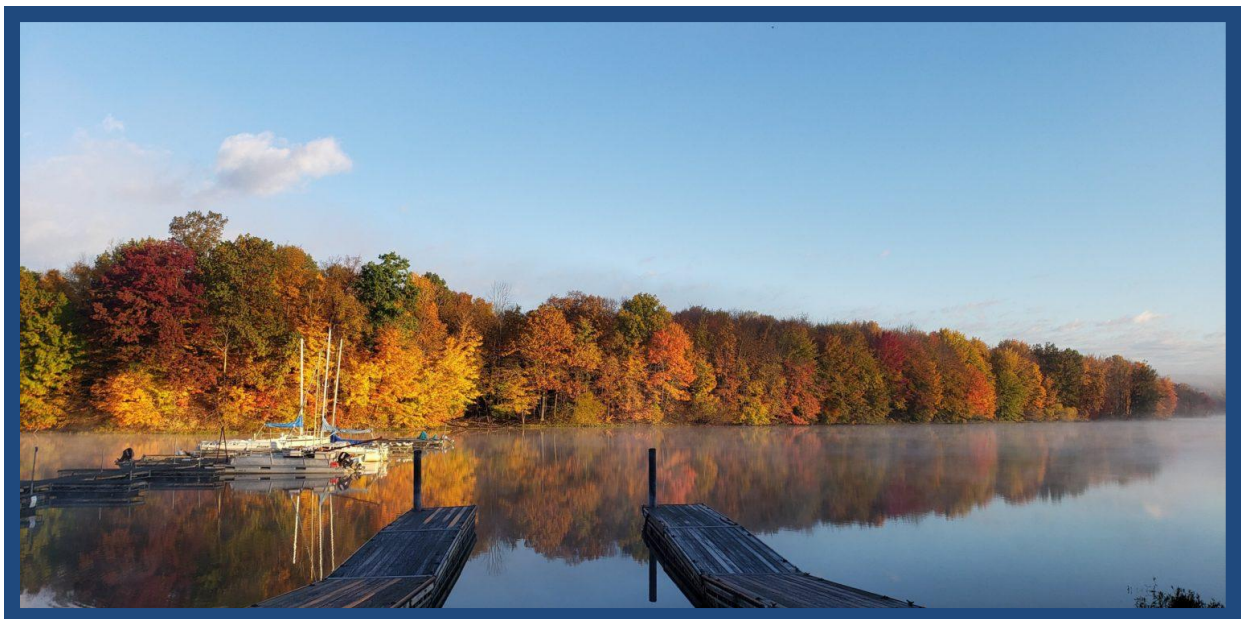


**Nine-Element Nonpoint Source-
Implementation Strategy
(NPS-IS) for the Headwaters Clear Fork
Mohican River HUC-12 (05040002 03 01)**



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Cover photo – Clear Fork Reservoir, City of Mansfield website.

Acronyms and Abbreviations

The acronyms and abbreviations below are commonly used by organizations working to restore Ohio's watersheds and are found throughout this NPS-IS document.

Numbers

§319 Section 319 of the Clean Water Act

A

ALU Aquatic Life Use

B

BMP Best Management Practice

C

CAFF Confined Animal Feeding Facility

CAFO Concentrated Animal Feeding Operation

CFU Colony Forming Units

CRP Conservation Reserve Program

D

DMR Discharge Monitoring Reports

DO Dissolved Oxygen

DSW Division of Surface Water

E

ECHO Enforcement and Compliance History Online

E. coli *Escherichia coli*

EOLP Erie-Ontario Lake Plain

EPT *Ephemeroptera, Plecoptera and Trichoptera* – sensitive macroinvertebrate species

EQIP Environmental Quality Incentives Program

EWH Exceptional Warmwater Habitat

F

FLS Federally Listed Species

FOTG Field Office Technical Guide

FSA Farm Service Agency

G

GIS Geographic Information Systems

H

HAB Harmful Algal Bloom

HHEI Headwater Habitat Evaluation Index

HSTS Home Sewage Treatment System

HTF Hypoxia Task Force

HUC Hydrologic Unit Code

I

IBI Index of Biotic Integrity

ICI Invertebrate Community Index

L

L	Liter
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M

MARB	Mississippi/Atchafalaya River Basin
MIwb	Modified Index of Well Being
mL	Milliliters
MS4	Municipal Separate Storm Sewer System
MWCD	Muskingum Watershed Conservancy District
MWH	Modified Warmwater Habitat

N

NPDES	National Pollutant Discharge Elimination System
NPS	Nonpoint Source
NPS-IS	Nonpoint Source-Implementation Strategy
NRCS	Natural Resources Conservation Service

O

OAC	Ohio Administrative Code
ODA	Ohio Department of Agriculture
ODH	Ohio Department of Health
ODNR	Ohio Department of Natural Resources
Ohio EPA	Ohio Environmental Protection Agency
OpTIS	Operational Tillage Information System
ORB	Ohio River Basin
ORBA	Ohio River Basin Alliance

P

PAD-US	Protected Areas Database of the United States
PCR	Primary Contact Recreation
PLET	Pollution Load Estimation Tool
PWS	Public Water Supply

Q

QHEI	Qualitative Habitat Evaluation Index
------	--------------------------------------

R

RCPD	Richland County Park District
RM	River Mile
RPH	Richland Public Health

S

SNC	Significant Noncompliance
-----	---------------------------

T

TMDL	Total Maximum Daily Load
TSD	Technical Support Document

U

ug	Micrograms
USACE	United States Army Corps of Engineers
USDA	United States Department of Agriculture
USEPA	United States Environmental Protection Agency
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey

V

VMNT	Voluntary Nutrient Management Plan
VRT	Variable Rate Technology

W

WAP	Watershed Action Plan
WASCOB	Water and Sediment Control Basin
WAU	Watershed Assessment Unit
West Creek	West Creek Conservancy
WPCLF	Water Pollution Control Loan Fund
WRP	Wetlands Reserve Program
WRRSP	Water Resource Restoration Sponsor Program
WSRA	Wild and Scenic Rivers Act
WQS	Water Quality Standards (Ohio Administrative Code 3745-1)
WWH	Warmwater Habitat

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CHAPTER 1: INTRODUCTION

The **Headwaters Clear Fork Mohican River Hydrologic Unit Code (HUC)-12 (05040002 03 01)** is located in eastern Richland County and northwestern Morrow County, Ohio (Figure 1). It drains a watershed of 33.76 square miles and is heavily forested (39%), interspersed with agricultural land use (43%). The watershed contains the headwaters of the Clear Fork Mohican River, from where it rises north of Ontario, OH (river mile (RM) 38.30) to the outlet of the Clear Fork Reservoir (RM 30.59). **The Headwaters Clear Fork Mohican River HUC-12** has been identified as an area of focus within the Ohio River Basin (ORB) due to the estimated loading of total nitrogen and total phosphorus that flows into the tributaries of the Ohio River, to the Mississippi River and its end-receiving waterbody, the Gulf of America (the Gulf)¹. Additionally, there is growing concern within the entire Mohican River watershed, as the Mohican River was the only Scenic River shown to decline in water quality during sampling conducted in 2021, primarily due to excessive sediment and over-enrichment. Locally, stakeholders are concerned about sediment deposition in the Clear Fork Reservoir, as well as over-enrichment and the formation of harmful algal blooms (HABs).

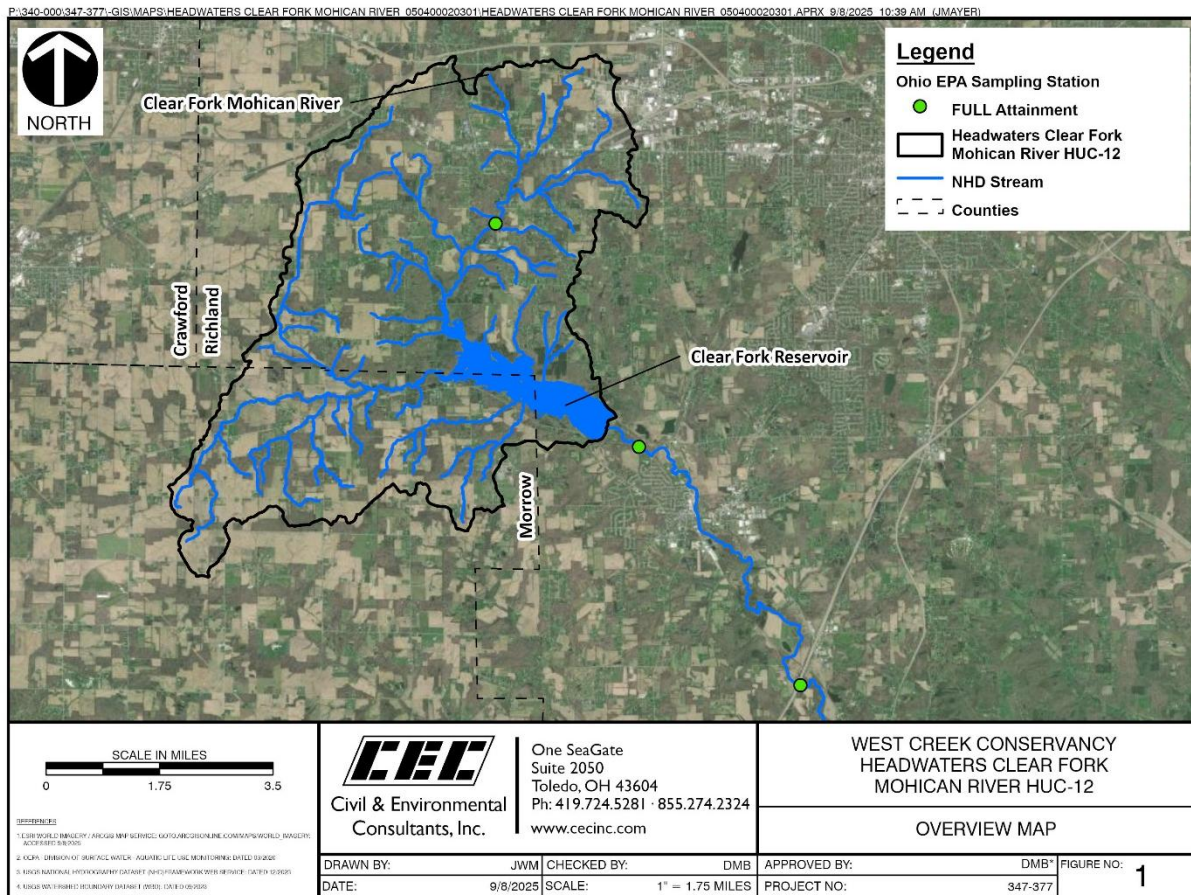


Figure 1: Headwaters Clear Fork Mohican River HUC-12 Overview

¹ Formerly known as the Gulf of Mexico.

1.1 Report Background

While watershed plans could be all-inclusive inventories, the US Environmental Protection Agency (USEPA) identified nine critical elements to include in strategic planning documents for impaired waters (Table 1). To ease implementation of projects addressing nonpoint source (NPS) management and habitat restoration, current federal and state NPS and habitat restoration funding opportunities require strategic watershed plans incorporate these nine key elements, concisely to HUC-12 watersheds.

