



Nonpoint Source Implementation Strategies

Hamley Run – Hocking River

HUC 12 # 05030204 08 01



Version 1.0

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Chapter 1: Introduction

1.1 Report Background

This NPS-IS plan was created to address water quality concerns identified by local government officials, state and federal agencies, non-government organizations, and citizen stakeholders. The overarching intent of this plan is to highlight critical areas and aid in identifying and securing funding to implement projects that will result in improvements in habitat and water quality. These improvements will enhance biological communities and ultimately improve or maintain aquatic life and recreational use attainment status within the Hamley Run - Hocking River HUC-12.

Following the Ohio Environmental Protection Agency (OEPA) 2009 TMDL study for the Hocking River, restoration efforts in the Sunday Creek and Monday Creek watersheds have resulted in tremendous water quality and biological improvements, reducing their impacts on the Hocking River. It now makes sense to focus attention on other impairments within the Hocking River watershed and to identify and pursue funding for projects that will further improve water quality within the Hamley Run - Hocking River HUC-12 (Figure 1)

The IBI scores recorded in 1991 and 2004 for this section of the Hocking River, 38 and 39 respectively, are below the threshold metric for attaining warm water habitat aquatic life use designation. However, since the scores are not a significant departure from the required score of 40, this reach is considered in attainment (OEPA, 2009). There is clearly room for improvement in this reach of the Hocking River and in the tributaries contained within the Hamley Run - Hocking River HUC-12. This NPS-IS plan outlines methods for achieving this improvement.

1.2 Watershed Profile and History

The Hocking River Watershed spans from central Ohio to southeast Ohio including three ecoregions; Eastern Cornbelt Plains, Erie – Ontario Lake Plains, and Western Allegheny Plateau (Figure 2). The watershed drains 1,197 square miles of land and covers parts of Fairfield, Perry, Hocking, Athens, Washington, Morgan and Meigs Counties. The mainstem of the river is over 102 miles long. It flows from Lancaster (Fairfield County) to Hocking Port (Athens County) before entering the Ohio River. The largest municipalities within the watershed are located along the mainstem and include Lancaster, Logan, Nelsonville, The Plains, and Athens. Many smaller communities are situated near major tributary streams such as New Lexington, Somerset and Bremen near Rush Creek, Amanda near Clear Creek, Albany adjacent to Margaret Creek, and Amesville along Federal Creek (OEPA, 2009).

The focus of this NPS IS plan is the 22.21 square mile drainage that comprises the Hamley Run – Hocking River HUC-12 (05030204 08 01) (Figure 1). Located centrally within the Hocking River Watershed, the Hamley Run - Hocking River HUC-12 lies within Athens, Dover, Waterloo, and York townships in Athens County. This area encompasses river miles 42.94

through 48.87 in the Hocking River, the Hamley Run subwatershed, and several other unnamed tributaries to the Hocking River. This HUC-12 is downstream of the Dorr Run - Hocking River HUC-12 (050302040606), which includes the community of Nelsonville, and upstream of the Coates Run - Hocking River HUC-12 (08030204 08 04), which includes the communities of Athens and The Plains. The Kitchen Run-Monday Creek HUC-12 (05030204 05 04) discharges into the Hocking River at RM 48.89 immediately upstream from the Hamley Run - Hocking River HUC-12 and the Greens Run-Sunday Creek HUC-12 (05030204 07 04) discharges into the Hocking River immediately downstream of the Hamley Run - Hocking River HUC-12 (OEPA, 2017). Both Sunday and Monday Creek have been partially restored from pre-regulations coal mine pollution and are no longer significantly impacting the Hocking River.

The Hamley Run-Hocking River HUC-12 is primarily forested, with row crops in the flood plain areas. It has an approximate population of 100 people or less per square mile (Figure 3). Erosion, sedimentation, household sewage treatment systems, absence of water quality related BMPs on some agricultural land, publicly owned treatment works (POTW), stream modification, and pre-regulation coal mining have negatively impacted the Hamley Run-Hocking River HUC-12 (OEPA, 2009).

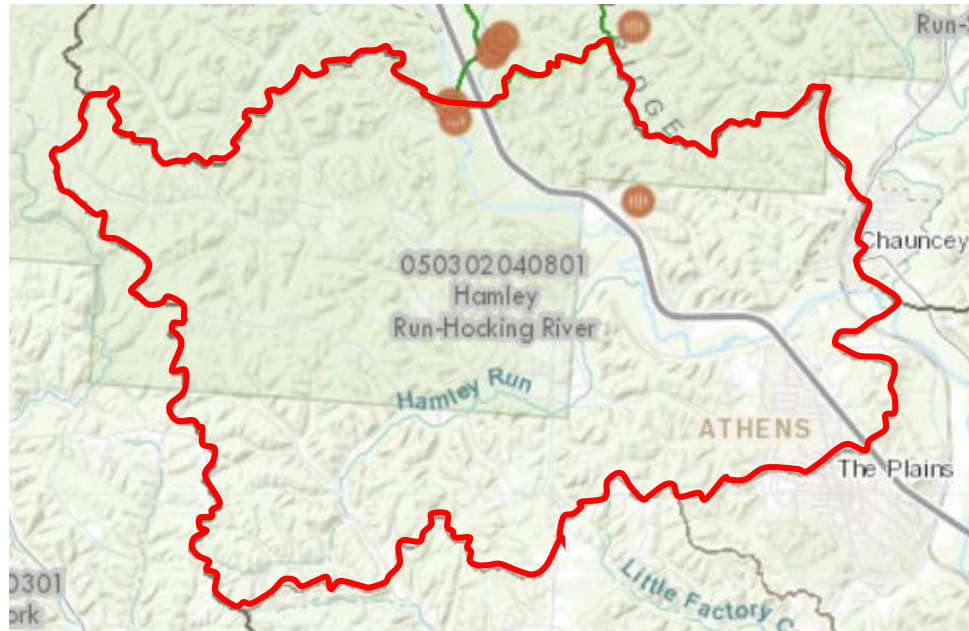
Land within the watershed was purchased by the Ohio Company in the late 1700's and the Northwest Ordinance mandated a system of townships as the local government, which is still in place and has had no major revisions. Following the creation of Ohio University, Athens County was formed in 1805. Political boundaries were established by 1818 after the creation of Hocking and Perry Counties (Steinmaus & Black, 2006).

Although coal mining ceased in Athens County in 1972, "In the mid 1800's, the industrial boom transformed the Hocking Valley Coalfields of southeastern Ohio into one of the most important coal producing regions in the nation (Steinmaus & Black, 2006)." Mining occurred within the Hamley Run - Hocking River watershed and water quality in some areas has been impaired by the resulting acid mine drainage (Figure 4). Since 1972 reclamation laws for operating mines have been effective in reducing environmental impacts of the mining industry and the most significant law to regulate mining was the Surface Mining Control and Reclamation Act (SMCRA), passed in 1977 (Steinmaus & Black, 2006).

During the Civil War, the iron industry in the region grew quickly and, along with coal, contributed to the economic boom in the Hocking Valley. Other industries helped to shape the region including timber, which was essential to coal and iron production, the extraction of oil and natural gas, salt mining, and clay mining for making bricks (Steinmaus & Black, 2006).

Figure 1

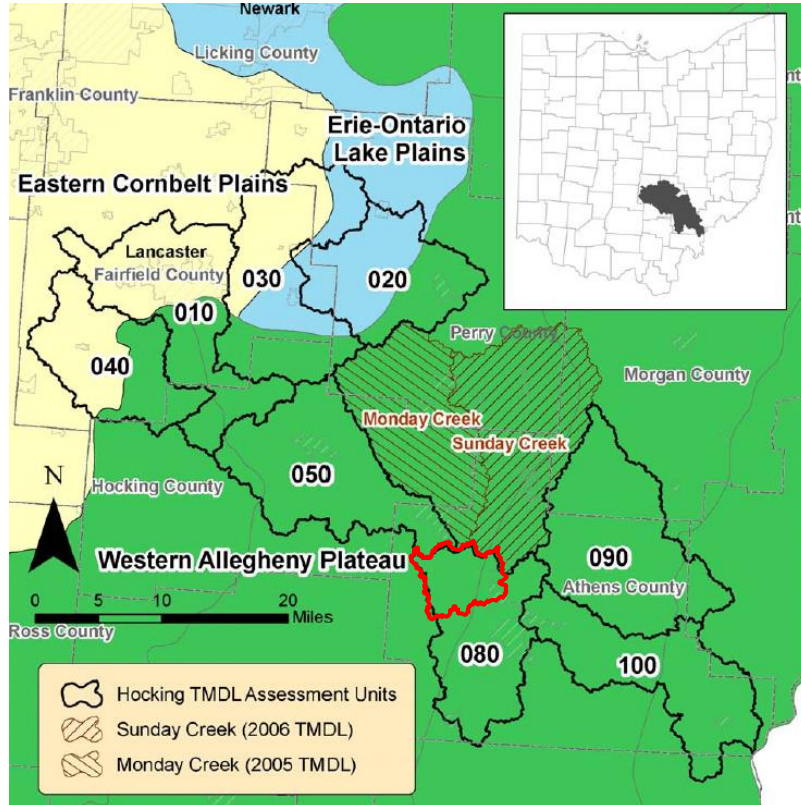
Hamley Run – Hocking River HUC 12 #050302040801 (Ohio University, 2017)



~~~~~ Hamley Run - Hocking River HUC 12 Watershed Boundary

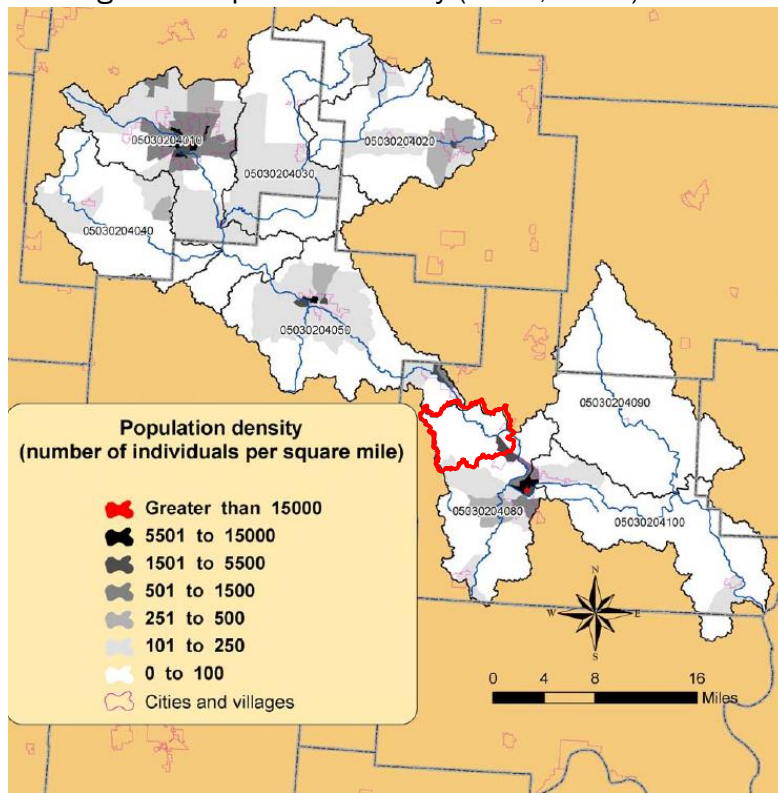
**Figure 2**

Hocking River Watershed (OEPA, 2009)



