Nine – Element Nonpoint Source Implementation Strategic Plan (NPS-IS plan)
Scioto River Watershed
Headwaters Little Scioto River HUC – 12
[05060001 03 02]

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The Nine-Element Nonpoint Source Implementation Strategic Plan’s (NPS-IS) for Chickasaw Creek (05120101-0201) and Heilman ditch-Swan Creek (04100009 08 04) served as templates for this plan.
Chapter 1: Introduction

This report is being created by the Crawford Soil and Water Conservation District as a strategy to improve the water quality in the **Headwaters Little Scioto River Watershed HUC-12 (05060001 03 02)**, with the focus of using best management practices within the watershed to improve water quality and soil health. The impact of this HUC-12 watershed can garner a lot of attention if it is negatively impacting the grander watershed. This is the start of the Scioto River watershed that works its way south through the state to end at the Ohio River. This NPS-IS was created for the **Headwaters of the Little Scioto River HUC-12** watershed to delve into its history of impairment and how best to improve the watershed. The watershed covers three counties – Crawford, Marion, and Wyandot. It has a miniscule portion of a municipality (Bucyrus), minimal woodland acreage, and the remaining acreage is cash crop farming with artificial drainage (by means of ditches and tiling).

This report is being created in advance to help obtain grant funding that will help fund BMP’s that are lacking in this watershed. This NPS-IS for **Headwaters Little Scioto River Watershed HUC-12 (05060001 03 02)** will meet the US EPA’s 9-Element watershed plan criteria.

1.1 Report Background

Crawford County is split north and south for watershed drainage. The northern part of the county has been under a microscope as it is the tail end of the Western Lake Erie Basin (WLEB) watershed. The WLEB has greatly improved its watershed functioning dynamic over several years through various grants and a lot of effort from the agricultural community. This report will focus on the **Headwaters Little Scioto River watershed HUC-12 (05060001 03 02)** and the work that is needed for its impairments.

Figure 1: Location of Crawford County within Ohio. (USDA SCS, 1979)
1.2 Watershed Profile and History

The Headwaters of the Little Scioto River watershed has 30,416 acres in Crawford, Marion, and Wyandot Counties. The northern edge of the watershed is on the south edge of the City of Bucyrus, flowing into the southwest corner of Crawford County, and extending west into Wyandot for a mile and a half, then travelling well beyond the county line into Marion County. It forks in Marion County going east and west around the Rock Fork Watershed. This HUC-12 watershed drains south, eventually into the Ohio River.

Figure 2: (Not to scale) Map of HUC – 12 Headwaters Little Scioto River HUC-12 (05060001 03 02) spanning three counties. (Crawford SWCD, 2018)

Headwaters Little Scioto River Watershed HUC-12 is a part of the HUC-8- Upper Scioto River Watershed that starts from the center of Crawford County down through to Pickaway County where it then enters the Lower Scioto River Watershed, then through the Little Scioto Watershed consequently, which ends at the Ohio River.

The Headwaters Little Scioto River Watershed HUC-12 (05060001 03 02) is directly south and east from the Headwaters Lower Sandusky River Watershed HUC-12 (04100011 04 05) and directly west from the Mud Run Watershed HUC-12 (05060001 08 02). North of the watershed is the Headwaters Middle Sandusky River Watershed HUC-12 (04100011 04 03), and south is the Rock Fork HUC-12 (05060001 03 01), and Otter Creek-Olentangy River HUC-12 (05060001 10 01) watersheds. (Ohio EPA, 2013)
Before this watershed became populated it was mostly grassland prairie and woodland acreage. Soil organic matter has diminished with the current crop rotations and intense tillage. Nutrients today are applied by either fertilizer and/or manure. The average soil organic matter ranges between 2-3% today, when it used to be 5% or above. The usual crop rotation for our farmers is corn-soybean-corn with wheat acreage dropping every year. Crawford County ranks 7th for corn production and 11th for soybean production in the state. (USDA, 2012) This dominantly agricultural watershed has minimal BMP’s in place for not only soil health but for water quality. Improving the soil health will play a larger part in the watershed’s water quality.

Crawford County ranks 6th in the state for pork production (USDA, 2012). The watershed is filled with small and medium sized operations that all have to manage their manure and nutrient management programs on their own with no private applicator companies. There are several large scale swine operations that are permitted through the ODA Division of Livestock Environmental Permitting (ODA-DLEP).

With the large amount of artificial drainage managing this watershed there is no maintenance on drainage practices. Most agricultural drainage ditches under county maintenance do not have sufficiently sized or effective filter strips. Adding filter strips where absent, and improving existing filter strips would reduce sediment impacts from crop field runoff and improve stream bank stability. Due to the amount of manure generated in this watershed, and the likelihood that it will be land applied in this watershed, it is critical that appropriate BMP’s are installed to prevent potential impacts on water quality related to inadvertent or accidental discharges of manure.

Figure 3: (Not to scale) Map shows HUC – 12 watersheds centered on the **Headwaters Little Scioto River HUC-12** that is marked by a star. (Ohio EPA, 2013)
Ditches are a major contribution to this flat grade watershed drainage. The Hill, Grau, Widman, Monnett, Steiger, George, and Gibb ditches are the largest in the watershed that drain the headwaters. 93,513 total feet of ditch is currently maintained by the Crawford County Engineer within the watershed boundaries of Crawford County. The ditches are maintained by the county with yearly mowing or spraying, and channel reconstruction when needed. They will maintain culverts if residue become excessive or if landowners have concerns about upkeep of the ditch. The county maintained ditches are funded through the landowner’s tax dollars to keep them maintained.

The other form of artificial drainage in the watershed is extensive subsurface tiling. Most fields are systematically tiled due to the minimal grade for surface water to flow to ditches. Tile laterals combine into tile mains that outlet to ditches and streams (i.e., waters of the state).

Figure 4: (Not to scale) Map depicts the ditches of Crawford County within the watershed. (Crawford SWCD, 2018)
1.3 Public Participation and Involvement

Affiliates involved with the work of best management practices include Crawford SWCD, Marion SWCD, Wyandot SWCD, USDA, NRCS, FSA, Crawford OSU Extension, and the Crawford County Engineer’s office. This report is being written for the intention of receiving future grant funding and having this watershed implementation strategy already created and approved.

The majority of the watershed is agriculture based. Likewise, there will be a focus on education to the agriculture community on how to improve their watershed, but more importantly BMP practices will be implemented for resource concern improvements. A survey was created in 2018 to ask the Crawford County farming population about what practices they are using and what they feel would help their watershed to improve, not only the watershed, but their farming operations.

