

MEMORANDUM - REVISED



TO: Technical Advisory Committee
FROM: Forrest Bell, FB Environmental
SUBJECT: **Mare Brook Summer 2016 Monitoring Plan - REVISED**
DATE: July 13, 2016
CC: Jared Woolston, Town of Brunswick

This memo summarizes the proposed monitoring for the summer of 2016 in the Mare Brook watershed, Brunswick ME. This plan was developed by FB Environmental, the Maine DEP, and the Town of Brunswick using professional judgement as well as feedback received from the technical advisory committee (TAC). The monitoring plan should be considered a dynamic, working document. Late season sampling is dependent on results from early season sampling, and therefore, may vary in terms of location, frequency and duration. Table 1 (below) provides an overview of the proposed monitoring and assessment based on priority, location and sampling frequency/duration.

Table 1. Summary of 2016 monitoring recommendations for Mare Brook.

MONITORING CATEGORY	PRIORITY	SITES	FREQUENCY	DURATION	LEAD
Fluvial Geomorphic Assessment	High	Representative sites (see Stantec SIP)	n/a	n/a	Stantec and FBE (support)
Continuous Monitoring	High	MB8, MB9, MB7, MB13, MB21, and MB24	Baseflow in early June. Continue in August dependent on June sampling.	Two week periods	Maine DEP
Macroinvertebrate Enclosures	High	MB7 and MB21 (five individual enclosures each), Reference: Topsham Fair Grounds Stream MB21, MB24, and	Once	Consecutive seven days – Tentative Deployment August 2	Maine DEP and FBE
Bacteria Sampling	High	bracket sampling as needed	As needed	n/a	Maine DEP
Algae Reconnaissance	Low	Unknown	n/a	n/a	Maine DEP and FBE
Chloride Sampling	Low	MB10	Three times at variable flow rates and antecedent conditions	n/a	Maine DEP/FBE

GEOMORPHIC ASSESSMENT & RIPARIAN SURVEY

The fluvial geomorphic assessment and the riparian survey will be conducted by Stantec. The purpose of these surveys is to perform a fluvial geomorphic assessment along Mare Brook and to characterize the riparian habitat and wetland resources in the floodplain area. Stantec will provide submit a separate sampling implementation plan (SIP) to the Town of Brunswick for this work.

CONTINUOUS MONITORING

Maine DEP will conduct continuous monitoring for temperature, dissolved oxygen (DO), and specific conductance. In general, continuous monitoring in 2015 revealed some brief periods of low DO but overall, all parameters were relatively stable across sites. Monitoring in 2016 will be conducted by Kristin Feindel of the Maine Department of Environmental Protection (DEP) using DEP monitoring equipment, covered under the state-approved Standard Operating Procedures (SOP). An intern from Bowdoin College will be available as needed to support DEP in the field, and FBE will be available for fieldwork and data analysis support as needed. Continuous logging will be conducted as follows:

- ❖ **Sites:** Logging will take place at six sites – MB8, MB9, MB7, MB13, MB21, and MB24 (with potential for monitoring at MB2/MB3 as possible). This scheme repeats all sites from 2015 as well as two additional sites, (1) below the confluence of Mare Brook and Merriconeag Stream and (2) at Baribeau Drive in the headwaters of Mare Brook.
- ❖ **Duration:** Loggers will be deployed as early as possible in June once baseflow is established in the stream. This decision will be made based on best professional judgment by the monitoring lead and will be based on antecedent conditions, stream flow, and upslope drainage area for each site. Loggers will be deployed for a two-week period. DEP will download the data and perform quality assurance and quality control review of all data following their state approved SOP. Following data review, DEP will share the data with FBE and the Town of Brunswick for discussion to determine if the loggers should be re-deployed in late summer. If so, the loggers will be re-deployed for another two weeks at locations to be determined.

MACROINVERTEBRATE ENCLOSURES

In 2016, macroinvertebrates will be studied via enclosure chambers rather than using rock bags. Enclosures will be deployed at two study sites and one reference site, with five individual enclosures at each site to assess within-site variability. Methodology for enclosure construction, deployment, and monitoring will follow that developed in 2014 by DEP, FBE, and the Cumberland County Soil and Water Conservation District (CCSWCD) for in-situ monitoring at Long Creek. An abbreviated summary of this methodology is described below:

- ❖ **Design:** Eight enclosures from the 2014 analysis on Long Creek will be used for Mare Brook as well as seven enclosure constructed by the Maine DEP. These enclosures are created using 11" x 14" x 3.5" plastic boxes with holes cut along each side of the box to maximize flow-through potential. The holes are then covered using window screen (inside) and ¼" hardware cloth (outside). Furthermore, cobbles between 1.5 – 3 inches from the reference stream (or other appropriate location) will be cleaned, dried, and added to the bottom of the chambers to act as substrate. A tube will then be attached through the lid to allow a water quality meter to be lowered into the chamber to monitor in-chamber water quality conditions.

- ❖ **Methods:** A proper macroinvertebrate indicator species will be harvested from the reference stream (or other appropriate location as necessary) for each of the fifteen individual enclosures. The purpose of this is to eliminate variability in response by using the same species of macroinvertebrate from the same location. FBE will consult with Jeremy Deeds and Leon Tsomides of the Maine DEP to assist with identifying the proper macroinvertebrate species and reference reach for this study. Chambers will be deployed at site MB21 by Richards Drive and at site MB7 below Purinton Road. The reference stream used will be the Topsham Fair Grounds Stream, which has consistently met class.
- ❖ **Duration:** Enclosures will be deployed for a period of seven full days in the summer of 2016 during baseflow when the stress to macroinvertebrate communities is highest (tentative deployment August 2). Continuous water quality monitoring using Maine DEP Onset® HOB0® loggers will be performed at sites indicated in the “Continuous Monitoring” section during the deployment period if loggers are available. Once daily field meter readings will be taken within each chamber (early morning) during the seven-day period (except for any weekend days occurring during monitoring). Macroinvertebrate enclosures will be retrieved following the seven-day period and processed by Maine DEP.

BACTERIA SAMPLING

Maine DEP will conduct bacteria sampling as a follow-up to the elevated levels of bacteria documented in the stream in 2015. The first sample will be collected in July at sites MB21 and MB24 to focus on 2015 results showing elevated bacteria in the upper watershed. Pending results from the June sampling, Maine DEP and FBE will conduct bracket sampling in order to identify the source of bacteria in the upper watershed.

ALGAE RECONNAISSANCE

Reconnaissance of algal presence and abundance will be conducted in late summer pending the results from the continuous logging for DO. If DO impairments are noted, algal reconnaissance will be used to locate potential upstream nutrient inputs to the stream responsible for fueling algal growth.

METALS

Jeff Dennis is currently in communication with Jim Stahlnecker to determine if bioassays could be completed in the estuarine portion of the stream. This may include using DEP SWAT funds to conduct tissue analysis of mussels within the tidal portion of the stream in order to establish a linkage between accumulation of metals in Merriconeag Stream and the estuary.

CHLORIDE SAMPLING

Chloride sampling is a low priority for the 2016 season and will only be conducted if extra time and funds are available. The purpose of chloride sampling would be to provide a comparison to the historical specific conductivity monitoring so that a chloride-conductivity relationship specific to Mare Brook can be established. However, because specific conductivity is relatively stable at all sites, creating this relationship is not a primary concern at this time. If sampling does occur, multiple samples will be taken at one “representative” site across different flow regimes in an attempt to capture a wide variety of chloride levels in the stream. Because chloride levels are slightly higher below the runway, site MB10 has been proposed as the best sampling location.