- Assess the organization's quality system and related activities to determine the effectiveness and continued suitability.
- All findings and recommendations from management reviews must be documented, as well as any actions needed as a result of the review.
- Field assistant, data collector, and data management.

Unit Managers (UM)

FKNMS Assistant Manager and the Florida Keys Aquatic Preserves Manager

- Provides general oversight of project activities.
- QAP and SOP preparer.
- Ensures quality system is operational within the program.
- Field assistant, data collector, and data management.
- Evaluate Data Quality Objectives and Data Quality Indicators to ensure program needs are met.
- Periodically evaluate the effectiveness of staff data quality activities, including the review of audit results.
- Evaluate corrective actions to policies and procedures when data does not meet program Data Quality Objectives.

Quality Assurance Officer (QAO)

- Assists PM in the development and implementation of the Quality System.
- Coordinates and participates in quality evaluation of program data.
- Provides oversight to ensure staff performs their QA functions.
- Delegates' responsibilities to properly trained and qualified staff, when appropriate.
- Conducts systems (internal and external data generators) and sampling performance audits.
- Ensures corrective action is implemented for data non-conformance incidents as determined by evaluating data against the program's Data Quality Objectives.
- Documents all program QA activities including training, audits, and corrective actions.
- Periodically provides this information to the DEP Aquatic Ecology and Quality Assurance Section.

Other Staff

- Ecosystem Assessment Specialist
- Water Quality Technicians
- Project Specialists

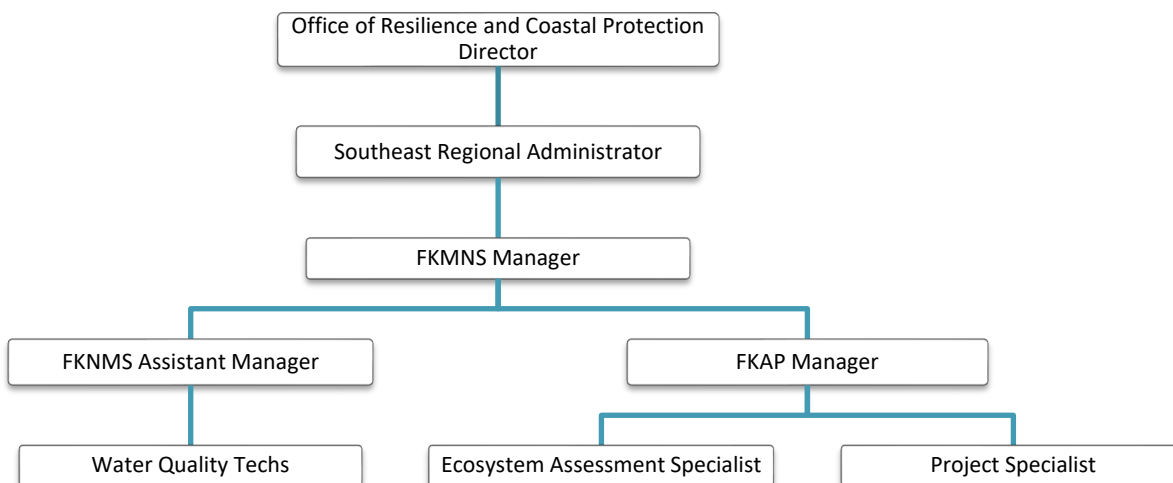


Figure 1. FKNMS/FKAP Staff Organizational Chart

All Staff and volunteers will be trained to work as field assistants and benthic surveyors. Those with specialized education will help generate results using different data evaluation and interpretation techniques and/or software. Work produced by any DEP staff or volunteer will adhere to all rules, regulations, and policies to help ensure scientifically valid and defensible reports.

Training

All personnel will be properly trained to perform their duties. Supervisors will periodically assess whether the staff's performance conforms with the policies and procedures of our unit.

Our training procedures consist of:

- Review of Policies and Ethics with the QA Officer.
- Specific training needed for QA functions per SOP (see Table 1).
- Necessary equipment training for designated QA activities.
- Refresher training as deemed necessary by the QAO or PM.

- Delivery of updated information.
- Evaluation of the effectiveness of training for each staff member.
- All training sessions will be documented and stored by the QAO or PM.