Table 1: Nine Elements for Watershed Plans and Implementation Projects

Element	Description
a	Identification of causes of impairment and pollutant sources or groups of similar sources that need to be controlled to achieve load reductions
b	Load reductions expected from management measures described under element (c) below
c	Description of the NPS measures that need to be implemented to achieve load reductions estimated under element (b) above and an identification of the critical areas in which those measures will be needed to implement this plan
d	An estimate of the amounts of technical and financial assistance needed, associated costs and/or sources and authorities that will be relied upon to implement this plan
e	An information/education component that will be used to enhance public understanding of the project and encourage their early and continued participation in selecting, designing and implementing the NPS management measures that will be implemented
f	A schedule for implementing the NPS measures identified in this plans that is reasonably expeditious
g	A description of interim, measurable milestones for determining whether NPS management measures or other control actions are being implemented
h	A set of criteria that can be used to determine whether loading reductions are being achieved over time and substantial progress is being made toward attaining water quality standards
i	A monitoring component to evaluate the effectiveness of the implementation efforts over time, measured against the criteria established under element (h) above

(Source: USEPA, 2008)

The Ohio Environmental Protection Agency (Ohio EPA) has historically supported watershed-based planning in many forms (Ohio EPA, 2016). In 1997, Ohio EPA issued guidance for the development of Watershed Action Plans (WAPs), which typically covered larger watersheds (HUC-10 to HUC-8 size). The plans included an outline and checklist to ensure USEPA's nine elements were included within each plan. The USEPA issued new guidance in 2013 and concluded Ohio's interpretation for watershed plan development did not adequately address critical areas, nor did it include an approach that detailed the nine elements at the project level (Ohio EPA, 2016). In response, Ohio EPA developed a new template for watershed planning in the form of a Nonpoint Source-Implementation Strategy (NPS-IS), ensuring NPS pollution is addressed at a finer resolution and that individual projects listed within each plan include each of the nine elements. The first NPS-IS plans were approved in 2017. Over time, these plans have evolved to not only address in-stream (near-field) water quality impairment from NPS pollution, but they also address reductions in nutrient loadings to larger bodies of water (far-field).

Hypoxia Task Force

The State of Ohio is an active participant in the Mississippi River/the Gulf Hypoxia Task Force (HTF), a multi-state agency effort established in 1997 to understand the causes and effects of eutrophication in the Gulf and coordinate activities throughout the Mississippi/Atchafalaya River Basin (MARB) to reduce the size, severity and duration and ameliorate the effects of hypoxia within the Gulf (USEPA, 2020). The 2007 Mississippi River Basin Science Advisory Committee recommended a reduction in total nitrogen and total phosphorus from baseline values calculated from 1980 to 1996 by 45% to reduce the hypoxic zone within the Gulf to a five year running average of 5,000 km² (USEPA, 2007). The HTF has accepted this recommendation and outlined an interim goal to reduce nutrient loading from major sources of nitrogen and phosphorus in the MARB by 20% by 2025 and 45% by 2035 (HTF, 2014; USEPA, 2017). Ohio EPA's *Nutrient Mass Balance Study for Ohio's Major Rivers 2024* has identified high nitrogen and phosphorus loads within the Ohio portion of the ORB, particularly from the Great Miami, Little Miami and Scioto watersheds, citing between 71-82% of the nitrogen load and 67-80% of the phosphorus load from these watersheds is from NPS contributions (Ohio EPA, 2024d). The *Nutrient Mass Balance Study* cites 81% of the nitrogen load and 69% of the phosphorus load in the Muskingum watershed is from nonpoint sources.

Through the *State of Ohio's Domestic Action Plan*, state agencies modeled and estimated nutrient loads for NPS classifications (agricultural, home sewage treatment system (HSTS) and urban contributions) at the HUC-12 level within the northwestern portion of the state in the Maumee River Basin, underlining the state's commitment to nutrient reduction from all landscapes (OLEC, 2020). While this level of modeling has not yet occurred within the ORB, approximate loads from agricultural and urban landscapes, based upon nutrient loss literature and *Mass Balance* results, have been estimated for watersheds within the ORB, including the Scioto, Great Miami and Muskingum watersheds as a beginning step in setting reduction targets to make progress toward HTF goals (Ohio EPA, 2024b). While the Muskingum River watershed is not listed among the top contributors to the ORB, nutrient reduction and water quality improvement efforts in this area will help make progress toward state and federal goals.

Ohio Department of Agriculture Regional Watershed Program: Watershed Plan, Region 5

The Ohio Department of Agriculture (ODA) has created seven watershed plans, focused on a larger regional scale, that were developed to initiate implementation of Ohio House Bill 7. Ohio House Bill 7 requires the Director of Agriculture to administer a statewide watershed planning and management program that aims to improve and protect Ohio watersheds. These plans focus primarily on addressing nonpoint source pollution and have four main objectives:

- Delineating local water quality impairment and nutrient sources by local watersheds of the region;
- Developing and strengthening organizational networks through which assistance may be provided and state agency collaboration may occur;
- Providing context, content, and references essential for effective local "nine-element" and other watershed-based planning within the watershed region; and,
- Serving as the first and foundational annual water quality report to Director of Agriculture.

Region 5 focuses on the Muskingum watershed, where the **Headwaters Clear Fork Mohican River HUC-12** is located (ODA, 2025). Information from this report was used to build the *Headwaters Clear Fork Mohican River HUC-12 NPS-IS*.

Headwaters Clear Fork Mohican River HUC-12 NPS-IS

The development of NPS-IS in watersheds contained within the ORB is critical to the efforts focused on implementing the HTF's goal to reduce nutrient loadings from major sources of nitrogen and phosphorus to the Gulf, as well as to meet state water quality standards and local goals. Development of NPS-IS within Ohio's portion of the ORB also aligns with goals established by the Ohio River Basin Alliance (ORBA) for abundant clean water and healthy and productive ecosystems in the Ohio River (USACE, 2020). This is the first NPS-IS under development in the Mohican River watershed through a partnership between West Creek Conservancy (West Creek) and the Richland County Park District (RCPD) under a NPS-IS Development grant from the Muskingum Watershed Conservancy District (MWCD). The *Headwaters Clear Fork Mohican River HUC-12 NPS-IS* will address NPS pollution by accounting for both near-field (within stream/watershed) and far-field (loadings to the Ohio River) effects.

Removal of NPS impairments and reduction in overall nutrient loss within the **Headwaters Clear Fork Mohican River HUC-12** is crucial to the attainment and maintenance of aquatic life use (ALU) standards within the Clear Fork Mohican River and its tributaries. Furthermore, removal of NPS impairments and reduction in overall nutrient loss will reduce the severity of impairments at a local level, in the Clear Fork Reservoir, and on a greater scale, within the context of the Ohio River watershed, the Mississippi River and its end-receiving waterbody. Within the **Headwaters Clear Fork Mohican River HUC-12**, the Clear Fork Mohican River was listed in *Full Attainment* of its Warmwater Habitat (WWH) designation at one location during the 2007 sampling event intended to support a Total Maximum Daily Load (TMDL) study for the entire Mohican watershed. Attainment at this site was based on one biological index only, which leads to a listing of "Insufficient Info" for ALU in the *2024 Ohio Integrated Report* (Ohio EPA, 2024a). This NPS-IS also includes the next sampling site downstream with full biological criteria as a comparison for the **Headwaters Clear Fork Mohican River HUC-12**. This site is located in the Clear Fork Mohican River in the downstream, adjacent, *Town of Lexington-Clear Fork Mohican River HUC-12 (050400020 03 03)*, and is in *Full Attainment* for ALU.

The Clear Fork Mohican River is designated as a Primary Contact Recreation (PCR) use stream. Sample results reported in the *Biological and Water Quality Study of the Mohican River and Select Tributaries, 2007* for the **Headwaters Clear Fork Mohican River HUC-12** showed the river to be in *Full Attainment* of the recreational use; however, at the time, the stream was designated a PCR Class B stream, meaning it was held to a lower standard than current recreational use standards that have condensed all PCR streams into one class. It is listed in the *2024 Ohio Integrated Report* as in *Full Attainment* of the PCR use based on these antiquated standards, but by current standards, it would be considered to be in *Non-Attainment*.

The **Headwaters Clear Fork Mohican River HUC-12** also is designated as a Public Drinking Water Supply (PWS), as the City of Mansfield draws its drinking water from the Clear Fork Reservoir at RM 30.6 (Ohio EPA, 2009). The HUC-12 is in *Non-Attainment* of the PWS designation due to algae and exceedances in

Table 2: Sub-watersheds in the Headwaters Clear Fork Mohican River HUC-10

Headwaters Clear Fork Mohican River HUC-10 (05040002 03)		
HUC-12	Area (Square miles)	Area (Acres) ^a
Headwaters Clear Fork Mohican River HUC-12 (01)	33.76	21,609.48
Cedar Fork HUC-12 (02)	47.67	30,512.13
Town of Lexington-Clear Fork Mohican River HUC-12 (03)	29.61	18,955.57

(Source: USGS, 2023)

NOTES

a Acres may vary slightly from reported values in Ohio EPA, 2025b based on processing of the Watershed Boundary Dataset Geographic Information System (GIS) layers (USGS, 2023).

Mohican Scenic River

The Wild and Scenic Rivers Act (WSRA) was created by Congress in 1968 to preserve rivers with outstanding natural, cultural, and recreational values in a free-flowing condition for the enjoyment of present and future generations (National Wild and Scenic Rivers System, 2022). Rivers classified as Scenic River Areas are those rivers or sections of rivers that are free of impoundments, with shorelines or watersheds still largely primitive and shorelines largely undeveloped.

Ohio’s State Scenic River Act was also passed in 1968, several months prior to the federal WRSA. Under this system, rivers classified as Wild are those rivers or sections of rivers that are generally inaccessible and free-flowing, with an undeveloped floodplain and adjacent riparian corridors that are forested and at least 300 feet wide for most of the reach. Rivers designated as Scenic maintain most of their natural character across most of the stream length with little development; human disturbance may be present, but riparian corridors should be forested and 300 feet deep for at least 25% of the stream (ODNR, 2025e).

There has long been interest in protecting the Mohican River. Local residents and community leaders, along with support from political subdivisions and local businesses, campgrounds and liveries initiated a study conducted by the Ohio Department of Natural Resources (ODNR) to conclude if the Clear Fork Mohican River and the mainstem Mohican River met scenic river designation criteria (ODNR, 2006a). The value of the Mohican River and its tributaries have long been recognized, being highly valued by indigenous tribes such as the Mohegan and Delaware, as well as early settlers (ODNR, 2006a). These water bodies provide abundant resources and offer excellent navigation for watercraft. Conservation efforts, especially in the Clear Fork Mohican River, have occurred since as early as 1933 when trees were planted and a dam, the Pleasant Hill Dam, was constructed to mitigate flooding caused by clearing of the natural vegetation for agricultural purposes. Construction of the Pleasant Hill Dam was funded by the MWCD. The Mohican River Vally has become and



Mohican valley. Photo courtesy of Civil & Environmental Consultants, Inc.

remains a recreational hotspot, with the Village of Loudonville, located in the valley in southern Ashland County, as the canoe capital of Ohio (ODNR, 2006a).

The lower 4.8 miles of the Clear Fork Mohican River and the entire mainstem of the Mohican River (27.5 miles) were designated as State Scenic Rivers in December 2006 (ODNR, 2025a). The designated stretch of the Clear Fork Mohican River is approximately 25 miles downstream of the **Headwaters Clear Fork Mohican River HUC-12**, and conservation activities performed in this upstream sub-watershed will help contribute to protection of this Scenic River.

1.3 Public Participation and Involvement

Watershed planning is best accomplished by collaboration and input from a diverse group of entities, including governmental agencies, private businesses, academia, non-profit groups, neighborhood organizations and the public at large. West Creek is the leading partner in the NPS-IS development process for the **Headwaters Clear Fork Mohican River HUC-12**. West Creek's mission lies in conserving natural habitats, restoring the ecological value of lands and waters, and expanding opportunities to connect people from all cultures to experience nature and discover the great outdoors (West Creek, 2025). West Creek is partnered with the RCPD, a vest stakeholder in the sub-watershed. RCPD endeavors to provide opportunities for county residents of all ages and abilities to learn about and explore nature through educational programs, preservation of natural areas, and the establishment of parks and trails throughout the county (RCPD, 2025).

West Creek and RCPD hosted an organizational stakeholder meeting on March 20, 2025, attended by representatives from the City of Mansfield, MWCD, the Village of Lexington, the Mohican Fly Fishers Of Ohio, Ohio State University-Mansfield and the ODNR Scenic River Programs. Additional input was solicited from the Richland Soil and Water Conservation District (SWCD) and the Morrow SWCD. Follow-up conversations occurred with organizational stakeholders and private landowners to identify potential projects.

