

## 9 Measuring Progress

As discussed in Chapter 6, Achieving Water Quality Criteria, the goal of the WMP is to achieve designated and desired uses by meeting water quality standards that are not currently being met. Specific goals and objectives to achieve the designated uses were established. Goal seven of the WMP is to evaluate the effectiveness of management measures through a long term evaluation and monitoring strategy. Ultimately, the management measures result in the implementation of BMPs. The success of the WMP toward meeting its goal of achieving designated and desired uses depends on many factors, all of which should be continuously evaluated. Establishing a monitoring strategy helps the Steering Committee meet the goal of creating a sustainable strategy for implementing the WMP. The monitoring strategy also aids in gauging whether the implementation efforts are resulting in improved water quality.

### 9.1 Measurements of Water Quality

#### *Pathogens and Bacteria: E.coli*

When striving to achieve water quality criteria, meeting PBC (1,000 organisms/100mL 30-day geometric mean) is the first benchmark (R 323.1062 Microorganisms. Rule 62. (1)). Once it is established that PBC is being met then meeting TBC (300 organisms/100mL single sample May 1<sup>st</sup> to October 1<sup>st</sup>) is the next criterion (R 323.1062 Microorganisms. Rule 62. (1)). Elimination of all identified *E.coli* contributing sources, such as failing septic systems, achieving designated uses and having the TMDL reaches lifted are the final measurements by which to determine a long term water quality improvement.

#### *TSS*

The criteria for addressing TSS (51 percent reduction) was established by the MDEQ Draft TMDL for DO. The WQS for DO is 5 mg DO/liter (R 323.1064 Rule 61 (1)). Elimination of all identified TSS contributing sources such as, poor construction site management, achieving designated uses and having the TMDL reaches lifted are the final measurements by which to determine a long term water quality improvement.

#### *Sediment*

The criteria for sediment evaluation will be based on implementing BMPs in areas where there is a high HIT Model sedimentation estimate and Carrier Creek where there is a current TMDL. A measureable increase in the macroinvertebrate and habitat rating as determine by Procedure 51, erosion assessments using the Bank Erosion Hazard Index (BEHI), sediment traps and/or bank pins can all be used to determine the success of BMPs in reducing sedimentation.

#### *Temperature*

To support the warmwater fish species in the Watershed, instream temperature should meet the MDEQ requirement for “warmwater fishery use,” which means the ability of the waterbody to support a balanced, integrated, adaptive community of fish species which thrive in relatively warm water. The final measurements by which to determine a long term water quality improvement are, elimination of

all contributing temperature sources such as, overland runoff due to lack of riparian vegetation, achieving designated uses and having the TMDL reaches lifted.

### *Biota*

The criteria for evaluating Biota are based on the rapid bioassessment of macroinvertebrate communities in wadeable streams and rivers (generally P51; MDEQ, 1990). Using P51, macroinvertebrate communities are scored with metrics that rate water bodies from excellent (+5 to +9) to poor (-5 to -9). Macroinvertebrate ratings from -4 to +4 are considered acceptable.

## **9.2 Monitoring Strategy**

As discussed previously the primary pollutant for this WMP is *E.coli*. TSS and sediment are secondary pollutants. The monitoring strategy below is a direct result of the monitoring that has been conducted by ECD, MDEQ, ICHD and Delhi Charter Township. The WMP is aimed at improving the overall health of the Watershed and the monitoring strategy is a reflection of that with an emphasis on increasing the current datasets.

### 9.2.1 Pathogens and Bacteria: *E.coli*

Organization	Monitoring Location	Type of Analysis	Protocol	Frequency	Milestone
MDEQ	Mainstem of Grand River, TMDL Sites	Coliform bacteria concentrations, BST	Standard Methods, QAPP	Every 5 years	Meet WQS for PBC then TBC. TMDL reaches are no longer exceeding, designated uses achieved and status lifted.
ICHD	Existing sites in Skinner-Extension Drain, Silver Creek and Carrier Creek	Coliform bacteria concentrations, BST (isolation of human sources)	Standard Methods, QAPP	Annual	Meet WQS for PBC then TBC. Elimination of human sources
Delhi Charter Township	Existing sites in Skinner-Extension Drain	Coliform bacteria concentrations, BST (including isolation of human sources)	Standard Methods, QAPP	Annual	Meet WQS for PBC then TBC. Elimination of human and livestock sources.
ECD	Existing sites in Columbia Creek, Skinner-Extension Drain and Silver Creek. Planned monitoring in Columbia Creek, Silver Creek, Sandstone Creek, Frayer Creek, Winchell and Union Drain, Cryderman Lake Drain and Sebewa Creek subwatersheds (Summer of 2014).	Coliform bacteria concentrations, BST (including isolation of human sources), agricultural practices survey	Standard Methods, QAPP	Annual	Meet WQS for PBC then TBC. Elimination of human and livestock sources.
GLRC	Urban TMDL Reaches	Coliform bacteria concentrations, BST	Standard Methods, QAPP	Annual	Meet WQS for PBC then TBC. Elimination of human and canine sources.