~~~~~ - Hamley Run – Hocking River HUC 12 Watershed Boundary

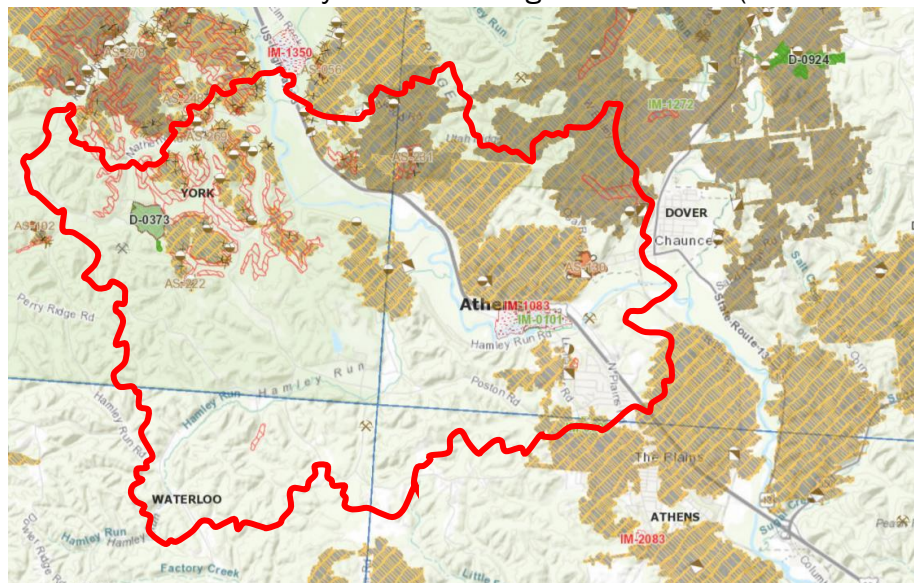

Figure 3
Hocking River Population Density (OEPA, 2009)





TMDL Map

 - Hamley Run – Hocking River HUC 12 Watershed Boundary

Figure 4
Mines within the Hamley Run – Hocking River HUC 12 (ODNR Mine Locator Map, 2017)



 - Hamley Run – Hocking River HUC 12 Watershed Boundary
 - Abandoned Underground Mines

1.3 Public Participation and Involvement

To create a new road map for watershed restoration, Rural Action led a planning process to identify the challenges to developing and implementing a regional watershed strategy. A planning team came together from October 2014 – March 2016, representing many of the different stakeholders working on watershed restoration in Appalachian Ohio:

- Rural Action
- Ohio Environmental Protection Agency
- Ohio Department of Natural Resources
- Ohio University Voinovich School of Leadership and Public Affairs
- Muskingum Watershed Conservancy District
- Raccoon Creek Partnership
- Federation of Soil and Water Conservation Districts

The planning team turned directly to the communities within the Ohio Appalachian coal region for input to the process. They coordinated eight community meetings in St. Clairsville, Canton, Jackson, Logan, Cambridge, Athens, Marietta, and Steubenville and collected 146 citizen surveys to assess how residents feel about their water quality and restoration work being done in their watershed. A second, similar survey was conducted for local governments.

Survey respondents identified water quality as the largest environmental concerns in their community (Figure 5). When asked what local areas need to be protected 31% of the respondents said “all streams or land,” 8% said “Hocking River,” and 7% said “riparian zones.” This represents three of the top four responses (Figure 6). The projects identified in this NPS-IS plan address some of the concerns citizens identified from the survey.

The Athens County Health Department provided information on the number of existing and failing home sewage treatment systems. The Athens County Soil and Water Conservation District will be consulted on best practices to address agricultural related sources of impairment.

Figure 5
Citizen Identified Environmental Concerns

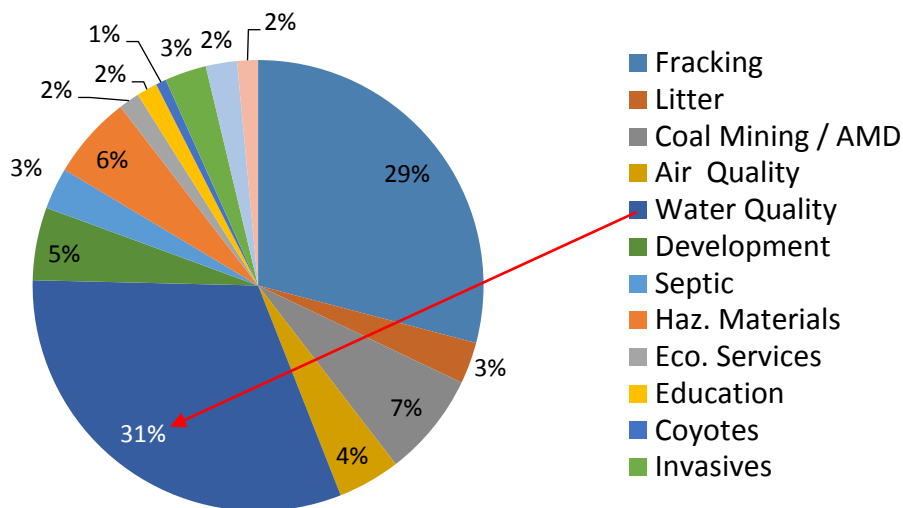
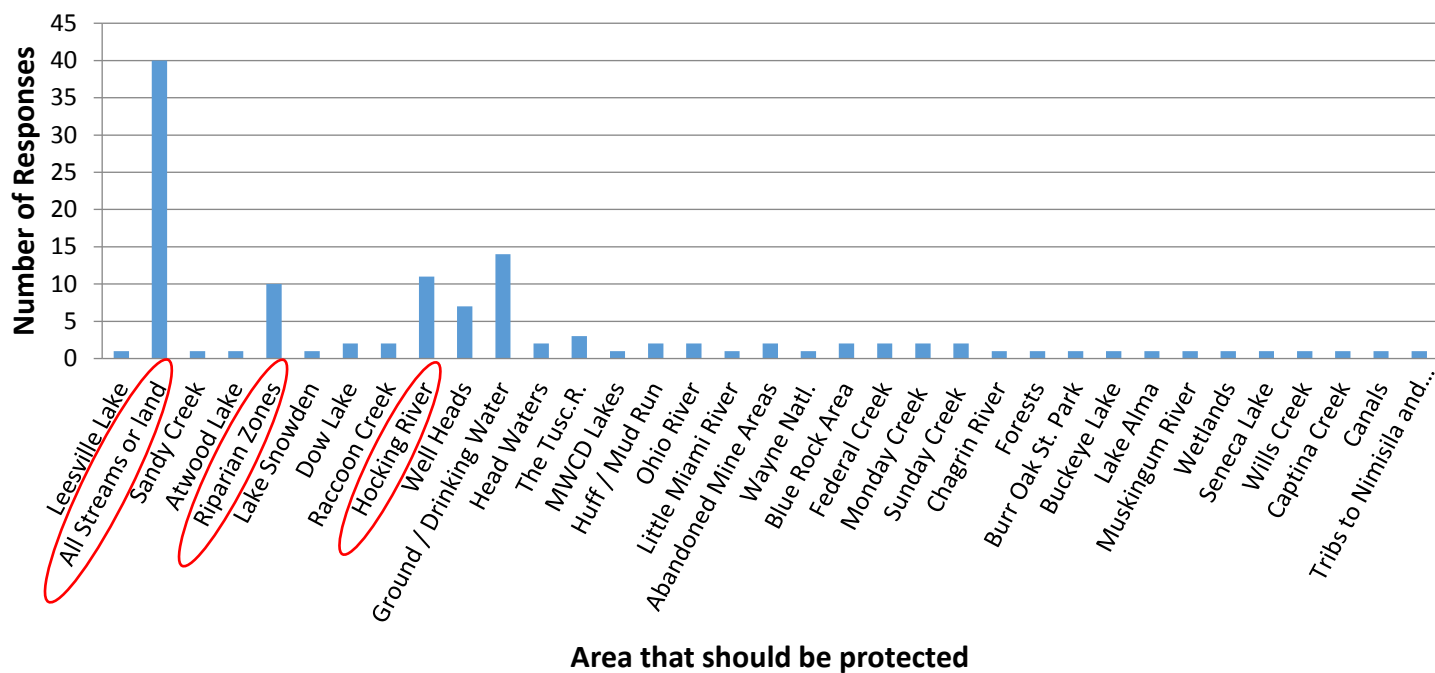


Figure 6
Citizen Identified Areas That Need to be Protected



Chapter 2: HUC-12 Watershed Characterization and Assessment Summary

2.1 Summary of HUC-12 Watershed Characterization

2.1.1 Physical and Natural Features

The Hocking River HUC-08 watershed is comprised of ten ten-digit Hydrologic Units (HUs) (OEPA, 2009). This document focuses on the Hamley Run-Hocking River HUC-12 (05030204 08 01) (Figure 1). This Hydrologic unit is located centrally in the Hocking River HUC-08 watershed and encompasses river miles 42.94 through 48.87 in the Hocking River, the Hamley Run subwatershed, and several other unnamed tributaries to the Hocking River. (Ohio University, 2017).