The results from the survey show that farmers are interested in implementing cover crops and nutrient management practices. They also have interest in re-establishing trees for timber, recreation, and windbreak use. Producers also stated they would be more likely to do BMP’s with split or whole cost share to help alleviate the expense. Concerns on their farming operations were: waterway management, filter strip management, and weed management. The overall indication from the survey is that they wanted more knowledge on these practices and were willing to go to field days and workshops if they were hosted.
Chapter 2: Headwaters Little Scioto River HUC-12 Watershed Characterization and Assessment \Summary

2.1 Summary of HUC-12 Watershed Characterization

2.1.1 Physical and Natural Features

There are 17,067 acres of the Headwaters of the Little Scioto River Watershed in Crawford County, draining 47.52 square miles. 11,814 acres in Marion county and 1,535 acres in Wyandot County. The average topographical grade is 0-2% slopes. The predominant soils are Blount – Pewamo, Luray – Tiro, and Milford - Del Rey Shinrock soils which are nearly level and gently sloping, somewhat poorly drained and very poorly drained soils; formed in glacial till or lacustrine sediment. (USDA SCS, 1979, 1982, & 1989)

With 93% of the watershed being agriculture, farming practices dictate the healthiness of the ground and water within the watershed. The watershed is predominately a corn-soybean-corn rotation with wheat acres dropping every year. The lack of biological cover for 7 months of the year by either wheat or cover crops is a contributing factor to poor soil quality. The producers then over fertilize to make up for the lack of nutrients in the soil. Through the 4R precision application program we can help producers put the right amount of nutrients, at the right rate, and at the right time to minimize future run-off conundrums.
Figure 5: Watershed delineation is overlaid on the USGS topographical map.

Chart 1: Table charts the acreage percent each county holds in the Headwaters Little Scioto HUC-12.
Figure 6: (Not to scale) This graphic depicts the dominate soil types as determined by the USDA Soils Survey. Refer to Legend in Table 2. (USDA SCS, 1979)
Soil Legend

<table>
<thead>
<tr>
<th></th>
<th>Soil Description</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Tiro-Condit-Luray: Nearly level and gently sloping, somewhat poorly drained, poorly drained, and very poorly drained soils; formed in lacustrine sediment and glacial till.</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Luray-Tiro: Nearly level and gently sloping, very poorly drained and somewhat poorly drained soils; formed in lacustrine sediment and glacial till.</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Lenawee-Bono: Nearly level, poorly drained and very poorly drained soils; formed in calcareous, lacustrine sediment.</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Bennington-Condit: Nearly level and gently sloping, somewhat poorly drained and poorly drained soils; formed in glacial till.</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Bount-Pewamo: Nearly level and gently sloping, somewhat poorly drained and very poorly drained soils; formed in glacial till.</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Wadsworth-Condit: Nearly level and gently sloping, somewhat poorly drained soils with fragipans and nearly level, poorly drained soils; formed in glacial till.</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Cardington-Bennington-Pewamo: Nearly level to sloping, moderately well drained, somewhat poorly drained, and very poorly drained soils; formed in glacial till.</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Blount-Glynwood-Pewamo: Nearly level to sloping, somewhat poorly drained, moderately well drained, and very poorly drained soils; formed in glacial till.</td>
<td></td>
</tr>
</tbody>
</table>

Soils formed in glacial till on uplands

<table>
<thead>
<tr>
<th></th>
<th>Soil Description</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>9</td>
<td>Cardington-Shoals: Gently Sloping to moderately steep, moderately well drained soils formed in glacial till and nearly level, somewhat poorly drained soils formed in alluvium.</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Glynwood-Lobdell: Gently sloping to moderately steep, moderately well drained soils formed in glacial till and nearly level, moderately well drained soil formed in alluvium.</td>
<td></td>
</tr>
</tbody>
</table>

Table 2: Legend from Crawford County, OH Soil Survey shows predominate soil types in the aforementioned figure 6. (USDA SCS, 1979)

2.1.2 Land Use and Protection

The watershed is mainly used for agricultural purposes. There is no water being used as a drinking supply in this watershed, and there is little storm water being drained in this watershed. There are several factories, a small municipal airport, and a railroad maintenance building on the south end of the city, with the railroad and two major ODOT state routes travelling south out of the city, and ultimately out of the county into Marion. Running south east through Marion is Route 23. On the east side of the watershed is Crawford County’s largest livestock production operation that has multiple facilities not only in the watershed but in the surrounding counties as well. Figure 7 below shows the percentages of each land use in this watershed. The following table has the acreages of each land use that amounts to the total acreage of the watershed.
### Headwaters Little Scioto River Watershed HUC-12 (05060001 03 02)

<table>
<thead>
<tr>
<th>Land Use</th>
<th>Acreage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Row Crop</td>
<td>28,181</td>
</tr>
<tr>
<td>Woodland</td>
<td>1,267</td>
</tr>
<tr>
<td>Urban</td>
<td>968</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>30,416</strong></td>
</tr>
</tbody>
</table>

Table 3: The watershed acreage is broken down into its individual land uses. (Crawford SWCD, 2018)

![Circle graph](image)

**Row Crop 93%  Woodland 4%  Urban 3%**

Figure 7: This circle graph depicts the land use percentage of the watershed. (Crawford SWCD, 2018)
Figure 8: (Not to scale) Aerial imagery of the south end of Bucyrus, Ohio, the only urban acreage in the Headwaters Little Scioto River HUC-12.
Figure 9: (Not to scale) Amounting to 3% of the watershed, outlined in orange is the urban part of the Headwaters Little Scioto River Watershed HUC-12 (05060001 03 02). (Crawford SWCD, 2018)
Figure 10: (Not to scale) Lined in green are the wood lot acreages in the Headwaters Little Scioto River Watershed HUC-12 (05060001 0302). (Crawford SWCD, 2018)

2.2 Summary of HUC-12 Biological Trends

The OEPA has three testing stations in this watershed at river miles 19.7 (Little Scioto River @ Crawford-Marion County Line Road), RM 25.6 (Little Scioto River @ Caldwell Road) in Crawford County, and one station at RM 11.1 (Little Scioto River N of Marion @ Kenton-Galion Rd.) in Marion County. They are considered WWH* (Warmwater Habitats). The sites were last tested in 2009 and won’t be tested again until 2027. River mile 19.7 is listed as a headwaters station and river miles 11.1 and 25.6 are listed as wading testing stations. Refer to figures 11-13 for aerial imagery of stations.

