Quality Plan for

Office of Resilience and Coastal Protection
Oyster Habitat Monitoring Program

Florida Department of Environmental Protection

June 30, 2022

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 Alex Reed

Director

X Michael A. Shirley

Deputy Director

X Samantha Howe

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 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 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 carry out 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 Office of Resilience and Coastal Protection Oyster Habitat Monitoring Program has 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 meets our established quality criteria.

Basic Elements of Our Quality Plan

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 (Chapter 62-160, F.A.C.). In addition, we ensure that our plan for all sampling activities 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, including those activities associated with database construction and management. 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 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 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 are responsible 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 Office of Resilience and Coastal Protection Oyster Habitat Monitoring Program 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 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

The Oyster Habitat Monitoring Program resides within the Office of Resilience and Coastal Protection (ORCP) and consists of the individual oyster habitat monitoring programs carried out by individual ORCP managed area offices (Aquatic Preserves, National Estuarine Research Reserves, the Florida Keys National Marine Sanctuary and/or the Coral Reef Conservation Program) and the Central Office in Tallahassee**.**

The function of our unit is to collect data on the condition of oyster habitat within the areas managed by ORCP and to ensure that they are of high quality and are publicly available through the Statewide Ecosystem Assessment of Coastal and Aquatic

Resources (SEACAR) Data Discovery Interface[1]. As of summer 2022, oyster habitat has been monitored by 10 programs in nine of the 31 managed areas that have oyster habitat mapped within their borders (Table 1). The quality system described here will guide staff from these managed areas as well as those from any future managed areas that choose to start an oyster habitat monitoring program.

Table 1. The Office of Resilience and Coastal Protection oyster monitoring programs in the SEACAR Data Discovery Interface as of summer 2022 and the time periods and managed areas they cover.

ID	Program Name	Region	Start Year	End Year	Frequency	Managed Area(s)
542	Apalachicola National Estuarine Research Reserve Oyster Growth Project	NW	2004	2009	Monthly	Apalachicola Bay AP, Apalachicola NERR
4000	Guana Tolomato Matanzas NERR Oyster monitoring	NE	2014	Current	Annual	Guana River Marsh AP, Guana Tolomato Matanzas NERR, Pellicer Creek AP
4016	Indian River Lagoon Oyster, Coastal Wetlands and Mangroves (MarineGEO site)	NE	2016	Current	Annual	Indian River-Malabar to Vero Beach AP, Indian River-Vero Beach to Ft. Pierce AP, Jensen Beach to Jupiter Inlet AP
4042	Estero Bay Oyster Monitoring	SW	2014	Current	Annual	Estero Bay AP
4044	NRDA Oyster Cultch Recovery Project	NW	2017	Current	Annual	Apalachicola Bay AP, Apalachicola NERR, Yellow River Marsh AP
4045	Rookery Bay Reserve Habitat Maps	SW	1940	2014	Periodic	Cape Romano-Ten Thousand Islands AP, Rookery Bay AP, Rookery Bay NERR
5007	RESTORE Oyster Cultch Recovery	NW	2018	2021	Annual	Apalachicola Bay AP, Apalachicola NERR
5010	Apalachicola Intertidal Oyster Project	NW	2018	Current	Annual	Apalachicola Bay AP, Apalachicola NERR

[1] https://data.florida-seacar.org/

5017	Northern Coastal Basins and Mosquito Lagoon Oyster Condition Assessment	NE	2015	2017	TBD	Guana River Marsh AP, Guana Tolomato Matanzas NERR, Mosquito Lagoon AP, Nassau River-St. Johns River Marshes AP, Tomoka Marsh AP
5035	Historical Oyster Body Size (HOBS) Study	NE, NW, SW	2018	2018	One-time	Apalachicola Bay AP, Apalachicola NERR, Big Bend Seagrasses AP, Estero Bay AP, Guana River Marsh AP, Guana Tolomato Matanzas NERR, Indian River-Vero Beach to Ft. Pierce AP, Lemon Bay AP

Office of Resilience and Coastal Protection staff have a variety of responsibilities pertaining to administration, research, monitoring, management and restoration of multiple habitat types, public education and coordination with other governmental and non-governmental stakeholders. However, responsibilities specifically related to natural and restored oyster habitat monitoring include data collection (fieldwork and lab work), data management, analysis and/or reporting, program administration, and strategic planning and leadership (Table 2).