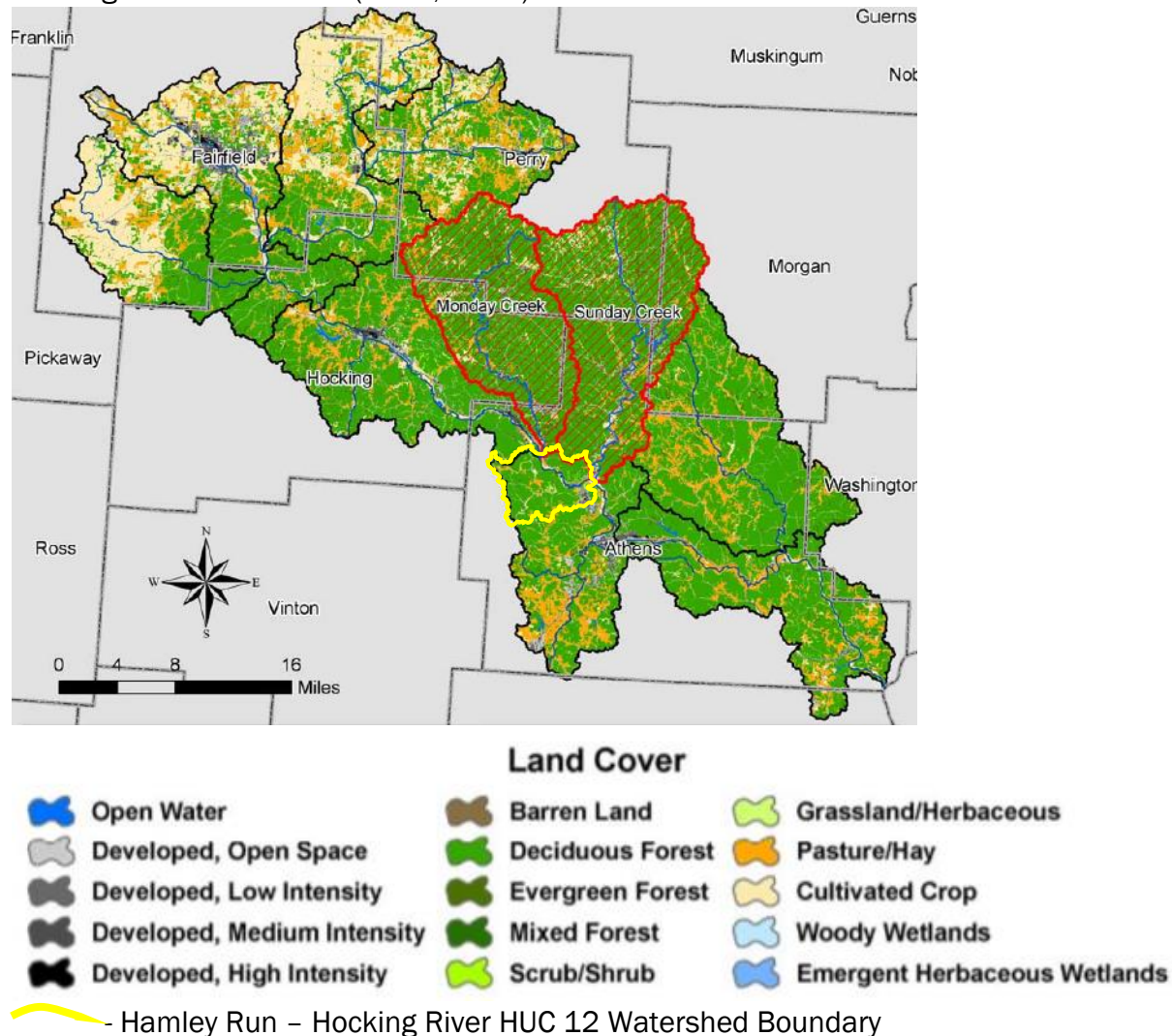
The Hamley Run HUC-12 watershed is wholly contained within the Unglaciaded Western Alleghany Plateau region (ODNR, 2005). The entire region is underlain by Pennsylvanian age sedimentary rocks (ODNR, 2017). Forested lands dominate the HUC-12 with some pasture and agricultural land as the streams approach the Hocking River and development along US 33 (Figure 7). Residential development and some commercial development is present throughout the watershed as well, but is not concentrated in the same area (Ohio University, 2017). Residual sandstone and shale soils, such as silt loams dominate the HU (Conrey & Burrage, 1938). Coal, oil, and gas deposits are found in this region. Extraction of coal has influenced the watershed in the form of acid mine drainage (AMD).

Notable features in this watershed include:

- The Le-Ax Water Filtration Plant
- Athens-Hocking Recycling Center Facility
- Manufacturing Facilities at Poston Industrial Complex (Global Cooling and Gem Coatings)
- Sand and Gravel Quarries
- Wayne National Forest Headquarters
- Wayne National Forest Property
- Fast Traxx Motoplex in Hocking River Floodplain
- Former Landfill
- Farm Fields near the Hocking River
- Businesses and Residential Housing

Figure 7

Hocking River Land Cover (OEPA, 2009)



2.1.2 Land Use and Protection

Hamley Run, Hocking River, and the unnamed tributaries that form the Hamley Run-Hocking River HUC-12 flow through land that is mostly forested. Heavier agricultural practices occur in the watershed closer to the Hocking River. The row crops that occur along the Hocking River are commonly farmed up to the riverbank with no riparian or buffer area in place. These agricultural practices and a general lack of woody vegetation in the riparian zone result in loss of bank stability and streambank erosion, introducing sediment into the stream channel, which is transported downstream.

Residential and commercial developments are also present near these streams in some places. It should be noted that the Le-Ax Water District wellhead protection area is within this HU, and the Le-Ax Water Filtration Plant is in this watershed in the Poston Industrial

Complex (Figure 8 and 9) (Le-Ax Water District, 2017; OEPA, 2010), alongside the Athens-Hocking Recycling Center and two manufacturing centers, Global Cooling and Gem Coatings. Approximately half of the town of The Plains, Ohio and a small portion of the town of Chauncey are contained in the Hamley Run HUC-12. A closed landfill exists along OH 691 outside of Nelsonville, Ohio, at which groundwater monitoring occurs. Two Ohio Department of Natural Resources (ODNR) Division of Natural Areas and Preserves (DNAP) Conservation sites occur in the watershed: Beaumont Swamp and Hamley Run Floodplain Forest, and Wayne National Forest (WNF) owns and manages land within the watershed as well (Ohio University, 2017).

Figure 8

Le-Ax Water District Source Water Protection Area (Ohio University, 2017)

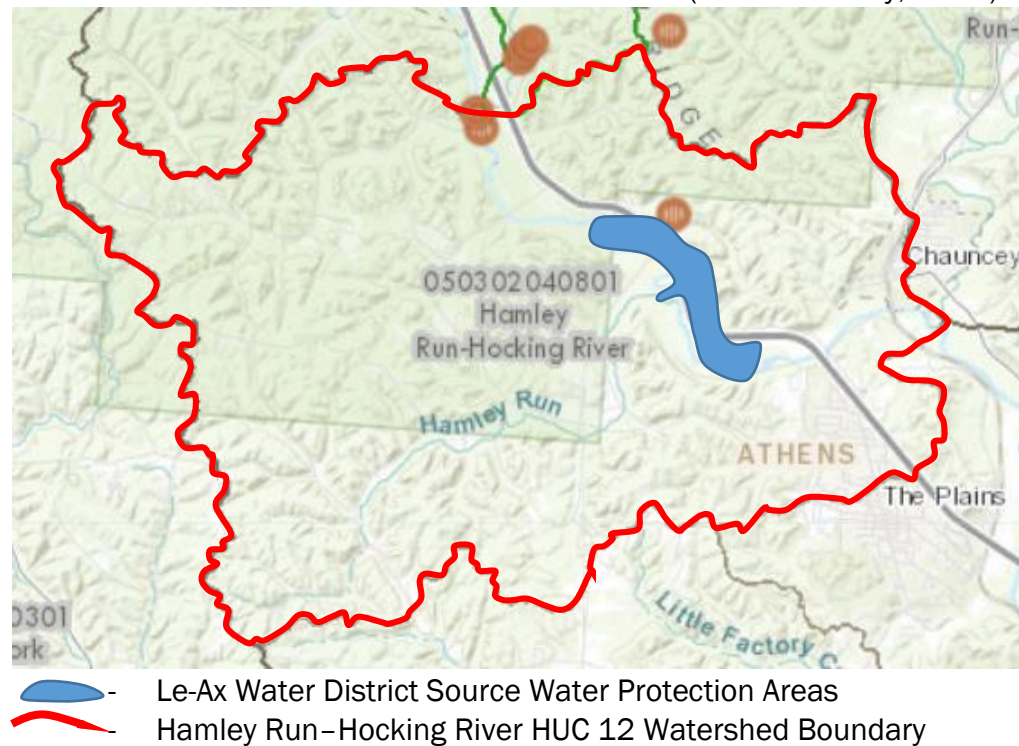
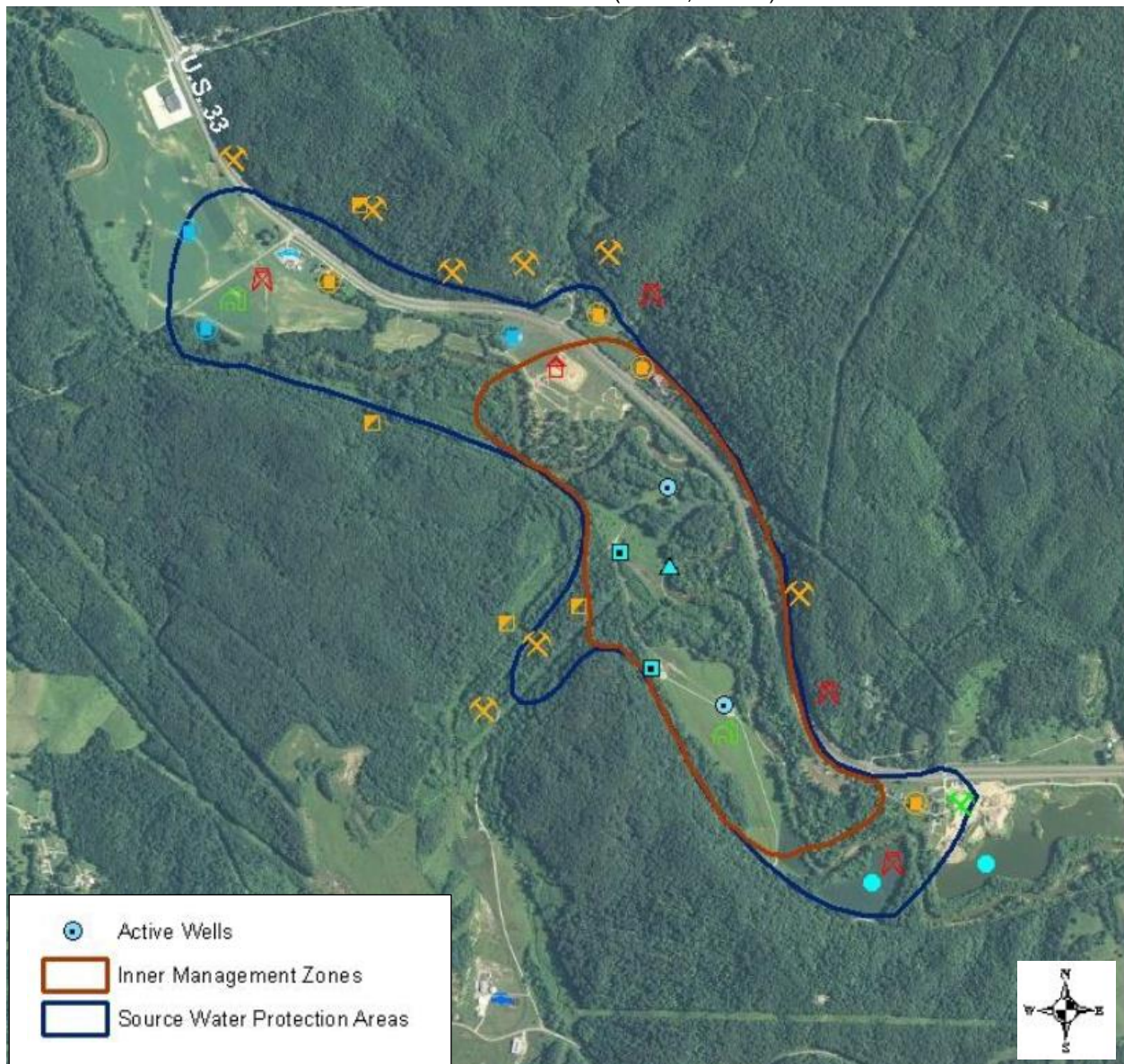


Figure 9

Le Ax Water District Source Water Protection Area (OEPA, 2010)



2.2 Summary of HUC-12 Biological Trends

The Ohio EPA monitored four sites (five samples) for biology and habitat in the Hamley Run-Hocking River HUC-12 for the *Biological and Water Quality Study of the Hocking River Mainstem and Selected Tributaries* in 1991 and for the *TMDL for the Hocking River* report in 2009 (samples collected in 2004) (Table 1). One site was sampled at river mile (RM) 47.9/48.5 in the mainstem of the Hocking River in both 1991 and 2004, two sites were sampled in Hamley Run, RM 0.4 and 2.1, and one site was sampled at RM 0.1 in an unnamed tributary that enters the Hocking River at RM 48.7 (OEPA, 1991; OEPA, 2009).