*WWH – This designation defines the “typical” warmwater assemblage of aquatic organisms for Ohio rivers and streams; this use represents the principal restoration target for the majority of water resource management efforts in Ohio. (Ohio EPA, 2012)
Figure 11: (Not to scale) Map shows the location of testing stations along the Little Scioto River. (Crawford SWCD, 2018)
Figure 12: RM 25.6 testing station. (Crawford SWCD, 2018)
Figure 13: RM 19.7 testing station. (Crawford SWCD, 2018)
Figure 14: RM 11.1 testing station. (Google Earth, 2018)

Figure 12, 13, and 14 (not to scale) represent the two OEPA testing stations in Crawford and the one in Marion County. Figure 12 is the river mile 25.6 just south of Caldwell Road, river mile 19.7 on the south side of Crawford - Marion Line Road is figure 13, and then river mile 11.1 on the north side of Kenton-Galion Rd is figure 14.
Below are Biological and Habitat evaluation indices and thresholds that are used to determine if designated Warm water habitat (WWH) streams are meeting Aquatic Life Use (ALU) designation standards.

**Index of Biotic Integrity (IBI) – 40**

**Invertebrate Community Index (ICI) – Good**

**Modified Index of well-being (Mlwb) – 8.3**

**Quantitative Habitat Evaluation Index (QHEI) – 60**

<table>
<thead>
<tr>
<th>RM</th>
<th>Stream Name</th>
<th>ICI</th>
<th>IBI</th>
<th>Mlwb</th>
<th>QHEI</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.1 W</td>
<td>L. SCIOTO R. N OF MARION @ KENTON-GALION RD.</td>
<td>MG</td>
<td>29*</td>
<td>4.34*</td>
<td>49</td>
</tr>
<tr>
<td>19.7 W</td>
<td>L. SCIOTO R. @ CRAWFORD-MARION COUNTY LINE RD.</td>
<td>F</td>
<td>27*</td>
<td>5.82*</td>
<td>69.5</td>
</tr>
<tr>
<td>25.6 H</td>
<td>L. SCIOTO R. @ CALDWELL RD.</td>
<td>F</td>
<td>30*</td>
<td>H</td>
<td>40.5</td>
</tr>
</tbody>
</table>

*Indicates significant departure form applicable biocriteria (>4 IBI units, or > 0.5 Mlwb units).

Underlined scores are in the Poor or Very Poor range.

H – Headwater site, Mlwb is not applicable

W – Wading site

[F = Fair, MG = Marginally Good]

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**Narrative ranges and WWH biocriteria (bold) for ECBP ecoregion. Exceptional (EWH biocriteria), very good (EWH nonsignificant departure), poor and very poor evaluations are common statewide. For WWH, the ranges of marginally good and nonsignificant departure are the same.**

<table>
<thead>
<tr>
<th>IBI</th>
<th>Mlwb</th>
<th>ICI</th>
<th>Narrative Evaluation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Headwater</td>
<td>Wading</td>
<td>Boat</td>
<td>Wading</td>
</tr>
<tr>
<td>50-60</td>
<td>50-60</td>
<td>48-60</td>
<td>≥9.4</td>
</tr>
</tbody>
</table>

**Eastern Corn Belt Plains**

<table>
<thead>
<tr>
<th>IBI</th>
<th>Mlwb</th>
<th>ICI</th>
<th>Narrative Evaluation</th>
</tr>
</thead>
<tbody>
<tr>
<td>40-45</td>
<td>40-45</td>
<td>42-43</td>
<td>8.3-8.8</td>
</tr>
<tr>
<td>36-39</td>
<td>36-39</td>
<td>38-41</td>
<td>7.8-8.2</td>
</tr>
<tr>
<td>28-35</td>
<td>28-35</td>
<td>26-37</td>
<td>5.9-7.7</td>
</tr>
<tr>
<td>18-27</td>
<td>18-27</td>
<td>16-25</td>
<td>4.5-5.8</td>
</tr>
<tr>
<td>12-17</td>
<td>12-17</td>
<td>12-15</td>
<td>0-4.4</td>
</tr>
</tbody>
</table>

Table 4: This table outlines the major indicators tested at sampling sites to put a value on aquatic life use to measure attainment status. (Ohio EPA, 2012)
<table>
<thead>
<tr>
<th>RM</th>
<th>Stream Name</th>
<th>QHEI</th>
<th>DA (mi²)</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.1</td>
<td>L. SCIOTO R. N OF MARION @ KENTON-GALION RD.</td>
<td>49.0</td>
<td>47.0</td>
</tr>
<tr>
<td>19.7</td>
<td>L. SCIOTO R. @ CRAWFORD – MARION COUNTY LINE RD.</td>
<td>69.5</td>
<td>33.0</td>
</tr>
<tr>
<td>25.6</td>
<td>L. SCIOTO R. @ CALDWELL RD.</td>
<td>40.5</td>
<td>12.8</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Narrative</th>
<th>QHEI Range</th>
<th>Headwaters (&lt;20 sq. mi)</th>
<th>Larger Streams</th>
</tr>
</thead>
<tbody>
<tr>
<td>Excellent</td>
<td>&gt;70</td>
<td>&gt;75</td>
<td></td>
</tr>
<tr>
<td>Good</td>
<td>55 to 69</td>
<td>60 to 74</td>
<td></td>
</tr>
<tr>
<td>Fair</td>
<td>43 to 54</td>
<td>45 to 59</td>
<td></td>
</tr>
<tr>
<td>Poor</td>
<td>30 to 42</td>
<td>30 to 44</td>
<td></td>
</tr>
<tr>
<td>Very Poor</td>
<td>&lt;30</td>
<td>&lt;30</td>
<td></td>
</tr>
</tbody>
</table>

Table 5: This chart from the “OEPA Biological and Water Quality Study” represents the summarized QHEI scores and drainage area for the Upper Scioto River Study area, 2009. Sample stations within the Little Scioto River HUC-12 were separated from original chart for comparison.