Table 2. Key Office of Resilience and Coastal Protection personnel at managed areas with mapped oyster reefs and their types of responsibilities regarding the Oyster Habitat Monitoring Program. Staff are listed by Section and by seniority within Section. Sections are listed in clockwise geographic order around the state starting with the Central Office.

Name	*Section*	*Position*	*Responsibilities*
Central Office			
Alex Reed	Central Office	ORCP Director	•Strategic planning and leadership
Michael Shirley, Ph.D.	Central Office	ORCP Deputy Director for Coastal Zone Management	•Strategic planning and leadership

Cheryl Clark	Central Office	Coastal Projects Manager	•Program administration •Data management, analysis, reporting
Stephen Durham, Ph.D.	Central Office	Environmental Specialist III	•Data collection •Data management, analysis, reporting
Samantha Howe	Central Office	Government Operations Consultant II	•ORCP Quality Assurance Officer
Northeast Region Office			
Scott Eastman	NE Region Office	NE Regional Administrator	•Strategic planning and leadership
James Tomazinis	Nassau River-St. Johns River Marshes and Fort Clinch Aquatic Preserves	Aquatic Preserve Manager	•No oyster monitoring program as of 2022
Nikki Dix, Ph.D.	Guana Tolomato Matanzas National Estuarine Research Reserve	Research Coordinator	•Program administration •Data collection •Data management, analysis, reporting
Pamela Marcum	Guana Tolomato Matanzas National Estuarine Research Reserve	Biological Scientist II	•Data collection •Data management, analysis, reporting
Ashley Hurley	Tomoka Marsh Aquatic Preserve	Aquatic Preserve Manager	•No program currently, but serves on the ORCP Oyster Working Group
Irene Arpayoglou	Indian River Lagoon Aquatic Preserves	Aquatic Preserve Manager	•Program administration
Matthew Anderson	Indian River Lagoon Aquatic Preserves	Environmental Specialist II	•Program administration •Data collection •Data management
Emily Surmont	Indian River Lagoon Aquatic Preserves	Environmental Specialist I	•Data collection
Northwest Region Office			
Jennifer Harper	NW Region Office	NW Regional Administrator	•Strategic planning and leadership
Jason Garwood	Apalachicola NERR	Research Coordinator	•Program administration •Data collection
Ethan Bourque	Apalachicola NERR	Environmental Specialist II	•Data collection
Tim Jones	Big Bend Seagrasses Aquatic Preserves	Environmental Specialist III	•No oyster monitoring program as of 2022

Jonathan Brucker	Central Panhandle Aquatic Preserves	Aquatic Preserve Manager	•Program administration •Data collection •Data management, analysis, reporting
Beth Fugate	NW FL Aquatic Preserves	Aquatic Preserve Manager	•Program administration •Data collection •Data management, analysis, reporting
Zach Schang	NW FL Aquatic Preserves	Environmental Specialist I	•Data collection
Southwest Region Office			
Keith Laakkonen	SW Region Office	SW Regional Administrator	•Strategic planning and leadership
Heather Stafford	SW Region Office	SW Regional Aquatic Preserve Manager	•Strategic planning and leadership
Randy Runnels, PhD	Tampa Bay Aquatic Preserves	Aquatic Preserve Manager	•No oyster monitoring program as of 2022
Mindy Brown	Charlotte Harbor Aquatic Preserves	Aquatic Preserve Manager	•No oyster monitoring program as of 2022
Stephanie Erickson	Estero Bay Aquatic Preserve	Aquatic Preserve Manager	•Program administration •Data collection •Data management, analysis, reporting
Rebecca Cray	Estero Bay Aquatic Preserve	Environmental Specialist I	•Data collection •Data management, analysis, reporting

The Quality Assurance Officer (QAO) coordinates and participates in the quality evaluation of program data and provides oversight to ensure that our staff perform their QA functions. The QAO may delegate some responsibilities to properly trained and qualified staff, when appropriate. The QAO conducts systems audits of internal and external data generators (lab and field) and conducts sampling performance audits. The QAO also ensures that corrective actions are implemented for data non-conformance incidents as determined by evaluation of the data against our program's Data Quality Objectives. Additionally, the QAO assists program managers in the development of the Quality System and other logistical aspects of its implementation, such as coordinating associated training needs.