Trainee Prerequisites:

- Needs to know how to swim
- Comfortable in the water
- General snorkeling knowledge
- Scuba Certification (if diving is required)

Out of Water Training (PowerPoint/Study Guide):

- Species identification
- Benthic habitat surveying techniques and protocol
- Sampling collection methods

In-Water Training:

- Snorkel Test
- Scuba Test (for certified divers only and if required)
- Survey Protocol
- Trainer and trainee (previously trained staff and volunteers are encouraged to join) will survey the same quadrat
 - An on-site quadrat survey will take place to address any species identification issues or differences in collected values.
 - Repetitive quadrat surveys will be done until the trainer is confident that the trainee can record results within an expected level of discrepancy.
- Other staff should take part in both agency and interagency training to ensure their techniques of data collection is comparable to that of others and other partnering agencies.

Projects	Standard Operating Procedures
Water Quality Collection and Sampling	https://floridadep.gov/dear/quality-assurance/content/dep-sops
Continuous Water Quality Monitoring	http://publicfiles.dep.state.fl.us/DEAR/DEARweb/QA/Plans/AP_ContinuousWQ_QualityPlan_signed_ADA_041421.pdf and F:\SOPs-QAP\SOP_SondeCalibration.docx and F:\SOPs-QAP\SOP_SondeContinuousMonitoring.docx
Benthic/Seagrass Monitoring	F:\SOPs-QAP\SOP_BenthicMonitoring.docx
Seagrass Tissue Collection	F:\SOPs-QAP\SOP_BenthicTissueCollection.docx
Epiphyte Collection and Seagrass Drying	F:\SOPs-QAP\SOP_EpiphyteCollectionSeagrassDrying.docx
Hardbottom/Coral Monitoring	F:\SOPs-QAP\SOP_HardbottomMonitoring.docx
Rookery Monitoring	F:\SOPs-QAP\SOP_Rookery.docx

Table 1: SOPs for all projects.

Project Background & Scope

Site Background

The beautiful blue waters surrounding the Florida Keys are managed and protected by multiple local, state, and government organizations; the largest and most inclusive being the Florida Keys National Marine Sanctuary (FKNMS), co-managed by NOAA, DEP, and FWC. Within the FKNMS's designated boundaries, the Florida Keys Department of Environmental Protection's Office of Resilience and Coastal Protection (DEP – RCP) is responsible for the management and oversight of all Aquatic Preserves (AP). There are three APs found within the keys; Biscayne Bay – Card Sound Aquatic Preserve (BBAP);

Lignumvitae Key Aquatic Preserve (LKAP), located between the Upper and Lower Matecumbe Keys; and Coupon Bight Aquatic Preserve (CBAP), is located in the southern portion of Big Pine Key (figure 2). Biscayne Bay Aquatic Preserve is managed separately and not included in the QAP. Additionally, while outside of the boundaries of FKNMS, DEP staff also co-manages the waters around Dry Tortugas National Park (DRTO).

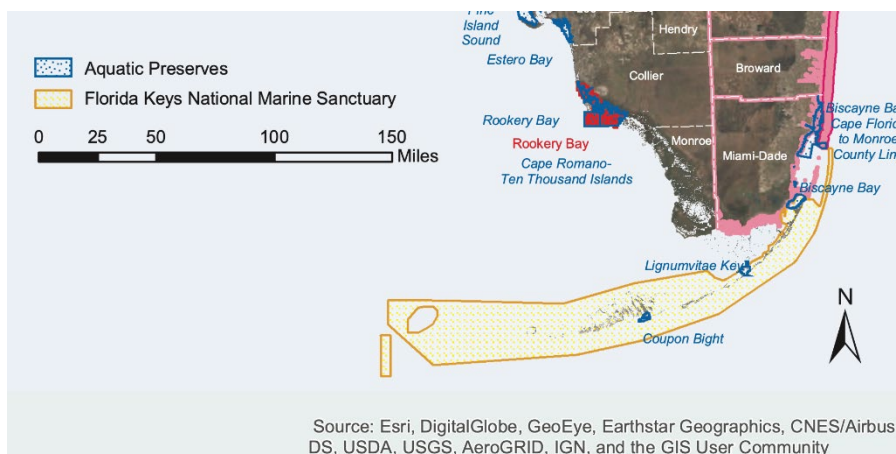


Figure 2: Location and boundaries of FKNMS, LKAP, CBAP, and BBAP

Florida Keys National Marine Sanctuary

In November of 1990, the FKNMS's boundaries were established, containing approximately 2,432,000 acres (3800 miles²) of sea life. These designated waters completely encompass the Florida Keys from Biscayne Bay to the Dry Tortugas, excluding the Dry Tortugas National Park and the northernmost bayside area where the southern edge of the Everglades National Park is located. This region is not only a recreational hotspot but a vital resource to the Florida Keys. These waters are home to more than 6000 marine species including coral reefs, seagrass beds, mangrove forests, and more.

