

# Southeast Coast Network

National Park Service  
Inventory and Monitoring Division



## Standard Operating Procedure 1.2.05

### *Park-wide Assessment Benthic Sediment Collection and Processing—Version 2.0*

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## Summary

The following standard operating procedure (SOP) outlines the procedure for collecting benthic sediment samples for the laboratory analysis of metals, total organic carbon, grain size, and organic contaminants. The purpose of this SOP is to ensure field teams are collecting data that are comparable year-to-year as well as to data collected by other programs using the same or similar techniques. The techniques and procedures outlined in this SOP are based on the EPA National Coastal Condition Assessment Field Manual (2014); with much of the information presented here 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           |
| 3/4/2021      | E. N. Starkey<br>and D. McCay | Updated equipment list, removed references to benthic invertebrate collection, and updated procedures from the NCCA Manual. Added pre-departure and arrival procedures. | New EPA field manual available. Updated equipment list and procedures based on the SECN field experience and the NCCA manual. Collection of benthic macroinvertebrates is not part of the protocol objectives. | 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 (1.2.05) pertains to benthic sediment collection and processing, which are part of the Sample Site activity.

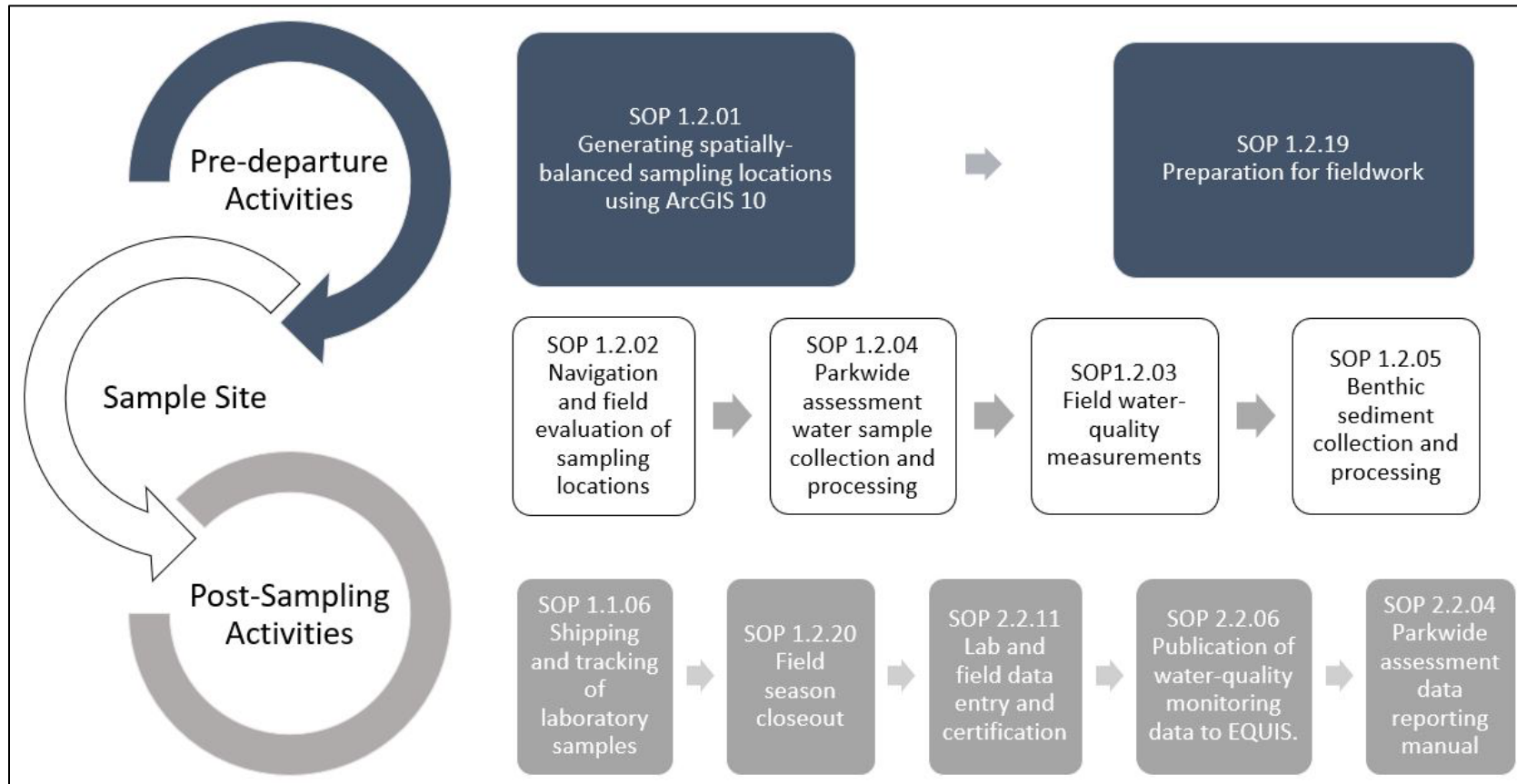


**Figure 1.** Park-wide assessment activities and workflow. SOPs are presented left to right in the general order of operations for each activity.

## Equipment/Materials List

- Transportation
  - Shallow draft aluminum boat with capacity for crew and equipment for all park-wide assessment sampling activities.
- For collecting and processing samples
  - Ponar grab sampler with doors (stainless steel, 9-inch width × 9-inch length [22.9 × 22.9 centimeters {cm}], sample volume 8,200 milliliters [mL; 270.5 ounces {oz}])
  - Line for sampler
  - Bucket to coil line
  - Rope windlass (rope winch)- electric