Biological and habitat sampling results collected in 1991 in the Hocking River at RM 47.9/48.5 are comparable to sample results collected in 2004 at the same site (Figure 10). In 1991 RM 47.9 was in partial aquatic life use attainment with an IBI score of 39, a MIwb score of 7.1, an ICI score of 48, and a QHEI of 62 (OEPA, 1991). In 2004 the same site was found to be in full aquatic life use attainment with an IBI score of 38, a MIwb score of 8.4, an ICI score of 52, and a QHEI score of 64.5 (Figure 11) (OEPA, 2009). Although the aquatic life use attainment status changed between 1991 and 2004 there did not appear to be a significant difference in the biological scores. Improvement in the MIwb score from 7.1 in 1991 to 8.4 in 2004 resulted in the change in aquatic life use status. In general the 1991 and 2004 sample results were very similar and are barely attaining full warm water habitat status indicating that there is a need to improve and stabilize this reach of the Hocking River.

Biological and habitat monitoring was completed at three other sites in the Hamley Run-Hocking River HUC-12 in 2004. These included two sites in Hamley Run, RM 0.4 and 2.1, and one site at RM 0.1 in an unnamed tributary that enters the Hocking River at RM 48.7. The RM 0.4 site in Hamley Run scored 44 for IBI, fair for ICI, and 66.5 for QHEI resulting in partial aquatic life use attainment status. The RM 2.1 site in Hamley Run scored 36 for IBI, poor for ICI, and 67 for QHEI resulting in an aquatic life use designation of non attainment. The RM 0.1 site in the unnamed tributary scored 12 for IBI, very poor for ICI, and 44.5 for QHEI resulting in an aquatic life use designation of non attainment (Table 1) (OEPA, 2009). Since data was only collected one time at these sites it is not possible to track a trend until another TMDL or more sampling is conducted.

No threatened or endangered species were found within this HUC 12. However, one previously endangered invertebrate species (removed from endangered list in 2017) and two declining fish species, brindled madtom (*Noturus miurus*) and mimic shiner (*Notropis volucellus*), were found in the Hocking River mainstem and one declining fish species, least brook lamprey (*Lampetra aepyptera*), was found in Hamely Run in 2004 (OEPA, 2009).

Table 1.

Attainment Status for the Hamley Run-Hocking River Huc-12 (OEPA, 2009; OEPA, 1991)

| Date | River Mile | IBI | MIwb | ICI | QHEI | Status | Location |
|------|------------------|------------------|-------------------|------------|------|---------|--------------------------------|
| 1991 | 47.9 / 48.5 | 39 ^{ns} | 7.1 | 48 | 62 | Partial | Hocking Riv. Dst. Monday Creek |
| 2004 | 47.9 / 48.5 | 38 ^{ns} | 8.4 ^{ns} | 52 | 64.5 | Full | Hocking Riv. Dst. Monday Creek |
| 2004 | 0.4 ^H | 44 | NA | F* | 66.5 | Partial | Hamley Run TR 252 |
| 2004 | 2.1 ^H | 36* | NA | <u>P*</u> | 67 | Non | Hamley Run TR 1266 |
| 2004 | 0.1 | 12* | NA | <u>VP*</u> | 44.5 | Non | Hocking Riv. Unnamed, at mouth |

* - Significant departure from biocriteria (>4 IBI or ICI units, >0.5 MIwb units), poor/very poor results underlined

ns- Nonsignificant departure from biocriteria (< 4 IBI or ICI units, < 0.5 MIwb units)

F - Fair

H - Headwater station (drainage area

NA - Not applicable

P - Poor

VP - Very poor

Figure 10

Hocking River Habitat and Biological Score Comparison 1991 Vs. 2004 (OEPA, 2009; OEPA, 1991)

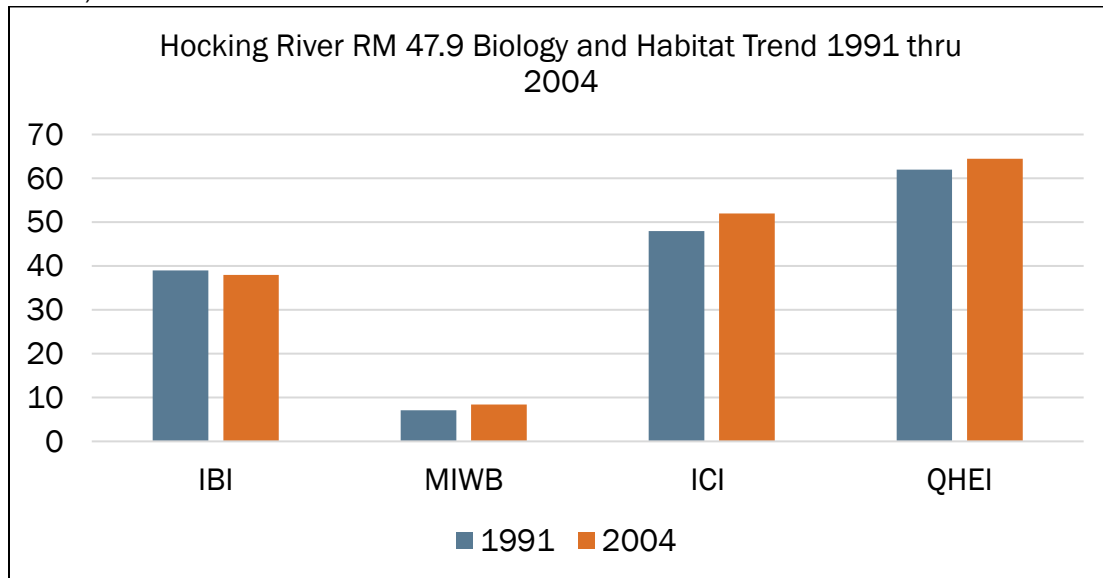


Figure 11.

Aquatic Life Use Attainment in the Hamley Run – Hocking River HUC 12 (OEPA, 2009)



2.3 Summary of HUC-12 Pollution Causes and Associated Sources

According to the 1991 *Biological and Water Quality Study of the Hocking River Mainstem and Selected Tributaries* “biological results and habitat observations in 1990, particularly from the lower mainstem, demonstrated the adverse impacts associated with channel modifications and encroachment on the riparian zone including tree removal, both of which result in a loss of bank stability”(OEPA, 1991). The report goes on to state that, “the lack of any significant woody riparian buffer along the mainstem contributes markedly to the moderate to severe bank erosion. In some sections the entire bank is devoid of any woody vegetation which leaves the banks open to severe erosion especially during elevated flows.” The report advises that, “any further clearing or disturbance of riparian borders in the lower section of the basin should be discouraged and efforts should be made to restore woody buffer strips in already denuded sections. In some areas this requires immediate intervention using vegetative bank stabilization techniques, while in other areas natural succession should be permitted to occur.” It suggests the goal for the mainstem should be to “achieve woody vegetative buffer strips of widths at least equal to two widths of the river on either bank.” “This should have the net effect of stabilizing the river channel within its normal meander and initiate a reduction in the amount of sediment as bed load. It may also be necessary to stabilize some of the active bed load segments that are presently migrating downstream and destabilizing adjacent stream banks” (OEPA, 1990).

The 2009 *TMDL for the Hocking River* identifies impairments and potential sources throughout the Hocking River Watershed including the Hamley Run–Hocking River HUC-12. Information about this HUC-12 can be found under the Hocking River assessment unit 080-010. Four sites were monitored to determine recreational use attainment status in the HUC-12. Water quality was not meeting recreational use attainment at 50% (2) of the sites monitored during the TMDL study. Hamley Run failed to meet both the geometric mean and the 90th percentile which indicates “that sources are significant under most flow conditions.” “Failure to meet the geometric mean reflects elevated bacteria concentrations under flow conditions that are not exclusively related to storm events. Such situations indicate a persistent source such as a discharge (e.g, illicit) or manure being directly deposited into a stream” (OEPA, 2009).

Four sites in the HUC-12 were surveyed to determine if aquatic life use designations were being attained. For aquatic life use, 25% (1 site) was in full attainment, 25% (1 site) was in partial attainment, and 50% (2 sites) were not attaining. The two sites that were not attaining include an unnamed tributary that enters the Hocking River at RM 48.7 and Hamley Run. All sites on the Hocking River mainstem were in full attainment. However, the IBI score for the mainstem, collected at river mile 47.9/48.5, was slightly below the score necessary for achieving warm water habitat (WWH), but since it was not a significant departure the site was still considered to be in full attainment. The slightly reduced IBI score could be a result of AMD impacts from Monday Creek, which enters the Hocking River upstream from the Hamley Run-Hocking River HUC-12 boundary or from other potential pollution sources discussed in this section.

Causes of impairments within the HUC-12 include nutrients, low dissolved oxygen (DO)/organic enrichment, siltation/sedimentation, and low pH. The most common sources of impairments include failing home sewage systems, riparian encroachment, a POTW spill event that occurred during the TMDL sampling, poor agricultural management practices, and acid mine drainage (OEPA, 2009). “The combination of high flows, accelerated sediment delivery due to runoff from abandoned mine lands, and moderate to severe bank erosion (partially due to encroachment on riparian zone) resulted in observations of excessive instream sediment bed load and numerous areas of destabilized banks. Although unstable and eroding banks appeared to be a significant problem throughout the mainstem, these impacts were most severe in the lower, unglaciated section of the mainstem” (OEPA, 1991).

Table 2

Impairment Causes and Sources within the Hamley Run–Hocking River HUC 12 (OEPA, 2009)

| Cause | Source |
|-----------------------------------------------|---------------------------------------------------------------------------------------------------|
| Nutrients | Failing Home sewage treatment systems
POTW Spill Event
Pastureland
Riparian Encroachment |
| Low Dissolve Oxygen (DO) / Organic Enrichment | Failing home sewage treatment systems
POTW Spill Event |
| Siltation / Sedimentation | Riparian Encroachment / unstable banks
Streambank modification
Tree removal
Pasture land |
| Low pH | Acid Mine Drainage |
| Flow Alteration | Channelization - agriculture |

2.4 Additional Information for Determining Critical Areas and Developing Implementation Strategies

All documents used to determine critical areas and develop implementation strategies are included in the work cited section of this NPS-IS plan and referenced in the text as necessary. Listed and described below are the documents which had the most influence on the development of this plan.