The QAO documents all program QA activities, including training, audits and corrective actions and provides this information to the DEP Aquatic Ecology and Quality Assurance Section on a periodic basis.

Program staff routinely carry out the following duties involving data collection, data usability evaluation, data interpretation, and the generation of DEP work products in a manner that ensures scientific defensibility and adherence to DEP rules and policies. Data collection is conducted in accordance with the ORCP Oyster Habitat Monitoring Standard Operating Procedure[2], which was developed by the ORCP Oyster Working Group and defines the minimum required monitoring information for oyster monitoring programs at individual ORCP managed areas to maintain a baseline level of consistency and comparability in data collection and data management around the state. The Oyster Working Group meets at least once annually to evaluate the ORCP Oyster Habitat Monitoring Program and the usability of the monitoring data produced.

Staff evaluate program data using program Data Quality Objectives (DQOs) and Data Quality Indicators (DQIs) and implement corrective actions as directed by the Quality Assurance Officer and as described in this plan. A list of our DQOs and DQIs can be found in Table 3**.**

Table 3. Data Quality Objectives and corresponding Data Quality Indicators for ORCP oyster habitat monitoring programs.

Data Quality Objectives	*Data Quality Indicators*
RCP oyster habitat monitoring programs will have clear goals and objectives for their work that are pursuant to the relevant managed area management plan(s).	• Each oyster habitat monitoring program will develop explicit monitoring goals, objectives, and performance measures based on the respective management plans for each managed area.
Sampling will be conducted following the most current version of the ORCP Oyster Habitat Monitoring SOP.	• Sufficient sampling will be conducted to detect a change of at least 30% of the mean with 80% power (i.e., $\alpha = 0.05$, $\beta = 0.2$) for each indicator, unless otherwise specified in this plan.
Any additional data collection beyond the minimum monitoring outlined in the ORCP Oyster Habitat Monitoring SOP must be conducted in accordance with an approved protocol and QA plan.	• Managed areas with expanded oyster habitat monitoring should have their protocols and quality plans cited in this plan.
Surveys and counts will be conducted by properly trained staff and volunteers, proficiency to be evaluated using comparison exercises.	• Conduct hands-on training/assessment for each indicator. • Novice data collectors should demonstrate competency before working independently. • Programs shall keep records of all training activities.

[2]https://floridadep.sharepoint.com/:b:/g/fco/seacar/rcp/ESM6F7LUxF5MIlt5PlYOxGYBmYVq1dSbaumicQg3ioQRsQ?e=KUa3MO

Data will be collected and handled, to the extent practicable, in a manner that reduces the chances for errors or data loss associated with human error or hardware failures.	• Quality checks on new oyster monitoring data will be completed within 60 business days of the monitoring event. • All electronic files associated with oyster monitoring (e.g., photos, data files, training records) will be backed up to an FDEP SharePoint site within 10 business days of completion of quality checks. • Copies of finalized oyster monitoring data files will be submitted to the SEACAR Data Discovery Interface within 10 business days of completion of quality checks.

Individual program staff also perform the following for their program's data prior to uploading them to SharePoint:

- Review field work and data collection for conformance with quality criteria
- Review and evaluate data
- Interpret data or determine compliance with permits and rules
- Check calculations
- Review documents for errors and completeness

Based on these tasks, program staff provide feedback to the program Quality Assurance Officer and the ORCP Oyster Working Group for improving the program quality system and/or the statewide quality system.

- Samantha Howe (Central Office), as the ORCP QAO, acts as liaison with other units, data providers, data consumers or other external parties concerning QA matters.
- The Aquatic Preserve and National Estuarine Research Reserve managers answer public or external technical inquiries about data interpretation, approved procedures, suspected QA problems, site-specific issues, etc., for their managed area(s). Stephen Durham (Central Office) also fields these types of questions as related to the SEACAR program and the ORCP Oyster Working Group.

Our unit's management, Director Alex Reed and Deputy Director Michael Shirley, ensure that this quality system is fully operational within our program, designates our Quality Assurance Officer, and provides general oversight. These managers also evaluate the above Data Quality Objectives and Data Quality Indicators to ensure they meet our program's needs, and periodically evaluate the effectiveness of staff's data quality activities, including reviewing audit results. These managers evaluate corrective action policies and procedures to be implemented when data do not meet program Data Quality Objectives. Our managers discuss audit results with the QAO, review the annual Quality Assurance Report to the Secretary, and discuss findings with the QAO.