  - Deep cycle battery for winch
  - Deep cycle battery charger
    - Crane with mounted rope winch (> 300 pound [lb; 136 kilograms {kg}] capacity)
  - Sample processing table (stainless)
  - Stainless steel or Teflon spoons (15-inch [38.1 cm])/scoops/spatula
  - Stainless steel beakers (sample pot) – nested
    - Large outer pot (8-quart [7.6 Liter [L]])
    - Small inner pot for mixing sample (6-quart [5.7 L])
    - Lid for inner pot lid
  - Wash down station (electric) with adjustable nozzle
  - Rag to wipe down/dry jars before bagging
  - Scrub brush
  - 1 liter (33.8 oz) spray bottle with 1% Alconox solution
  - 1 liter bottle with extra 1% Alconox solution, used to refill the spray bottle
  - Cooler with wet ice (38-quart [36 L]) – to keep sample bucket and sample cool while processing

- Cooler (48-quart [45 L]) to hold new sample jars, gloves, tape, and extra supplies while on the boat
- Cooler (75-quart [71 L]) with six to eight large freezer packs to hold samples after processing
- Nitrile gloves
- Sharp knife
- Electrical tape
- One sample kit per site (i.e., 30 per sampled park) and one sample kit per duplicate QC sample (3 per sampled park). Kit consists of:
  - Resealable plastic bag (1-gallon)
  - Three pre-labeled glass sample jars wrapped in bubble wrap
    - PAH/Pesticides/PCB/Metals (250 milliliters [8.5 oz])
    - Particle size (250 milliliters)
    - Total Organic Carbon (TOC; 125 milliliters [4.2 oz])
- For recording
  - SECN Park-wide Assessment Sediment Sample Collection Form
  - Sample tracking form
  - Fine tip permanent markers
  - Pencils
  - Clear packing/strapping tape
- Extra supplies, spare parts, and tools
  - Socket and wrench set (for installation and maintenance of the Ponar sampler)
  - Pliers
  - Screwdrivers
  - One carboy (6 gallons [22.7 L]) with extra 1% Alconox solution
  - Alconox powdered detergent
  - Cooler (48-quart [45 L]) with extra sample jars

- Steel spoons
- Steel pot for mixing samples
- Lid for steel pot
- Glass sample jars
- Ponar screen doors and pin
- Ponar sampler (if available)
- Rope windlass (rope winch) – electric (if available)
- Washdown station – electric
- Spray nozzle

