6.0 IMPLEMENTATION AND MONITORING RECOMMENDATIONS

6.1 Implementation Strategies

Pursuant to the regulations at 40 CFR 130.6, states are to develop water quality management plans to implement water quality control measures such as TMDLs. There are two subwatersheds (East Branch and North Fork) within the Sugar Creek basin that are receiving grants that should facilitate the development of such plans. Information provided in this TMDL report should assist watershed groups and local government organizations develop implementation plans and justify requests for additional funds to implement control measures.

The major causes of impairment in this basin are related to agricultural activities that are contributing large sediment and nutrient loads to Sugar Creek and its tributaries, although a few point sources are exerting significant influence in the receiving water bodies. Nutrient loads from point sources are being reduced through the NPDES permit process. The implementation of a basinwide total phosphorus limit of 1 mg/l for point source dischargers has already started, and will continue as permits are renewed. Although point source limits are subject to a compliance schedule, it is expected that most point sources will meet the recommended phosphorus effluent limits within 5 years. Point source load reductions for NO\textsubscript{3} + NO\textsubscript{2} are only recommended for one subwatershed (North Fork) for which point sources are the main sources of nitrogen. For other subwatersheds, top priority should be given to nitrogen load reductions from failing septic systems, crop production and livestock activities. The recreational use of the waterbodies is also being impaired by widespread exceedances of bacterial water quality criteria. Although this report doesn’t include TMDLs for bacteria (due to insufficient data), many of the management practices recommended for sediment and nutrient load reductions are expected to lower bacteria loads as well. After the management practices are implemented, the Sugar Creek watershed will be reassessed to verify if bacteria counts are still excessive. The possible impact of abandoned mines on Sugar Creek will also be assessed during future surveys.

The following activities are some examples of management practices that should result in significant load reductions in listed segments and the areas downstream from them:

1. Improve manure management practices
2. Implement conservation tillage/no-till in 50% of cropland to lower sediment and total phosphorus
3. Convert cropland to pasture or forest
4. Establish buffer strips/riparian forest buffers
5. Fence livestock off the stream
6. Bring habitat (QHEI index) score up to an average of 60 through riparian improvements and appropriate sediment reduction measures
7. Implement an initial basin wide effluent phosphorus limit of 1 mg/l for point sources
8. Identify and upgrade/eliminate faulty septic systems
9. Locate and reclaim abandoned strip mines
10. Set load limits for manganese and iron, once criteria are developed for those parameters
Ohio EPA intends to reassess the Sugar Creek watershed several years from now, once restoration measures are implemented. Information regarding available sources of funds for planning and implementation of TMDL goals has been circulated by Ohio EPA among the local entities in Wayne, Tuscarawas, Holmes and Stark counties.

The seven listed segments are itemized below, showing specific load reduction and habitat improvement recommendations for each.

### 6.1.1 Sugar Creek (Headwaters to Middle Fork)

A very positive development in this part of the basin is the formation of a watershed group near the headwaters (Smithville area), organized with assistance from the Ohio Agricultural Research and Development Center (OARDC). Most group members are farmers or landowners in the area. The group members received information about the habitat and water quality problems in Sugar Creek, and discussed options that suit their needs and meet the TMDL goals. Landowners are planning to enroll part of their land in the Conservation Reserve Program. The combined farms of the twelve farmer team members have over 8 miles of potential contiguous CRP buffers. More details about this particular group is available in subsection 6.2. Ohio EPA is collaborating with OARDC to provide technical assistance to this and other proposed watershed groups.

Some of the load reduction and habitat improvement options recommended for this reach are:
- Improve manure management practices
- Implement conservation tillage/no-till in 50% of cropland to lower sediment and total phosphorus load
- Convert cropland to pasture or forest
- Establish buffer strips/riparian forest buffers
- Fence livestock off the stream
- Bring habitat (QHEI index) score up to an average of 60 through riparian improvements/appropriate sediment reduction measures
- Identify and upgrade faulty septic systems
- Limit point source nutrient loads. The following summer loads are recommended for the main dischargers in this reach:

<table>
<thead>
<tr>
<th>Discharger</th>
<th>Flow (MGD)</th>
<th>NO$_3$+NO$_2$-N</th>
<th>Total phosphorus</th>
</tr>
</thead>
<tbody>
<tr>
<td>Smithville WWTP</td>
<td>0.3</td>
<td>monitor</td>
<td>1.1 kg/day (1 mg/l)</td>
</tr>
<tr>
<td>Harmony Lake WWTP</td>
<td>0.036</td>
<td>monitor</td>
<td>0.1 kg/day (1 mg/l)</td>
</tr>
</tbody>
</table>
6.1.2 North Fork Sugar Creek

A North Fork watershed group has been meeting regularly and is expected to develop an implementation plan to address many of the nonpoint source problems affecting the segment. More details are given in subsection 6.2. Ohio EPA has been providing technical assistance and information about sources of funding to assist this group with its efforts.

