

Southeast Coast Network

National Park Service
Inventory and Monitoring Division



Standard Operating Procedure 1.2.03

Park-wide Assessment Field Water Quality Measurements—Version 2.0

Please cite this as:

Starkey, E. N., and M. B. Gregory. 2022. Park-wide assessment field water-quality measurements—Version 2.0. Southeast Coast Network Standard Operating Procedure NPS/SECN/SOP—1.2.03. Southeast Coast Network, Athens, Georgia.

Summary

The following standard operating procedures (SOP) outlines the procedure for collecting water quality field measurements (hydrographic profile and water column transparency) during park-wide assessments. The purpose of this SOP is to ensure that field teams are collecting data that are comparable across parks and years as well as data collected by the EPA Coastal Assessment Program and other programs using the same or similar data collection techniques. The techniques and procedures outlined in this SOP are based on the EPA National Coastal Condition Assessment Field Operations Manual (2014); much of the information herein is modified only slightly from EPA instructions.

Revision Log

Revision Date	Author	Changes Made	Reason for Change	New Version #
1/17/2013		Citation updated	Protocol publication	1.0
1/21/2021	E. N. Starkey	Citation and procedures updated. Title changed to reflect the spatial extent of the water quality assessment. Figure was added to clarify workflow. New data collection form figures.	New EPA field manual available. All sections modified/updated to aid in clarity. Data collection form reflects database updates.	2.0

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Park-wide Assessment Activities and Workflow Summary

An overview of park-wide assessment activities and workflow are presented in Figure 1. SOPs are presented left to right in the general order of operations for each activity. This SOP (1.2.03) pertains to the Sample Site activity.