River mile 25.6 is rated as a “Poor”, RM 19.7 is a “Good”, and RM 11.1 is rated as “Fair” for QHEI scores. There are many factors and data sets that are comprised in the overall QHEI such as the M1wb, IBI, and ICI. The following will review key factors that were tested at each station to garner the QHEI score.
ICI testing for Headwaters Little Scioto River Watershed HUC-12

<table>
<thead>
<tr>
<th>River</th>
<th>RM</th>
<th>D.A.</th>
<th>Predominant Populations on the Natural Substrates (Tolerance Categories = sensitive, facultative, tolerant)*</th>
<th>Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>Little Scioto River</td>
<td>11.11</td>
<td>47.0</td>
<td>Baetid mayflies (facultative)</td>
<td>Marginally Good</td>
</tr>
<tr>
<td>Little Scioto River</td>
<td>19.7</td>
<td>33</td>
<td>Flatworm, riffle beetles (facultative), snailcase caddisflies (sensitive)</td>
<td>Fair</td>
</tr>
<tr>
<td>Little Scioto River</td>
<td>25.6</td>
<td>12.8</td>
<td>Flatworm (facultative), leeches (tolerant)</td>
<td>Fair</td>
</tr>
</tbody>
</table>

*Tolerance descriptors are derived from Ohio EPA macroinvertebrate taxa tolerance categories. “Sensitive” includes Intolerant and Moderately Intolerant taxa. “Tolerant” includes taxa listed as Very Tolerant, Tolerant, and Moderately Tolerant.

(The rating scale was Good, Marginally Good, High Fair Range, Fair, Low Fair Range, Poor, Very Poor based on macroinvertebrate populations.)

Table 6: This chart shows stations tested in the Headwaters Little Scioto River HUC-12 for macroinvertebrate data, collected from artificial substrates and natural substrates in the upper Scioto River basin study area, July to October, 2009. This watershed was given a narrative rating instead of numerical, which is indicated in the ratings at the beginning of this section. (Ohio EPA, 2012)
2.3 Summary of NPS Pollution Causes and Associated Sources for Headwaters Little Scioto River Watershed HUC-12 (05060001 03 02)

All sites are listed as non-attainment sites in the **Headwaters Little Scioto River Watershed HUC-12**. The causes for the rating are from direct habitat alterations and sedimentation/siltation. The sources being channelization and agriculture.

<table>
<thead>
<tr>
<th>RM</th>
<th>Stream Name</th>
<th>Station ID</th>
<th>Current Aquatic Life Use</th>
<th>Attainment Status</th>
<th>Cause</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.1</td>
<td>L. Scioto R. N Of Marion @ Kenton-Galion Rd.</td>
<td>V02S01</td>
<td>WWH</td>
<td>Non</td>
<td>Sedimentation / siltation</td>
<td>Agriculture</td>
</tr>
<tr>
<td>19.7</td>
<td>L. Scioto R. @ Crawford – Marion County Line Rd.</td>
<td>V02G01</td>
<td>WWH</td>
<td>Non</td>
<td>Sedimentation / Siltation</td>
<td>Agriculture</td>
</tr>
<tr>
<td>25.6</td>
<td>L. Scioto R. @ Caldwell Rd.</td>
<td>V02G02</td>
<td>WWH</td>
<td>Non</td>
<td>Habitat alteration</td>
<td>Channelization</td>
</tr>
</tbody>
</table>

Table 7: Chart lists the streams and station ID along with attainment status as found by the OEPA. (Ohio EPA, 2012)
2.4 Additional Information for Determining Critical Areas and Developing Implementation Strategies for Headwaters Little Scioto River HUC-12

Working to better improve the Headwaters Little Scioto River HUC-12 will be several agencies including: Crawford SWCD, Marion SWCD, Wyandot SWCD, FSA, NRCS, OSU Extension Office, and the Crawford County Engineer. Information, data and resources were gathered from these agencies as well as from the OEPA. Mainly from the Biological and Water Quality Study of the Upper Scioto River Watershed 2009 & 2011 along with its appendices written by the Division of Surface Water. This report also looks at data from the Total Maximum Daily Loads for the Scioto River (upper) Watershed {draft}written by the Division of Surface Water in 2014.

Chapter 3: Critical Area Conditions and Restoration Strategies for Headwaters Little Scioto River HUC-12

3.1 Overview of Critical Areas

According to the OEPA reports, the entire Headwaters Little Scioto River HUC-12 is considered in non-attainment of its Aquatic Use Designation (ALU). This is due in part to its artificial drainage (ditches and tiling) and its large percentage of crop ground. There is a need for improved buffers along the Little Scioto River and the unnamed tributaries and ditches that drain to the Little Scioto River. Farming close to the river and tributary ditches is causing more and more issues because there are no, or little to none, setbacks and more chances for chemical/manure to have direct access to waters of the state and in turn, is ramping up the need for application regulations on manure and fertilizers. The bank stability of the ditches and stream is also a concern because modifications contribute to sedimentation and siltation of stream substrates.
3.2 Critical Area 1: Conditions, goals, and objectives for Headwaters Little Scioto HUC-12

3.2.1 Detailed Characterization

The area in Critical Area 1 in the Headwaters Little Scioto River HUC-12 is focusing on the stream corridor and prominent ditches within the watershed. There is 168,800 feet of stream and 93,513 feet of tributary ditches in this watershed. The projects will focus on the stream, ditches, and riparian areas (100 feet adjacent to either side of the stream and/or ditch). The ditches need treatment grass filter strips to prevent farmers getting too close to the ditch with their sprayers and equipment that could cause a spill or degrade the stabilization of the banks. Along the stream more strategically placed trees and grass filter strips need established to stabilize the banks and filter nutrients before entering the stream.

Figure 15: Maps detail the area for Critical Area 1 which includes the stream corridor and the prominent ditches (red) of the watershed further explained in section 3.2.1. Critical area 2, (shadowed in purple) is further explained in section 3.3.4. (Crawford SWCD, 2018)
Figure 16: Critical area 1 is highlighted in red.
### 3.2.2 Detailed Biological Conditions

<table>
<thead>
<tr>
<th>RM</th>
<th>Stream Name</th>
<th>ICI</th>
<th>IBI</th>
<th>Mlwb</th>
<th>QHEI</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.1 W</td>
<td>L. SCIOTO R. N OF MARION @ KENTON-GALION RD.</td>
<td>MG</td>
<td>29*</td>
<td>4.34*</td>
<td>49</td>
</tr>
<tr>
<td>19.7 W</td>
<td>L. SCIOTO R. @ CRAWFORD-MARION COUNTY LINE RD.</td>
<td>F</td>
<td>27*</td>
<td>5.82*</td>
<td>69.5</td>
</tr>
<tr>
<td>25.6 H</td>
<td>L. SCIOTO R. @ CALDWELL RD.</td>
<td>F</td>
<td>30*</td>
<td>H</td>
<td>40.5</td>
</tr>
</tbody>
</table>

*Indicates significant departure from applicable biocriteria (>4 IBI units, or > 0.5 Mlwb units).

Underlined scores are in the Poor or Very Poor range.