## **Procedures**

### **Prior to Departure from Boat Ramp**

1. Ensure the rope winch deep cycle battery is charged and on the boat.
2. Install the crane and electric rope winch on the boat.
3. Install the stainless-steel processing table on the boat.
4. Assemble the Ponar sampler and attach the winch line with a shackle.
5. Run the line through the pulley end of the crane and coil remaining line in a bucket.
6. Ensure proper alignment of the crane, Ponar and sample table. The Ponar should easily be lifted with the winch/crane, come aboard the boat, and be lowered onto the processing table.
7. Install the electric washdown station.
8. Check all electrical connections.
9. Ensure all coolers are loaded with wet ice (for sediment sample homogenization) and freezer packs (for sediment transport). Add the large sample pot to the sediment homogenization cooler and place the small pot inside of it. The large pot is useful to prevent the ice from caving back in.
10. Load all coolers, equipment, and sample jars on the boat (see equipment list above).
11. Lower Ponar sampler to the deck of the boat and secure with strap or bungee cord.

## Navigation to and Arrival at Sample Site

1. Navigate to the sample site and conduct preliminary site evaluation outlined in SOP 1.2.02 *Park-wide Assessment Navigation and Field Evaluation of Sampling Locations*—Version 2.0 (Starkey and McCay 2022).
2. Upon arrival at the site, place Ponar sampler on the processing table. See Appendix A, Figure A-1 for setup.
3. Place the intake end of the washdown station in the water.
4. Turn on washdown station and allow it to pressurize.

## Sample Collection

Modified from *National Coastal Condition Assessment: Field Operations Manual* (EPA 2014).

### IMPORTANT NOTES:

Do not apply sunscreen or other chemical contaminants until after the sample is collected (or implement measures to reduce contamination by such chemicals if applied such as washing or wearing long gloves). Be sure to use new clean nitrile gloves or wash gloves between stations if they are reused from one station to the next.

Great care must be taken to avoid contamination of this sample from atmospheric contaminants. The boat engine must be turned off or the boat maneuvered to ensure the exhaust is down wind. All containers, including the grab sampler, are kept closed except when opening is necessary to remove or add samples.

1. Prior to sample collection at the site, spray a 1% Alconox solution on the Ponar sampler, sampler screen doors, spoons, sample pot, lid, and processing table. Rinse with ambient water to ensure no sediments remain from the previous station. This will reduce the potential for cross contamination of the sample. See Appendix A, Figures A-2, A-3 and A-4.
2. Replace the screen doors on the Ponar sampler, place sample pot and lid in the cooler with wet ice.
3. Cock the grab according to manufacturer's instructions and disengage any safety device designed to lock the sampler open.
4. Lower the grab sampler through the water column such that travel through the last 5 meters (16.4 feet [ft]) is no faster than about 1 meter per second. This minimizes the effects of bow wave disturbance to surficial sediments. See Appendix A, Figure A-5.
5. Allow a moment for the sampler to settle into the substrate and then slack off on the line. Letting the line go slack serves to release the jaws of the sampler so they will close as the sampler is retrieved.

6. Retrieve the sampler and lower it onto the sample table on-board. Open the top and determine whether the sampling is successful or not. See Appendix A, Figure A-6.
  - a. A successful grab is when the Ponar sampler is completely shut, and contains relatively level, intact sediment over the entire area of the grab. On occasion, oyster shells or rocks may prevent the Ponar from closing completely. If this occurs, it is considered an un-successful grab and must be repeated. Do not collect sediment from an un-successful grab.
  - b. Grabs containing no sediment, or grossly slumped surfaces are unacceptable. Slumped surfaces may indicate that sediment washed out as it was retrieved.
  - c. Grabs completely filled to the top, where the sediment is in direct contact with the hinged top and screen, are also unacceptable.
  - d. It may take several attempts using different amounts of weight to obtain the first acceptable sample. The more weight added, the deeper the bite of the grab. In very soft mud, pads may be needed to prevent the sampler from sinking in the mud. If pads are used, the rate of descent near the bottom must be slowed even further to reduce the bow wave.
2. It may take several attempts to obtain a successful grab. Note any difficulties obtaining a sample in the comment section on the Sediment Sample Collection Form (Figure 2 on the next page).
3. Carefully drain overlying water from the grab. Record notes about the condition of the sample (e.g., smell, substrate, presence of organisms on the surface) in the comment section on the Sediment Sample Collection Form.
4. Process the grab sample for chemical analysis as indicated in the section below.
5. Repeat grabs (steps 4–9) until approximately 4 liters (4.2 quarts [qt]) of sediment has been obtained. To minimize the chance of sampling the exact same location twice, additional anchor line can be let out.
6. Record the number of total grabs on the Sediment Sample Collection Form.
7. Upon completion of sample collection, use the electric washdown station and spray nozzle to thoroughly rinse the Ponar sampler, spoons, sample pot, and processing table with ambient water. Remove all sediment and debris prior to departing the site.