An organizational chart is presented in Appendix 1.

Training

One of the data quality objectives is for all personnel to be properly trained to perform their duties. Supervisors periodically assess whether our staff performance conforms with the policies and procedures of our unit. Each program trains their own new staff and/or volunteers who will be involved in data collection and/or management. Training minimally consists of the following steps:

- The new staff/volunteer reads the protocol(s) and has the opportunity to ask questions and discuss the protocol with an experienced staff person before they go out in the field to ensure understanding.
- The new staff/volunteer must meet all DEP safety and training criteria. For instance, all divers collecting subtidal oyster reef samples must be certified to dive for FDEP. Similarly, all boat operators must be certified to captain FDEP vessels. All diving is done in accordance with the FDEP's Underwater Operation Manual[3].
- Hands-on training/assessment is performed for each indicator either as directly supervised data collection in the field or as an exercise in the lab, as applicable. No new staff person or volunteer should conduct any aspect of the monitoring program on their own until they have shadowed an experienced staff person and conducted the measurement under their supervision at least once. The supervision continues for as many measurements or field days as necessary for the experienced staff person to trust the work of the novice and for the novice to meet the data quality indicator for the focal measurement type. The experienced trainer must be an ORCP staff person; even though there may be some very experienced volunteers, it is the ORCP staff who are ultimately responsible for each monitoring program and the quality of its data. In all cases, the name of the data collector must be associated with the data they have collected to facilitate corrective actions if issues are identified.
    - For percent cover, new staff or volunteers should observe at least one quadrat of data collection (both the surveyor and the data recorder roles) in the field and be given the opportunity to ask questions before participating in one or both roles under the direct supervision of an experienced staff person. The first quadrat or two that the novice conducts on their own should be spot-checked by the experienced staff person before the quadrat is considered complete and picked up off the reef.

      Data Quality Indicator: ≥95% of novice and expert grid point determinations should match for the same quadrat.

    - For density, the novice data collector(s) should be shown examples of live versus dead oysters to ensure they can reliably identify the correct

[3] Available at: https://www.floridadep.net/resources/water-safety-and-information

specimens to count. An experienced staff person should also show all novices how to disaggregate oyster clumps and identify live oysters that may be obscured within the clumps, on the insides of boxes, etc. If any counting aids are used (e.g., tally counters), novices should be trained in their use by an experienced staff person as well. In all cases, the novices should be given opportunities to have questions answered. Novices should be given a subset of the sample to count, working with the experienced staff person, and then the experienced staff person should count the novice subset themselves after the novice has finished to ensure consistency of the density estimates. This exercise should be repeated as needed until the experienced staff person trusts the live oyster counts of the novice.

Data Quality Indicator: Novice live oyster counts (and dead oyster counts, if applicable) must be within 5% of the expert oyster counts for the same sample.

- For shell height, each Program should maintain a set of ~50 oyster shells of varying shapes and sizes, and labeled with numbers 1 to *n* shells, so that all staff and volunteers measure the same set of shells and their measurements can be compared. In general, measurements from different data collectors should be within 2mm of each other to be considered acceptable. Prior to measuring the test set of shells, novice data collectors should be shown how to properly use the calipers, as well as how to identify live versus dead oysters and how to identify the dorso-ventral growth axis to be measured (See Figure 1). Any differences of >2mm between a novice's measurements and those of the experienced staff person should be discussed to identify and address the reason for the discrepancy. The measurements from at least the first sample for which a novice data collector is responsible should be spot-checked by an experienced staff-person (at least 10 specimens of varying sizes and shapes from the sample should be checked).

  If differences >2mm are found in more than one out of ten measurements, the novice data collector or experienced staff person must re-measure the sample until they can meet the <2mm difference data quality indicator. Even experienced staff members should spot-check each other's measurements regularly (a minimum of once per year) to ensure consistency of data collection and the test set of oyster shells should be re-measured periodically (e.g., annually), even by experienced staff, to document any drift in measurements over time.

  Data Quality Indicator: No more than 10% of novice shell height measurements should differ from the expert measurement for the same

shell by more than 2mm, and a minimum of 10 shell measurements should be checked.