H – Headwater site, Mlwb is not applicable

W – Wading site

[F = Fair, MG = Marginally Good]

Table 8: This table outlines the major indicators tested at sampling sites to put a value on aquatic life use to measure attainment status. (Ohio EPA, 2012)

This data is the most current from OEPA. This watershed will not be surveyed again until 2027.

### 3.2.3 Detailed Causes and Associated Sources

**Headwaters Little Scioto River HUC-12**

- **Causes**
  - Direct habitat alteration
  - Channelization

- **Sources**
  - Sedimentation
  - Agriculture

Table 9: Causes and Sources of Impairment.
Because this watershed is dominated by row-crop agriculture, implementation of conservation and farming practices would benefit the watershed. Implementation of conservation practices in riparian corridors will also address causes and sources of impairment.

Figure 17. Image showing a gully leading directly to the stream which is a large source of sedimentation and nutrient losses from fields. (Crawford SWCD, 2018)
Figure 18. This photograph shows the lack of riparian or grass cover setback along the stream from row crop acreage. (Crawford SWCD, 2018) This is the common scenario along the stream and tributary ditches within the watershed. Farmers are cropping close to the banks increasing erosion concerns.
Figure 19: Technician surveying a gully often found between pinched slopes. These are direct losses of sediment and nutrients to waters of the state.
The TMDL did not set pollutant thresholds for Nitrogen and Phosphorus in this watershed. However, sediment issues were considered in the TMDL as shown in the table below.

<table>
<thead>
<tr>
<th>Existing Scores Stream/River (Use)</th>
<th>River Mile</th>
<th>QHEI Categories</th>
<th>Total Sediment Score</th>
<th>Deviation from target (%)</th>
<th>Main impairment category</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Substrate</td>
<td>Channel</td>
<td>Riparian</td>
<td></td>
</tr>
<tr>
<td></td>
<td>05060001 03 02 Headwaters Little Scioto River</td>
<td>25.6</td>
<td>0</td>
<td>12.0</td>
<td>5.5</td>
</tr>
<tr>
<td>Little Scioto River</td>
<td>19.7</td>
<td>15.0</td>
<td>14.0</td>
<td>10.0</td>
<td>39.0</td>
</tr>
<tr>
<td></td>
<td>11.1</td>
<td>10.0</td>
<td>11.5</td>
<td>7.0</td>
<td>28.5</td>
</tr>
</tbody>
</table>

Table 10: Table shows the sediment TMDL for the sample sites and its ultimate deviation from the TMDL target required by OEPA. (Ohio EPA, 2014)

### 3.2.4 Outline Goals and Objectives for Critical Area 1

There are approximately 52,160 linear feet of stream, and 93,513 linear feet of ditches through Crawford County in the **Headwaters Little Scioto River HUC-12**. Strategic placement of effective filter areas are designed to distribute, slow down, and filter runoff and drainage waters. Having a minimum setback of 30’ per side from farming practices and converting to filter strip could vastly improve the sedimentation/siltation impacts and create a wildlife habitat in an established riparian corridor.

**Goals**

Being that this entire watershed is in non-attainment status, there is 100% chance of improvement with the start of any BMP. To that affect, this WWH needs to improve its QHEI, IBI, Mlwbb, and ICI. Bring all levels into the “Good” range is the goal.

Goal 1. Achieve IBI score of 40 at RM 11.1.
NOT ACHIEVED: Current score is 29.

Goal 2. Achieve IBI score of 40 at RM 19.7.
NOT ACHIEVED: Current score is 27

Goal 3. Achieve IBI score of 40 at RM 25.6.
NOT ACHIEVED: Current score is 30.

NOT ACHIEVED: Current score is Marginally Good.

Goal 5. Achieve ICI score of Good at RM 19.7.
NOT ACHIEVED: Current score is Fair.

NOT ACHIEVED: Current score is Fair.

Goal 7. Achieve Mlwb score of 8.3 at RM 11.1.
NOT ACHIEVED: Current score is 4.34.

Goal 8. Achieve Mlwb score of 8.3 at RM 19.7.
NOT ACHIEVED: Current score is 5.82.

Goal 9. Achieve QHEI score of 60 at RM 11.1.
NOT ACHIEVED: Current score is 49.

Goal 10. Achieve QHEI score of 60 at RM 25.6.
NOT ACHIEVED: Current score is 40.5.
Objectives

To achieve Full Attainment and improved water quality/soil health to the watershed the following practices will help toward the restoration goal. The objectives for Critical Area 1 will also coincide with Critical Area 2 on some BMP’s and will show improvement for both critical areas.

- **Objective 1.** Implement treatment filter areas along stream and ditch corridors, using grass and ground construction design to ensure flow concentrates are dispersed and filtered before entering waters of the state.
  
  30% of total linear length would be 79,500 feet of treatment filters.

- **Objective 2.** Implement forested riparian buffers along stretches of the stream to increase stream and wildlife habitat, reduce erosion losses from cropland, and stabilize streambanks and associated sedimentation.
  
  20% of stream length would be 33,600 feet of wooded riparian buffer.

- **Objective 3.** Install grade stabilization structures where gullies are eroding banks.
  
  10 structures to maintain 200 acres of row crops.

- **Objective 4.** Install drainage control structures to reduce nutrient losses.
  
  Install at least 10 structures to manage 200 acres of row crops.

- **Objective 5.** Install 2-stage ditches to provide water quality benefits associated with flood plain access during periods of high flow.
  
  Install two 2-stage ditches spanning 2,000’ each, on the wading portion of the stream (near county line) of the HUC-12 watershed.

Water quality monitoring is an integral part of the project implementation process. Both project-specific and routinely scheduled monitoring will be conducted to determine progress towards meeting the goals (i.e., water quality standards). Through an adaptive management process, the aforementioned objectives will be re-evaluated and modified as necessary. Objectives may be added to make further progress towards attainment goals, or altered, as a systems approach of multiple best management practices (BMP’s) can accelerate the improvement of water quality conditions. The Ohio EPA Nonpoint Source Management Plan Update (Ohio EPA, 2013) will be
utilized as a re-evaluation tool for its listing of all eligible NPS management strategies to consider including:

- Urban Sediment and Nutrient Reduction Strategies;
- Altered Stream and Habitat Restoration Strategies;
- Nonpoint Source Reduction strategies; and
- High Quality Waters Protection Strategies.