Chapters 1, 2 and 3 of this NPS-IS were primarily prepared using data referenced in the *Biological and Water Quality Study of the Mohican River and Selected Tributaries, 2007/EAS/2009-5-4* (Ohio EPA, 2009), the *2024 Integrated Report* (Ohio EPA, 2024a) and the *Water Quality and Hydrologic Units Online Database* (Ohio EPA, 2025b). Additional information was provided by West Creek and its partners. Project information for Chapter 4 was compiled by collaborative meetings with organizational stakeholders, community partners and local landowners.

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 *Headwaters Clear Fork Mohican River HUC-10* is comprised of three HUC-12 watersheds; this document focuses on the #01 hydrologic unit—the **Headwaters Clear Fork Mohican River HUC-12**. An approximate 7.71 mile-long segment of the Clear Fork Mohican River is the principal stream through this sub-watershed and rises from its headwaters southeast of Five Corners to the outlet of the Clear Fork Reservoir at RM 30.59. In total, the Clear Fork Mohican River is 38.3 miles in length, drains 217 square miles and has a gradient of 11 feet per mile (ODNR, 2001; Ohio EPA, 2025b). There are no named tributaries in the sub-watershed. In total, approximately 81.2 miles (428,736 linear feet) of stream segments flow throughout the sub-watershed.

Clear Fork Reservoir

The Clear Fork Reservoir was created in 1949 with the installation of the Clear Fork Reservoir Dam by the City of Mansfield. The Class I, earthen-fill dam is 3,420 feet long and 44 feet high to create a normal pool of 1,024 acres and a capacity of 4.4 billion gallons (ODNR, 2025b; City of Mansfield, 2024). Clear Fork Reservoir has a gently sloping bottom with maximum depths up to 40 feet (City of Mansfield, 2024). The upper end is characterized as shallow with numerous tree stumps. Several islands characterize the mid-lake area while the lower end is deeper and open. The reservoir has approximately 14 miles of shoreline, and the lake and 1,000 acres surrounding it are open for public recreation (City of Mansfield, 2024). The reservoir serves as the primary source water for the City of Mansfield, along with nine wells, and has had recent turbidity issues contributing to drinking water violations. The Source Water Protection Area for the Clear Fork Reservoir includes all the streams located within the **Headwaters Clear Fork Mohican River HUC-12**.



Clear Fork Reservoir Dam in 1967. Photo from the Richland SWCD website.

The **Headwaters Clear Fork Mohican River HUC-12** watershed is wholly contained within the Erie-Ontario Lake Plain (EOLP) ecoregion. This ecoregion is characterized by level to rolling terrain with low lime drift and lacustrine deposits (USEPA, 2013). Soils within the EOLP are typically lower in carbonate and less fertile than other glaciated ecoregions (USEPA, 2013). The EOLP ecoregion can be further classified into smaller (Level IV) ecoregions with distinct characteristics. The **Headwaters Clear Fork Mohican River HUC-12** is wholly contained within the Low Lime Drift Plain Level IV ecoregion. This ecoregion is characterized by a low rolling landscape with end moraines and kettles with many wooded lowlands (USEPA, 2013).

Land use is diverse in this region, supporting both urban or industrial activities as well as livestock production and row crop farming.

Approximately 130,000 years ago, the sub-watershed was heavily altered by the Illinoian glacier, altering the Mohican River’s path from a southwestern direction to a more southerly direction. The glacier scoured the river valley, creating deep river gorges with very narrow riparian edges. Forests are common surrounding the Mohican River and its tributaries, including hemlock-hardwood, oak-maple, oak barren, beech-sugar maple, mixed mesophytic and floodplain forests and forests seeps. Marshes, shrub swamps and non-calcareous cliffs are also common (ODNR, 2006a). Bedrock is Mississippian in age. Bedford and Sunbury shales in the western portion of the sub-watershed transition easterly to shale interbedded with sandstone and siltstone grading to the massive Black Hand Sandstone (ODNR, 2025c).

The **Headwaters Clear Fork Mohican River HUC-12** is largely covered by finer-grained soils that range from somewhat poorly to moderately well-drained (Figure 4). These fine-loamy soils consist mainly of the Bennington, Canfield, Rittman, Shoals and Wadsworth series. Of the major soil series covering the sub-watershed, the Bennington, Shoals and Wadsworth display hydric characteristics (USDA-NRCS, 2025). Wetlands are prominent along the Clear Fork Mohican River mainstem just upstream of the Clear Fork Reservoir, but are otherwise small and isolated throughout the sub-watershed (USFWS, 2020) (Figure 5).

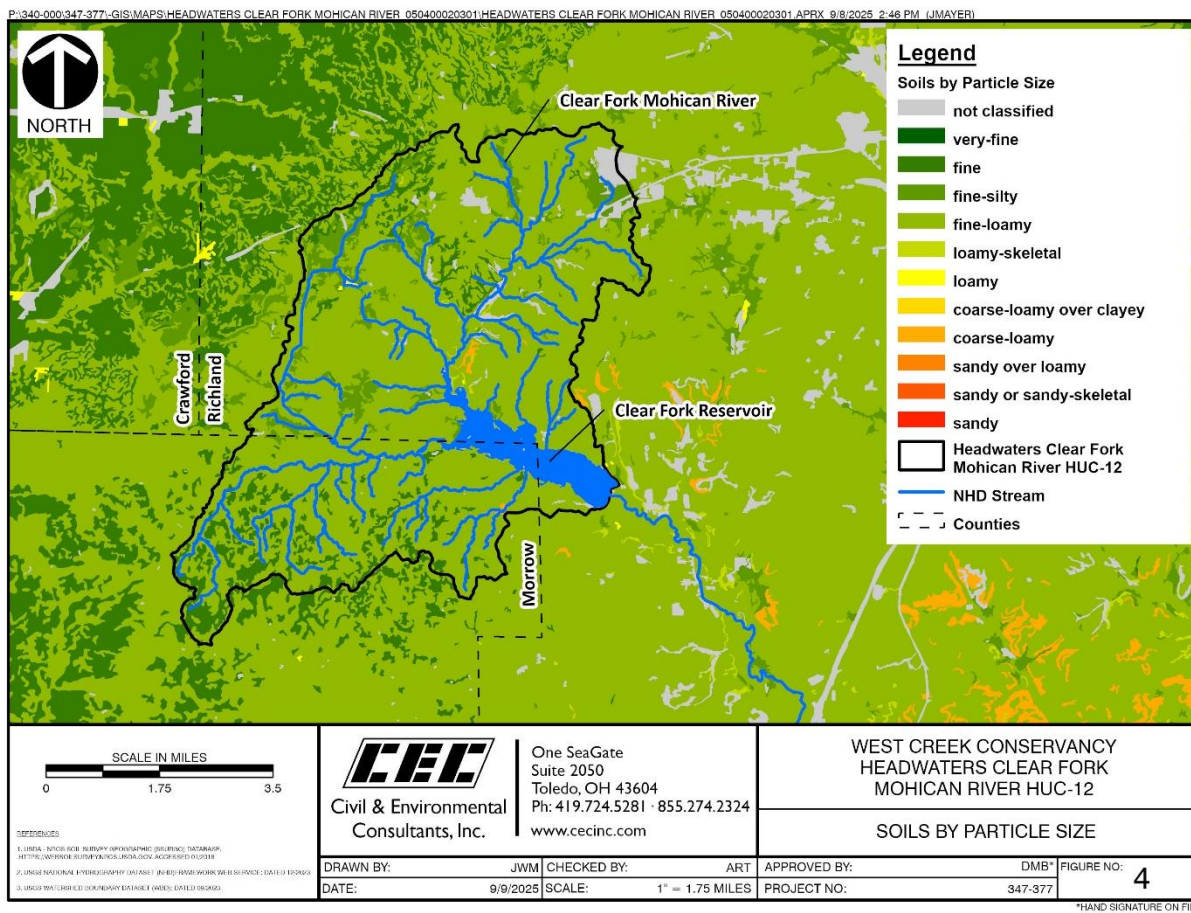


Figure 4: Soils Classified by Particle Size

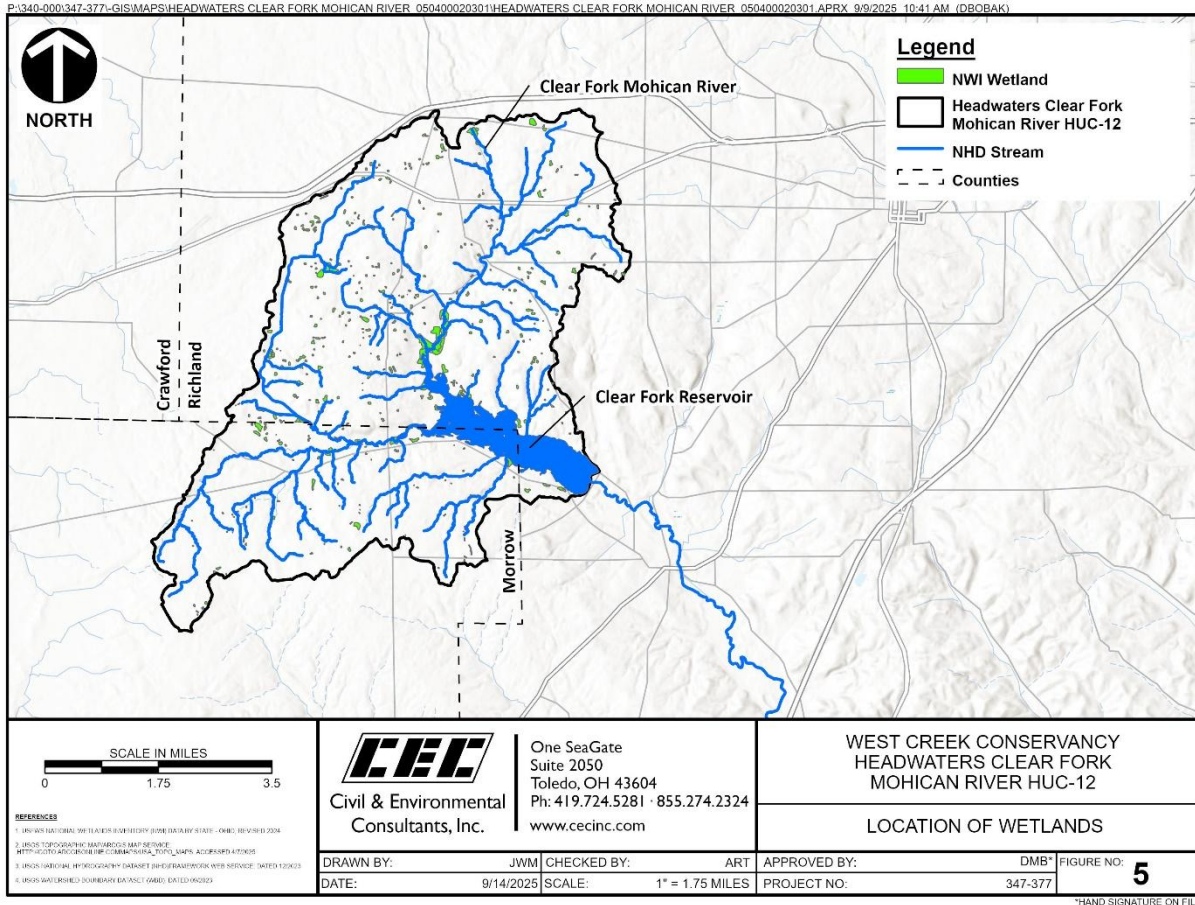


Figure 5: Wetlands in the Headwaters Clear Fork Mohican River HUC-12

2.1.2 Land Use and Protection

Land use within the **Headwaters Clear Fork Mohican River HUC-12** is predominantly agricultural, with substantial coverage of forested land types (Figure 6). Approximately 26% of land use is cultivated cropland, with approximately 18% dedicated to hay/pasturelands (Table 3). Forested land use constitutes ~39% of land coverage, mainly deciduous (~23%) and mixed forest (~15%), with a small amount of evergreen forest (~1%).