Florida Keys Aquatic Preserves

Lignumvitae Key Aquatic Preserve

In 1969 Florida legislature designated approximately 6700 acres (10.5 miles²) of water, just off the southwestern shore of Islamorada, as LKAP. Pervaded with seagrass flats, mangrove forests, and hard-bottom communities, this protected area spans across both the bay and oceanside of the Keys. Since Lignumvitae Key Botanical State Park overlaps most of the aquatic preserve, the Florida Keys DEP RCP co-manages this area with the state park (figure 3).

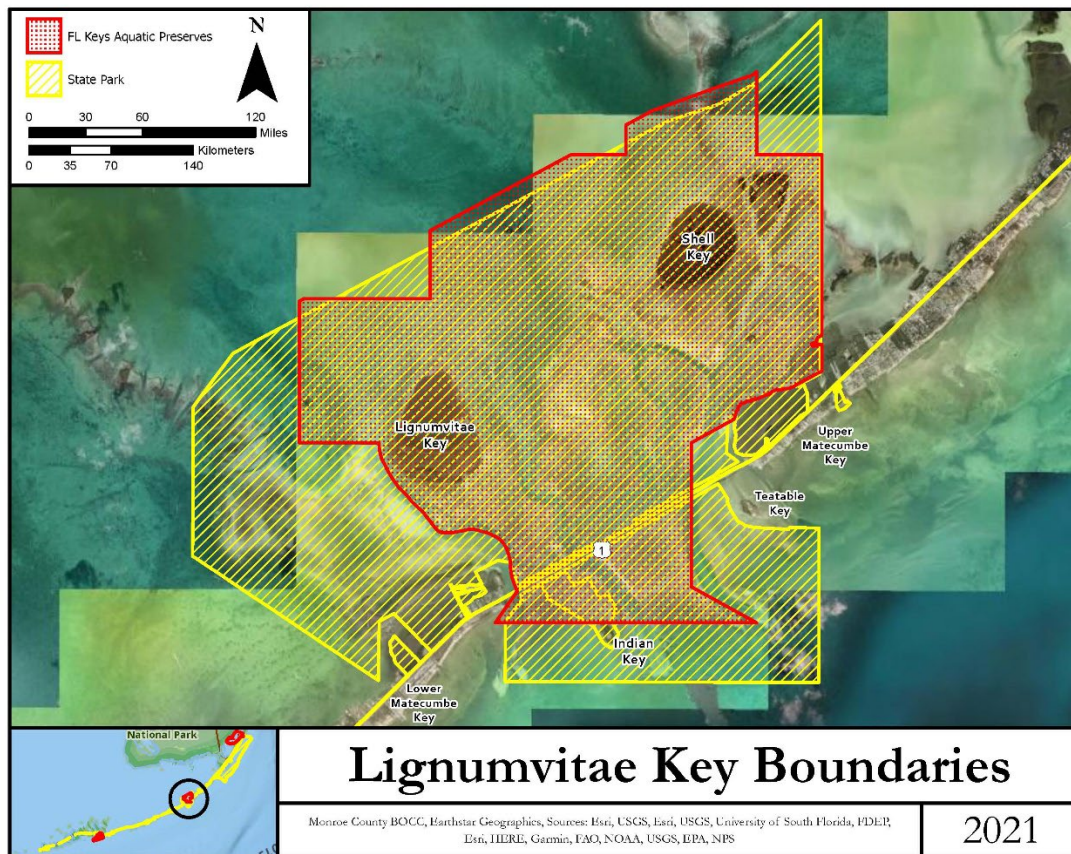


Figure 3: LKAP boundaries (red) vs. Lignumvitae Key Botanical State Park's boundaries (yellow)

Coupon Bight Aquatic Preserve

Established in 1969, CBAP is located in the southern portions of Big Pine Key and is the Florida Keys' southernmost aquatic preserve. Spanning over 5400 acres (8.5 miles²), this protected area consists of both lagoon and oceanside waters. Newfound Harbor Key, a privately owned island, separates the inner sheltered waters of the bight from its outer oceanic portion. This diverse area is inhabited by mangrove forests, seagrass beds, and patchy reef communities which bring forth a vast array of aquatic and marsh wildlife including the iconic Key Deer (figure 4).