3.3 Critical Area 2: Conditions, Goals & Objectives for Headwaters Little Scioto River Watershed HUC-12

3.3.1 Detailed Characterization

Critical area two focuses the cropland in the watershed that is directly adjacent to the stream or tributaries, as well as any crop ground with the conditions stated in section 3.3.4. This is equivalent to 17,000 acres within the watershed. The focus for this critical area is to manage soil health, water quality, and nutrient management. The farming practices today are not conducive towards healthy soil with the crop rotation and tillage practices currently used. Erosion and nutrient losses are also an issue with few BMP’s in place to manage.
Figure 20: Critical area 2
3.3.2 Detailed Biological Conditions

<table>
<thead>
<tr>
<th>RM</th>
<th>Stream Name</th>
<th>ICI</th>
<th>IBI</th>
<th>Mlwb</th>
<th>QHEI</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.1W</td>
<td>L. SCIOTO R. N OF MARION @ KENTON-GALION RD.</td>
<td>MG</td>
<td>29*</td>
<td>4.34*</td>
<td>49</td>
</tr>
<tr>
<td>19.7W</td>
<td>L. SCIOTO R. @ CRAWFORD-MARION COUNTY LINE RD.</td>
<td>F</td>
<td>27*</td>
<td>5.82*</td>
<td>69.5</td>
</tr>
<tr>
<td>25.6H</td>
<td>L. SCIOTO R. @ CALDWELL RD.</td>
<td>F</td>
<td>30*</td>
<td>H</td>
<td>40.5</td>
</tr>
</tbody>
</table>

*Indicates significant departure from applicable biocriteria (>4 IBI units, or > 0.5 Mlwb units).

Underlined scores are in the Poor or Very Poor range.

H – Headwater site, Mlwb is not applicable

W – Wading site

[F = Fair, MG = Marginally Good]

Table 11: This table outlines the major indicators tested at sampling sites to put a value on aquatic life use to measure attainment status. (Ohio EPA, 2012)

This data is the most current from OEPA. This watershed will not be surveyed again until 2027.

3.3.3 Detailed Causes and Associated Sources

Headwaters Little Scioto River HUC-12

Table 12: Table shows the causation and sources of impairment for the Headwaters Little Scioto River HUC-12.
Within this critical area the crop land amounts to 95% of the watershed. With swine operations dotted around the critical area, managing manure and implementation of conservation practices to reduce the risk of impacts associated with manure management will be crucial in order to achieve full attainment of the Aquatic Life use (ALU) designation in this watershed.

3.3.4 Outline Goals and Objectives for Critical Area 2

The majority of farmers in this watershed utilize tillage in their farming operations. Erosion is increasing and nutrients attached to that eroding sediment enters waters of the state. Nutrient management needs to take place to see how much fertilizer actually needs applied on the fields and at the appropriate time. Agriculture has dictated the drainage in the watershed by means of ditches and tiling, however, water quality related impacts of channelization and subsurface tile are not adequately mitigated through the implementation of practices such as setbacks, precision application, or minimal tillage BMP’s.

Critical area 2’s predominant land use in this HUC-12 is 93% row-crop farmland. Likewise, additional and improved conservation practice implementation throughout the watershed are most likely to move the needle with respect to the need to incrementally improve the water quality metrics (i.e., IBI, ICI, QHEI, and Mlwb) in this HUC-12. Whereas, critical area 2 identifies all row-crop land and riparian corridor acreage (within 5,000’) adjacent to waters of the state, project participation will be prioritized according to the prioritization list below (1 is highest priority, 4 is lowest priority):

1) Fields with documented (photo) evidence of gully erosion.
2) Fields directly adjacent to; and that drain into waters of the state (ditches, creeks, stream) via surface runoff or tile outlets
3) Fields with soil test P levels above (100 ppm Mehlich-3) according to up–to-date Nutrient Management Plans
4) Fields scheduled to be fertilized with manure in next 12 months

Overall we want to improve the non-attainment status to a full attainment status by improving QHEI scores at the sample sites. This being the headwaters watershed, we are not getting the up stream’s impairments, but we are impacting the downstream with our current lack of BMP and farming practices.
Goals

→ Goal 1. Achieve QHEI score of 60 at RM 11.1.
   NOT ACHIEVED: Current score is 49.

→ Goal 2. Achieve QHEI score of 60 at RM 25.6.
   NOT ACHIEVED: Current score is 40.5.

→ Goal 3. Maintain QHEI score of 69.5 at RM 19.7.
   ACHIEVED: Needed 60 for “Good” rating.

Objectives

In order to achieve the full attainment ALU for this Headwaters Little Scioto River HUC-12 (05060001 03 02) watershed, the following objectives will need to be achieved within Critical Area 2. These practices address and restore the goals for this watershed, and will also improve soil health and water quality, overall.

→ Objective 1. Improve nutrient management with 4R precision application technology.

   Fund 15 farming (500 acres per farm) operations to utilize precision application. Monitor before and after using this technology.

→ Objective 2. Utilize minimum tillage planting.

   Fund 15 farmers (500 acres per farm) to utilize minimum tillage practices on their farming operations.

→ Objective 3. Improve education in the watershed about watershed impairment and how to improve residents/farmers management practices.

   Host 4 workshops per year on soil health, water quality, and available programs to improve conservation practices.
Objective 4. Install blind inlets to filter nutrients in the tile before reaching waters of the state.

Install 10 blind inlets managing 200 acres of the HUC-12 watershed.

Objective 5. Reduce erosion and nutrient loss by installing grassed waterways.

Install 15.0 acres of waterway (minimum 20’ wide) with proper outlets to waters of the state through programs such as Conservation Reserve Program (CRP) or Environmental Quality Incentive Program (EQIP).

Objective 6. Install drainage control structures to reduce nutrient losses.

Install at least 25 structures to manage 500 acres of row crops.

Objective 7. Plant cover crops to promote soil health in row crop acres that are adjacent to waterways in the critical area to prevent erosion and nutrients running off into waters of the state.

Plant 90% (15,000 acres) of row crop acres in cover crops.

Water quality monitoring is an integral part of the project implementation process. Both project – specific and routinely scheduled monitoring will be conducted to determine progress towards meeting the goals (i.e., water quality standards). Through an adaptive management process, the aforementioned objectives will be re-evaluated and modifies as necessary. Objectives may be added to make further progress towards attainment goals, or altered, as a systems approach of multiple best management practices (BMP’s) can accelerate the improvement of water quality conditions. The Ohio EPA Nonpoint Source Management Plan Update (Ohio EPA, 2013) will be utilized as a reevaluation tool for its listing of all eligible NPS management strategies to consider including:

- Urban Sediment and Nutrient Reduction Strategies;
- Altered Stream and Habitat Restoration Strategies;
- Nonpoint Source Reduction strategies; and
- High Quality Waters Protection Strategies.
Chapter 4: Projects and Implementation Strategy

4.1 Overview Tables and Project Sheets for Critical Areas

The following tables represent the goals and objectives in a tabular form in what we believe will improve the Headwaters Little Scioto River HUC-12 into full attainment status. The BMP’s to address the impairment concerns will not all have immediate remediation. Therefore, over several years monitoring will be needed. The project sheets will combine several objectives into one project.