Some of the load reduction options recommended for this segment are:
- Improve manure management practices in livestock holding facilities
- Implement conservation tillage/no-till in 50% of cropland to lower sediment and total phosphorus load
- Establish buffer strips/riparian forest buffers
- Bring habitat (QHEI index) score up to an average of 60 through riparian improvements and appropriate sediment reduction measures.
- Fence livestock off the stream (already being partially implemented)
- Upgrade/elimination of faulty septic systems (a treatment plant is already being designed)
- Limit point source nutrient loads. The following summer loads are recommended for the main dischargers in this reach:

<table>
<thead>
<tr>
<th>Discharger</th>
<th>Flow (MGD)</th>
<th>NO$_3$+NO$_2$-N</th>
<th>Total phosphorus</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kidron WWTP*</td>
<td>0.1</td>
<td>3.79 kg/day (10 mg/l)</td>
<td>0.38 kg/day (1 mg/l)</td>
</tr>
<tr>
<td>Gerber Poultry</td>
<td>0.8</td>
<td>15.1 kg/day (5 mg/l)</td>
<td>3.0 kg/day (1 mg/l)</td>
</tr>
</tbody>
</table>

* proposed

6.1.3 Little Sugar Creek

Although this segment does not currently have a watershed group, there are plans underway to organize stakeholders (Moore, 2001). In addition, Little Sugar Creek is part of the upper Sugar Creek subwatershed, which has a watershed coordinator in place. Ohio EPA staff communicate regularly with the watershed coordinator and will continue providing technical assistance as needed.

Some of the load reduction & habitat improvement options recommended for this reach are:
- Improve manure management practices
- Fence livestock off the stream
- Establish buffer strips/riparian forest buffers
- Bring habitat (QHEI index) score up to an average of 60 through riparian improvements and appropriate sediment reduction measures
- Implement conservation tillage/no-till in 50% of cropland to lower sediment and total P load
- Convert cropland to pasture or forest
- Identify and upgrade faulty septic systems
- Limit point source phosphorus loads; monitor effluent NO$_3$+NO$_2$-N.

The following summer loads are recommended for the main discharger in Little Sugar Ck:
6.1.4 Sugar Ck: South Fork to Tuscarawas River (RM 12.3 to 0.0)

There are no stakeholder groups in this subwatershed. A significant portion of the phosphorus load originates from point source discharges. Examples of load reduction options recommended for this segment are:
- Implement conservation tillage/no-till in 50% of cropland to lower sediment and total P load
- Establish buffer strips/riparian forest buffers
- Identify and upgrade faulty septic systems
- Limit all point source phosphorus loads based on 1 mg/l effluent concentration. Nitrate-N concentrations in this segment are already below the recommended target, but ammonia limits are also recommended to avoid dissolved oxygen standard violations.

The following summer average loads are recommended for the main dischargers in this reach:

<table>
<thead>
<tr>
<th>Discharger</th>
<th>Flow (MGD)</th>
<th>NO$_3$+NO$_2$-N</th>
<th>NH$_3$-N</th>
<th>Total P*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brewster Dairy</td>
<td>0.3</td>
<td>monitor</td>
<td>6.8 kg/day (6 mg/l)</td>
<td>1.14 kg/day</td>
</tr>
<tr>
<td>Brewster WWTP</td>
<td>0.665</td>
<td>monitor</td>
<td>15.1 kg/day (6 mg/l)</td>
<td>2.5 kg/day</td>
</tr>
<tr>
<td>Beach City WWTP</td>
<td>0.3</td>
<td>monitor</td>
<td>1.9 kg/day (1.7 mg/l)</td>
<td>1.1 kg/day</td>
</tr>
<tr>
<td>Strasburg WWTP</td>
<td>0.338</td>
<td>monitor</td>
<td>1.28 kg/day (1 mg/l)</td>
<td>1.3 kg/day</td>
</tr>
</tbody>
</table>

* All point sources limited to 1 mg/l total phosphorus

6.1.5 Goettge Run

There are no stakeholder groups and no known point sources in this five square mile subwatershed. A watershed located nearby (Huff Run) with similar problems has a watershed coordinator and a very active watershed group. Lessons learned from that watershed could be applied to Goettge Run.