2.4.1 Total Maximum Daily Loads for the Hocking River Watershed

“Ohio EPA conducted a comprehensive physical, chemical and biological survey in portions of the Hocking River watershed from 2003 to 2005. The water quality survey included monitoring of the Hocking River and several streams within tributary subwatersheds. Several

stream segments not meeting the Ohio water quality standards were identified during the survey. These findings and other information regarding water quality and habitat conditions are summarized in this report. Total Maximum Daily Loads (TMDL) have been developed for pollutants and stressors which have impaired water uses and precluded attainment of applicable water quality standards. This report summarizes the approach taken and results for these TMDL analyses. This report also includes a discussion about actions and land management that can abate the identified water resource problems” (OEPA, 2009).

2.4.2 Biological and Water Quality Study of the Hocking River Mainstem and Selected Tributaries

For this OEPA report “the Hocking River mainstem study area extended from upstream from Lancaster (RM 95.2) to downstream from Coolville (RM4.6). Also included were chemical effluent and biological mixing zone samples from Lancaster, Logan, Nelsonville (effluent only), and Athens wastewater treatment plants”(OEPA, 1991). The objectives of this study were to (1) evaluate potential impacts of wastewater treatment plants, (2) document current chemical and biological conditions, identify problem areas, and recommend aquatic life used designations, (3) evaluate reference sites for the development of ecoregional databases, and (4) establish baseline data (OEPA, 1991).

2.4.3 Rural Action Watershed Planning Initiative Citizen and Local Government Surveys

As noted in section 1.3, Rural Action led a planning process to identify the challenges to developing and implementing a regional watershed strategy. A planning team came together from October 2014 – March 2016, representing many of the different stakeholders working on watershed restoration in Appalachian Ohio.

The planning team turned directly to the communities within the Ohio Appalachian coal region for input to the process. They coordinated eight community meetings in St. Clairsville, Canton, Jackson, Logan, Cambridge, Athens, Marietta, and Steubenville and collected 146 citizen surveys to assess how residents feel about their water quality and restoration work being done in their watershed. Survey respondents identified water quality as one of the largest environmental concerns in their region.

Chapter 3: Critical Area Conditions and Restoration Strategies

3.1 – Overview of Critical Areas

The Critical Areas identified in the Hamley Run – Hocking River HUC-12 (05030204 08 01) are located in the mainstem of the Hocking River between river miles 42.9 and 48.6, in the Hamley Run subwatershed, and in the unnamed tributary that enters the Hocking River at river mile 48.7 (Figure 12 and Figure 13). The critical area identified on the mainstem is currently in full attainment for aquatic life use designation. However, the IBI scores are on

the low end for full attainment and improvement is necessary to ensure attainment is maintained. The other two critical areas are located in stream reaches that were not attaining or partially attaining aquatic life use designations. Failing home sewage treatment systems, riparian encroachment, a POTW spill event that occurred during the TMDL sampling, absence of water quality related BMPs on some agricultural land, and acid mine drainage were identified in the 2009 TMDL as sources of impairment throughout this HUC-12 (OEPA, 2009).

Figure 12

Hamley Run-Hocking River HUC 12 Critical Areas

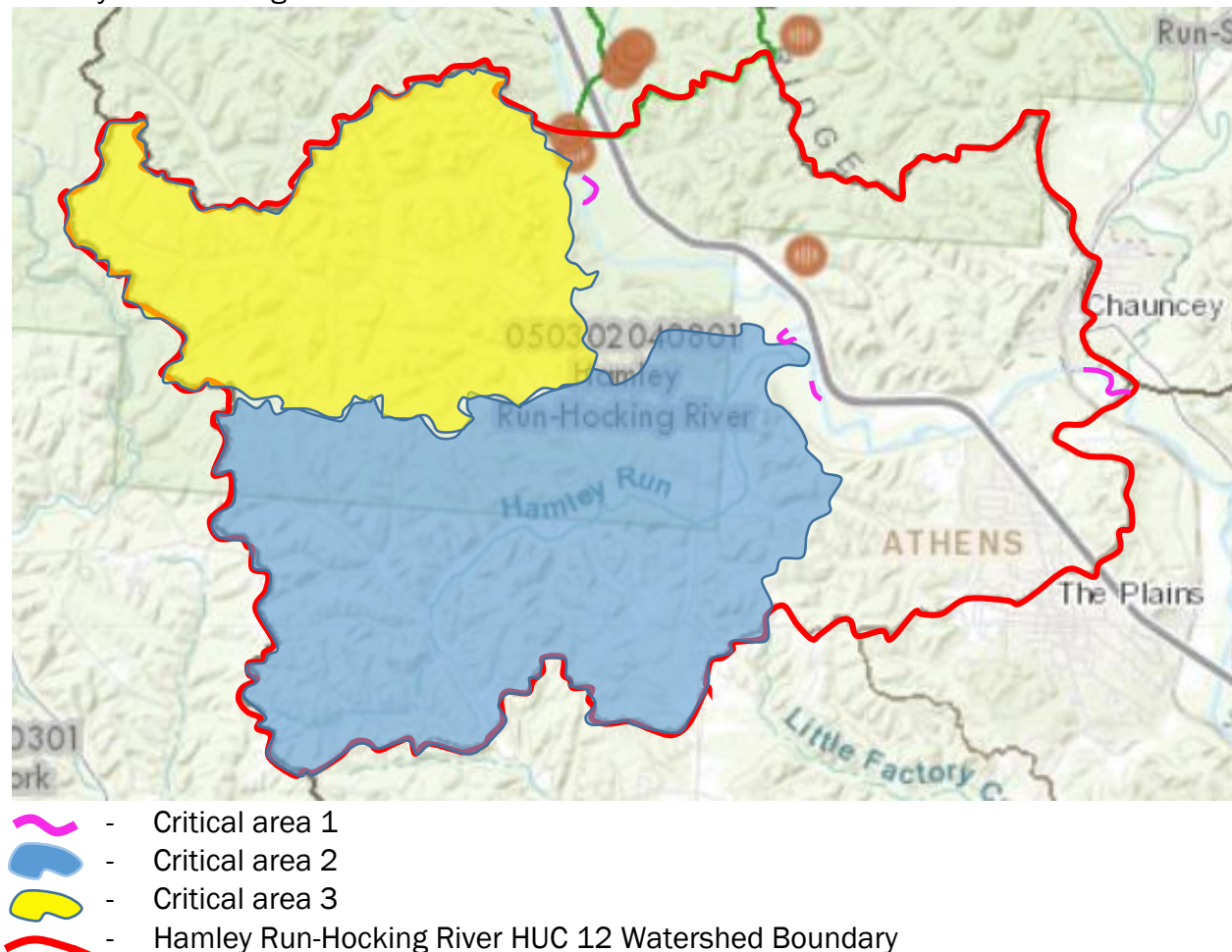
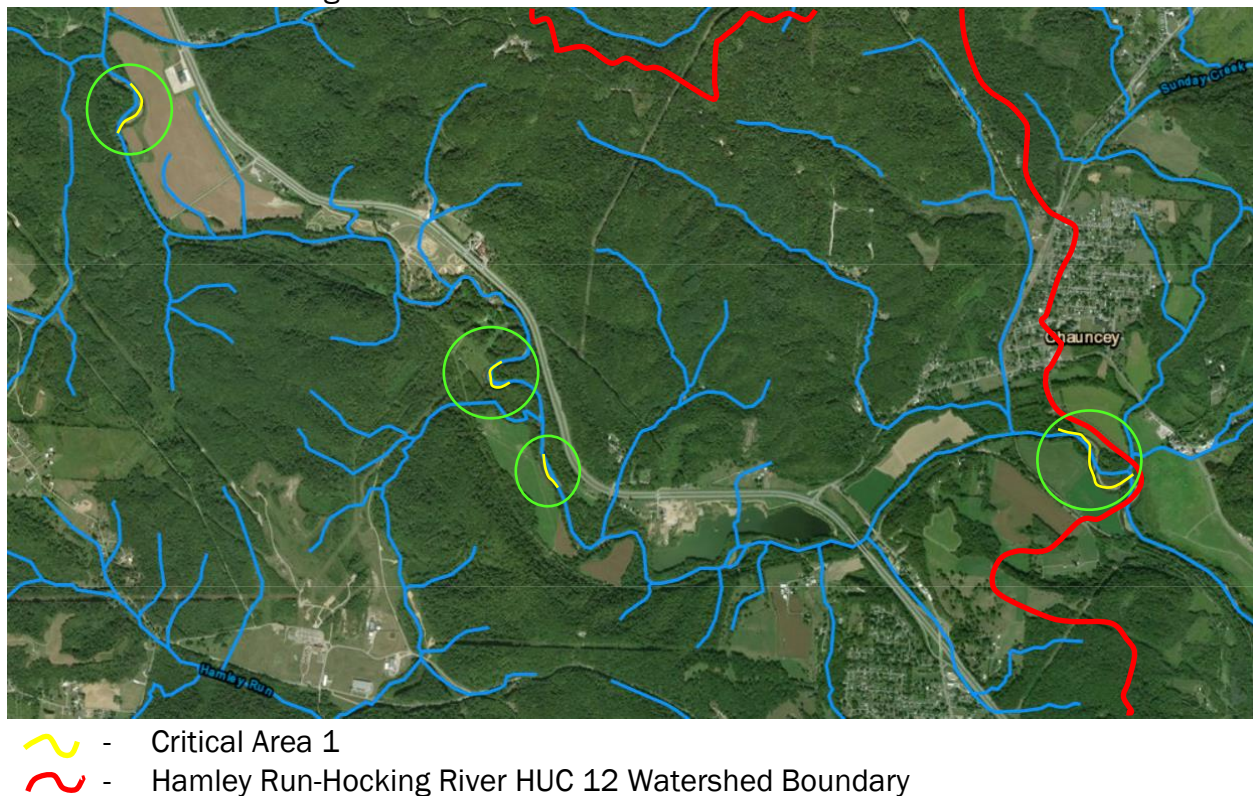


Figure 13
Critical Area 1 – Hocking River Mainstem Erosion



3.2 Name/Number of Critical Areas: Conditions, Goals and Objectives

3.2.1 Critical Area 1: Detailed Characterization

Critical Area 1 – Hocking River Mainstem Erosion.

Critical Area 1 is located in Dover and York Townships, Athens County, Ohio. This critical area includes all eroding banks on the mainstem of the Hocking River throughout the Hamley Run – Hocking River HUC-12. This reach has been selected as a critical area because of severe bank erosion, downstream sedimentation, lack of riparian, and crops (currently alfalfa) planted to the edge of the river (Figure 19). The most severe erosion is occurring at four locations, described below, totaling 3,740 linear feet and resulting in 11,869 pounds per year of sediment entering the Hocking River (Figure 13).

- Reach 1 (Figures 14, 18, and 19) – Located between RM 42.9 and 43.3 in Section 20 of Dover Township. This reach accounts for 1900 linear feet of erosion and 7,978 tons per year of sediment (67%).

