



Tidal Monitoring Standard Operating Procedures

For

Back Creek Conservancy

Prepared by:

**CENTER FOR
WATERSHED
PROTECTION**

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Purpose

The purposes of these procedures are to outline the materials and methods associated with sustaining high quality tidal water quality monitoring program in Back Creek. These procedures should be used by the Back Creek Conservancy staff, volunteers, and interns to ensure that data collected is consistent, reliable, and accurate, thus providing considerable benefit for use.

Definition

Back Creek is a 6,000-foot-long, tidal estuary in the Annapolis Neck peninsula — just east of downtown Annapolis and one of the city's navigable tributaries of the Severn River with a Maryland 8-digit watershed code of 02131002. Back Creek's 817-acre watershed is almost entirely located within the City of Annapolis, Maryland, with less than 5% of its area in Anne Arundel County. Back Creek is the southeastern-most of the four Severn River creeks on which Annapolis has developed, and it is the most recently urbanized, after being annexed by the City in 1951. Back Creek begins near Georgetown East Elementary School, located off of Bay Ridge Avenue, and outfalls to the Severn River and subsequently into the Chesapeake Bay.

The Creek is covered by two TMDL's, the Chesapeake Bay TMDL for nutrients and sediment, and the Severn River TMDL for bacteria. The Creek also suffers from toxins and hydrocarbons from poorly managed stormwater and, to an unknown extent, from recreational and tourist boats that travel and dock there. Back Creek may also be influenced from silt influx by the Severn River. Sedimentation is an ongoing problem throughout the upper third of the creek and particularly in the five small coves (outfalls) along the western side.

Responsibilities

The Back Creek Conservancy Executive Director is responsible for the organizing and operating the sampling campaign and maintaining and enforcing standards in this document.

Required Supplies and Equipment

Physical Water Parameters

- YSI Professional Multi probe instrument
- One liter (1 L) brown plastic bottle for on vessel probe storage

Calibration

- pH buffer solutions (3 @ pH – 4.01, 7.00, 10.01)
- Conductivity

Water Clarity

- Secchi Disk with marked line

Miscellaneous

- Kestrel 3500 Pocket Weather Station
- Camera
- Clipboard

Documents

- YSI Calibration Sheet
- Data Entry Sheets

Optional Equipment

- Personal comfort gear such as sunscreen, jackets, water, etc.

Procedures

Sites

There are eight (8) sites along the tidal reaches of Back Creek that are monitored according to this protocol. Site locations are given below and stored in the Back Creek Conservancy's data base. The samplers should familiarize themselves with the general location of the sites prior to departure.

If using a vessel to conduct the sampling utilize a GPS unit to guide the vessel into close proximity of the site. A reasonable effort should be made to sample at the recorded location with a reasonable tolerance for navigating and anchoring a boat in variable wind and water conditions. Sampling within 10-15 m of the actual site location can be considered sufficient.

BACK CREEK CONSERVANCY WATER QUALITY MONITORING LOCATIONS			
Site	Description	Latitude	Longitude
BC 1	Outfall near King James Landing	76° 29' 5.193" W	38° 57' 22.734" N
BC 2	SPCA Outfall	76° 29' 15.075" W	38° 57' 22.343" N
BC 3	Greenacres outfall	76° 29' 12.38" W	38° 57' 29.789" N
BC 4	Outfall behind St. Luke's Church	76° 29' 7.84" W	38° 57' 46.459" N
BC 5	Harborview Conservation Easement Outfall	76° 29' 3.684" W	38° 57' 57.974" N
BC 6	Mouth of the Creek	76° 28' 33.03" W	38° 58' 6.212" N
BC 7	Port Annapolis discharge Lagoon	76° 28' 44.777" W	38° 57' 44.53" N
BC 8	Community Boating Ramp	76° 28' 51.092" W	38° 57' 40.105" N

Time Frame

Monitoring of the tidal sites will begin on April 1 and continue through October 31 and biweekly from November 1 to March 31, weather permitting. Each season a specific day of the week and time should be developed to provide a **consistent** sampling window to incorporate natural fluctuations in environment conditions. Every effort should be made to sample at this day and time throughout the

season; however, should unfavorable weather or other situations arise that interfere, the collection of data on another day or at another time is preferable to not having the data. In 2016, samples were collected on Tuesdays and/or Thursdays each week.