## v2.5 (01/2021)

**Figure 2.** SECN Park-wide Assessment Sediment Sample Collection Form.

## Processing for Sediment Composition and Chemistry

IMPORTANT NOTE: Great care must be taken to avoid contamination of this sample from atmospheric contaminants. The boat engine must be turned off or the boat maneuvered to ensure the exhaust is down wind. All containers, including the grab sampler, are kept closed except when opening is necessary to remove or add samples.

1. As each grab is retrieved, carefully examine it to determine acceptability. The grab is considered acceptable if the surface layer is intact. The grab need not be greater than 7 centimeters (2.8 inches [in]) in depth for chemistry samples, but the other criteria outlined above apply. Carefully drain off, or siphon, any overlying water, and remove and discard large, non-living surface items such as rocks or pieces of wood. Remove any submerged aquatic vegetation (SAV) after recording its presence on the Sediment Sample Collection Form.
2. A clean stainless steel or Teflon spoon is used to remove sediments from grab samples for these analyses. The stainless steel or Teflon spoon must be washed with Alconox and rinsed with ambient seawater or lake water before use in obtaining grab samples.
3. Remove the top 2 centimeters (0.8 in) of sediment using the stainless steel or Teflon spoon. Sediment which is in direct contact with the sides of the sampler is excluded as they may be contaminated from the device. Place the sediment in a stainless-steel pot and place the pot in a cooler on wet ice (NOT dry ice). The sample must be stored at 4°C (39.2°F), NOT FROZEN. See Appendix A, Figure A-7.
4. Repeat obtaining sediment samples from the grab and compositing the sediment in the same stainless pot until enough sediment has been collected for all samples (approximately 4 liters [135.3 oz]). Stir sediment to homogenize them after every addition to the composite to ensure adequate mixing. Keep the container covered and in the cooler between grabs. See Appendix A, Figure A-8.
5. Homogenize the sediment by stirring with a Teflon paddle or stainless-steel spoon for 10 minutes.
6. Use a permanent marker to fill out the pre-labeled glass sample jars. See Appendix A, Figures A-9 and A-10. Include the site name, number, date, time (EST), and staff initials. There should be a separate jar for each of the following:
  - a. Organics/Metals (PAH/Pesticides/PCBs/Metals; 300 milliliters [10.1 oz])
  - b. Grain size (Particle Size; 300 milliliters [10.1 oz])
  - c. Total organic carbon (TOC; 125 milliliters [4.2 oz])
7. Divide the composite into the following three sample types:

- a. ORGANICS and METALS – Using a stainless-steel spoon, carefully place 250 milliliters (8.5 oz) of sediment into a clean 300 mL jar for chemical analysis. CARE MUST BE TAKEN TO ENSURE THAT THE INSIDE OF THE BOTTLE, BOTTLE CAP, AND THE SAMPLE ARE NOT CONTAMINATED. Place the cap on the jar.
  - b. SEDIMENT GRAIN SIZE – Using a stainless-steel spoon, place approximately 250 mL of sediment into a clean 300 mL jar. Place the cap on the jar.
  - c. TOTAL ORGANIC CARBON – Using a stainless-steel spoon, place approximately 100 mL of sediment into a clean 125 mL jar. Place the cap on the jar.
8. If necessary, wipe the outside of the sample jar with a clean rag to remove any water and debris.
9. Record the sample site name and number on the Sample Tracking Form (Figure 3 on the next page) and ensure all information is correct on the Sediment Sample Collection Form. See Appendix A, Figure A-11.
10. Wrap each jar in "bubble wrap" to protect it from breakage and place all three jars inside the same resealable plastic bag.
11. Place the plastic bag containing all sample jars in the cooler with freezer packs or wet ice (NOT dry ice). The samples need to be stored at 4°C, NOT FROZEN. Upon completion of sample processing, use the electric washdown station and spray nozzle to thoroughly rinse the Ponar sampler, spoons, sample pot, and processing table with ambient water. Remove all sediment and debris prior to departing the site. See Appendix A, Figure A-12.
12. If the site has been pre-selected for a quality control sample, follow the steps outlined in the next section.