Figure 14

Critical Area 1 – Reach 1



- Reach 2 (Figure 15) – Located between RM 45.5 and 45.7 in Section 31 of Dover Township. This reach accounts for 535 linear feet of erosion and 1040 tons per year of sediment (9%)

Figure 15

Critical Area 1 – Reach 2



- Reach 3 (Figure 16) – Located between RM 46 and 46.2 in Section 32 of Dover Township. This reach accounts for 430 linear feet of erosion and 321 tons per year of sediment (3%).

Figure 16

Critical Area 1 – Reach 3



- Reach 4 (Figure 17) – Located between RM 48.4 and 48.6 in Section 9 of York Township approximately 1/3 of a mile upstream from the County Road 4 bridge. This reach accounts for 880 linear feet of erosion and 2,530 tons per year of sediment (21%).

Figure 17

Critical Area 1 – Reach 4



Figure 18

Hocking River between River Miles 42.6 and 43.3 (2015). Red line represents stream channel location in 1994 (Hocking, 2015)

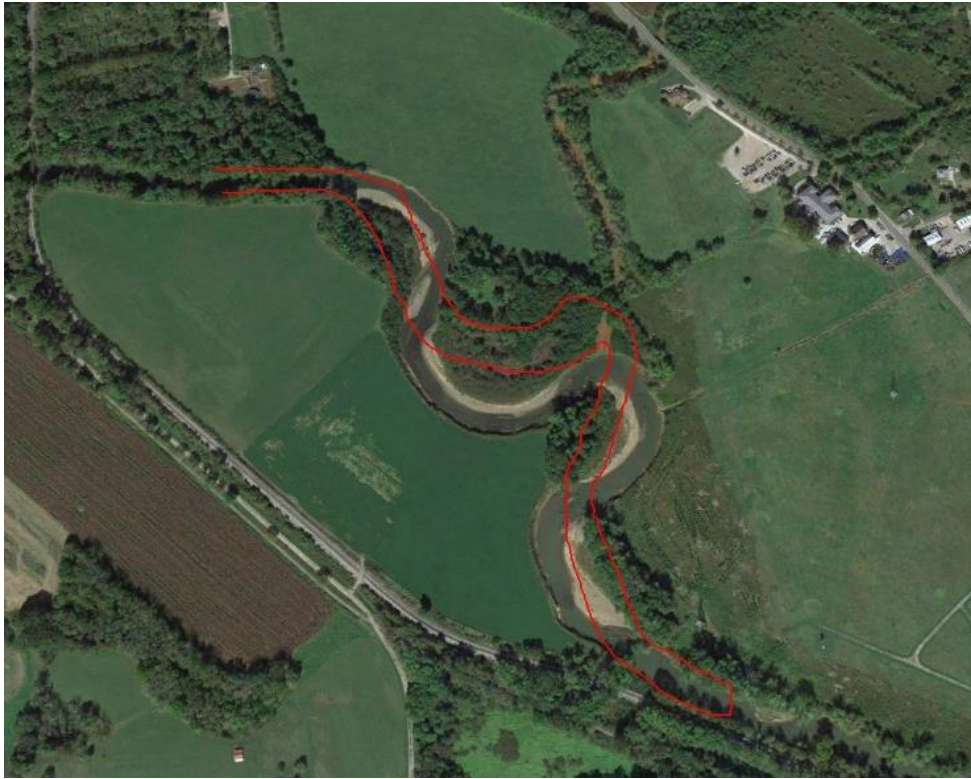


Figure 19

Severely eroding bank on the Hocking River at RM 43



3.2.2 Critical area 1: Detailed Biological Condition

The only sample results available were collected in the Hocking River at RM 47.9/48.5. Samples collected in 2004 for the *TMDL for the Hocking River* were shown to be in full aquatic life use attainment. The IBI (38) and MIwb (8.4) scores were not considered to be a significant departure from the required WWH standard scores for the Western Allegheny Plateau (boat: IBI – 40 & MIwb - 8.6), but they were slightly low indicating that there is room for improvement. The ICI score (52) exceeded the standard for exceptional warm water habitat (50). The Qualitative Habitat Evaluation Index (QHEI) score (64.5) shows that the habitat is sufficient to support a healthy and diverse biological population. One previously endangered invertebrate species (removed from endangered list in 2017) and two declining fish species, brindled madtom (*Noturus miurus*) and mimic shiner (*Notropis volucellus*), were found within Critical Area 1 (OEPA, 2009).

3.2.3 Critical Area 1: Detailed Causes and Associated Sources

The main cause of impairment in this critical area is sedimentation (11,869 tons per year of sediment entering the Hocking River) resulting from severely eroding and unstable stream banks, riparian encroachment, and absence of water quality related BMPs on some agricultural land. The severe erosion is occurring at four locations totaling 3,740 linear feet. The sediment threatens the Aquatic Life Use (ALU) designation attainment status of downstream monitoring locations.

3.2.4 Critical Area 1: Outline Goals and Objectives for the Critical Area

Goals

The overall nonpoint source restoration goals of any NPS-IS plan include improving or maintaining IBI, MIwb, ICI and QHEI scores so that streams achieving Full Attainment are preserved and so that streams in Partial or Non-Attainment status can achieve Full Attainment of the designated aquatic life use for that waterbody. IBI scores in Critical Area 1 are under the standard for attainment and sediment entering the stream in Critical Area 1 is threatening the attainment status of downstream reaches. Therefore, specific goals for Critical Area 1 include:

- Goal 1.1. Achieve an ICI score of ≥ 50 between river miles 42.9 and 48.9 in the Hocking River mainstem.
 - **Achieved** – Score is currently 52
- Goal 1.2. Achieve an IBI score of ≥ 40 between river miles 42.9 and 48.9 in the Hocking River mainstem.
 - **Not Achieved** – Score is currently 38/39
- Goal 1.3. Reduce Sediment load to < 3000 tons per year between river miles 42.9 and 48.9 in the Hocking River mainstem.
 - **Not Achieved** – Sediment load is currently ~ 11,869 tons per year

Objectives

In order to achieve the overall nonpoint source restoration goal of Full Attainment in the Hamley – Hocking River HUC-12, the following objectives that address unstable stream banks, riparian encroachment, and absence of water quality related BMPs on some agricultural land sources of impairment need to be achieved within Critical Area 1. These objectives are the prioritized management measures and practices in Critical Area 1 and will be the primary objectives as projects are conceptualized and developed to reduce NPS impacts in this critical area.

- Objective 1.1. Restore the stream using natural channel design features and principles
 - Restore 3,740 linear feet of stream channel in the Hocking River between River Miles 42.9 and 48.6.
- Objective 1.2. Restore the stream and riparian corridor to increase access of high flow runoff waters to functional floodplain bench.
 - Provide a functional terraced floodplain bench along 3,740 linear feet of the Hocking River between River Miles 42.9 and 48.6.
- Objective 1.3. Restore and maintain wooded riparian corridors
 - Restore and maintain 100 foot wide wooded riparian corridors along 3,740 linear feet of the Hocking River (8.5 acres).
 - Acquire conservation easements encompassing 100 foot wide riparian corridors along 3,740 linear feet of the Hocking River (8.5 acres)

As these objectives are implemented, water quality monitoring (both project related and regularly scheduled monitoring) will be conducted to determine progress toward meeting the identified goals (i.e., water quality standards). These objectives will be reevaluated and modified if determined to be necessary. For instance; many agricultural BMPs can be “stacked” (a systems approach) that will also incrementally improve the quality and quantity of runoff and drainage waters and in-stream water quality.

When reevaluating, the committee will reference the Ohio EPA Nonpoint Source Management Plan Update (Ohio EPA, 2014), which has a complete listing of all eligible NPS management strategies to consider including:

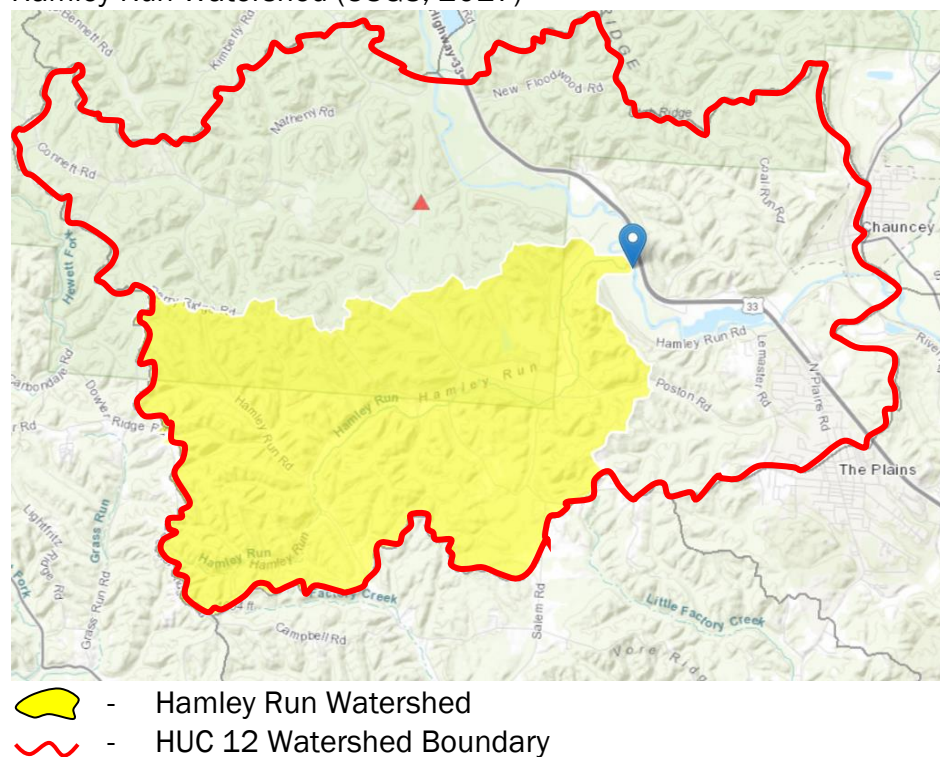
- Urban Sediment and Nutrient Reduction Strategies;
- Altered Stream and Habitat Restoration Strategies;
- Nonpoint Source Reduction Strategies; and
- High Quality Waters Protection Strategies

3.3.1 Critical Area 2: Detailed Characterization

Critical Area 2 – Hamley Run Watershed

Hamley Run, located in Dover, York, and Waterloo Townships in Athens County, is a 6.5 mile tributary to the Hocking River (Figure 20). The watershed, comprised of 80% forested land and 5.8% developed land, drains 8.3 square miles (USGS, 2017). According to the 2009 TMDL, Hamley Run is not attaining or only partially attaining the aquatic life use designation (Table 1 and Figure 11). Hamley Run also failed to meet the water quality standard for fecal coliform bacteria including the geometric mean and the 90th percentile criteria for recreation, indicating that sources of bacteria/pollution are significant during most stream flow conditions (OEPA, 2009).