Some of the options recommended for this segment are:
- Conduct additional monitoring during high flows to assess urban and mine runoff impact
- Locate and reclaim abandoned strip mines
- Promote formation of watershed group to interact and learn from experience of adjacent watersheds facing similar problems
- Encourage citizen monitoring to expand water quality data available
- Set load limits for manganese and iron, once criteria are developed for those parameters
6.1.6 Brandywine Creek

There are no known stakeholder groups in this small watershed.

Some of the options recommended for this segment are:
- Locate and reclaim abandoned strip mines
- Promote formation of watershed group to interact and learn from experience of adjacent watersheds facing similar problems
- Conduct additional monitoring during high flows to assess urban and mine runoff impact
- Set load limits for total iron, once criteria are developed
- Implement conservation tillage/no-till in 50% of cropland to lower sediment load
- Establish buffer strips/riparian forest buffers
- Identify and upgrade faulty septic systems
- Bring habitat (QHEI index) score up to an average of 60 through riparian improvements and appropriate sediment reduction measures.

6.1.7 Unnamed tributary to South Fork Sugar Creek at RM 14.15

This tributary is small enough that it could be a good case study for a local watershed group to plan and implement restoration activities. A combination of point source load reductions, management practices to reduce impact of runoff from pasture/agricultural lands, and restoration of riparian vegetation should allow this segment to attain its use designation.

Some of the same habitat improvement and nutrient reduction strategies recommended for this segment are listed below.

Some of the load reduction options recommended for this segment are:
- Improve manure management practices
- Fence livestock off the stream to lower nutrient, bacteria and habitat impact
- Establish buffer strips/riparian forest buffers to lower sediment load and increase shade
- Monitor for impact of mining activities/urban runoff
- Bring habitat (QHEI index) score up to an average of 60 through riparian improvements and appropriate sediment reduction measures
- Transfer discharge from American Whey directly to the South Fork Sugar Creek
- Limit point source nutrient loads. The following summer loads are recommended for the main dischargers in this reach. Limits for other dischargers to the South Fork and its tributaries are also shown below:
Recommended Nutrient Loads (as kilograms/day)

<table>
<thead>
<tr>
<th>Discharger</th>
<th>Flow (MGD)</th>
<th>NO\textsubscript{3}+NO\textsubscript{2}−N</th>
<th>Total P</th>
<th>NH\textsubscript{4}−N</th>
</tr>
</thead>
<tbody>
<tr>
<td>American Whey</td>
<td>0.065</td>
<td>monitor</td>
<td>0.25 (1mg/l)</td>
<td>0.25 (1 mg/l)</td>
</tr>
<tr>
<td>Sugar Creek WWTP \textsuperscript{A}</td>
<td>0.5</td>
<td>monitor</td>
<td>1.9 (1mg/l)</td>
<td>4.4 (2.3 mg/l)</td>
</tr>
<tr>
<td>Guggisberg Cheese \textsuperscript{A}</td>
<td>0.04</td>
<td>monitor</td>
<td>0.15 (1mg/l)</td>
<td>0.15 (1mg/l)</td>
</tr>
<tr>
<td>Baltic WWTP \textsuperscript{A}</td>
<td>0.1</td>
<td>monitor</td>
<td>0.38 (1mg/l)</td>
<td>0.6 (1mg/l)</td>
</tr>
<tr>
<td>Case Farms \textsuperscript{A}</td>
<td>0.5</td>
<td>monitor</td>
<td>1.89 (1mg/l)</td>
<td>2.8 (1.5 mg/l)</td>
</tr>
<tr>
<td>Troyer’s Trail Bologna \textsuperscript{A}</td>
<td>0.005</td>
<td>monitor</td>
<td>0.02 (1mg/l)</td>
<td>0.03 (2 mg/l)</td>
</tr>
<tr>
<td>Walnut Ck WWTP \textsuperscript{A}</td>
<td>0.09</td>
<td>monitor</td>
<td>0.34 (1mg/l)</td>
<td>0.68 (2mg/l)</td>
</tr>
</tbody>
</table>