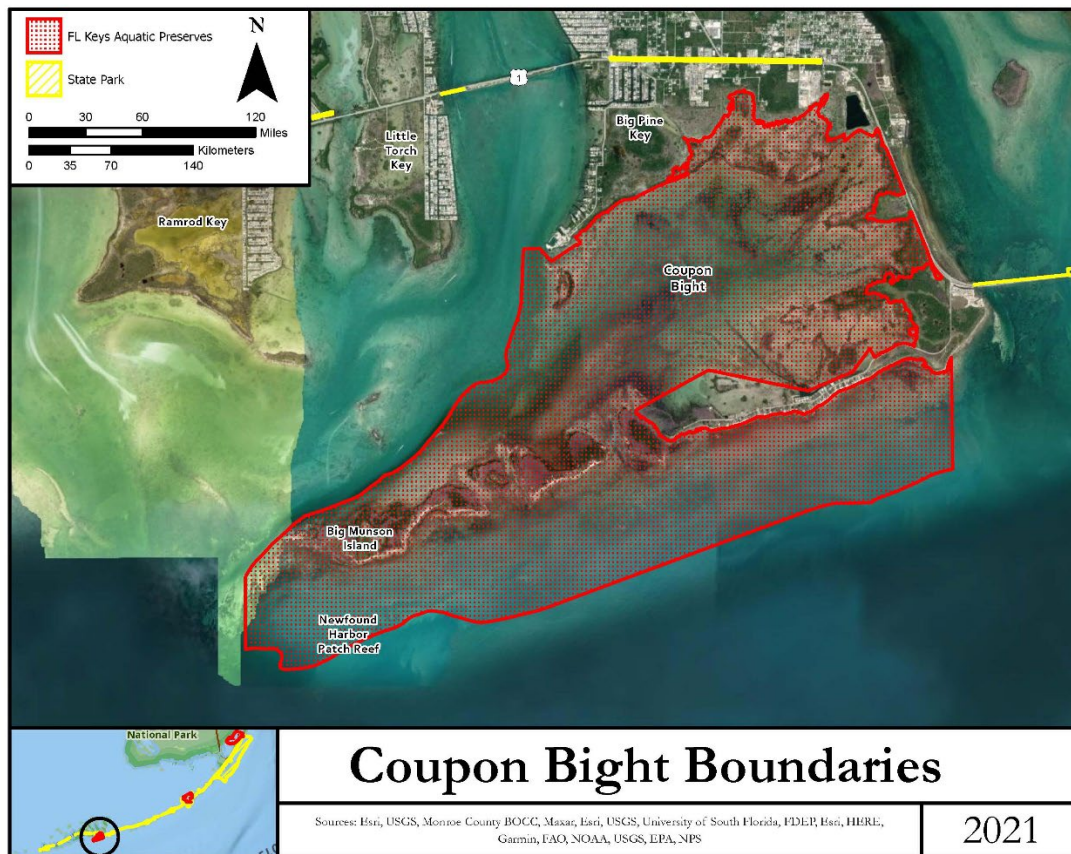


Figure 4: CBAP boundaries (red)

Sampling Design and Procedures

- The UM designs sampling plans, QA plans, and SOPs. Alternatively, the unit can adopt other units' up-to-date SOPs where appropriate.
- The PM reviews the sampling plans, QA plans, and SOPs.
- The PM handles requests for use of alternative, new, or modified sampling procedures or lab methods.
- The UMs review procedures and methods for compliance with QA plans and requirements.
- The UMs coordinate data reviews, sampling activities, or other QA tasks for timely completion.
- All staff manage or conduct sampling, field-testing and associated support operations.