Figure 20
Hamley Run Watershed (USGS, 2017)



3.3.2 Critical Area 2: Detailed Biological Condition

Two sites were sampled in Hamley Run to determine aquatic life use attainment for the 2009 TMDL for the Hocking River. The site located at river mile 0.4 was partially attaining, and the site located at river mile 2.1 was not attaining. Both sites were sampled for fish (IBI), aquatic macroinvertebrates (ICI), and habitat (QHEI). QHEI scores (66.5 and 67 respectively) indicate that habitat at both sites is suitable for healthy populations of aquatic life, therefore other factors are having a negative influence on the biological populations,

resulting in a failure to attain the warm water habitat aquatic life use designation. ICI scores at both sites and the IBI score at river mile 2.1 were below the required level for attaining the desired aquatic life use status (Table 1 and Figure 11). One declining species, Least Brook Lamprey (*Lampetra aepyptera*) is found in high number within Hamley Run (OEPA, 2009).

3.3.3 Critical Area 2: Detailed Causes and Associated Sources

A bedload TMDL was developed for the Hamley Run tributary showing that the main cause of habitat impairment in this tributary is the substrate (OEPA, 2009). The primary cause of aquatic life use impairment during the TMDL monitoring was nutrients and organic enrichment/low DO resulting from a spill event. “Impacted communities and WQ for Hamley Run were attributed to a break in The Plains POTW collection system that resulted in a large release of untreated wastewater. This event simply overwhelmed Hamley Run with vast quantities of untreated wastewater. The fish sampling effort predated the spill event, and thus explains the discrepancies between the macro-benthos, fish, and WQ results. Impairment upstream of the spill event was delineated by the macro-benthos alone. Poor community performance was attributed to impacted natural substrates (OEPA, 2009).” The secondary cause of aquatic life use impairment is sedimentation resulting from riparian removal/encroachment (Figure 21) (OEPA, 2009). Although nutrients and organic enrichment/low DO were listed in the TMDL as the main source of impairment during the sampling event, these sources are likely no longer a significant source of impairment in Hamley Run.

3.3.4 Critical Area 2: Outline Goals and Objectives for the Critical Area

Goals

The overall nonpoint source restoration goals of any NPS-IS plan include improving or maintaining IBI, MIWB, ICI and QHEI scores so that streams achieving Full Attainment are preserved and so that streams in Partial or Non-Attainment status can achieve Full Attainment of the designated aquatic life use for that waterbody. IBI and ICI scores in Critical Area 2 are under the standard for attainment and bacteria concentrations are above the level required for primary recreation contact. Therefore, specific goals for Critical Area 2 include:

- Goal 2.1. Achieve an IBI score of 44 at the RM 0.4 sample site
 - **Achieved** – Score is currently 44
- Goal 2.2. Achieve an IBI score of 44 at the RM 2.1 sample site
 - **Not achieved** – Score is currently 36
- Goal 2.3. Achieve a narrative ICI score of “good” (≥ 36) at the RM 0.4 sample site
 - **Not achieved** – Score is currently “fair” (22 – 30)

- Goal 2.4. Achieve a narrative ICI score of “good” (≥ 36) at the RM 2.1 sample site
- **Not achieved** – Score is currently “poor” (8-12)
- Goal 2.5. Achieve bacteria concentrations of ≤ 2000 per 100 mL, the standard for primary contact recreation.
- **Not Achieved** – Concentrations are currently 15,525 per 100 mL

Objectives

In order to achieve the overall nonpoint source restoration goal of Full Attainment in the Hamley – Hocking River HUC-12, the following objectives that address substrate, sedimentation, nutrients, and organic enrichment / low DO sources of impairment need to be achieved within Critical Area 2. These objectives are the prioritized management measures and practices in Critical Area 2 and will be the primary objectives as projects are conceptualized and developed to reduce NPS impacts in this critical area.

- Objective 2.1. Restore and maintain wooded riparian corridors
- Restore 13,280 linear feet of riparian corridor along the mainstem of Hamely Run (Figure 21)
- Objective 2.2. Restore and enhance instream habitat and substrate
- Restore a total of 900 linear feet of habitat within the stream channel at RM 0.4 and 2.1.
- Objective 2.3. Inspect HSTS and Alternative systems
- Inspect 120 systems (estimated number of systems within the subwatershed according to the Athens County Health Department)
- Objective 2.4. Repair and replace failing HSTS systems
- Repair and replace 30 systems (estimated number of systems failing according to the Athens Count Health Department)

As these objectives are implemented, water quality monitoring (both project related and regularly scheduled monitoring) will be conducted to determine progress toward meeting the identified goals (i.e., water quality standards). These objectives will be reevaluated and modified if determined to be necessary. For instance; many agricultural BMPs can be “stacked” (a systems approach) that will also incrementally improve the quality and quantity of runoff and drainage waters and in-stream water quality.

When reevaluating, the committee will reference the Ohio EPA Nonpoint Source Management Plan Update (Ohio EPA, 2014), which has a complete 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

Figure 21

Hamley Run Riparian Encroachment (base map – Ohio University, 2017)



 - Insufficient riparian corridor

3.4.1 Critical Area 3: Detailed Characterization

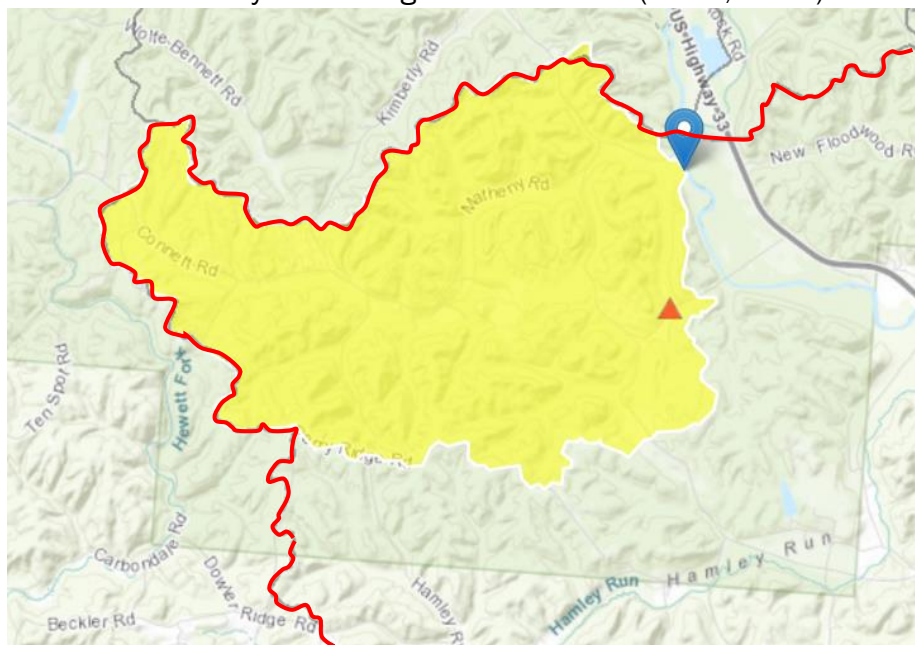
Critical Area 3 - Unnamed Tributary at Hocking River RM 48.7



An unnamed tributary, located in York Township in Athens County, enters the Hocking River at RM 48.7. This tributary is 4.5 miles long and drains an area of 5.45 square miles (Figure 22). The watershed is 80% forested and 6.1 percent developed (USGS, 2017).

Approximately 50% of the watershed has been surface or underground mined (Figure 23) (Ohio University, 2017). According to the 2009 TMDL, the unnamed tributary is not attaining warm water habitat aquatic life use designation primarily because of low pH conditions resulting from acid mine drainage pollution (OEPA, 2009).

Figure 22

Unnamed Tributary at Hocking River Mile 48.7 (USGS, 2017)



-  - Unnamed tributary watershed
-  - HUC 12 Boundary

Underground and Surface Mines within Hamley Run – Hocking River HUC 12 (Ohio University, watershed data, 2017)



QHEI monitoring was also conducted at the site and yielded a score of 44.5, well below the warm water habitat target of ≥ 60 . Some of the attributes that resulted in a low QHEI score

include silt or muck substrate, low sinuosity, sparse cover, heavy silt, poor development, no fast current, and extensive embeddedness (OEPA, 2009).

3.4.3 Critical Area 3: Detailed Causes and Associated Sources

The primary cause of impairment in this Critical Area is acid mine drainage pollution resulting in poor water quality (low pH and high metal concentrations). The source of the pollution is abandoned pre-regulation coal mines. Poor habitat quality also plagues this watershed. However, the severity of the acid mine drainage pollution supersedes the habitat quality concerns (OEPA, 2009).

3.4.4 Critical Area 3: Outline Goals and Objectives for the Critical Area

Goals

The overall nonpoint source restoration goals of any NPS-IS plan include improving or maintaining IBI, MIWB, ICI and QHEI scores so that streams achieving Full Attainment are preserved and so that streams in Partial or Non-Attainment status can achieve Full Attainment of the designated aquatic life use for that waterbody. IBI, ICI, and QHEI scores in Critical Area 3 are under the standard for attainment. Therefore, specific goals for Critical Area 3 include:

- Goal 3.1. Achieve narrative ICI score of “good” (≥ 36) at the RM 0.1 sample site
 - **Not Achieved** – Score is currently “very poor” (0 - 6)
- Goal 3.2. Achieve an IBI score of ≥ 44 at the RM 0.1 sample site
 - **Not Achieved** – Score is currently 12
- Goal 3.3. Achieve a QHEI score of 60 at RM 0.1 sample site
 - **Not Achieved** – Score is currently 44.5
- Goal 3.4. Achieve a pH measurement of ≥ 6.5 at the RM 0.1 sample site
 - **Not Achieved** – pH currently 3.5

Objectives

In order to achieve the overall nonpoint source restoration goal of Full Attainment in the Hamley – Hocking River HUC-12, the following objectives that address abandoned pre-regulation coal mine pollution sources of impairment need to be achieved within Critical Area 3. These objectives are the prioritized management measures and practices in Critical Area 3 and will be the primary objectives as projects are conceptualized and developed to reduce NPS impacts in this critical area.

- Objective 3.1. Implement restoration projects to reduce the impacts of acid mine drainage.
 - Close 1 subsidence hole / mine opening
 - Open 1 blocked drainage
- Objective 3.2. Neutralize acid mine drainage and enable metals to precipitate.
 - Install 1 limestone doser
- Objective 3.3. Restore in-stream habitat using natural channel design features.
 - Restore 300 linear feet of stream channel at River mile 0.1

As these objectives are implemented, water quality monitoring (both project related and regularly scheduled monitoring) will be conducted to determine progress toward meeting the identified goals (i.e., water quality standards). These objectives will be reevaluated and modified if determined to be necessary. For instance; many agricultural BMPs can be “stacked” (a systems approach) that will also incrementally improve the quality and quantity of runoff and drainage waters and in-stream water quality.