Table 3: Land Use Classification in the Headwaters Clear Fork Mohican River HUC-12

Land Use	Headwaters Clear Fork Mohican River HUC-12 (05040002 03 01)		
	Area (mi ²)	Area (acres)	% Watershed Area
Barren Land	0.01	5.29	0.02%
Cultivated Crops	8.62	5,514.99	25.52%
Deciduous Forest	7.86	5,031.87	23.29%
Developed, High Intensity	0.29	183.09	0.85%
Developed, Low Intensity	1.18	757.18	3.50%
Developed, Medium Intensity	0.43	272.53	1.26%
Developed, Open Space	2.16	1,380.96	6.39%

Land Use	Headwaters Clear Fork Mohican River HUC-12 (05040002 03 01)		
	Area (mi ²)	Area (acres)	% Watershed Area
Emergent Herbaceous Wetlands	0.06	39.01	0.18%
Evergreen Forest	0.48	310.26	1.44%
Hay/Pasture	5.91	3,782.61	17.51%
Herbaceous	0.12	74.27	0.34%
Mixed Forest	4.94	3,164.78	14.65%
Open Water	1.56	1,000.25	4.63%
Shrub/Scrub	0.06	35.64	0.16%
Woody Wetlands	0.09	55.76	0.26%
Total	33.77	21,608.49	100.00%

(Source: Dewitz et al., 2023)

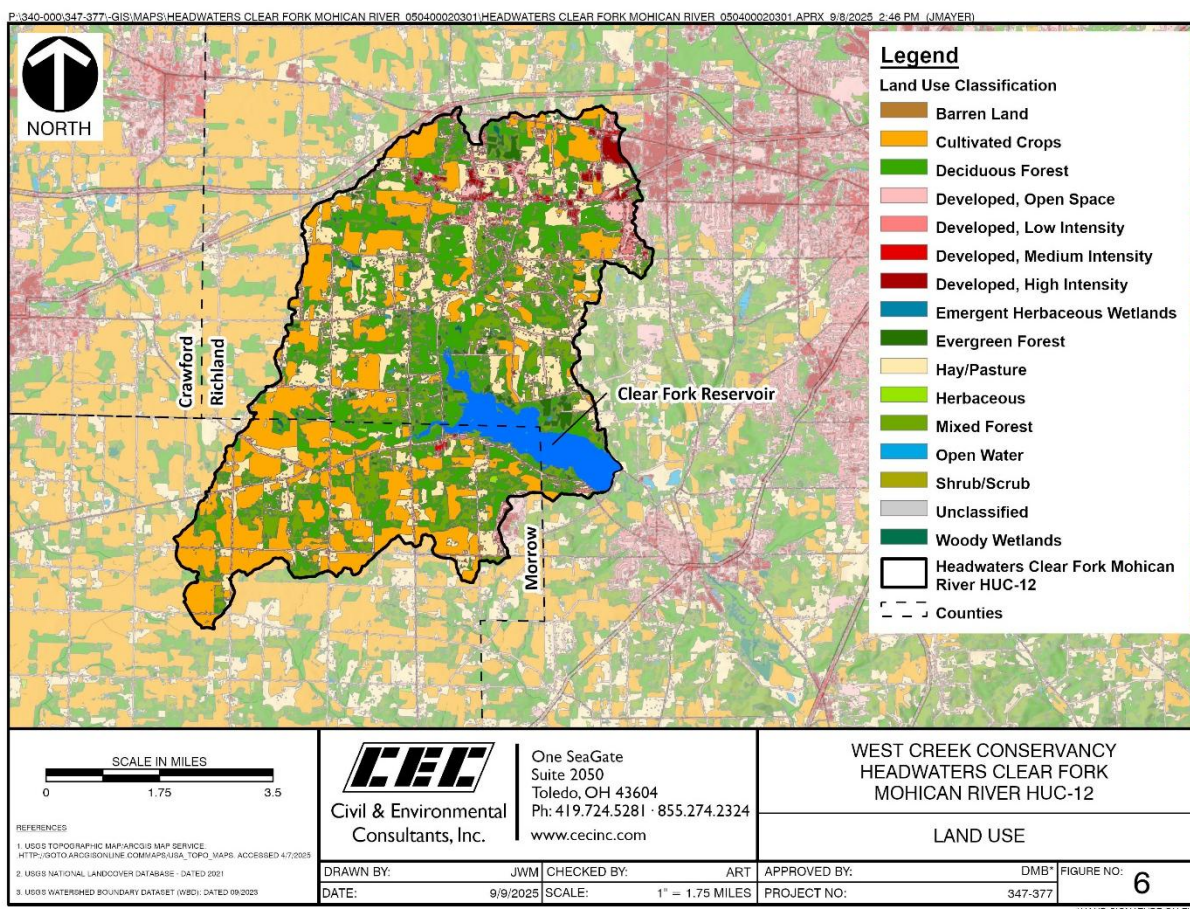


Figure 6: Land Use in the Headwaters Clear Fork Mohican River HUC-12

Developed, urban lands constitute a very small percentage of land area in the **Headwaters Clear Fork Mohican River HUC-12** (~12%), with developed open space comprising approximately half of that. The sub-watershed spans the following townships: North Bloomfield (Morrow County), Springfield and Sandusky (Richland County) and Troy (both counties). The concentration of urban land use occurs in the northeast section of the sub-watershed, mainly within the City of Ontario (Figure 7). Ontario has a

population of 6,656 as of 2020, showing a 17.4 % population growth over the last ten years (US Census Bureau, 2025; City of Ontario, 2025). Ontario has managed stormwater within in its municipal boundaries under a National Pollutant Discharge Elimination System (NPDES) Phase II Municipal Separate Storm Sewer System (MS4) permit (Permit #2GQ00000*DG) since 2009 (City of Ontario, 2025; Ohio EPA, 2024c). These stormwater systems do not connect with water treatment systems; therefore, oil, grease, pesticides, herbicides, dirt and grit are carried directly to waterways and have a high potential to negatively impact water quality. While the contributing runoff throughout MS4s is dispersed from urban nonpoint sources, it is considered to be a point source and permitted through the City’s MS4 permit.

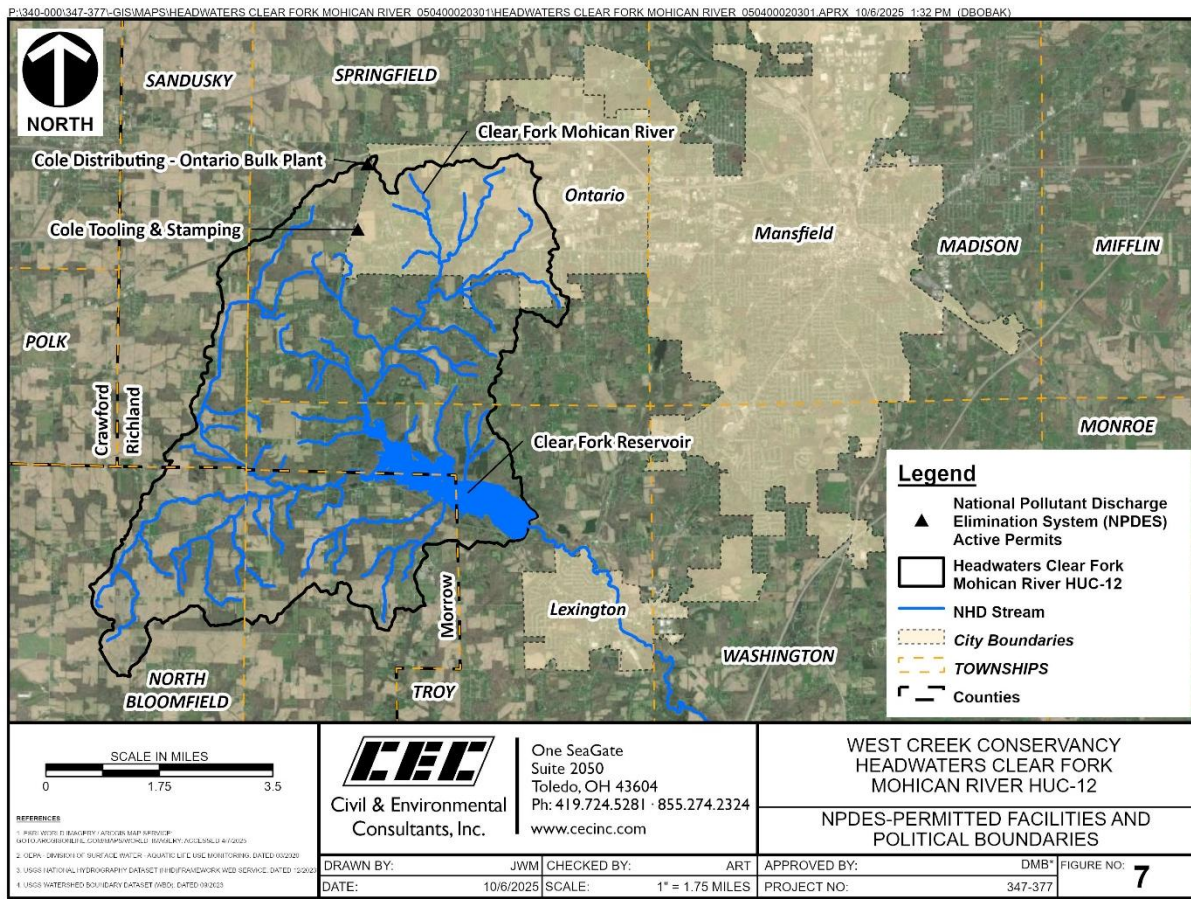


Figure 7: Political Boundaries and NPDES-Permitted Facilities in the Headwaters Clear Fork Mohican River HUC-12

Currently, there are two individual NPDES-permitted facilities located in the **Headwaters Clear Fork Mohican River HUC-12** (Table 4). The USEPA documents NPDES permit compliance through the Enforcement and Compliance History Online (ECHO) database (USEPA, 2025a). Results discussed here cover the three year (12-quarters) compliance history from July 1, 2022 through June 30, 2025. The Cole Distributing – Ontario Bulk Plant is reported to be in Significant Noncompliance (SNC) for ten quarters due to failure to submit discharge monitoring reports (DMR). Cole Tooling and Stamping reported exceedances in nitrogen ammonia for one quarter.

Table 4: NPDES-Permitted Facilities in the Headwaters Clear Fork Mohican River HUC-12

Facility Name	Permit Number	Receiving Waterbody	County
Cole Tooling & Stamping	2PR00243*DD	Unnamed Tributary to the Clear Fork Mohican River	Richland
Cole Distributing – Ontario Bulk Plant	2IN00179*FD	Black Fork Mohican River ^a	Richland

(Ohio EPA, 2025b)

NOTES

NPDES National Pollutant Discharge Elimination System

a The facility is located in the Headwaters Clear Fork Mohican River HUC-12; however, its discharge point lies in an adjacent sub-watershed.

Wastewater treatment within the City of Ontario is provided by the City of Mansfield, a larger municipality located to the east. Outside of the City boundary and in the rural landscape, residences and small businesses use HSTS, which are a potential source of NPS pollution for bacteria and nutrients. Using National Small Flows Clearinghouse Data from 1992 and 1998, 756 HSTS were estimated to be within the **Headwaters Clear Fork Mohican River HUC-12** (USEPA, 2024b). Studies conducted by the Ohio Department of Health (ODH) across Ohio have shown an average HSTS failure rate of 31% (ODH, 2013). Though the amount of NPS pollution from HSTS in the **Headwaters Clear Fork Mohican River HUC-12** is relatively small compared to other sources, repair or replacement of failing HSTS or connection to sanitary sewer lines reduces the potential for NPS pollution from this source. Richland Public Health (RPH) has received funding from the Water Pollution Control Loan Fund (WPCLF) for HSTS repair or replacement assistance (RPH, 2024).

The United States Department of Agriculture (USDA) *2022 Census of Agriculture* lists soybeans as the largest field crop harvested in Morrow and Richland Counties (~45% and ~35% respectively). Corn is the second most harvested crop, following with ~25% and ~35%, respectively. Lands used for forage and hay crops constitute ~5% of row crops in each county (USDA, 2024). In general, farms are relatively small in size in both counties, with the average operation in Morrow County covering 177 acres and 148 acres in Richland County (USDA, 2024).