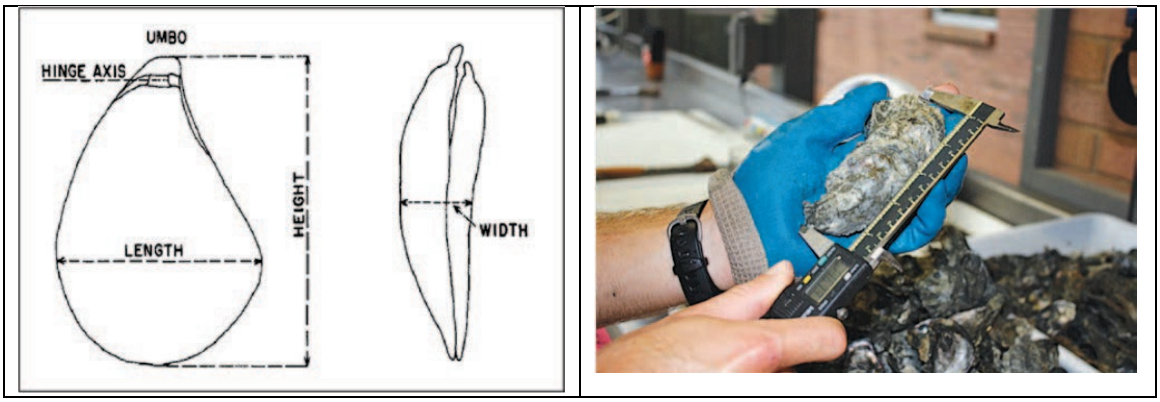

Figure 1. (left) Diagram of the height, length, and width measurements of an oyster shell, from Galtsoff (1964)[4], Chapter 2. (right) An example of shell height measurement in a lab. Figure modified from Baggett et al. (2014)[5].

- For reef height, as with percent cover, novices should shadow an experienced staff member and be closely supervised when assisting with the measurement. For instance, for intertidal measurements, how to identify where to place the stadia rod and where to measure from the reef crest should be thoroughly explained and the novice's judgements tested by allowing them to subsequently suggest the reef crest and reef edge positions for future measurements until the experienced staff person is confident that they understand the procedure. Although it is still experimental at this time, for subtidal measurements, the operation of sonar equipment and software, as applicable, must be thoroughly explained and documented in a written protocol in the event new data collectors will be trained.

  Data Quality Indicator: Novice reef height measurements must be within 5% of the expert reef height value.

Each program maintains a file of records for their field staff and volunteers that documents the date when they began monitoring and who trained them. This log should also be used to record test set results and field competency demonstration results for each trainee, as well as any issues and corrective actions taken with the data collectors. These records will facilitate ensuring that each staff person or volunteer has been

[4]Galtsoff, Paul Simon. The American Oyster *Crassostrea virginica* (Gmelin). Vol. 64. Fishery Bulletin of the Fish and Wildlife Service. Washington, D.C.: United States Government Printing Office, 1964.

[5]Baggett, Lesley P., Sean P. Powers, Robert Brumbaugh, Loren D. Coen, Bryan DeAngelis, Jennifer Greene, Boze Hancock, and Summer Morlock. Oyster Habitat Restoration Monitoring and Assessment Handbook. Arlington, VA, USA: The Nature Conservancy, 2014.

trained, will help ORCP staff identify who may need refresher training, and will help ORCP assess the inherent uncertainty in the data collected under their programs.

Sampling Design and Procedures

Successful implementation of our program relies on valid data, which begins with proper sampling. The ORCP Oyster Working Group, consisting of Division staff representing each ORCP oyster monitoring program around the state was created to coordinate various aspects of oyster monitoring programs across managed areas to ensure a minimum level of data comparability, as well as the development and maintenance of the agreed upon standards for methodology and quality assurance outlined in this document. The ORCP Oyster Working Group meets at least once annually to:

- Review the status of ORCP oyster monitoring programs
- Make any needed updates to the SOP or quality assurance plan
- Review procedures and methods for compliance with QA plans and requirements
- Handle requests for use of alternative, new or modified sampling or data management procedures

Note that each oyster monitoring program manages their own sampling plans and operations, data collection and data reviews. Individual programs may also monitor additional indicators or use other modifications of the statewide SOP cited here, as long as the modified methods are still repeatable and scientifically defensible. Local modifications are documented in a local SOP and quality plan to ensure all ORCP oyster monitoring data meet clear standards of repeatability and scientific soundness.

Individual managed areas that currently employ modified SOPs are listed below.