### 9.2.2 Biological Monitoring

Organization	Monitoring Location	Type of Analysis	Protocol	Frequency	Milestone
MDEQ	TMDL Sites in Carrier Creek	Procedure 51	Standard Methods, QAPP	Every 5 years	Determine if the biota and habitat score high enough to lift the TMDL in Carrier Creek. Designated uses achieved and TMDL lifted.
Mid-MEAC	Existing sites in the Watershed	Procedure 51 or MiCorps	Standard Methods, QAPP	Annual	Assess macroinvertebrates and habitat, track changes over time and share data with partner organizations and the community.
Delhi Charter Township	Existing sites in Skinner-Extension Drain	Procedure 51 or MiCorps	Standard Methods, QAPP	Annual	Assess macroinvertebrates and habitat, track changes over time and share data with partner organizations and the community.
ICD	Utilize existing ECD 2012 sites in Columbia Creek and Skinner-Extension Drain.	Procedure 51 or MiCorps	Standard Methods, QAPP	Annual	Assess macroinvertebrates and habitat, track changes over time and share data with partner organizations and the community.
ECD	Existing sites across the Watershed	Procedure 51 or MiCorps	Standard Methods, QAPP	Annual	Assess macroinvertebrates and habitat, track changes over time and share data with partner organizations and the community.

### 9.2.3 Temperature

Organization	Monitoring Location	Type of Analysis	Protocol	Frequency	Milestone
MDEQ	TMDL Sites in Carrier Creek	Procedure 71	Standard Methods, QAPP	Every 5 years	Track changes over time. TMDL reaches are no longer exceeding, designated uses achieved and status lifted.
ECD & Steering Committee Partners	Carrier Creek	Procedure 71	Standard Methods, QAPP	Annual	Track changes over time and share data with partner organizations and the community.

### 9.2.4 Sediment

Organization	Monitoring Location	Type of Analysis	Protocol	Frequency	Milestone
MDEQ	TMDL Sites in Carrier Creek	BEHI, Sediment Traps and/or Bank Pins.	Standard Methods, QAPP	Every 5 years	Track changes over time. TMDL reaches are no longer exceeding, designated uses achieved and status lifted.
ECD & Steering Committee Partners	Carrier Creek, High sedimentation estimate subwatersheds (HIT Model) and Critical Zones	BEHI, Sediment Traps and/or Bank Pins.	Standard Methods, QAPP	Annual	Track changes over time and share data with partner organizations and the community.

### 9.2.5 TSS

Organization	Monitoring Location	Type of Analysis	Protocol	Frequency	Milestone
MDEQ	TMDL Sites in Carrier Creek	Procedure 71	Standard Methods, QAPP	Every 5 years	Track changes over time. TMDL reaches are no longer exceeding, designated uses achieved and status lifted.
ECD & Steering Committee Partners	Carrier Creek	Procedure 71	Standard Methods, QAPP	Annual	Track changes over time and share data with partner organizations and the community.

## 9.3 Regional Collaboration

Through discussions with Steering Committee partners and the RCWP there is a strong interest in capitalizing on resources and similar pollutants to create a collaborative regional monitoring approach. Currently, ICHD organizes a collaborative surface water monitoring program and many of the municipalities represented by the GLRC are a part of it. The idea is to strengthen the existing *E.coli* monitoring facilitated through ICHD. This will be achieved through the creation of a watershed report card by ECD, U.S. Geological Survey (USGS), RCWP, GLRC and MGROW.

## 9.4 Monitoring Strategy Summary

Understanding the overall health and functionality of the Watershed is a pivotal component of the WMP. Ultimately, the success of the WMP will be defined by the attainment of designated uses and the restoration of TMDL reaches due to improved water quality. In order to measure whether or not success is being achieved, a monitoring strategy is necessary. The monitoring strategy is meant to provide a framework by which to track progress over time. It is by no means intended to be prescriptive as new information may provide improved monitoring and data collection techniques. Implementation of the monitoring strategy will be the responsibility of many partners including ECD, and should occur throughout the Watershed.