Livestock operations are generally smaller in size (Table 5). Cow and goat inventories are of similar size in both Morrow and Richland Counties compared to the rest of the state, with Richland having a slightly higher density of cows than Morrow. Both Morrow and Richland Counties have a slightly higher than average inventory of horses and ponies, distinctive to the northeast quadrant of the state (USDA, 2024). No large Concentrated Animal Feeding Operations (CAFOs) or Ohio Department of Agriculture or ODA-permitted Confined Animal Feeding Facilities (CAFFs) are located within the sub-watershed (Ohio EPA, 2025b; PRR, 2023).

Table 5: Estimated Animal Counts in the Headwaters Clear Fork Mohican River HUC-12

Livestock Type	Animal Units
Beef	1,196
Dairy	589
Swine	4,054
Sheep	116
Horse	122
Chicken	35,979
Turkey	12
Duck	5

(Source: USDA Census of Agriculture, 2012, as presented in the PLET Input Data Server (USEPA, 2024b))

Forty-two (42) acres of land are listed in the United States Geological Survey’s (USGS) Protected Areas Database of the United States (PAD-US) for recreation and greenspace (Figure 8). However, over 2,400 acres are held as parks, campgrounds, reservoirs, and/or bird sanctuaries (Table 6). In 2021, the RCPD received a Clean Ohio grant to acquire 213 acres of an agricultural site near Blooming Grove. This land, now referred to as the Clear Fork Preserve, has the potential for a multi-phased restoration effort of approximately 100 acres of wetlands, 100 acres of upland and riparian buffer and up to 3,000 linear feet of stream (RCPD, 2021).

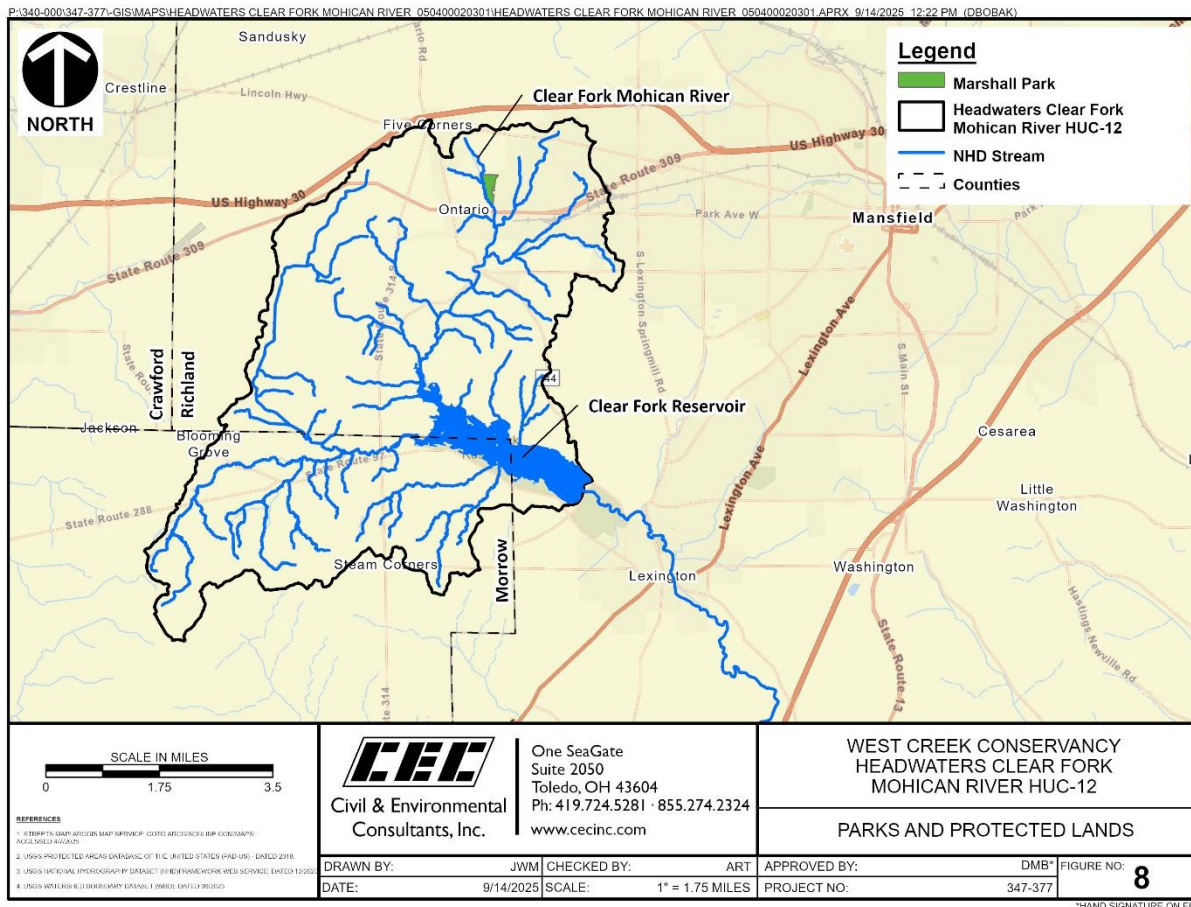


Figure 8: Parks and Protected Lands

Table 6: Parks and Protected Lands in the Headwaters Clear Fork Mohican River HUC-12

Name	Acreage	Owner/Manager	Description
Ontario Marshall Park ¹	42	Village of Ontario	Park with baseball diamonds, dog park and disc golf course
Clear Fork Marina and Campground ²	171	Private	Marina and campground
Clear Fork Reservoir ³	2,028	City of Mansfield	Reservoir
Ohio Bird Sanctuary ⁴	90	Private – Non-profit	Nature preserve/bird rehabilitation
Mansfield Memorial Park ²	55	Private – Non-profit	Cemetery
Gorman Nature Center ⁵	150	Richland County	Nature park with trails

(Source: ¹USGS, 2024; ²Google Earth, 2022; ³City of Mansfield, 2024; ⁴Ohio Bird Sanctuary, 2024; ⁵Richland County Park District, 2025)

These protected lands can contribute to conserved habitat for the seven federally threatened or endangered species listed by the United States Fish and Wildlife Service (USFWS) for Morrow and Richland Counties (Table 7). The Clear Fork Mohican River is listed as a Group 1 stream in Appendix A of the *Ohio Mussel Survey Protocol*, indicating that it is a small to mid-sized stream that has potential for mussels but the Federally Listed Species (FLS) on USFWS’s listing are not expected to be found (ODNR, 2025d).

Table 7: Threatened and Endangered Species in Richland and Morrow Counties, OH

Species	Status	Habitat Characteristics	County
Indiana bat (<i>Myotis sodalis</i>)	Endangered	Hibernates in caves and mines and forages in small stream corridors with well-developed riparian woods, as well as upland forests	Both
Little Brown Bat (<i>Myotis lucifungus</i>)	Under Review	Hibernates in caves and mines and forages over or along the margins of water bodies, as well as woodlands near water	Both
Northern long-eared bat (<i>Myotis septentrionalis</i>)	Endangered	Hibernates in caves and mines and swarms in surrounding wooded areas in autumn; roosts and forages in upland forests during late spring and summer	Both
Eastern massasauga (<i>Sistrurus catenatus</i>)	Threatened	Found in wet areas including prairies, marshes and low areas near water bodies. Individuals will also use surrounding upland habitat. Hibernates in crayfish burrows or under tree debris or roots	Richland
Snuffbox mussel (<i>Epioblasma triquetra</i>)	Endangered	Found in areas of swift current in small to medium sized streams burrowing in sand, gravel or cobble substrates	Morrow
Rayed bean (<i>Villosa fabalis</i>)	Endangered	Mostly found in smaller, headwater creeks, but sometimes in large rivers	Morrow
Eastern prairie fringed orchid (<i>Platanthera leucophaea</i>)	Threatened	Wet to mesic prairie habitats with open sun	Both

(Source: USFWS, 2024)

2018 (USDA-NRCS, 2018). Additional data provided by the Farm Service Agency (FSA) on current contracts within Morrow and Richland counties are found in Table 9.

Table 8: OptIS Countywide Conservation Practice Averages for the Mohican HUC-8

Conservation Practice	% Usage between 2015-2021
No-till conditions	28.7
Reduced till conditions	30.6
Conventional till	6.2
Cover crop	7.1

(Source: CTIC, 2024)

Table 9: Conservation Reserve Program (CRP) Contract Acreage in Richland and Morrow Counties

Practice	Acres*	
	Richland County	Morrow County
Establishment of Permanent Introduced Grasses and Legumes	288.53	25.20
Wildlife Food Plot	18.56	0.30
Establishment of Permanent Native Grasses	72.64	224.36
Filter Strips	74.88	344.24
Riparian Buffer	31.21	117.58
Wetland Restoration, Non-Floodplain	--	40.74
Rare and Declining Habitat	46.20	--
Tree Planting	18.36	7.50
Upland Habitat Buffers	32.39	41.00
Wildlife Habitat for Pheasants	48.71	450.41
Hardwood Tree Planting	306.05	73.98
Pollinator Habitat	351.82	4.00
Permanent Wildlife Habitat, Noneasement	363.52	19.40
Grassland Wildlife Plan; CP87	5.30	--
Grassland Wildlife Plan; CP88	11.69	81.74
Grass Waterways, Noneasement	41.16	191.47
Shallow Water Areas for Wildlife	0.28	16.40

(Source: USDA-NRCS, 2024)

NOTES

*Acres reported at the county level and may not necessarily fall within the Clear Fork Mohican River watershed boundaries.

Additionally, the H2Ohio Initiative, a comprehensive water quality initiative, was launched in 2019. Administered by three different departments: Ohio EPA, ODA and ODNR, the program aims to strategically address serious water quality issues that have been building in Ohio for decades (H2Ohio, 2023). The portion administered by ODA provides economic incentives to producers who develop Voluntary Nutrient Management Plans (VNMPs) for their fields and implement effective and cost-efficient best management practices (BMPs) that include: soil testing, variable rate fertilization, subsurface nutrient application, manure incorporation, conservation crop rotation, cover crops, drainage water management structures,

two-stage ditch construction, edge of field buffers and headwaters and coastal wetlands that reduce agricultural runoff (H2Ohio, 2023). The H2Ohio Program is offered on a limited basis in Richland and Morrow Counties. Enrollment for various practices in Richland County during 2021 and 2022 is available on the Data Ohio – H2Ohio Dashboard and is listed in Table 10. Data for Morrow County are not available.

Table 10: H2Ohio Enrollment in Richland County

Practice	Enrollment Acres*	
	2021	2022
VNMP Development	--	22,270
Conservation Crop Rotation – Small Grains	--	1,168
Overwintering Cover Crop	4,187	5,271

(Source: Data Ohio, 2025)

NOTES

*Acres reported at the county level and may not necessarily fall within the Black Fork Mohican watershed boundaries.

VNMP Voluntary Nutrient Management Plan

VRT Variable Rate Technology

-- No data available

The ODNR-administered H2Ohio program funded a wetland restoration project in the **Headwaters Clear Fork Mohican River HUC-12** in 2022-2023. The project included the restoration of approximately 57 acres of wet meadows and shrub-scrub wetlands, with the conversion of 12 acres of farmed croplands to wet meadow. Headwater and wetland functions were returned to the site with hydrologic reconnection of streams to their floodplain to raise the groundwater table and increase the wetland hydroperiod (West Creek, 2023). While the use of woody debris to create beaver dam analogs was proposed for the site, beaver activity pre-construction shifted the restoration activities toward the creation of additional habitat opportunities, enhanced seeding and an increase in invasive species management (West Creek, 2023).

2.2 Summary of HUC-12 Biological Trends

The Ohio EPA sampled the **Headwaters Clear Fork Mohican River HUC-12** in 2007, as documented in the *Biological and Water Quality Study of the Mohican River and Selected Tributaries, 2007/EAS/2009-5-4* (Ohio EPA, 2009). This report serves as the Technical Support Document (TSD) for the Mohican Total Maximum Daily Load (TMDL) study that is still under preparation. The Clear Fork Mohican River was confirmed for the WWH designation during this study. A summary of the single sample location and its biological status in the **Headwaters Clear Fork Mohican River HUC-12** is provided in Table 11. Data from this sampling focuses on macroinvertebrate communities only; therefore, additional data points in the downstream, adjacent sub-watershed, the *Town of Lexington-Clear Fork Mohican River HUC-12*, are also provided as a comparison. For reference, water quality standards (WQS) for the EOLP ecoregion are presented in Table 12.