Estero Bay Oyster Monitoring

- Standard Operating Procedures for additional indicators: *In development*
  - Will include QA guidelines for the additional indicators.
- Additional indicators monitored:
  - Reef perimeters mapped with Trimble GPS
  - Tide stage
  - Reef length
  - Associated faunal presence (including predators and invasive species)
  - Water quality parameters- temperature, salinity, dissolved oxygen, conductivity, pH, turbidity
- Other notable differences from statewide SOP:
  - Use random offset perpendicular to the transect for quad placement
  - Fixed reef selections for monitoring (though may alter reef selection process to include a mix of fixed and randomly selected reefs in the future)

Guana Tolomato Matanzas NERR Oyster Monitoring

- Standard Operating Procedures for additional indicators: *In development*

    - Will include QA guidelines for the additional indicators.

- Additional indicators monitored:
    - Cluster density per m^2
    - Predatory snail density per m^2
    - Cluster relief- height above sediment at four corners and tallest point inside m^2 quadrat
    - Associated faunal density per 0.0625 m^2 – barnacles, mussels, clams
    - Associated fauna shell heights – mussels, clams
- Other notable differences from statewide SOP:
    - Oyster shell heights measured for all live oyster in samples
    - Only oysters 25mm or greater are recorded
    - Hard copy field data sheets used
    - Auto-recording calipers not used

Data Review

Our program 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 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.

All data undergoes review and proofing by the individual program that collected them. The SEACAR Data Discovery Interface also has an automated flagging system that checks data uploads for appropriate geographic location information and realistic data values. Flags are applied to any suspect data that may indicate a potential error, and flagged records are then investigated by SEACAR project staff and staff of the relevant program to determine what, if any, corrective action is needed.

Documentation and Data Management

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

- **Sampling** – ORCP developed an electronic field sheet (the ORCP Oyster Monitoring Form[6]) that can be used in the field on a mobile device using the Excel mobile app, or as a printed hard copy that all programs have the option to

[6]https://floridadep.sharepoint.com/:x:/g/fco/seacar/rcp/EXwj5W435TxHsbroqokZrR0BwxBMrwE6wzhFkHFgsEYc2A?e=dAOR9u

use. Copies of all field sheets, photographs, and other documents are saved to an ORCP SharePoint directory[7].

- **Field-testing** – Field staff indicate on each field data sheet whether the data in the sheet are primary monitoring data, field testing data, or training data, and all field sheets are subject to the same data management processes regardless of their purpose. Field testing and training data are aggregated and stored in SharePoint in a similar manner as primary monitoring data to document data variability introduced by having multiple data collectors.
- **Data review** – All field sheets are proofed by a second program staff member separate from the staff member who filled out the sheet to ensure that all required fields are filled out correctly.
- **Calculation checks** – Basic calculations such as percent live cover, density, and estimated minimum sample size are automated in the ORCP field sheet workflow.
- **Data archiving** – Copies of all field sheets are archived on ORCP SharePoint. In addition, all program data are uploaded to the SEACAR Data Discovery Interface following the completion of quality checks.

  Data Quality Indicators:
  - Transcription of hard copy field sheets into electronic .csv or xlsx format and quality checks of all field sheets and indicator data should be completed within 60 business days after the corresponding monitoring event.
  - All electronic files associated with oyster monitoring programs (e.g., photos, data files, training records) will be backed up to an FDEP SharePoint site (e.g., ORCP Habitat Monitoring) within 10 business days of the completion of quality checks. It is also recommended that each program maintain additional local backup copies of their records.
  - Copies of all ORCP oyster monitoring data files will be submitted to the SEACAR Data Discovery Interface under the appropriate program page within 10 business days of completion of quality checks.
- Programs are encouraged to use the ORCP Oyster Monitoring Form[8] and Locality Stats Summary Generation Form[9] for data entry. The former standardizes metadata fields, allows easy tracking of power metrics, and automatically generates a standard format data sheet ready for upload to the SEACAR Data Discovery Interface. The latter can pass locality-level power analysis statistics to the electronic field sheets in real time. These forms can also

[7]https://floridadep.sharepoint.com/fco/seacar/rcp/RCP%20Oyster%20Monitoring/Forms/AllItems.aspx

[8]https://floridadep.sharepoint.com/:x:/g/fco/seacar/rcp/EXwj5W435TxHsbroqokZrR0BwxBMrwE6wzhFkHFgsEYc2A?e=dAOR9u

[9]https://floridadep.sharepoint.com/:x:/g/fco/seacar/rcp/EcaKIGhSwmNLi9TsnPZKRZUB4t640jvlveUDALyc4chSJg?e=uqchzb

be used with a SharePoint data workflow to automatically process the file content (including images) into components with standardized filenames and save them into a SharePoint document library.