When reevaluating, the committee will reference the Ohio EPA Nonpoint Source Management Plan Update (Ohio EPA, 2014), which has a complete 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 Projects and Implementation Strategy Overview Table

Table 3

Critical Area Project Overview Table

| Applicable Critical Area | Goal | Objective | Project # | Project Title (EPA Criteria g) | Lead Organization (Criteria d) | Time Frame (EPA Criteria f) | Estimated Cost (EPA Criteria d) | Potential/Actual Funding Source (EPA Criteria d) |
|---------------------------------------------------------------|--------------------------|-------------------|-----------|-----------------------------------------------------------------|----------------------------------------------------------------|---------------------------------|---------------------------------|--------------------------------------------------------------------------------------------------|
| Altered Stream and Habitat Restoration Strategies | | | | | | | | |
| 1 | 1.1
1.2
1.3 | 1.1
1.2
1.3 | 1.1 | Hocking River Erosion Full Scale Project (option 1) | Rural Action | Short term (priority) 1-3 years | \$600,000 | OEPA WRRSP
OEPA Section 319
NRAC –Clean Ohio Fund |
| 1 | 1.1
1.2
1.3 | 1.2
1.2
1.3 | 1.2 | Hocking River Erosion – Riparian Enhancement Project (option 2) | Rural Action | Short term (priority) 1-3 years | \$45,000 | OEPA Section 319
NRAC –Clean Ohio Fund
Local SWCD / NRCS
Private |
| 2 | 2.1
2.2
2.3
2.4 | 2.1
2.2 | 2.1 | Hamley Run Habitat Improvement Project | Rural Action | Moderate (3-7 years) | In development | OEPA 319
NRCS |
| Other NPS Causes and Associated Sources of Impairments | | | | | | | | |
| 2 | 2.5 | 2.3
2.4 | 2.2 | Hamley Run Fecal Coliform Reduction Project | Rural Action or Athens Co. Health Department | Moderate Term (3-7 years) | In development | OEPA
Athens Co. Health Department
Athens County Commissioners
Ohio Department of Health |
| 3 | 3.1
3.2
3.4 | 3.1
3.2 | 3.1 | Hamley Run – Hocking River Acid Mine Drainage Remediation | Rural Action or ODNR, Division of Mineral Resources Management | Long Term (7 + years) | In development | Office of Surface Mining
OEPA 319
ODNR, DMRM |

4.2 Project Summary Sheets

| Critical Area 1: Project 1.1 (option 1) | | |
|-----------------------------------------|----------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Nine Element Criteria | Information Needed | Explanation |
| N/A | Title | Hocking River Full Scale Erosion Project |
| Criteria d | Project Lead Organization and Partners | Lead Organization – Rural Action
Potential Partners – Ohio Environmental Protection Agency, Ohio University, Athens Co. Commissioners, Soil and Water Conservation district, Civil Environmental Consultants, private landowners. |
| Criteria c | HUC-12 and Critical Area | This project is located within the Hamley Run – Hocking River HUC 12 # 050302040801 and is identified in this nine element plan as Reach 1 in Critical Area # 1. |
| Criteria c | Location of Project | This project is located near 12815 River Road, Athens, Ohio and the center of the project site can be found at the latitude / longitude 39.390666 / -82.175047 |
| N/A | Which Strategy is being addressed by this project | Altered stream and habitat restoration strategies |
| Criteria f | Time Frame | Short term (priority) 1-3 years |
| Criteria g | Short Description | The Hocking River Full Scale Erosion Project is located in Section 20, Dover Township, Athens County, Ohio. The site is south of Chauncey and adjacent to River Road. Impairments at this site include severe bank erosion, downstream sedimentation, lack of riparian, and absence of water quality related BMPs on some agricultural land. Proposed restoration activities include bank stabilization, stream channel enhancement, riparian corridor development, and conservation easement establishment. |
| Criteria g | Project Narrative | The Hocking River Full Scale Erosion Project is located in Section 20, Dover Township, Athens County, Ohio. Impairments at this site include severe bank erosion, downstream sedimentation, no riparian corridor, and absence of water quality related BMPs on some agricultural land along approximately 1,900 linear feet of the Hocking River. The eroding stream banks are currently depositing ~8,000 tons of sediment into the Hocking River each year. The goals of this project are to (1) reduce sediment load by 90% and (2) establish conservation easements on 80% of the riparian corridor. To achieve these goals, altered stream and habitat restoration strategies will be implemented as follows: |

| | | |
|------------|--------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Criteria d | | <ul style="list-style-type: none"> • Reestablish connection to floodplain by engineering 1,900 linear feet of stream bank to develop a functional floodplain terrace bench that can be accessed during regular high flow events. • Divert water away from the stream bank using J-hooks, or other natural channel design structures. • Plant and maintain a riparian corridor of at least 100 feet on each side of the river. • Establish a conservation easement for the riparian corridor on both sides of the stream for a minimum of 1,520 linear feet (3.5 acres). • Educate about and discourage poor agricultural land management techniques |
| | Estimated Total cost | \$600,000 (\$315 / linear foot of restoration) |
| | Possible Funding Sources | OEPA WRRSP
OEPA Section 319
NRAC – Clean Ohio Fund |
| | Criteria a | Causes <ul style="list-style-type: none"> • ~8,000 tons per year of sediment entering the Hocking River |
| | | Sources <ul style="list-style-type: none"> • Eroding and unstable stream banks • No riparian corridor • absence of water quality related BMPs on some agricultural land |
| | Criteria b & h | <p>This critical area is fully attaining warm water habitat aquatic life use designation based on a biological sample collected near Hocking River RM 48.0 for the 2009 TMDL report (OEPA, 2009). IBI and ICI scores, currently 38/39 and 52 respectively, will be maintained or improved enabling this site to remain in full attainment of WWH. The impairments in this critical area are likely having the most impact on water quality and habitat downstream from the critical area.</p> <p>Reducing the sediment load by 11,869 tons per year (100%) and establishing 3,740 linear feet of riparian corridor would remove this NPS impairment for the whole critical area.</p> |
| | | Part 2: How much of the needed |

| | | |
|------------|--------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Criteria i | improvement for the whole Critical Area is <i>estimated to be accomplished by this project</i> ? | Through this project 7,200 tons per year of sediment will be reduced and at least 1,520 linear feet of riparian corridor will be established. This represents approximately 60% of the needed sediment load reduction and 40% of the needed riparian enhancement necessary to improve this critical area. |
| | Part 3: Load Reduction? | 7,200 tons per year of sediment |
| | How will the effectiveness of this project in addressing the NPS impairment be measured? | Rural Action and Ohio University will monitor the riparian corridor, erosion rates, and sediment load.

OEPA will monitor biology in the Hocking River near RM 48.0 and RM 36.0 (upstream and downstream from the project site) for TMDL reporting. |
| Criteria e | Information and Education | This project will be promoted via website updates, newsletter articles, and press releases. This site will also serve as a demonstration site and model for remediating other sediment issues on the Hocking River. |

| Critical Area 1: Project 1.2 (option 2) | | |
|-----------------------------------------|---------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Nine Element Criteria | Information Needed | Explanation |
| N/A | Title | Hocking River Erosion - Riparian Enhancement Project |
| Criteria d | Project Lead Organization and Partners | Lead Organization – Rural Action
Potential Partners – Ohio Environmental Protection Agency, Ohio University, Athens Co. Commissioners, Soil and Water Conservation district, Civil Environmental Consultants, private landowners, local colleges. |
| Criteria c | HUC-12 and Critical Area | This project is located within the Hamley Run – Hocking River HUC 12 # 050302040801 and is identified in this nine element plan as Reach 1 in Critical Area # 1. |
| Criteria c | Location of Project | This project is located near 12815 River Road, Athens, Ohio and the center of the project site can be found at the latitude / longitude 39.390666 / -82.175047 |
| N/A | Which Strategy is being addressed by this project | Altered stream and habitat restoration strategies |
| Criteria f | Time Frame | Short term (priority) 1-3 years |

| | | | |
|------------|-------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
| Criteria g | Short Description | <p>The Hocking River Erosion – Riparian Enhancement Project is located in Section 20, Dover Township, Athens County, Ohio. The site is south of Chauncey and adjacent to River Road. Impairments at this site include severe bank erosion, downstream sedimentation, lack of riparian, and absence of water quality related BMPs on some agricultural land. Proposed restoration activities include riparian corridor development, and conservation easement establishment.</p> | |
| Criteria g | Project Narrative | <p>The Hocking River Erosion – Riparian Enhancement Project is located in Section 20, Dover Township, Athens County, Ohio. Impairments at this site include severe bank erosion, downstream sedimentation, no riparian corridor, and absence of water quality related BMPs on some agricultural land along approximately 1900 linear feet of the Hocking River. The eroding stream banks are currently depositing more than 8,000 tons of sediment in the Hocking River each year. The goals of this project are to (1) reduce sediment load by 20% and (2) establish conservation easements on 80% of the riparian corridor. To achieve these goals, altered stream and habitat restoration strategies will be implemented as follows:</p> <ul style="list-style-type: none"> • Plant and maintain a riparian corridor of at least 100 feet on each side of the stream for 1,900 linear feet. • Plant willow post in the eroding banks along 1900 linear feet of the stream. • Establish a conservation easement for the riparian corridor on both sides of the stream for a minimum of 1,520 linear feet (3.5 acres). • Educate about and discourage poor agricultural land management techniques | |
| Criteria d | Estimated Total cost | \$45,000 | |
| Criteria d | Possible Funding Sources | <p>OEPA Section 319
NRAC –Clean Ohio Fund
Local SWCD / NRCS
Private</p> | |
| Criteria a | Identified Causes and Sources | <p>Causes</p> <ul style="list-style-type: none"> • ~8,000 tons per year of sediment entering the Hocking River <p>Sources</p> <ul style="list-style-type: none"> • Eroding and unstable stream banks • No riparian corridor | |

| | | |
|----------------|--------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Criteria b & h | | <ul style="list-style-type: none"> absence of water quality related BMPs on some agricultural land |
| | Part 1: How much improvement is needed to remove the NPS impairment for the whole Critical Area? | <p>This critical area is fully attaining warm water habitat aquatic life use designation based on a biological sample collected near Hocking River RM 48.0 for the 2009 TMDL report (OEPA, 2009). IBI and ICI scores, currently 38/39 and 52 respectively, will be maintained or improved enabling this site to remain in full attainment of WWH. The impairments in this critical area are likely having the most impact on water quality and habitat downstream from the critical area.</p> <p>Reducing the sediment load by 11,869 tons per year (100%) and establishing 3,740 linear feet of riparian corridor would remove this NPS impairment for the whole critical area.</p> |
| | Part 2: How much of the needed improvement for the whole Critical Area is <i>estimated</i> to be accomplished by this project? | Through this project 1,600 tons per year of sediment will be reduced and at least 1,520 linear feet of riparian corridor will be established. This represents approximately 13% of the needed sediment load reduction and 40% of the needed riparian enhancement necessary to improve this critical area. |
| | Part 3: Load Reduction? | 1,600 tons per year of sediment |
| Criteria i | How will the effectiveness of this project in addressing the NPS impairment be measured? | <p>Rural Action and Ohio University will monitor the riparian corridor, erosion rates, and sediment load.</p> <p>OEPA will monitor biology in the Hocking River near RM 48.0 and RM 36.0 (upstream and downstream from the project site) for TMDL reporting.</p> |
| Criteria e | Information and Education | This project will be promoted via website updates, newsletter articles, and press releases. This site will also serve as a demonstration site and model for remediating other sediment issues on the Hocking River. |

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