Table 11: Biological Indices Scores for Sites in the Headwaters Clear Fork Mohican River HUC-12

Headwaters Clear Fork Mohican River HUC-12 (05040002 03 01)							
River Mile	Drainage Area (mi ²)	IBI	MIwb ^a	ICI ^b	QHEI	Attainment Status	Location
Clear Fork Mohican River (WWH)							
35.68 ^H	6.6	--	N/A	Good	N/A	(Full)	Marion Avenue
Town of Lexington-Clear Fork Mohican River HUC-12 (05040002 03 03) [^]							
Clear Fork Mohican River (WWH)							
29.57 ^W	39.6	--	--	Marginally Good ^{ns}	N/A	(Full)	Lexington Ontario Road
23.35 ^W	63.0	44	8.9	42	86.5	Full	Ritter Road

(Source: Ohio EPA, 2009)

NOTES

IBI Index of Biotic Integrity

a The Modified Index of Well Being (MIwb) is not applicable to headwater sites (drainage ≤20 mi²).

ICI Invertebrate Community Index

b Narrative evaluation used in lieu of ICI (E=Exceptional; G=Good; MG=Marginally Good; H Fair =High Fair; F=Fair; L Fair=Low Fair; P=Poor; VP=Very Poor).

QHEI Qualitative Habitat Evaluation Index

H Headwater site

W Wading site

ns Nonsignificant departure from ecoregion biocriteria (≤4 IBI or ICI units, ≤0.5 MIwb units).

-- Data not collected.

N/A Not applicable.

WWH Warmwater Habitat

() Attainment status based on single parameter

[^] No complete biological sampling sites exist in the Headwaters Clear Fork Mohican River HUC-12; therefore, data collected at sampling stations immediately downstream in the Town of Lexington-Clear Fork Mohican River HUC-12 are provided for reference.

Table 12: Water Quality Standards for the Erie Ontario Lake Plain (EOLP) Ecoregion

EOLP Ecoregion	WWH WQS			EWH WQS		
	Headwater	Wading	Boat	Headwater	Wading	Boat
IBI	40	38	40	50	50	50
MIwb	N/A	7.9	8.7	N/A	9.4	9.6
ICI	34	34	34	46	46	46
QHEI ^a	55	60	60	70	75	75

(Source: Ohio Administrative Code (OAC) 3745-1-07)

NOTES

WWH Warmwater Habitat

EWH Exceptional Warmwater Habitat

WQS Water Quality Standards

a QHEI is not criteria included in Ohio WQS; however, it has been shown to be highly correlated with the health of aquatic communities. In general, sites scoring 60 or above (or above 55 for headwater sites) support healthy aquatic assemblages indicative of WWH (Ohio EPA, 2013). Sites scoring 75 or above support Exceptional Warmwater Habitat assemblages (Ohio EPA, 1999).

N/A MIwb not applicable to headwaters sampling locations with drainage areas ≤ 20 mi².

Fishes (Modified Index of Well-Being [MIwb] & Index of Biotic Integrity [IBI])

In 2007, 30 streams within the Mohican River watershed were sampled for biological data. Of these streams, 67% met attainment thresholds, while 16% were partially attaining and 17% failed to meet attainment goals. Generally, the Clear Fork Mohican River meets WQS; however, the stream has a history of channel modification, specifically when the Clear Fork Reservoir dam, at RM 30.59, was constructed in 1949 (Ohio EPA, 2009). Poor habitat quality and substrate embeddedness was documented in the Clear Fork Mohican River from 1998 to 2004, and siltation was noted as a high magnitude of impairment. At the time of the 2007 survey, the stream was in various stages of recovery (Ohio EPA, 2009). While no fish metrics were surveyed at the sampling point in the **Headwaters Clear Fork Mohican River HUC-12**, nor at the sampling point immediately downstream from the sub-watershed in the *Town of Lexington-Clear Fork Mohican River HUC-12*, fish communities at sampling locations throughout the remainder of the stream were in *Full Attainment* of the WWH designation.

Macroinvertebrates (Invertebrate Community Index [ICI])

Four sites within the *Headwaters Clear Fork Mohican HUC-10* were assessed for ALU, and two additional sites were added for just macroinvertebrate sampling, one within the **Headwaters Clear Fork Mohican River HUC-12** and one just downstream in the *Town of Lexington-Clear Fork Mohican River HUC-12*. Despite noted siltation throughout the Clear Fork Mohican River, communities at both these additional locations met WWH expectations. Assemblages at RM 35.67 were *Good*; however, assemblages at RM 29.57 appeared to be impacted by enriched and organic-laden water released from an upstream septic discharge.

Habitat (via Qualitative Habitat Evaluation Index [QHEI])

The Ohio EPA sampling crews documented various water quality and habitat attributes during the QHEI assessment within the Mohican River watershed in 2007; however, habitat was not evaluated in the **Headwaters Clear Fork Mohican River HUC-12** or immediately downstream from the sub-watershed (Table 12). The next closest sampling location is shown in Table 13 as a general reference for downstream conditions of the Clear Fork Mohican River; however, the high-quality habitat noted there does not necessarily translate to the upper reaches of the Clear Fork Mohican River.

Anecdotally, stakeholders have identified that habitat found within the **Headwaters Clear Fork Mohican River HUC-12** is impacted by a high amount of sedimentation that settles behind the Clear Fork Reservoir Dam. This high amount of sediment loss is contributing to recent turbidity violations for the City of Mansfield's drinking water plant and has prompted the City to begin studying the level and rate of sedimentation within the Reservoir (Hunnell, 2024).

Table 13: QHEI Matrix for the Headwaters Clear Fork Mohican River HUC-12

Headwaters Clear Fork Mohican River HUC-12 (05040002 03 01)																																
Key QHEI Components			WWH Attributes											MWH Attributes																		
														High Influence						Moderate Influence												
River Mile	QHEI Score	Gradient (ft/mi)	Not Channelized or Recovered	Boulder/Cobble/Gravel Substrate	Silt Free Substrates	Good/Excellent Development	Moderate/High Sinuosity	Extensive/Moderate Cover	Fast Current/Eddies	Low/Normal Embeddedness	Max Depth >40 cm	Low/No Riffle/Run Embeddedness	WWH Attributes	Channelized/No Recovery	Silt/Muck Substrates	No Sinuosity	Sparse/No Cover	Max Depth <40 cm	High-Influence MWH Attributes	Recovering Channel	Heavy/Moderate Silt Cover	Sand Substrate (Boat)	Hardpan Substrate Origin	Fair/Poor Development	Low Sinuosity	Only 1 or 2 Cover Types	Intermediate/Poor Pools	No Fast Current	High/Moderate Embeddedness	High/Moderate Riffle Embeddedness	No Riffle	Moderate-Influence MWH Attributes
Clear Fork Mohican River (WWH)																																
35.68 ^H	--	--	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Town of Lexington-Clear Fork Mohican River HUC-12 (05040002 03 03)[^]																																
Clear Fork Mohican River (WWH)																																
29.57 ^W	--	--	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
23.35 ^W	86.5	8.85	•	•	•	•	•	•	•	•	•	•	9							0												0

(Source: Ohio EPA, 2009)

NOTES

QHEI Qualitative Habitat Evaluation Index

W Wading site

WWH Warmwater Habitat

[^] No complete biological sampling sites exist in the Headwaters Clear Fork Mohican River HUC-12; therefore, attainment will be compared to sampling sites downstream in the Town of Lexington-Clear Fork Mohican River HUC-12

Generally, streams that have QHEI scores of at least 60 are capable of supporting WWH assemblages. Strong correlations exist between habitat attributes and a stream’s ability to support healthy aquatic assemblages (Ohio EPA, 1999). The presence of certain attributes are shown to have a larger negative impact on fish and macroinvertebrate communities. Streams designated as WWH should exhibit no more than four total Modified Warmwater Habitat (MWH) attributes; additionally, no more than one of those four should be of high-influence (Ohio EPA, 2013). While habitat was not assessed within the **Headwaters Clear Fork Mohican River HUC-12**, habitat downstream is of high quality, performing at Exceptional Warmwater Habitat (EWH) standards (QHEI ≥75).

2.3 Summary of HUC-12 Pollution Causes and Associated Sources

As listed in the *Biological and Water Quality Study of the Mohican River and Selected Tributaries, 2007/EAS/2009-5-4* (Ohio EPA, 2009), one sampling location in the **Headwaters Clear Fork Mohican River HUC-12** is considered to be in *Full Attainment* of the WWH designation, based upon its ICI score (Table 14)². For reference, a similar site immediately downstream of the Clear Fork Reservoir Dam is considered to be in *Full Attainment* of the WWH designation, based upon its marginally-attaining ICI score. The next immediate downstream location with a full ALU assessment is also in *Full Attainment* of the WWH designation.

Table 14: Causes and Sources of Impairments in the Headwaters Clear Fork Mohican River HUC-12

Headwaters Clear Fork Mohican River HUC-12 (05040002 03 01)				
River Mile	Primary Cause(s)	Primary Source(s)	Attainment Status	Location
Clear Fork Mohican River (WWH)				
35.68 ^H	--	--	(Full)	Marion Avenue
Town of Lexington-Clear Fork Mohican River HUC-12 (05040002 03 03)[^]				
Clear Fork Mohican River (WWH)				
29.57 ^W	--	--	(Full)	Lexington Ontario Road
23.35 ^W	--	--	Full	Ritter Road

(Source: Ohio EPA, 2009)

NOTES

WWH Warmwater Habitat

H Headwater site

W Wading site

() Attainment status based on single parameter

[^] No complete biological sampling sites exist in the Headwaters Clear Fork Mohican River HUC-12; therefore, attainment will be compared to sampling sites downstream in the Town of Lexington-Clear Fork Mohican River HUC-12

Efforts made in the agricultural landscape to mitigate NPS pollution can help offset other impacts and help maintain attainment of WQS. Agricultural operations can have a substantial impact on water quality due to the extent of farm activities on the landscape, the soil-disturbing nature of those activities and associated impacts from sediment, nutrients and other crop-related chemicals (USEPA, 2023b). Soil erosion, nutrient loss, bacteria from livestock manure and pesticides are primary stressors to water quality that unbalance both water chemistry and habitat. Additionally, channelization diminishes the quality and diversity of streamside habitats by altering water temperatures, flows and channel-forming processes. When the riparian ecosystem functionality is altered, impacts to water quality can be seen in increased sedimentation, nutrient loads and temperatures that lead to algal blooms or eutrophication (California State Water Board, 2018). Floodplains and riparian habitats that are disconnected from their floodwaters through channelization lose their ability to attenuate sediments and associated nutrients on the land.

² The USEPA *How's My Waterbody Report* (2025b) lists "Insufficient Info" for Aquatic Life Use for the **Headwaters Clear Fork Mohican River HUC-12**. For the purposes of this NPS-IS, attainment is based off one biological index.

Loss of sediments from the surrounding landscape (both in urban and agricultural settings) may also imply loss of nutrients, as a fraction of these nutrients introduced to the landscape through fertilization techniques and other sources bind to soil particles. As soil particles are lost to local waterways, additional nutrients can become available for microorganism uptake, and in situations where nutrients concentrate and are overabundant, eutrophication occurs and drives HAB formation. This can occur both in-stream as well as in far-field, receiving waterbodies, such as the Clear Fork Reservoir or further, including the Ohio River.

The TSD noted that water chemistry was tested at three locations in the Clear Fork Mohican River (RM 35.68, 29.57 and 23.35) and was found to be generally good. No indication of nutrient enrichment in the stream was observed at the time and no phosphorus concentrations were above target. Only one nitrate-nitrite concentration exceeded the target value, which was located at RM 35.68 within the **Headwaters Clear Fork Mohican River HUC-12**. The Ohio EPA did note a green hue downstream of the Clear Fork Reservoir at RM 29.57, and attributed this discoloration to the reservoir itself, which was noted to be eutrophic and containing a high amount of primary productivity in the form of algae (Ohio EPA, 2009). These algae would spill over the dam, impacting sites downstream.