- **Checks of database entries** – The SEACAR Data Discovery Interface has a built-in system for flagging suspect data values so that they can be investigated, and corrective actions can be taken if necessary.
- **Document control and maintenance** – All ORCP oyster monitoring documents (e.g., SOP, field sheets) have version numbers and dates, and are subject to regular review and updates by the ORCP Oyster Working Group. Division leadership also reviews and approves sampling, data management, and quality assurance procedures.
- **Record generation, retention, and storage procedures** – Archiving copies of all ORCP oyster monitoring program documents in a centralized SharePoint directory will protect records from loss due to destruction of hard copies or failure of local hard drives at individual program offices. It also makes it easy to keep the documents organized. Documents will be retained indefinitely. All data quality indicators listed under the *Data archiving* section above also apply to record generation, retention, and storage.

Contract Management

Our program 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 requiring a QA Plan as a deliverable. As such, we conduct the following activities related to contract development and review:

- Any oyster habitat monitoring contract, work plan and/or QA plan is reviewed for consistency with the standards outlined in this document and if deficiencies are identified, they are addressed with the contractor to amend the affected contract/plan(s).
- All oyster habitat monitoring data collected are archived in the SEACAR Data Discovery Interface for data management and additional quality checks.

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:

- *Conducts 1 audit per year and compiles audit reports*

  Each year, on a rotating basis, one of the ORCP oyster monitoring programs is audited. The audit consists of:

- Either an ORCP Oyster Working Group member from a different program or the ORCP QAO conducts a ride-along on one day of sampling to observe field operations for the focal program.
- Either an ORCP Oyster Working Group member from a different program or the ORCP QAO leads a review of data collected by the focal program since its most recent audit. The ORCP Oyster Working Group data audit team divides the work of spot-checking the focal program's data to verify that documentation is adequate, including checking that performance on all data quality indicators is acceptable.
- The audit team (field and data) will draft a report on their findings and present their results to the QAO and representatives of the audited program. In the event any issues are identified the audit team will propose recommended corrective actions to the ORCP Deputy Director and QAO for approval. Approved corrective actions will be communicated to the leadership of the impacted program by the ORCP Deputy Director, QAO, and audit team, as appropriate.

- *Handles complaints and other reports received from data users and the public concerning data quality*

  Any concerns from data users and the public about data quality will be reviewed by the ORCP Oyster Working Group and both the reported concern as well as the ORCP Oyster Working Group recommendation for any corrective action will be submitted to the ORCP Deputy Director and the QAO for approval. If approved, the corrective actions will be communicated to the leadership of the impacted program by the ORCP Deputy Director, QAO, and audit team, as appropriate, to discuss implementation. Otherwise, comments from the ORCP Deputy Director and QAO are addressed by the ORCP Oyster Working Group and the recommendation is resubmitted.

  The SEACAR Data Discovery Interface has a *Report an Issue with this Program* button on each program page that is another method for the public to send feedback about ORCP program data. Any comments received through the SEACAR Data Discovery Interface that have to do with a program's data quality will be sent to the relevant program to either address the concern or determine whether a review by the ORCP Oyster Working Group is needed.

- *Reports exceptions to established procedures and criteria*

  Reports of exceptions to established procedures and criteria are handled in the same way as the audit review and complaints described above, with a meeting of the ORCP Oyster Working Group to determine a recommended corrective action (members of the program that was the subject of any complaint may not vote), which is then approved by the ORCP Deputy Director and QAO.

- *Devises and implements corrective actions for problems with procedures, data reviews, etc*.

  The ORCP Oyster Working Group makes recommendations for corrective actions to the ORCP Deputy Director and QAO based on any reported problems or issues identified in an audit. The implementation of the approved corrective actions is then discussed between the ORCP Deputy Director, the QAO, and leadership of the affected program.

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 it to the Aquatic Ecology and Quality Assurance Section for an annual report.

Appendix 1

The figure below shows the organizational structure of the ORCP oyster monitoring program.