Preparation

- Calibrate Dissolved Oxygen, pH, and conductance YSI Professional Plus Multi-Probe instrument according to YSI user manual (See X)
- Conductivity and pH standards
- Distilled water
- Record calibration values on calibration data sheet (See X) and file into calibration log
- Print weekly data collection sheets for each site (See X)

General Field Monitoring Procedures

Proceed to each site. If using a boat anchor within a reasonable vicinity of the GPS coordinates accounting for how the boat will rest on anchor given the tidal and wind action.

Record basic site information on the data sheet prior to sampling (e.g. time, date, weather, tide).

Using handheld Kestrel 3500 weather station take air temperature and wind speed. Note general weather conditions (sunny, partial sun, cloudy w/ t-storms in vicinity, etc.). Wind direction can be determined through visual observation of wave action on water. Record these in the appropriate location on weekly data collection sheet (See X).

YSI multi-probe Monitoring

The Back Creek Conservancy uses a YSI ProDSS multi-meter which is a handheld instrument for water quality spot-sampling and profiling. The ProDSS can measure a wide range of parameters including dissolved oxygen (optical), pH, ORP, turbidity, conductivity, temperature, depth, nitrate, chloride, and ammonium. The instrument utilizes a rechargeable lithium-ion battery pack, features a menu-driven user interface and an on-board help key/function, and uses a micro USB port for connection to a PC or USB stick.

- If a site has a depth greater than three meters (3.0 m), measurements will be taken at one meter (1.0 m) intervals. If a site has a depth of three meters or less (< 3.0 m), measurements will be taken at half meter intervals.
- Once at the site, lower the YSI multi-probe into the water to the depth of 0.5 m above the bottom using the marked cable attached to the probe for reference.
- Allow the instrument to stabilize and record the values on the screen to the appropriate row and column on the data sheet: Temperature, pH, Depth, Dissolved Oxygen (DO), Salinity, Turbidity, Total Suspended Solids (TSS), Chlorophyll a, and Specific Conductance.

NOTE: Most parameters will achieve stability rather quickly, if not (generally) record values once you have confidence that it seems to be oscillating around a value and not drifting consistently in one direction.

- Continue raising the cable up every half (0.5 m) or (1.0 m) full meter depending on procedure outlined in above, recording values at each interval until reaching the surface. Always finish with taking a reading at the surface, the highest level that can maintain continuous probe immersion given wind and wave action.

Secchi Disk

A 20 cm Secchi disk, a circular plate-like disk painted in alternating black and white quadrants is held by a line that is marked in tenths of meters. The Secchi disk is used to give a measurement of transparency of the water column also called the Secchi depth.

- Slowly lower the Secchi disk until it is no longer visible and note the depth using the markings on the line. Then lower the line slightly deeper.
- Slowly raise the Secchi disk until it just becomes visible and note the depth using the markings on the line.
- Perform steps 1 and 2 three times, noting both readings. Record the mean of the three readings.

NOTE: If the range of measurements for the three sets of readings is greater than 0.5 m, the entire process should be performed again. Raise and lower several times around "disappearing" point.

NOTE: No sunglasses or any other devices should be used to shade the eyes while this procedure is being performed.

NOTE: The Secchi depths should ideally be determined by the same person during each sampling session for consistency.

NOTE: If using a boat, the Secchi depth should be determined from the shady side of the boat during daylight hours.

Safety and Environmental Information

Safety is of the utmost importance to the and should be considered the first priority in all situations. Given the inherent variability of working outdoors in natural environments near open water considerable hazards exist and care should be taken to minimize risks. These procedures and guidelines are designed to minimize safety concerns related to known risks, but should not be considered comprehensive or a substitute for critical analysis and common sense.

Revision History

Date	Revision
12/16	Document Created

Appended Documents

- YSI Professional Plus User Manual
- Kestrel 3500 Weather Meter User Manual
- Calibration Data Sheet
- Data Collection Sheet
- Site Map
- Chain of Custody Form