Nutrient loadings within individual sub-watersheds throughout the State of Ohio can be estimated using *Mass Balance* results derived from the larger, HUC-8 watersheds for which nutrient data are available. These estimates can be classified into estimated loads from contributing sources of NPS pollutants, such as agricultural lands/activities and developed/urban lands (Table 15). Efforts to reduce nutrients from each of these contributing sources will focus on reaching the 20% reduction goal by 2025, as outlined by the HTF in 2014.

Table 15: Estimated Annual Nutrient Loadings in the Headwaters Clear Fork Mohican River HUC-12

	Agricultural Load (lbs/yr)		Developed/Urban Load (lbs/yr)	
	Total Nitrogen	Total Phosphorus	Total Nitrogen	Total Phosphorus
Current Estimates*	140,000	7,600	19,000	1,100
Target Loadings	110,000	6,100	15,000	880

(Source: Ohio EPA, 2024b)

NOTES

*Estimated using two significant figures

Within the **Headwaters Clear Fork Mohican River HUC-12**, the Clear Fork Mohican was given a PCR-Class B designation, for which it was in *Full Attainment* in 2007 (Table 16). However, the Class B designation is no longer in use, and compared to current standards, would be in *Non-Attainment* of the PCR designation for exceeding the 90-day geometric mean target. Current statewide standards for Recreational Use are in Table 17.

Table 16: Recreational Water Quality Data in the Headwaters Clear Fork Mohican River HUC-12

River Mile	Location	Number of Samples	Geometric Mean (CFU per 100 ml)	Maximum Value (CFU per 100 ml)	Attainment Status	Potential Sources
Clear Fork Mohican River (WWH)						
35.68	Marion Avenue	5	138	260	Full ^a	--

(Source: Ohio EPA, 2009)

NOTES

CFU Colony Forming Unit

ml Milliliters

a Based upon classification of the Clear Fork Mohican River at RM 35.68 as a Primary Contact Recreation – Class B stream. This classification is no longer in use, and if compared to current WQS, this site would be in Non-Attainment.

Table 17: Statewide Numerical Criteria for Recreational Use Protection

Recreation use	<i>E. coli</i> (CFU per 100 ml)	
	90-day geometric mean	Statistical threshold value ¹
Bathing water	126	410 ^a
Primary contact recreation	126	410
Secondary contact recreation	1,030	1,030

(Source: Ohio Administrative Code 3745-1-37)

NOTES

E. coli Escherichia coli

1 These criteria shall not be exceeded in more than ten percent of the samples taken during any 90-day period.

a A beach action value of 235 *E. coli* colony counts per 100 ml shall be used for the purpose of issuing beach and bathing water advisories.

CFU Colony Forming Units

ml Milliliters

At the time of sampling in 2007, the Clear Fork Mohican River at RM 30.6 was listed in *Full Attainment* of the PWS designation. However, sampling in 2017 yielded at least two water samples with microcystin levels above the acceptable standard of 1.0 micrograms per liter (ug/L) (Ohio EPA, 2018). The **Headwaters Clear Fork Mohican River HUC-12** has been on Ohio’s Integrated Report List for impairment since 2018 (Table 18). Public water supply thresholds for algae-cyanotoxins are referenced in Table 19.

Table 18: Public Water Supply Integrated Report Data for the Headwaters Clear Fork Mohican River HUC-12

River Mile	Location	Year	Indicator					Notes
			Nitrate	Pesticides	Other Contaminants	Algae - Cyanotoxins	Cryptosporidium	
Clear Fork Mohican River (WWH)								
30.6	City of Mansfield Intake	2018	Full	Full	Full	Non	Full	The City of Mansfield's source water from Clear Fork Reservoir had microcystins exceeding the threshold from August to November 2017 (maximum 5.6 µg/L). Saxitoxins were also detected, but only one raw water sample exceeded the saxitoxins threshold (maximum 0.25 µg/L).
		2020	Full	Full	Full	Non	Full	The City of Mansfield's source water from Clear Fork Reservoir had microcystins exceeding the threshold in 2016 and 2018 (maximum concentration 5.6 µg/L).
		2022	Full	Full	Full	Non	Full	The City of Mansfield's source water from Clear Fork Reservoir had microcystins exceeding the threshold in 2016 and 2018 (maximum concentration 5.6 µg/L).
		2024	Full	Full	Full	Non	Full	The City of Mansfield's source water from Clear Fork Reservoir had microcystins exceeding the threshold in 2016 and 2018 (maximum concentration 5.6 µg/L).

(Source: Ohio EPA, 2018; 2020; 2022; 2024a)

NOTES

ug/L Micrograms per liter

Table 19: Public Water Supply Attainment Determination for the Algae – Microcystin Indicator

	Full Attainment	Impaired	Watch List
Algae - Microcystins	No more than one excursion ^a above the state drinking water thresholds (microcystins = 1.0 µg/L, cylindrospermopsin = 1.0 µg/L, and saxitoxins = 0.2 µg/L) within the 5-year period	Two or more excursions ^a above the state drinking water thresholds (microcystins = 1.0 µg/L) within the 5-year period	Maximum instantaneous value > 50% of the state drinking water thresholds

(Source: Ohio EPA, 2018; 2020; 2022; 2024a)

NOTES

a Excursions must be at least 30 days apart in order to capture separate or extended source water quality events

2.4 Additional Information for Determining Critical Areas and Developing Implementation Strategies

Assessment data from the 2007 sampling event and data referenced in the *Biological and Water Quality Study of the Mohican River and Selected Tributaries, 2007/EAS/2009-5-4* (Ohio EPA, 2009), the *2024 Integrated Report* (Ohio EPA, 2024a) and the *Water Quality and Hydrologic Units Online Database* (Ohio EPA, 2025b) were used in the development of this NPS-IS. Any additional documents and/or studies created by outside organizations that were used as supplemental information to develop this NPS-IS are referenced in Chapter 5 (Works Cited), as appropriate.

CHAPTER 3: CRITICAL AREA CONDITIONS & RESTORATION STRATEGIES

3.1 Overview of Critical Areas

One biological sampling site is located in the Clear Fork Mohican River in the **Headwaters Clear Fork Mohican River HUC-12** and is in *Full Attainment* of the WWH designation. While the sub-watershed is in attainment for ALU, three critical areas have been identified to address NPS pollution that contributes to far-field impairment and threatens near-field attainment (Figure 10³). Two critical areas will address far-field impacts of nutrients and sediments flowing in the Clear Fork Mohican River to the Clear Fork Reservoir, and onward to the Ohio River, Mississippi River and the Gulf. One critical area will address riverine habitat alterations and channelization effects that threaten the attainment of near-field communities (Table 20).

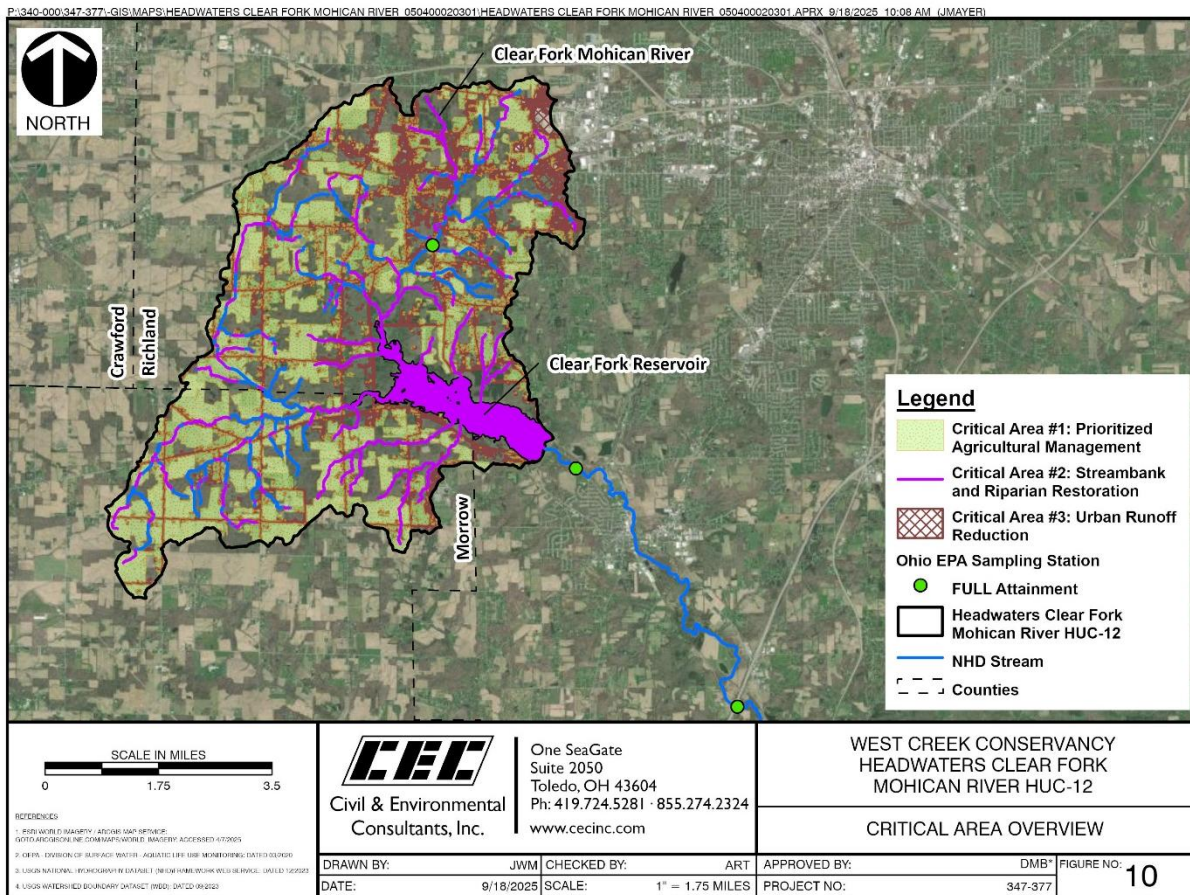


Figure 10: Headwaters Clear Fork Mohican River HUC-12 Critical Area Overview

³ Critical area maps developed with the most recently available digital geographic data and may not reflect current land use or existing conditions that have changed since digital publication.

Table 20: Headwaters Clear Fork Mohican River HUC-12 Critical Area Descriptions

Critical Area Number	Critical Area Description	Impairments Addressed
1	Nutrient Reduction in Prioritized Agricultural Lands	Far-field, with near-field effects
2	Streambank and Riparian Restoration	Near-field, with far-field effects
3	Urban Runoff Reduction	Far-field, with near-field effects

3.2 Critical Area #1: Conditions, Goals & Objectives for Prioritized Agricultural Lands

3.2.1 Detailed Characterization

Ohio's *Nutrient Mass Balance Study* (Ohio EPA, 2024d) estimated 81% of the nitrogen nutrient loading and 69% of the phosphorus nutrient loading to the Ohio River via the Muskingum River was primarily from nonpoint sources, related to land use activities, with smaller contributions from failing HSTS and NPDES-permitted facilities. Given the abundance of agricultural land use throughout the Mohican watershed, the use of BMPs are recommended for agricultural operations to minimize nutrient and associated sediment loss to local waterways and drainage ditches through surface and tile flow.