For the Headwaters Little Scioto River HUC-12, there are two Project and Implementation Strategy Overview Tables (subsection 4.2.1 and 4.3.1). Each Critical area only has two cause and source impairments identified for the critical areas. If another nonpoint source impairment is identified for one of the existing critical areas, it will be explained and added to that critical area’s table. If a new impairment is determined that has a different critical area, a new table will be created for that new critical area. The projects described in the Overview Tables have been prioritized using the following three-step prioritized method.

Priority 1 Projects that specifically address one or more of the listed objectives for the critical area.

Priority 2 Projects where there is landowner willingness to engage in projects that are designed to address the causes and sources of impairment or where there is an expectation that such potential projects will improve water quality in Headwaters Little Scioto River HUC-12.

Priority 3 In an effort to generate interest in projects, an information and education campaign will be developed and delivered. Such outreach will engage citizens to spark interest by stakeholders to participate and implement projects like those mentioned in Priority 1 and 2.

Project Summary Sheets (PSS) are in subsection 4.2.2 and 4.3.2. These PSS provide the essential nine elements for short-term and/or next step projects that are in development and/or in need of funding. As projects are implemented and new projects are developed, these sheets will be updated. Any new PSS created will be submitted to the state of Ohio for funding eligibility verification (i.e., all nine elements are included).
4.2 Critical Area 1: Overview Table and Project Sheets for Headwaters Little Scioto River HUC-12

The following tables will explain the BMP solutions to help remediate the attainment status for the Headwaters Little Scioto River HUC-12. Project summary sheets are included for short term projects or any project that is considering seeking funding in the near future. Only those projects with complete Project summary sheets will be considered for state and federal NPS program funding.

4.2.1 Critical Area 1: Project and Implementation Strategy Overview Table

The Headwaters Little Scioto River HUC-12 Critical Area 1 is based on a non-attainment rating with a focus on sedimentation/siltation, and agricultural use. The Critical Area 1 is focusing on the area of streams and ditches in the watershed and the overview table will provide a quick summary of what needs to be done, where, and what problem will be addressed. The overview table will act as a guide for the restoration of the impairments within this Critical Area
<table>
<thead>
<tr>
<th>Goal</th>
<th>Objective</th>
<th>Project #</th>
<th>Project Title (EPA Criteria g)</th>
<th>Lead Organization (EPA Criteria d)</th>
<th>Time Frame (EPA Criteria f)</th>
<th>Estimated Cost (EPA Criteria d)</th>
<th>Potential/Actual Funding Source (EPA Criteria d)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Urban Sediment and Nutrient Reduction Strategies*</td>
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<td></td>
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<td>Altered Stream and Habitat Restoration Strategies*</td>
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<td></td>
</tr>
<tr>
<td>1-10</td>
<td>1,2,3,4,5</td>
<td>1</td>
<td>Stream and Ditch Corridor Restoration</td>
<td>Crawford SWCD</td>
<td>5+ years</td>
<td>$285,000.00</td>
<td>Ohio EPA §319, CIG, CRP, CREP Programs</td>
</tr>
<tr>
<td>Agricultural Nonpoint Source Reduction Strategies*</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>High Quality Waters Protection Strategies*</td>
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<td></td>
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<td>Other NPS Causes and Associated Sources of Impairment</td>
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<td></td>
<td></td>
<td></td>
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</tbody>
</table>

*Ohio EPA, 2013
4.2.2 Critical Area 1: Project Summary Sheet(s)

The critical area 1 within **Headwaters Little Scioto River HUC-12** project has a longer time frame (5+ years) and therefore does not have a summary sheet in this report. Once proper planning and stakeholder outreach are complete, this NPS-IS will be updated to include a project in this critical area that is designed to incrementally accomplish the listed objectives.

4.3 Critical Area 2: Overview Table and Project Sheet(s) for the Headwaters Little Scioto River HUC-12

The following tables will explain the BMP solutions to help remediate the attainment status for the **Headwaters Little Scioto River HUC-12**. Project summary sheets are included for short term projects or any project that is considering seeking funding in the near future. Only those projects with complete Project summary sheets will be considered for state and federal NPS program funding.

4.3.1 Critical Area 2: Project and Implementation Strategy Overview Table

The **Headwaters Little Scioto River HUC-12** - Critical Area 2 is based on a non-attainment rating with a focus on sedimentation/ siltation, and agricultural use. Critical Area 2 is focusing on the area of fields that averages 5,000’ from the stream and or/ tributaries in the watershed. The overview table will provide a quick summary of what needs to be done, where, and what problem will be addressed. The overview table will act as a guide for the restoration of the impairments within this Critical Area.
<table>
<thead>
<tr>
<th>Goal</th>
<th>Objective</th>
<th>Project #</th>
<th>Project Title (EPA Criteria g)</th>
<th>Lead Organization (EPA Criteria d)</th>
<th>Time Frame (EPA Criteria f)</th>
<th>Estimated Cost (EPA Criteria d)</th>
<th>Potential/Actual Funding Source (EPA Criteria d)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Urban Sediment and Nutrient Reduction Strategies*&lt;br/&gt; 1-3</td>
<td>1-7</td>
<td>1</td>
<td>Nutrient and Erosion Reduction Through BMP’s</td>
<td>Crawford SWCD</td>
<td>1-3 years</td>
<td>$542,000</td>
<td>Ohio EPA §319, CIG, CRP, CREP Programs</td>
</tr>
<tr>
<td>Altered Stream and Habitat Restoration Strategies*&lt;br/&gt;</td>
<td></td>
<td></td>
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<tr>
<td>Agricultural Nonpoint Source Reduction Strategies*&lt;br/&gt;</td>
<td></td>
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<tr>
<td>High Quality Waters Protection Strategies*&lt;br/&gt;</td>
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<td></td>
</tr>
<tr>
<td>Other NPS Causes and Associated Sources of Impairment&lt;br/&gt;</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Ohio EPA, 201
### 4.3.2 Critical Area 2: Project Summary Sheet(s)

The project summary sheets provided below were developed based on actions or activities needed to restore the sampling sites of Crawford County to full attainment. These projects are considered next step or priority/short term projects and are considered ready to implement. Both projects are set on a short term scale of 1-3 years.