Quality Control Requirements

Program Quality Control Requirements

Program	Instrument/ Analysis	Frequency	Acceptance Criteria	Corrective Action
Water Quality Collection and Sampling	YSI ProDSS	<u>Pre-Calibration:</u> <24 hrs. prior to sampling event <u>Post or</u> <u>Continuous</u> <u>Calibration:</u> <24 hrs. following sampling event	Table 4	May need maintenance if doesn't calibrate correctly (yearly maintenance required)
Continuous Water Quality Monitoring	YSI EXO2	<u>Pre-Calibration:</u> <1 week before deployment <u>Post or</u> <u>Continuous</u> <u>Calibration:</u> <24 hrs. following retrieval	Table 5	May need maintenance if doesn't calibrate correctly (yearly maintenance required)
Benthic/Seagrass Monitoring	% coverage, BB score, & species identification	Quarterly (at first site visited)	Lead surveyor's discretion	Continue surveying with lead surveyor until in sync
Seagrass Tissue Collection	Pre-labeled Bags	N/A	N/A	N/A
Epiphyte Collection and Seagrass Drying	Milligram scale (Biomass weight)	Calibrate before each use	Follow instructions using 200 mg weight provided by manufacturer	N/A
Hardbottom/Coral Monitoring	% coverage, colony size, and species identification	At first, site visited during each survey period	Lead surveyor's discretion	Continue surveying with lead surveyor until in sync
Rookery Monitoring	Nesting behavior, species identification	Annually (during first survey)	Lead surveyor's discretion	N/A

Table 2: Quality Control Requirements.

Instrument/Equipment Testing, Inspection, & Maintenance

Program Instrument/Equipment Testing, Inspection, & Maintenance Timeline

Program	Instrument/ Equipment	Inspection	Maintenance
Water Quality Sampling	YSI ProDSS	Visually inspect before and after every use. Clean immediately after using.	Yearly maintenance required at a YSI-certified facility
Datasonde Continuous Water Quality Monitoring	YSI EXO2	Visually inspect before and after every use. Clean immediately after using.	Yearly maintenance required at a YSI-certified facility
Datasonde Continuous Water Quality Monitoring	Sonde Mounts	Visually inspect during swap.	Repair as needed.
Benthic/Seagrass Monitoring	Scuba Gear (BCD & regulators)	Visually and manually inspect before and after every use. 1. Inflate and deflate BCD 2. Make sure BCD holds air 3. Test both regulators to make sure they breathe adequately Clean immediately after using.	Yearly maintenance is required at a manufacturer-certified facility
Benthic/Seagrass Monitoring	Scuba Tanks (including spare air)	Visually inspect before and after every use. 1. Check that the valve O-ring is present and in good working condition (round, no nicks, not dry rotted, etc....) Clean immediately after using.	A yearly visual inspection is required Hydrostatic testing is required every 5 years
Benthic/Seagrass Monitoring	GPS Units	Visually inspect before and after every use. Clean immediately after using.	Replace batteries as needed.
Benthic/Seagrass Monitoring	Cameras	Watertight testing quarterly. Visually inspect before and after every use. Clean immediately after using.	Lubricate O-rings quarterly.
Seagrass Tissue Collection	Zip-top bags	Visually inspect for holes or tears.	N/A
Epiphyte Collection and Seagrass Drying	Milligram scale (Biomass weight)	Visually inspect before and after every use. Always clean immediately after using.	N/A
Epiphyte Collection and Seagrass Drying	Dry Oven	Visually inspect before and after every use. Clean immediately after using.	N/A
Hardbottom/Coral Monitoring	See Benthic/Seagrass Monitoring	See Benthic/Seagrass Monitoring	See Benthic/Seagrass Monitoring

Rookery Monitoring	Kayaks	Visually inspect before and after every use.	Clean with fresh water after use.
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Table 3: Instrument and Equipment Testing, Inspection, and Maintenance.

Instrument/Equipment Calibration

Water Quality Program

YSI ProDSS Multiparameter Water Quality Meter is required to be calibrated within 24 hours of a sampling event and a continuous or post-calibration needs to occur within 24 hours of the pre or previous continuous calibration. All standards used during pre-, continuous, and post-calibrations are manufactured or approved by Xylem YSI. The calibration acceptance criteria for our water quality program can be found in Table 5. For further ProDSS calibration information refer to the SOP link provided in Table 1.

YSI ProDSS Pre- and Post-Calibration Acceptance Criteria (AC)

Sensor	Acceptance Criteria
Optical Dissolved Oxygen (FT 1500)	± 0.3 mg/L of theoretical value
Specific Conductivity (FT 1200)	$\pm 5\%$ of standard value
Temperature (FT 1400)	$\pm 0.5^{\circ}\text{C}$ of NIST traceable value
pH (FT 1100)	± 0.2 standard pH units of buffer

Table 4: YSI ProDSS Calibration Acceptance Criteria (AC), Appendix FT 1000.

Continuous Water Quality Monitoring Program

YSI EXO2 Multiparameter sondes are required to be calibrated within a week prior to deployment and post-calibrated within 24 hours of retrieval. All standards used during pre-, continuous, and post-calibrations are manufactured or approved via YSI.