\textsuperscript{A} Discharges to a different tributary or to the South Fork Sugar Creek

### 6.2 Reasonable Assurances

USEPA guidance calls for reasonable assurances when TMDLs are developed for waters impaired by both point and nonpoint sources and for waters impaired solely by nonpoint sources. The purpose of including reasonable assurances is for US EPA to be confident that the identified activities will in fact be implemented and will have the desired results. Reasonable assurances for reductions in nonpoint source loadings may be non-regulatory, regulatory, or incentive-based, and should be consistent with applicable laws and programs. Because Ohio EPA does not have direct authority/jurisdiction over many of the identified nonpoint sources, it will be important to coordinate activities with those governmental agencies that do (e.g., county health departments, municipalities, Department of Agriculture offices). Reasonable assurances for nonpoint source activities can be strengthened by having signed memorandums of agreement, relying on entities with proven track records of performance, and/or documenting that the required funding levels are available.

The following is a summary of regulatory, non regulatory and incentive based actions applicable to or recommended for the Sugar Creek basin:

**Regulatory:**
- basin wide phosphorus limit of 1 mg/l for NPDES dischargers
- regulation of existing CAFOs in the watershed (already in place)
- new requirements for household sewage treatment systems (statewide requirement)
- sewage sludge disposal standards to regulate sludge application rates (statewide)

**Non-regulatory:**
- formation of stakeholder groups to promote implementation of TMDL recommendations
- educate stakeholder groups (involves SWCDs, OSU-Extension, Ohio EPA, NRCS, etc)
- periodic stream monitoring (Ohio EPA, watershed groups) to measure progress

**Incentive-based**
- appoint watershed coordinators to prepare & undertake implementation plans
- provide 319 grants for implementation of conservation tillage, buffers, and other management options
- provide 319 grants and other loans for septic system improvements
• provide loans for WWTP and riparian/habitat improvements

The implementation of the phosphorus limit of 1 mg/l for point source dischargers has already started, and will continue as permits are renewed. Although point source limits are subject to a compliance schedule, it is expected that most point sources will meet the recommended phosphorus effluent limits within 5 years. Ohio EPA recommends that habitat improvements aimed at achieving the QHEI (habitat) index goal of 60 be implemented within 5 years from the date of this TMDL report. This will assure that the management practices will be in place before the existing watershed coordinator grant ends.

In the Sugar Creek basin there are several watershed groups that have been active or are in the process of being formed. The East Branch Sugar Creek has a locally led Watershed Task Force that has been meeting since August 1998. In 1999-2000 this group secured funding from the Ohio Department of Natural Resources, Division of Soil and Water for a vegetated riparian buffer strip demonstration project. In spring of 2001, the first thirty five acres of riparian buffer strips were installed in the watershed. This represents approximately ten miles of stream bank buffers, out of about fifty miles of streambanks in the East Branch subwatershed. Buffers have a minimum average width of twenty five feet. Also in 2001, the group received a grant for water quality monitoring equipment and began local water quality monitoring. (McKenney, 2001). This group was also awarded a nonpoint source grant ($115,500, including local match) for development of a watershed plan for the East Branch. Ohio EPA will continue to support this local effort, providing technical assistance for the water quality monitoring project and serving on the planning project’s Technical Advisory Committee.

The North Fork Sugar Creek has a watershed group (the North Fork Task Force) that has been meeting regularly since March 2000 and is developing a watershed plan to address the nonpoint source problems affecting the segment. Ohio EPA has been providing technical assistance and information about sources of funding to assist this group with their efforts. Point source issues in the North Fork are already being addressed through the NPDES permit process. In addition, a proposed wastewater treatment plan for Kidron is being designed and should significantly reduce the bacterial and nutrient impact from unsewered areas in that sub-watershed.