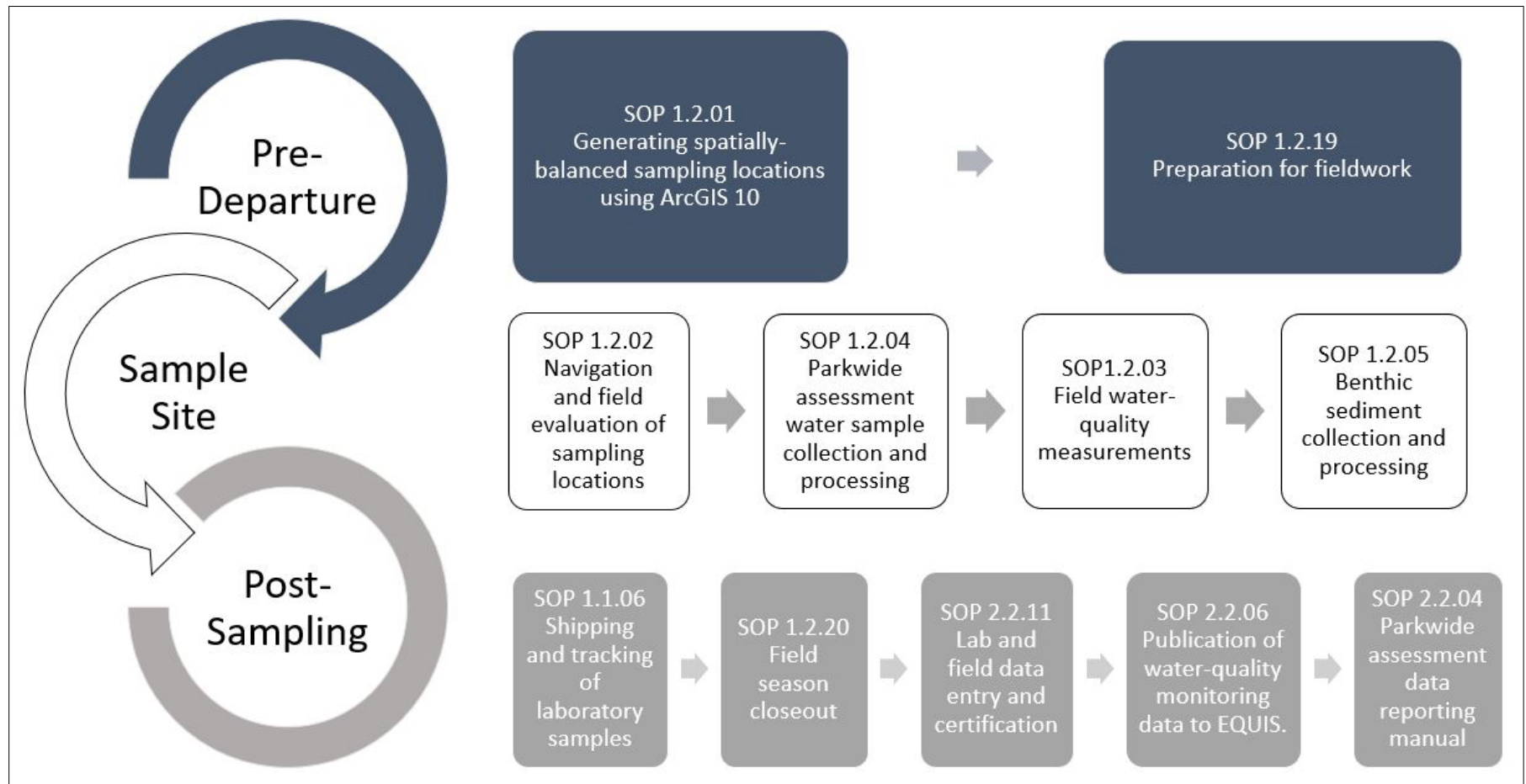


Figure 1. Park-wide assessment activities and workflow. SOPs are presented left to right in the general order of operations for each activity.

Equipment/Materials List

- For water column transparency measurements
 - Secchi disk, 20 centimeters (cm; 7.8 inches [in] diameter, weighted)
 - Line with graduations every 0.25 meter (m; 9.8 in)
 - Extra Secchi disk/line
- For hydrographic profile measurements
 - Sonde (YSI EXO or newer)
 - Conductivity/temperature sensor
 - pH sensor
 - Dissolved oxygen sensor
 - Turbidity sensor
 - Total algae sensor (Chlorophyll *a*)
 - Handheld display for sonde
 - Handheld display charger
 - Depth meter
 - Communication cable (20-plus meters [65.6 feet {ft}] in length)
 - Line with graduations at 0.5 meters (19.7 in) and every meter thereafter
 - Weighted sonde sensor guard (brass)
 - Crane (arm) to lower sonde
 - Extra batteries for sonde (D cell) and depth meter (9V)
 - Extra communication cable
 - Extra sonde
- For recording measurements
 - Data sheets (Water Sample Form, Hydrographic Profile Form)
 - Pencil

- For sonde QC checks and calibration
 - Standards for calibration of installed sensors
 - Datasheet (Field Calibration QC Check Form)

Water Column Transparency (Secchi Depth) Procedures

1. Remove sunglasses, hats or other devices used to shade the eyes.
2. Slowly lower the Secchi disk on the shady side of the boat until it is no longer visible.
3. If the disk hits the bottom, meaning the Secchi depth is greater than the water depth, note this on the datasheet by writing “Clear to Bottom” in the “Secchi Depth” blank on the Water Sample Collection Form (Figure 2).
4. Slowly raise the Secchi disk until it just becomes visible and note the depth using the markings on the line. Interpolate between the 0.25-meter markings to the nearest 0.1 meter (3.9 in). Record this measurement on the Water Sample Collection Form (Figure 2).
5. As a check, lower the Secchi disk until it disappears and then raise it until it becomes visible. Note the depth using the markings on the line and interpolate to the nearest 0.1 meter. This check must be within 0.2 meter of the first observation, if not, repeat the process.