- Quality Assurance Plan
http://publicfiles.dep.state.fl.us/DEAR/DEARweb/QA/Plans/2021-2022_QualityPlans/QualityPlan_APContinuousWQ_rev2022.pdf
- Standard Operating Procedure links can be found in Table 1
- Calibration Acceptance Criteria are located in Table 4.

EXO2 Pre- and Post-Calibration Acceptance Criteria (AC)

Sensor	Acceptance Criteria
Optical Dissolved Oxygen	<u>% Saturation:</u> 0-200% air sat.: $\pm 1\%$ of reading <u>0-20 mg/L:</u> ± 0.1 mg/L OR $\pm 1\%$ of the reading, whichever is greater
Total Algae (PE)	<i>No given AC from NERR SWMP</i> <u>Chlorophyll (ug/L):</u> $\pm 2\%$ of reading
Conductivity/Temperature (wiped)	<u>Temperature:</u> CANNOT be calibrated <i>Wiped Sensor:</i> -5 to 50°C: $\pm 0.2^\circ\text{C}$ <u>Specific conductance:</u> <i>Wiped Sensor:</i> 0 to 100 mS/cm: $\pm 1\%$ of the reading OR ± 0.002 mS/cm, whichever is greater <u>Cell Constant:</u> <i>Wiped Sensor:</i> 0.469/cm ± 0.5
Turbidity	<u>Turbidity (FNU):</u> 0 to 999 FNU: 0.3 FNU OR $\pm 2\%$ of reading, whichever is greater
pH ISE02, unguarded	<u>pH:</u> ± 0.1 units within $\pm 10^\circ\text{C}$ of calibration temperature ± 0.2 units for the entire temperature range <u>pH (mV):</u> pH 7: 0mV ± 50 mV pH 10: -180mV ± 50 mV <u>Delta Slope:</u> From pH 7 to pH 10: -177.3 mV/pH unit (based on 25°C) *Should always be ≥ 165 *The delta slope helps assess the performance of the pH modules as it ages.
Depth	<u>Depth (m):</u> Shallow ($\leq 10\text{m}$): $\pm 0.004\text{m}$ Medium ($\leq 100\text{m}$): $\pm 0.04\text{m}$

Table 5: EXO2 Datasonde Calibration Acceptance Criteria (AC).

Inspection/Acceptance Requirements of Supplies and Consumables

Calibration Standards

All standards used during calibrations are manufactured or approved via YSI. There is no verification needed on our part. For further sonde calibration information refer to the link provided in Table 1.

- YSI 124 FNU Turbidity Standard (SKU: 607300)
<https://www.ysi.com/Product/id-607200/Turbidity-Standard>
- Fisher pH 7 Standard – Color-coded yellow (SB107-4)
<https://www.fishersci.com/shop/products/buffer-solution-ph-7-00-color-coded-yellow-certified-fisher-chemical-5/sb1074>
- Fisher pH 10 Standard – Color-coded blue (SB115-20)
<https://www.fishersci.com/shop/products/buffer-solution-ph-10-00-color-coded-blue-certified-fisher-chemical-4/sb11520>
- Ricca Potassium Chloride 50,000 µS/cm Conductivity Standard (R5889000)
[http://www.riccachemical.com/products/standards/conductivity-standards/potassium-chloride-conductivity-standards/5889-\(-r5889000-\)](http://www.riccachemical.com/products/standards/conductivity-standards/potassium-chloride-conductivity-standards/5889-(-r5889000-))
- Ricca Potassium Chloride 7,000 µS/cm Conductivity Standard (R5889270)
<http://www.riccachemical.com/products/standards/conductivity-standards/potassium-chloride-conductivity-standards/r5889300>
- Kingscote Rhodamine FWT Dye Concentrate

Data Acquisition Requirements (Non-Direct Measurements)

At this time, FKNMS/FKAP does use data from other programs.