<table>
<thead>
<tr>
<th>Critical Area 2: Project 1</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Nine Element Criteria</strong></td>
</tr>
<tr>
<td>n/a</td>
</tr>
<tr>
<td>Criteria d</td>
</tr>
<tr>
<td>Criteria c</td>
</tr>
</tbody>
</table>
| Criteria c                | Location of Project | Within 5,000’, fields adjacent to stream or tributaries in the watershed:  
1) Fields with documented (photo) evidence of gully erosion.  
2) Fields directly adjacent to; and that drain into waters of the state (ditches, creeks, stream) via surface runoff or tile outlets  
3) Fields with soil test P levels above (100 ppm Mehlich-3) according to up-to-date Nutrient Management Plans  
4) Fields scheduled to be fertilized with manure in next 12 months |
| n/a                       | Which strategy is being addressed by this project/ | Sedimentation/ Siltation and Agriculture Nonpoint Source Reduction |
| Criteria f                | Time Frame         | 1-3 years |
| Criteria g                | Short Description  | Implement BMP’s to improve farming practices and reduce erosion and nutrient losses. |
| Criteria g                | Project Narrative  | Crawford SWCD will work with landowners within the Critical Area to establish 5,000 acres of precision application technology, 5,000 acres of minimum till plantings, two workshops, 5 blind inlets managing 100 acres, 10 acres of grassed waterway to reduce erosion and nutrient losses, 15 drainage water management structures managing 300 acres, and 10,000 acres of cover crops (60% of row crop acreage in the critical area). Funds will be based on CRP provided amounts for grass waterways, $20.00/acre for 4R precision application technology and minimum or no-till planting practices, verified by SWCD |
employees that practices were implemented, $1,000.00 for each workshop, $2,000 per each blind inlet installed, $6,000.00 for each drainage water management structure installed, and $20.00/acre for cover crops.

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Estimated Total cost</th>
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<tbody>
<tr>
<td>d</td>
<td>$542,000</td>
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<table>
<thead>
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<th>Criteria</th>
<th>Possible Funding Source</th>
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<td>d</td>
<td>Ohio EPA §319, CIG, CRP, CREP Programs</td>
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<table>
<thead>
<tr>
<th>Criteria</th>
<th>Identified Causes and Sources</th>
</tr>
</thead>
<tbody>
<tr>
<td>a</td>
<td>Cause: Direct Habitat Alteration/ channelization Sources: Sedimentation/ Siltation &amp; Agriculture</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Part 1: How much improvement is needed to remove the NPS impairment associated with this Critical Area?</th>
</tr>
</thead>
<tbody>
<tr>
<td>b &amp; h</td>
<td>The goal is to raise the lowest QHEI score 20 points from 40 to 60 to achieve a “Good” rating.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Part 2: How much of the needed improvement for the whole Critical area is estimated to be accomplished by this project?</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>- 5,000 of the 7,500 acres each managed through 4R precision technology and minimum tillage</td>
</tr>
<tr>
<td></td>
<td>- 2 of the 4 workshops to educate on best management practices and watershed impairments</td>
</tr>
<tr>
<td></td>
<td>- 5 of 10 blind inlets managing 100 acres</td>
</tr>
<tr>
<td></td>
<td>- 10 of 15 acres of grassed waterways to reduce erosion</td>
</tr>
<tr>
<td></td>
<td>- 15 of 25 drainage water management structures managing 300 acres</td>
</tr>
<tr>
<td></td>
<td>- 10,000 of the 15,000 acres of cover crops to manage 60% of the critical area within the watershed.</td>
</tr>
<tr>
<td></td>
<td>Each practice is accounting for an average 70% practice completion of the NPS-IS goals listed.</td>
</tr>
</tbody>
</table>

**Implementation of listed practices will raise the QHEI by 15 points.**

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Part 3: Load reduced?</th>
</tr>
</thead>
<tbody>
<tr>
<td>i</td>
<td>Approximately 25,000#N, 2000#P, and 302 tons sediment/ year</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Criteria</th>
<th>How will the effectiveness of this project in addressing the NPS impairment be measured?</th>
</tr>
</thead>
<tbody>
<tr>
<td>i</td>
<td>Staff from OEPA-DSW Ecological Assessment unit will perform both pre and post project monitoring to determine progress (IBI, ICI, MIwb, and QHEI) from non to full attainment rating. A water sample will be taken during average stream flow and will monitor nutrient levels. OEPA is not expected to test again until 2027.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Information and education</th>
</tr>
</thead>
<tbody>
<tr>
<td>e</td>
<td>This project will be promoted with workshops, field days, and public meetings to inform local producers about the project. Radio, newspaper, and social media will be utilized to advertise to the producers about the programs. Partner with OSU Extension for workshop education and publicity. Documentation of project success will be shared with the public when available.</td>
</tr>
</tbody>
</table>
Works Cited


Crawford County Engineers (2018) Ditches of Crawford County. Retrieved on 01 04 2018, from Crawford County Engineer.


Appendices

Appendix A: Acronyms and Abbreviations

The acronyms and abbreviations below are commonly used by organizations working to restore Ohio’s natural resources and watersheds; many of which are included in the NPS-IS plan.

A
ALU Aquatic Life Use

B
BMP Better Management Practice

C
CIG Conservation Innovation Grant
CREP Conservation Reserve Enhancement Program
CRP Conservation Reserve Program

D
DSW Division of Surface Water

F
FSA Farm Service Agency

H
HUC Hydrologic Unit Code

I
IBI Index of Biotic Integrity
ICI Invertebrate Community Index
L
LEP     Livestock Environmental Permitting

M
Mlwb    Modified Index of Well-being

N
NPS-IS  Nonpoint Source Implementation Strategic Plan
NRCS    Natural Resource Conservation Service

O
ODA     Ohio Department of Agriculture
OEPA    Ohio Environmental Protection Agency
OSU     Ohio State University

P
PSS     Project Summary Sheet

Q
QHEI    Qualitative Habitat Evaluation Index

R
RM      River Mile

S
SCS     Soil Conservation Service
SWCD    Soil and Water Conservation District
U
USDA United Stated Department of Agriculture
USGS United States Geological Survey
US EPA United States Environmental Protection Agency

W
WAP Watershed Action Plan
WLEB Western Lake Erie Basin
WWH Warm Water Habitat
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