### **Quality Control Duplicate Sample**

Quality control (QC) duplicate samples are taken at 10% of sites (i.e., 3 sites/park). These sites are randomly selected before departure from the office. The QC duplicate is a new sample and IS NOT a split sample of the initial grab.

- 1) Upon completion of the routine sample, all sample collection and processing procedures are repeated.
- 2) Fill out another SECN Park-wide Assessment Sediment Sample Collection Form and ensure that the station name indicates a duplicate sample (e.g., CUIS27\_2020\_dup).
- 3) Ensure that sample jar station names indicate a duplicate (e.g., CUIS27\_2020\_dup).

| Client Name: <b>National Parks Service</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                    |           | Project Name: <b>Cape Hatteras National Seashore</b>          |              |        | BOTTLE SIZE & TYPE |                   |                                                    |                |            |           |      |     |                        |     |     | LABORATORY I.D. NUMBER |                  |  |      |      |              |  |      |      |   |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |
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| Address: <b>135 Phoenix Rd</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                    |           | P.O. Number/Project Number: P17PX01845                        |              |        |                    |                   |                                                    |                |            |           |      |     |                        |     |     |                        |                  |  |      |      |              |  |      |      |   |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |
| <b>Athens, GA 30605</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                    |           | Project Location:                                             |              |        |                    |                   |                                                    |                |            |           |      |     |                        |     |     |                        |                  |  |      |      |              |  |      |      |   |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |
| Phone: <b>706-286-0355</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                    |           | FDEP Facility No:                                             |              |        |                    | ANALYSIS REQUIRED | Al, Sb, As, Cd, Cr, Cu, Fe, Pb, Mn, Ni, Zn by 6010 | Se, Sn by 6020 | Hg by 7471 | 8081/8082 | PAHs | TOC | Particle Size by Sieve |     |     |                        |                  |  |      |      |              |  |      |      |   |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |
| FAX:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                    |           | Project Name and Address:                                     |              |        |                    |                   |                                                    |                |            |           |      |     |                        |     |     |                        |                  |  |      |      |              |  |      |      |   |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |
| Contact: <b>Eric Starkey</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                    |           |                                                               |              |        |                    |                   |                                                    |                |            |           |      |     |                        |     |     |                        |                  |  |      |      |              |  |      |      |   |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |
| Sampled By: <b>Eric Starkey</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                    |           |                                                               |              |        |                    |                   |                                                    |                |            |           |      |     |                        |     |     |                        |                  |  |      |      |              |  |      |      |   |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |
| Turn Around Time: <input type="checkbox"/> STANDARD <input type="checkbox"/> RUSH                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                    |           | Special Instructions: <b>Jax Profile: 32685</b>               |              |        |                    |                   |                                                    |                |            |           |      |     |                        |     |     |                        |                  |  |      |      |              |  |      |      |   |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |
| Page _____ of _____                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                    |           | <input type="checkbox"/> ADaPT <input type="checkbox"/> EQulS |              |        |                    |                   |                                                    |                |            |           |      |     |                        |     |     |                        |                  |  |      |      |              |  |      |      |   |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |
| SAMPLE ID                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | SAMPLE DESCRIPTION | Grab Comp | SAMPLING                                                      |              | MATRIX | NO. COUNT          | PRESERVATION      | Ice                                                | Ice            | Ice        | Ice       | Ice  | Ice | Ice                    | Ice | Ice |                        |                  |  |      |      |              |  |      |      |   |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                    |           | DATE                                                          | TIME         |        |                    |                   |                                                    |                |            |           |      |     |                        |     |     |                        |                  |  |      |      |              |  |      |      |   |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |
| CAHA-                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                    |           |                                                               |              | SO     | 3                  |                   | X                                                  | X              | X          | X         | X    | X   | X                      | X   | X   |                        |                  |  |      |      |              |  |      |      |   |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |
| CAHA-                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                    |           |                                                               |              | SO     | 3                  |                   | X                                                  | X              | X          | X         | X    | X   | X                      | X   | X   | X                      |                  |  |      |      |              |  |      |      |   |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |
| CAHA-                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                    |           |                                                               |              | SO     | 3                  |                   | X                                                  | X              | X          | X         | X    | X   | X                      | X   | X   | X                      |                  |  |      |      |              |  |      |      |   |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |
| CAHA-                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                    |           |                                                               |              | SO     | 3                  |                   | X                                                  | X              | X          | X         | X    | X   | X                      | X   | X   | X                      |                  |  |      |      |              |  |      |      |   |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |
| CAHA-                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                    |           |                                                               |              | SO     | 3                  |                   | X                                                  | X              | X          | X         | X    | X   | X                      | X   | X   | X                      |                  |  |      |      |              |  |      |      |   |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |
| CAHA-                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                    |           |                                                               |              | SO     | 3                  |                   | X                                                  | X              | X          | X         | X    | X   | X                      | X   | X   | X                      |                  |  |      |      |              |  |      |      |   |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |
| CAHA-                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                    |           |                                                               |              | SO     | 3                  |                   | X                                                  | X              | X          | X         | X    | X   | X                      | X   | X   | X                      |                  |  |      |      |              |  |      |      |   |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |
| CAHA-                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                    |           |                                                               |              | SO     | 3                  |                   | X                                                  | X              | X          | X         | X    | X   | X                      | X   | X   | X                      |                  |  |      |      |              |  |      |      |   |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |
| CAHA-                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                    |           |                                                               |              | SO     | 3                  |                   | X                                                  | X              | X          | X         | X    | X   | X                      | X   | X   | X                      |                  |  |      |      |              |  |      |      |   |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |
| CAHA-                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                    |           |                                                               |              | SO     | 3                  |                   | X                                                  | X              | X          | X         | X    | X   | X                      | X   | X   | X                      |                  |  |      |      |              |  |      |      |   |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |
| Matrix Code: WW = wastewater SW = surface water GW = ground water DW = drinking water O = oil A = air SO = soil SL = sludge      Preservation Code: I = ice H=(HCl) S = (H2SO4) N = (HNO3) T = (Sodium Thiosulfate)                                                                                                                                                                                                                                                                                                                                               |                    |           |                                                               |              |        |                    |                   |                                                    |                |            |           |      |     |                        |     |     |                        |                  |  |      |      |              |  |      |      |   |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |
| Received on Ice <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Temp taken from sample <input type="checkbox"/> Temp from blank      Wh <input type="checkbox"/> required, pH checked      Temperature when received _____ (in degrees celcius)                                                                                                                                                                                                                                                                                 |                    |           |                                                               |              |        |                    |                   |                                                    |                |            |           |      |     |                        |     |     |                        |                  |  |      |      |              |  |      |      |   |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |
| DCN: AD-051 Form last revised 08/18/2014      Device used for measuring Temp by unique identifier (circle IR temp gun used)    J: 9A    G: LT-1 LT-2    T: 10A    A: 3A    M: 3A    S: 1V                                                                                                                                                                                                                                                                                                                                                                         |                    |           |                                                               |              |        |                    |                   |                                                    |                |            |           |      |     |                        |     |     |                        |                  |  |      |      |              |  |      |      |   |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |
| <table border="1" style="width:100%; border-collapse: collapse;"> <tr> <th colspan="2">Relinquished by:</th> <th>Date</th> <th>Time</th> <th colspan="2">Received by:</th> <th>Date</th> <th>Time</th> </tr> <tr><td>1</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>2</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>3</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>4</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> </table> |                    |           |                                                               |              |        |                    |                   |                                                    |                |            |           |      |     |                        |     |     |                        | Relinquished by: |  | Date | Time | Received by: |  | Date | Time | 1 |  |  |  |  |  |  |  | 2 |  |  |  |  |  |  |  | 3 |  |  |  |  |  |  |  | 4 |  |  |  |  |  |  |  |
| Relinquished by:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                    | Date      | Time                                                          | Received by: |        | Date               | Time              |                                                    |                |            |           |      |     |                        |     |     |                        |                  |  |      |      |              |  |      |      |   |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |
| 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                    |           |                                                               |              |        |                    |                   |                                                    |                |            |           |      |     |                        |     |     |                        |                  |  |      |      |              |  |      |      |   |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |
| 2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                    |           |                                                               |              |        |                    |                   |                                                    |                |            |           |      |     |                        |     |     |                        |                  |  |      |      |              |  |      |      |   |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |
| 3                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                    |           |                                                               |              |        |                    |                   |                                                    |                |            |           |      |     |                        |     |     |                        |                  |  |      |      |              |  |      |      |   |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |
| 4                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                    |           |                                                               |              |        |                    |                   |                                                    |                |            |           |      |     |                        |     |     |                        |                  |  |      |      |              |  |      |      |   |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |
| <div style="border: 2px solid black; padding: 5px;"> <b>FOR DRINKING WATER USE:</b><br/> (When PWS Information not otherwise supplied)    PWS ID: _____<br/> Contact Person: _____ Phone: _____<br/> Supplier of Water: _____<br/> Site-Address: _____ </div>                                                                                                                                                                                                                                                                                                     |                    |           |                                                               |              |        |                    |                   |                                                    |                |            |           |      |     |                        |     |     |                        |                  |  |      |      |              |  |      |      |   |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |

**Figure 3.** Example sediment sample tracking form provided by an analytical laboratory.

## Literature Cited

- Starkey, E. N., and D. McCay. 2022. Park-wide assessment navigation and field evaluation of sampling locations—Version 2.0. Southeast Coast Network Standard Operating Procedure NPS/SECN/SOP—1.2.02. Southeast Coast Network, Athens, Georgia. Available at: <https://irma.nps.gov/DataStore/Reference/Profile/2284594> (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.

## Appendix A. Sediment Collection Equipment and Processing Photos



**Figure A-1.** General setup of boat, sample processing table, Ponar sampler, winch, and coolers.



**Figure A-2.** Ponar sampler, sample pot, and spoons ready to be rinsed with 1% Alconox solution.



**Figure A-3.** Application of the 1% Alconox solution.



**Figure A-4.** Ambient water rinse with the washdown station.



**Figure A-5.** Deployment of the Ponar sampler.



**Figure A-6.** Retrieval of the Ponar sampler and placement on the sample processing table.



**Figure A-7.** Removal of a successful sample from the Ponar and placement in sample pot (on ice).



**Figure A-8.** Sufficient sediment for homogenization.

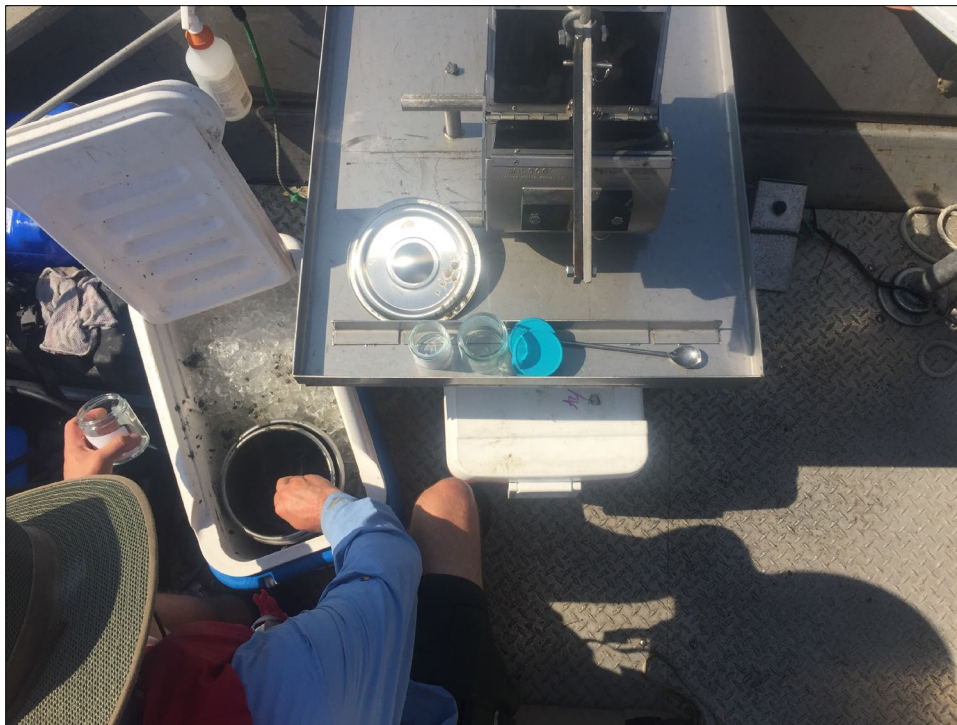


**Figure A-9.** Filling sample jars with sediment.



**Figure A-10.** Labeled sample jars. Note that when not in use the Ponar is secured.

Advanced Environmental Laboratories, Inc.

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Contact: Eric Starkey  
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Project Name: [Blank]  
Contract Number: [Blank]  
Field Location: [Blank]  
Project Number: 32685

Page: 3 of 3

| SAMPLE ID    | SAMPLE DESCRIPTION | Unit Comp | DATE   | TIME  | MATERIAL | NO. COUNTS | ANALYSIS REQUIRED | LABORATORY ID NUMBER |
|--------------|--------------------|-----------|--------|-------|----------|------------|-------------------|----------------------|