Data Management

Program	Data Recording Method	Reporting	Data Backup
Water Quality Collection and Sampling	Data logged on YSI ProDSS internal memory	Uploaded to WIN by either DEAR staff via Chain of Custody sheet or directly by FKNMS/FKAP staff	Digital data exported in Kor and saved on \\BiscayneBay-16\FKNMS_SHARE\Fieldwork\Data
Continuous Water Quality Monitoring	Data logged on YSI Exo2 internal memory	Uploaded to RCP Continuous Water Quality Monitoring Data website (https://floridaapdata.org/)	Digital data exported in Kor and saved on \\BiscayneBay-16\FKNMS_SHARE\Fieldwork\Data

Benthic/Seagrass Monitoring	Field data sheets transcribed into spreadsheet	Uploaded to FIU Seagrass Ecosystems Research Lab website (seagrass.fiu.edu/)	Scans saved to \\BiscayneBay-16\FKNMS_SHARE\Fieldwork\Data Paper sheets stored in FKAP office
Seagrass Tissue Collection	N/A	N/A	N/A
Epiphyte Collection and Seagrass Drying	Laboratory data sheets transcribed into spreadsheets; FIU laboratory results	Uploaded to FIU Seagrass Ecosystems Research Lab website (seagrass.fiu.edu/)	Results saved to \\BiscayneBay-16\FKNMS_SHARE\Fieldwork\Data Paper sheets stored in FKAP office
Hardbottom/Coral Monitoring	Field data sheets transcribed into spreadsheets	Coupon Bight Aquatic Preserve website (floridadep.gov/RCP/aquatic-preserve/locations/coupon-bight-aquatic-preserve)	Scans saved to \\BiscayneBay-16\FKNMS_SHARE\Fieldwork\Data Paper sheets stored in FKAP office
Rookery Monitoring	Field data sheets transcribed into spreadsheets	SFWMD/Audubon South Florida Wading Bird Report	Scans saved to \\BiscayneBay-16\FKNMS_SHARE\Fieldwork\Data Paper sheets stored in FKAP office

All data generated within Aquatic Preserves are also included in an annual report

Table 6: Data management and backup.

Data Review

Our program understands the need to evaluate the quality and usefulness of environmental data before making decisions. We conduct the following review procedures **to determine the usability of data for determination of compliance with permits or rules, etc.** These procedures are based on our established Data Quality Objectives and Data Quality Indicators and incorporate the concepts and criteria found in DEP's "Process for Assessing Data Usability", DEP-EA-001/07

Program	Initial Data Collection	Verification	Validation	Qualified Data
Water Quality Collection and Sampling	Data is collected on a YSI ProDSS and then transferred to a DEAR Chain of Custody sheet to be sent to the lab with grab samples; if no grab samples, data is transcribed and uploaded to WIN	After recording or transcribing data, values are verified by the recorder	Data is graphed; outliers are visually identified	Qualified data is not included
Continuous Water Quality Monitoring (QAP link found on pg. 15)	Data is collected on a YSI Exo2 and then downloaded from the sonde to Kor (computer software). Using Kor, data is converted and saved as a .csv	AP Staff reviews, notes obvious errors, removes pre- and post-deployment readings, saves file with _L at end, and uploads to CDMO's Non-SWMP-Data Upload Service.	AP staff analyze primary QAQC and make notes in quarterly metadata report. AP staff reviews quarterly and annual reports and apply QC flags via loading files into CDMO QAQC macro	AP data manager reviews annual data, reports, and logs, creates question and comment document, data manager and AP staff meet to make corrections and finalize
Benthic/Sea grass Monitoring	Data is collected on field data sheets and then put into a spreadsheet	Values are verified by the recorder	Data is graphed; outliers are visually identified	N/A
Seagrass Tissue Collection	N/A	N/A	N/A	N/A
Epiphyte Collection and Seagrass Drying	Data is collected on a lab data sheet and then put into a spreadsheet	Values are verified by the recorder	Data is graphed; outliers are visually identified	N/A
Hardbottom/ Coral Monitoring	Data is collected on field data sheets and then put into a spreadsheet	Values are verified by the recorder	Data is graphed; outliers are visually identified	N/A
Rookery Monitoring	Data is collected on field data sheets and then put into a spreadsheet	Values are verified by the recorder	Results by the two independent recorders are compared and averaged	If a large discrepancy exists, qualified data will not be included

All Standard Operating Procedure links can be found in Table 1

Table 7: Data collection, entry, and validation for quality assurance.

