Appendix 3: Water Quality Monitoring Plan & Recommended Future Actions

Water Quality Monitoring Plan

Addressing water quality impairments in these streams will require the identification and assessment of individual NPS pollution sites in the watershed. Once sites are identified, and BMPs have been applied, assessments should include stream monitoring to develop standards for post and pre-application comparisons. Water quality monitoring should be conducted to gauge effectiveness of any BMPs or engineered design solutions, as recommended in the 'Future Actions' section below. As restoration plans proceed, Maine Department of Environmental Protection (Maine DEP) will check on the progress towards attainment of Maine's Water Quality Standards (WQS) with both water chemistry and biological monitoring evaluations. Also, Maine DEP's Biological Monitoring Program will check on water quality status or improvement in the future under the existing rotating basin sampling schedule.

Benthic macroinvertebrates are excellent indicators of water quality. The number of different kinds of organisms and the abundance of different groups provide information about a waterbody's health. The Biological Monitoring Program of Maine DEP uses macroinvertebrate data to determine if streams and rivers are attaining the aquatic life goals assigned to them. The Program uses a statistical model that incorporates 30 variables of numeric data collected from rivers and streams, including macroinvertebrate richness and abundance, to determine the probability of a sample attaining statutory Class A, B, or C conditions. Biologists use the model results and supporting information to determine if samples attain the aquatic life use goals of the class assigned to the stream or river (Davies and Tsomides, 2002).

An ongoing monitoring program is critical to assess the effectiveness of implementation efforts. Implementation is expected to continue until monitoring shows attainment of aquatic life use goals (macroinvertebrates and/or algae) or dissolved oxygen (DO) WQS. Maine DEP will evaluate progress towards attainment of Maine's WQS by monitoring the benthic macroinvertebrate communities and DO in the impaired streams. Depending on the existing impairment(s), benthic macroinvertebrates and/or algae, or DO will provide the primary metric to measure the progress of attaining WQS.

Recommended Future Actions

The goal of the *Maine Statewide Total Maximum Daily Load (TMDL) for Nonpoint Source (NPS) Pollution* is to use a water quality model, MapShed (Appendix 2), to define pollutant loads and set water quality targets that will ensure compliance with Maine's WQS. The nutrient and sediment reductions listed in the TMDL Allocations (Appendix 1) represent averages over the year (given the seasonal variation of runoff and ambient conditions), and demonstrate the need to reduce nutrient and sediment

loads as the key to water quality restoration. The load reductions provide a guide for restoration plans and engineered solutions that will lower the content of nutrient and sediment in the runoff reaching the impaired streams.

The Restoration Process

Watershed inventory and watershed planning are important first steps toward reducing sediment and nutrient inputs to waterbodies. Yet improving DO regimes and restoring a sustainable and functional aquatic community requires more than just planning and assessment. Reversing stream degradation from anthropogenic impacts will require planning and effort that includes local stewardship, instream restoration and attention to cumulative impacts. An effective restoration approach should look to all potential nutrient and sediment sources, including the impact of agricultural land, impervious surfaces such as roads and eroding road ditches, residential and commercial development.

Watershed Inventory and Developing a Watershed Plan

While TMDLs focus on specific waterbody segments and specific pollutant sources, watershed-based plans (WBP) should be holistic, incorporating the pollutant- and site-specific TMDLs into the larger context of the watershed, including additional water quality threats, pollutants, and sources. It is recommended that detailed watershed plans be developed to focus and prioritize appropriate restoration measures. Plans should incorporate on-the-ground mitigation measures and practices that will reduce pollutant loads and contribute in measurable ways to reducing impairments and to meeting WQS. WBPs should be designed to take into account information provided in this TMDL, including stream-specific appendices.

To begin the restoration process, additional investigation is necessary for all of the impaired watersheds in order to fully document problem areas for each WBP or restoration strategy. The usual strategy includes:

1) Conducting parcel-level field work to locate NPS pollution problems and identify sources of nutrient and sediment inputs;

2) Minimizing additional disturbance to maintain existing natural buffering capacity and reestablish buffers where necessary; and

3) Installing Best Management Practices (BMPs) and incorporating Low Impact Development (LID) techniques for future development to reduce the impact of NPS pollution on receiving water hydrology and water quality.

Local stakeholders need to choose the appropriate BMPs and stream restoration techniques to reduce nonpoint source runoff on a case-by case-basis. This TMDL report provides the following information, tools, and contacts for taking action:

- Results of preliminary watershed assessment results, including pollutant load reductions needed for nutrients and sediment (see Appendix 7).

- Information on watershed restoration projects, including watershed surveys, watershed-based planning, implementing pollution reduction measures, and grant funding opportunities from Maine's NPS Program: http://www.maine.gov/dep/water/grants/319.html.

- Examples of agricultural best management practices (BMPs) (see Appendix 4) .BMP optimizing tool: The Pollution Reduction Impact Comparison Tool (PRedICT) to estimate load reductions and their associated cost. More information about this tool can be found at: http://www.predict.psu.edu/. Sub-watershed models (using MapShed) have been developed for each impaired waterbody addressed by this TMDL (see Appendix 2). Once more detailed data for site-specific land uses are entered into the base model, various BMP scenarios can be generated by the PRedICT portion of the model. Copies of the model and technical support are available upon request from Maine DEP.

- NPS site tracking tool: The NPS Site Tracker, used to record and track watershed inventory or survey information about NPS sites identified in a watershed over time. Electronic copies of the MS Excel templates and technical support are available from ME DEP upon request (see Appendix 5).