Hydrographic Profile Procedures

1. Ensure that the sonde has been calibrated prior to use, according to SOP 1.2.09 *Fixed-Station Water-Quality Data Sonde Maintenance, Calibration, Deployment and Retrieval*—Version 3.0 (McCay et al. 2022). After initial calibration, the sonde needs to be QC checked every-other day during fieldwork. All calibrations and checks are record on the Field Calibration QC Checks Form (Figure 3) and filed with hard copies of datasheets resulting from the park-wide assessment.
2. On the Hydrographic Profile Form (Figure 4) record the following: station number, date, time, field meter instrument #, QC check date, and QC’d by.
3. Use a portable depth meter to measure the total water depth to the nearest 0.1 meters (0.3 ft) and record it on the Hydrographic Profile Form (Figure 4).
4. Lower the sonde in the water and measure dissolved oxygen (DO; mg/L), pH (units), temperature (°C), and salinity (PSU) to the nearest 0.01 units; measure turbidity (FNU), and chlorophyll *a* (µg/L) to the nearest 0.1 units at the following depths: 0.1 meter (0.3 ft) below the surface, 0.5 meter (1.6 ft) below the surface, every 1 meter (3.3 ft) from depths of 1 to 10 meters (3.3 to 32.8 ft), and every 5 meters (16.4 ft) thereafter if the site is greater than 10 meters (Figures 4 and 5). Take the last set of measurements at 0.5 meters from the bottom. These measurements are recorded in the “DOWN” section of the Hydrographic Profile Form.

5. Repeat the full set of measurements at each of the same depth intervals as the sonde is retrieved. Record these measurements in the “UP” section of the Hydrographic Profile Form (Figure 4).
6. Flag any measurements that need further comment or when a measurement cannot be made.
7. The sonde must be QC checked every other day; checks are recorded on the Field Calibration QC Checks Form (Figure 3). Calibrations are done according to the sonde user manual for YSI EXO sondes (YSI 2021).

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Figure 2. Park-wide assessment water sample form.

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COMMENTS

Recorded By: _____

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SECN Parkwide Assessment: Hydrographic Profile Form

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Station Name: _____ Date (MM/DD/YY): _____ Time (EST): _____
(e.g. CUIS27_2020, FOMAD5_2018)

Barometric Pressure (mmHG): _____ Total Depth (m): _____

Field Meter QC Check

Field Meter Instrument #: _____ Date (MM/DD/YY): _____ QC'd by: _____

PROFILE Note: Take readings while lowering the sonde at 0.1 m, 0.5 m, and every 1.0 m from depths 1.0 m to 10.0 m, and every 5 m thereafter if the site is greater than 10m deep. Take the last measurements 0.5 m from the bottom. Data collection while retrieving the sonde (UP) serves as a QA/QC measure.

	Sample Depth (m)	Water Temp (°C)	D.O. (mg/l)	Salinity (PSU)	pH (Units)	Turbidity (FNU)	Chla (µg/l)
DOWN							
UP							

COMMENTS: Check here for comments ☐ and write comments on back for form.

Recorded By: _____ Computer Entry By / Date: _____

Accepted By / Date: _____

Figure 4. Hydrographic profile sample form.



Figure 5. Sonde being lowered into the water to complete the hydrographic profile.

Literature Cited

- McCay, D. L., E. N. Starkey, and M. B. Gregory. 2022. Fixed-station, water-quality data sonde maintenance, calibration, deployment, and retrieval. Version 3.0. Southeast Coast Network Standard Operating Procedure NPS/SECN/SOP—1.2.09. Southeast Coast Network, Athens, Georgia. Available at: <https://irma.nps.gov/DataStore/Reference/Profile/2284553> (last accessed June 2022).
- US Environmental Protection Agency (EPA). 2014. National Coastal Condition Assessment: Field Operations Manual. EPA-841-R-14-007. U.S. Environmental Protection Agency, Washington, DC. 165 p.
- YSI Incorporated. 2021. EXO user manual, Yellow Springs, Ohio. Item # 603789REF.Revision K. 244p. <https://www.ysi.com/file%20library/documents/manuals/exo-user-manual-web.pdf> (last accessed June 2022).