Documentation

Since accurate documentation is an important factor in determining the success of QA activities, our unit carries out the following record-keeping procedures to ensure appropriate documentation:

Laboratory data reports will include:

- Instrument calibration data and sign-off sheets
- Copies of raw data and logbooks
- Field sampling results
- Quality control sample results (if present)
- Description of data qualifiers or ranges that apply to the sample
- Description of any issues or problems that arose during sampling or analysis, including resolution(s)
- Calculation checks
- Review of database entries

Other project records:

- Training and field forms
- Chain of custody records (e.g. forms, receipts, shipping records)
- Assessment reports
- Oversight reports
- Interim progress/status reports
- Final report

Project	Paperwork	Location
Water Quality Collection and Sampling	ProDSS Calibration	F:\Fieldwork\Monitoring Programs\Calibration Paperwork\ProDSS\ProDSS_CalibrationLog_Template.pdf
Water Quality Collection and Sampling	ProDSS Temperature Verification	F:\Fieldwork\Monitoring Programs\Calibration Paperwork\ProDSS\ProDSS_TempVerification_Template.pdf

Continuous Water Quality Monitoring	EXO2 Calibration	F:\Fieldwork\Monitoring Programs\Calibration Paperwork\EXO2\FKNMS APCWQ Calibration&FieldLog_TEMPLATE.xlsx
Benthic/ Seagrass Monitoring	Seagrass Data Sheet	F:\Fieldwork\Monitoring Programs\Material Paperwork Papers\Field Paperwork\Seagrass DataSheet.pdf
Seagrass Tissue Collection	Tare Weights	F:\Fieldwork\Monitoring Programs\Material Paperwork Papers\Lab Paperwork\LKAP Thalassia Tare List.pdf
Seagrass Tissue Collection	Leaf Morphology Data Sheet	F:\Fieldwork\Monitoring Programs\Material Paperwork Papers\Lab Paperwork\Copy of Leaf Morphology Sheet.pdf
Seagrass Tissue Collection	Epiphyte Dry Weight Data Sheet	F:\Fieldwork\Monitoring Programs\Material Paperwork Papers\Lab Paperwork\Epiphyte Dry Weight Data Sheet.pdf
Hardbottom/ Coral Monitoring	N/A	N/A
Rookery Monitoring	Rookery Count Data Sheets	F:\Fieldwork\Monitoring Programs\Material Paperwork Papers\Field Paperwork\RookeryCount DataSheet.docx

Table 8: Lab and Field Calibration/Data Sheets.

All computer documents and records will be saved and backed up to the appropriate Microsoft OneDrive folder. All paper project documents and records will be stored with the QAO or PM, copies will be scanned and placed into the same OneDrive folder with all other material. Staff will have access to all current QA Project Plans, revisions/updates, etc. via this folder

Contract Management

Our program ensures that any DEP contracts administered are properly managed to assure appropriate data quality. All Standard or Research QA plans are accessible for agreements that include sample collection or analysis and require a QA Plan as a deliverable. As such, we conduct the following activities related to contract development and review:

Contracts will be reviewed and discussed with vendors at the start of every fiscal year so that updates can be made to the work plans, purchase orders, QA plans, and SOPs.

Audits and Corrective Actions

Audits provide objective feedback concerning the effectiveness of our program's quality system and may identify areas in need of improvement. Therefore, our unit performs the following activities as discussed below:

- **Conduct one audit per year**
- **Compile and save all audit reports to share drive**
- **Handle any complaints and reports received concerning data quality**
- **Report all exceptions to the established procedures and criteria**
- **Devise and implement corrective actions for problems found with the procedures, data reviews, etc.**

Report Compilation

To provide the Secretary with information regarding DEP's ongoing QA efforts, our unit describes and compiles the results of all appropriate QA activities, and relays them to the Aquatic Ecology and Quality Assurance Section for the [Annual Quality Assurance Report to the Secretary](#).

Additionally, the Florida Keys Aquatic Preserves will produce an annual report with all data collected within Lignumvitae and Coupon Bight Aquatic Preserves. This report will be made publicly available through DEP's ORCP and AP Data Portal websites.

References

1. [Florida Keys National Marine Sanctuary | Florida Department of Environmental Protection](#)
2. [Lignumvitae Key Aquatic Preserve | Florida Department of Environmental Protection](#)
3. [Coupon Bight Aquatic Preserve | Florida Department of Environmental Protection](#)
4. [The Management of Natural Coastal Carbon Sinks - Google Books](#)
5. [Losses and recovery of organic carbon from a seagrass ecosystem following disturbance | Proceedings of the Royal Society B: Biological Sciences \(royalsocietypublishing.org\)](#)
6. [\(1\) \(PDF\) A preliminary evaluation of wave attenuation by four species of seagrass | Jennifer Cahalan and Mark Fonseca - Academia.edu](#)
7. [MarineGEO_2019_Seagrass-Food-Webs_Proposal_v0.0.2.pdf](#)