The uppermost reach of the Sugar Creek (HUC 100) has a watershed coordinator that has been guaranteed funds ($252,100) for seven years. This steady funding will provide continuity and improve the opportunities for success of implementation plans developed by the local watershed groups. The reaches included in the coordinator’s project area are the Sugar Creek (mainstem from headwaters to Middle Fork), Little Sugar Creek, and the North Fork Sugar Creek, mostly located within Wayne County. The coordinator (a Wayne county SWCD employee) is working closely with other local and state agencies (including Ohio EPA) to improve water quality in this subwatershed. A 319 grant has been conditionally approved to help defray the costs of implementation of many of the management options recommended in this TMDL report. The total amount of that grant is approximately $814,000 (including state and local matching funds).

A recent report prepared by NEFCO (Northeast Ohio Four County Regional Planning and Development Organization) contains inventories and maps of point and non-point sources, land
use and other data for this subwatershed of Sugar Creek. It identifies sub-basins having highly erodible soils; shows result of habitat assessment done by NEFCO; has inventories of potential pollutant sources including animal husbandry operations, semi-public non-discharging systems, etc. It provides information that will be very useful to local watershed groups as they develop and implement restoration activities. (NEFCO, 2000).

The unnamed tributary to South Fork Sugar Creek is partly affected by a point source that is being addressed through the NPDES permit process. The nonpoint source impacts can best be tackled by local stakeholders. Ohio EPA will continue working closely with Ohio State University-extension and OARDC, who are encouraging and promoting the formation of local watershed groups in the Sugar Creek basin. Ohio EPA is making 319 grants available for planning and implementation. Ohio EPA expects implementation (or watershed action) plans to be in place for the Upper Sugar Creek, North Fork, and Little Sugar Creek sub-watersheds within the next two to three years. A plan for the East Branch (unlisted watershed) should also be ready within that period. The combined drainage area covered by these subwatersheds represent 35% of the basin’s drainage area.

Development of stakeholder groups throughout the basin is important for implementation of TMDL recommendations. At least one of the existing watershed groups has developed an effective way to recruit stakeholders. It relies on a participatory approach promoted by OARDC (Ohio Agricultural Research and Development Center) staff. This approach starts with one (or more) conservation-oriented stakeholders that owns property adjacent to the stream. That person recruits a neighbor, who contacts other neighbors to form a watershed group. OARDC staff provide support during the organizational stages to facilitate the initial meetings, and also communicate local habitat and water quality data provided by Ohio EPA. Since its inception in mid-2000, members of this group have agreed to devote several miles of contiguous property as wildlife corridors along the creek (are currently seeking matching funds to defray the cost of this management practice). Plate 4 shows the extent of existing riparian buffers in this segment, and is one of the tools used by this watershed group to track progress. They are also monitoring water quality to pinpoint water quality problems. The procedure (the “Sugar Creek method”) followed to develop this watershed group will be applied by OARDC to other subwatersheds in the Sugar Creek basin (Little Sugar Creek and South Fork) to form stakeholder groups.

Nutrient loads from point sources are being reduced through the NPDES permit process. A basin wide total phosphorus limit of 1 mg/l will considerably reduce the point source phosphorus load. Additional reductions may be required and phased-in over several years, if the stream nutrient concentrations remain high. Nitrogen reductions should be recommended on a case by case basis, taking into account the existing biological scores downstream of the discharger, the difference between the instream concentration and proposed nitrogen targets for that segment, and the proportion of point source to non point source load in the subwatershed. This report recommends nitrogen point source reductions for one of the seven listed segments (North Fork Sugar Creek).
Plate 4. Location of Existing Riparian Buffers in Sugar Creek near Smithville
References


Herman, J. Wayne County Environmental Services, personal communication, July 2001.


McKenney, A. Tuscarawas Soil and Water Conservation District, e-mail communications, November 2001.


Ohio EPA, 2001b. Information about schedule of training on biocriteria and Qualitative Habitat Evaluation Index are available in the Ohio EPA website at: http://www.epa.state.oh.us/dsw/whatsnew.html


Rankin, E. T. 1989. The qualitative habitat evaluation index (QHEI), rationale, methods, and application. Ohio Environmental Protection Agency, Division of Water Quality Planning and Assessment, Ecological Assessment Section, Columbus, Ohio.


Tuscarawas County NRCS. According to Tuscarawas County NRCS staff (Ray Rummell) the sediment basins were not as effective in controlling sediment as had been expected. Possibly the capacity/retention time was insufficient to allow for adequate settling of sediments, Personal Communication, 2000.