| CA-25-14     | CAIS-14            | 0         | 8/4/17 | 11:45 | SO       | 3          | X X X X X X X X   | -021                 |
| CA-25-23     | CAIS-23            | 0         | 8/4/17 | 13:10 | SO       | 3          | X X X X X X X X   | -022                 |
| CA-25-24     | CAIS-24            | 0         | 8/4/17 | 17:45 | SO       | 3          | X X X X X X X X   | -023                 |
| CA-25-24     | CAIS-24            | 0         | 8/4/17 | 18:30 | SO       | 3          | X X X X X X X X   | -024                 |
| CA-25-27     | CAIS-27            | 0         | 8/4/17 | 19:55 | SO       | 3          | X X X X X X X X   | -025                 |
| CA-25-ALT-01 | CAIS-ALT-01        | 0         | 8/4/17 | 16:15 | SO       | 3          | X X X X X X X X   | -026                 |
| CA-25-ALT-21 | CAIS-ALT-21        | 0         | 8/4/17 | 11:25 | SO       | 3          | X X X X X X X X   | -027                 |
| CA-25-ALT-09 | CAIS-ALT-09        | 0         | 8/4/17 | 13:45 | SO       | 3          | X X X X X X X X   | -028                 |
| CA-25-27     | CAIS-27            | 0         | 8/4/17 | 13:40 | SO       | 3          | X X X X X X X X   | -029                 |
| CA-25-ALT-20 | CAIS-ALT-20        | 0         | 8/4/17 | 14:35 | SO       | 3          | X X X X X X X X   | -030                 |

Matrix Code: WW = wastewater SW = surface water DW = drinking water O = oil A = air SO = soil SL = sludge  
Received on ice: ☐ Yes ☐ No ☐ Temp taken from sample ☐ Temp from blank ☐ Where required, pH checked ☐ Temperature when received: \_\_\_\_\_ (in degrees Celsius)

DCR AD-101 Form last revised 09/18/2014

Requisitioned by: [Signature] Date: 8/5/17 Time: 10:53  
Received by: [Signature] Date: 8/8/17 Time: 13:53

FOR DRINKING WATER USE:  
(Other EPA information not otherwise supplied) Field ID: \_\_\_\_\_  
Contact Person: \_\_\_\_\_ Phone: \_\_\_\_\_  
Supplier of Water: \_\_\_\_\_  
Site Address: \_\_\_\_\_



Figure A-12. Ponar sampler being rinsed off prior to moving to the next sample site.