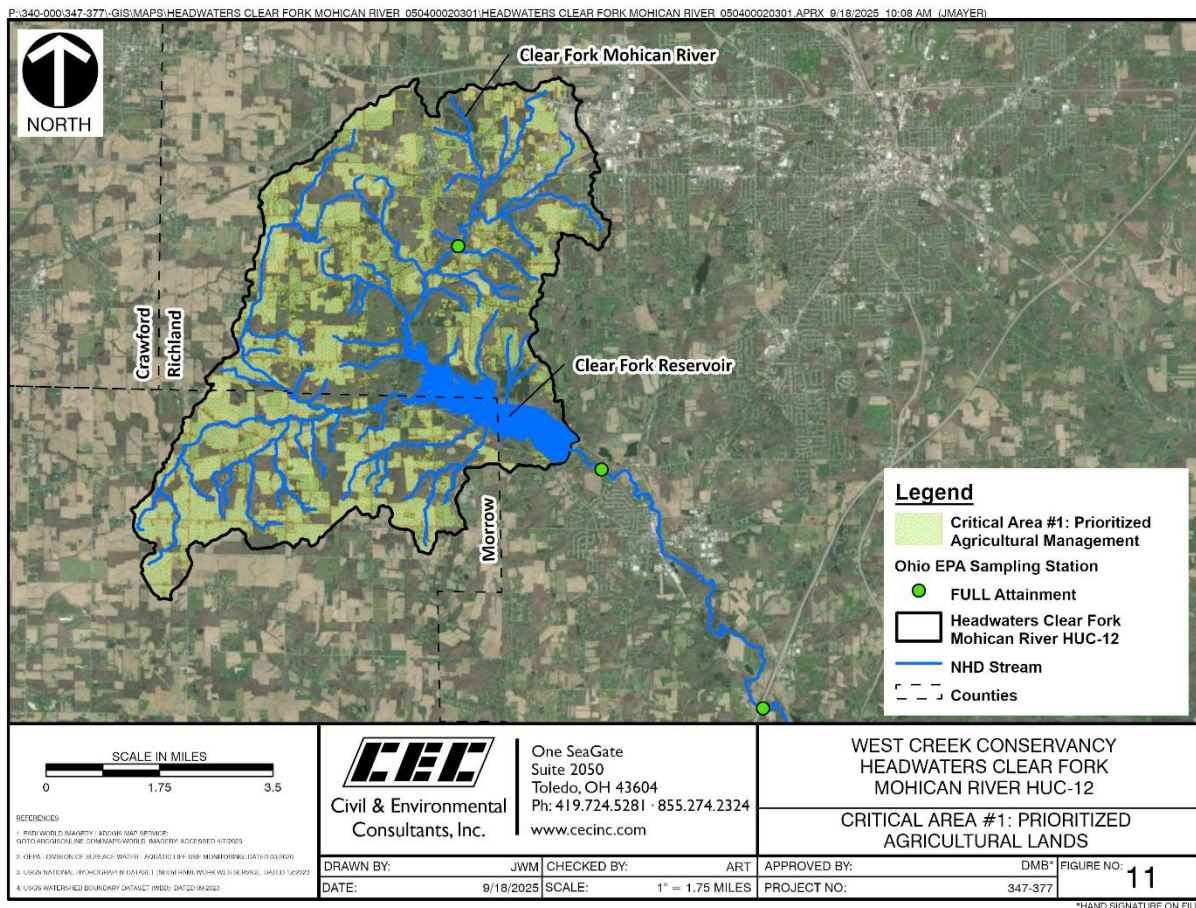


Figure 11: Headwaters Clear Fork Mohican River HUC-12 Critical Area #1

While BMPs are encouraged on all agricultural lands, certain lands are more prone to nutrient loss than others and are prioritized for BMP implementation. Lands maintained under conventional agricultural production or managed as pasture are prone to contribute excessive sediment and nutrient loadings to adjacent waterways that eventually flow to the ORB. Lands that are proximal to streams and ditches or do not currently implement specific BMPs are most vulnerable to excessive nutrient and sediment loss, and these lands are also prioritized as critical within this watershed. *Critical Area #1* contains prioritized agricultural lands throughout the **Headwaters Clear Fork Mohican River HUC-12** (Figure 11).

Of the approximate 9,298 agricultural acres in the **Headwaters Clear Fork Mohican River HUC-12**, prioritized lands are operations that meet one or more of the following criteria:

- Lands directly adjacent to streams or drainage waterways;
- Lands in need of surface water management for runoff retention or erosion reduction;
- Lands with uncontrolled or unfiltered subsurface drainage water;
- Lands without a current (<3 years) nutrient management plan or soil test; and,
- Lands without a current grazing management plan or comprehensive nutrient management plan and/or lands in need of pasture, livestock and/or manure management.

3.2.2 Detailed Biological Conditions

Analysis of the abundance, diversity and pollution tolerance of existing fish species found by Ohio EPA at each sampling location, in relation to the corresponding QHEI score, aids in the identification of causes and sources of impairment. No fish community data are available for the single sampling point within the **Headwaters Clear Fork Mohican River HUC-12**, nor at the most immediate downstream location in the *Town of Lexington- Clear Fork Mohican River HUC-12*. Fish communities were monitored at RM 23.35, approximately seven miles downstream of the sub-watershed terminus (Table 21). Here, two species that are becoming increasingly rare in Ohio were found: the bigeye chub and redbside dace (Ohio EPA, 2009).

Table 21: Critical Area #1 – Fish Community and Habitat Data

Headwaters Clear Fork Mohican River HUC-12 (05040002 03 01)							
River Mile	Drainage Area (mi ²)	Total Species	QHEI	IBI	MIwb ^a	Predominant Species (Percent of Catch)	Narrative Evaluation
Clear Fork Mohican River (WWH)							
35.68 ^H	6.6	--	--	--	N/A	--	--
Town of Lexington-Clear Fork Mohican River HUC-12 (05040002 03 03)[^]							
Clear Fork Mohican River (WWH)							
29.57 ^W	39.6	--	--	--	--	--	--
23.35 ^W	63.0	25	86.5	44	8.9	Creek chub (22%), mottled sculpin (22%), greenside darter (10%)	Good – Very Good

(Source: Ohio EPA, 2009)

NOTES

IBI Index of Biotic Integrity

a The Modified Index of Well Being (MIwb) is not applicable to headwater sites (drainage ≤20 mi²).

QHEI Qualitative Habitat Evaluation Index

W Wading site

N/A Not applicable

-- No data available

WWH Warmwater Habitat

^ No complete biological sampling sites exist in the Headwaters Clear Fork Mohican River HUC-12; therefore, attainment will be compared to sampling sites downstream in the Town of Lexington-Clear Fork Mohican River HUC-12

Characteristics of the aquatic macroinvertebrate community for the **Headwaters Clear Fork Mohican River HUC-12** sampling location in *Critical Area #1* are summarized below (Table 22). Analysis of the abundance, diversity, and pollution tolerance of existing aquatic macroinvertebrates (bugs) found by Ohio EPA at these sampling locations, related to QHEI scores, can aid in the identification of causes and sources of impairment. Communities at RM 35.68 performed well, with a substantial number of *Ephemeroptera*, *Plecoptera* and *Trichoptera* (EPT) taxa. For reference, communities at the next closest downstream location in the *Town of Lexington-Clear Fork Mohican River HUC-12* showed impact from an observed septic discharge at RM 35.67, reflected in the decrease of EPT taxa and diversity. However, communities still marginally met WWH attainment (Ohio EPA, 2009).

Table 22: Critical Area #1 - Macroinvertebrate Community Data

Headwaters Clear Fork Mohican River HUC-12 (05040002 03 01)		
River Mile	ICI Score-Narrative ^a	Predominant Species ^b
Clear Fork Mohican River (WWH)		
35.68 ^H	N/A – Good 11 qualitative EPT taxa	<i>Hydra sp</i> (F), <i>Turbellaria</i> (F), <i>Oligochaeta</i> (T), <i>Caecidotea sp</i> (T), <i>Lirceus sp</i> (MT), <i>Hyaella Azteca</i> (F), <i>Orconectes sp</i> (F), <i>Hydrachnidia</i> (F), <i>Baetis flavistriga</i> (F), <i>Baetis intercalaris</i> (F) <i>Centroptilum sp</i> (w/o hindwing pads) (MI), <i>Stenonema femoratum</i> (F), <i>Caenis sp</i> (F), <i>Calopteryx sp</i> (F), <i>Coenagrionidae</i> (T), <i>Argia sp</i> (F), <i>Corduliidae</i> , <i>Leuctra sp</i> (MI), <i>Sialis sp</i> (MT), <i>Polycentropus sp</i> (MI), <i>Cheumatopsyche sp</i> (F), <i>Ceratopsyche morosa group</i> (MI), <i>Ceratopsyche slossonae</i> (MI), <i>Hydroptila sp</i> (F), <i>Enochrus sp</i> (MT), <i>Helophorus sp</i> (MT), <i>Laccobius sp</i> (F), <i>Paracymus sp</i> (MT), <i>Dubiraphia quadrinotata</i> (F), <i>Stenelmis sp</i> (F), <i>Hexatoma sp</i> (MI), <i>Tipula sp</i> (F), <i>Anopheles sp</i> (F), <i>Simulium sp</i> (F), <i>Ceratopogonidae</i> (T), <i>Conchapelopia sp</i> (F), <i>Helopelopia sp</i> (F), <i>Pentaneura inconspicua</i> (F), <i>Procladius (Holotanypus) sp</i> (MT), <i>Brillia flavifrons group</i> (F), <i>Cricotopus (C.) bicinctus</i> (T), <i>Eukiefferiella claripennis group</i> (MT), <i>Orthocladius (O.) sp</i> (F), <i>Parametrioctenus sp</i> (F), <i>Tvetenia bavarica group</i> (MI), <i>Chironomus (C.) decorus group</i> (T), <i>Cryptochironomus sp</i> (F), <i>Dicrotendipes fumidus</i> (F), <i>Paratendipes albimanus</i> or <i>P. duplicatus</i> (F), <i>Polypedilum (Uresipedilum) flavum</i> (F), <i>Polypedilum (P.) illinoense</i> (T), <i>Polypedilum (Tripodura) scalaenum group</i> (F), <i>Stictochironomus sp</i> (F), <i>Rheotanytarsus sp</i> (MI), <i>Tanytarsus sp</i> (F), <i>Tanytarsus glabrescens group sp 7</i> (F), <i>Eristalis sp</i> (VT), <i>Limnophora aequifrons</i> (F)
Town of Lexington-Clear Fork Mohican River HUC-12 (05040002 03 03)[^]		
Clear Fork Mohican River (WWH)		
29.57 ^W	N/A – Marginally Good ^{ns} 7 qualitative EPT taxa	<i>Eunapius fragilis</i> (F), <i>Turbellaria</i> (F), <i>Oligochaeta</i> (T), <i>Lirceus sp</i> (MT), <i>Hyaella Azteca</i> (F), <i>Hydrachnidia</i> (F), <i>Stenonema femoratum</i> (F), <i>Leptophlebia sp</i> (F) or <i>Paraleptophlebia sp</i> (F), <i>Caenis sp</i> (F), <i>Calopteryx sp</i> (F), <i>Coenagrionidae</i> (T), <i>Cheumatopsyche sp</i> (F), <i>Hydropsyche depravata group</i> (F), <i>Hydroptilidae</i> (F), <i>Neophylax sp</i> (MI), <i>Stenelmis sp</i> (F), <i>Conchapelopia sp</i> (F), <i>Helopelopia sp</i> (F), <i>Natarsia species A (sensu Roback, 1978)</i> (T), <i>Cricotopus (C.) bicinctus</i> (T), <i>Chironomus (C.) decorus group</i> (T), <i>Polypedilum (Uresipedilum) flavum</i> (F),

Headwaters Clear Fork Mohican River HUC-12 (05040002 03 01)		
River Mile	ICI Score-Narrative ^a	Predominant Species ^b
Town of Lexington-Clear Fork Mohican River HUC-12 (05040002 03 03) [^]		
Clear Fork Mohican River (WWH)		
		<i>Polypedilum (P.) illinoense</i> (T), <i>Polypedilum (Tripodura) scalaenum group</i> (F), <i>Stictochironomus sp</i> (F), <i>Elimia sp</i> (MI), <i>Dreissena polymorpha</i> (F)
23.35 ^w	42 – Very Good 13 qualitative EPT taxa	<i>Polypedilum (Uresipedilum) flavum</i> (F), <i>Lirceus sp</i> (MT), <i>Ceratopsyche morosa group</i> (MI)

(Source: Ohio EPA, 2009)

NOTES

H Headwater site

W Wading site

ns Nonsignificant departure from ecoregion biocriteria (≤ 4 IBI or ICI units, ≤ 0.5 MIwb units).

a Narrative evaluation used in lieu of ICI

b When scored qualitatively, all species observed at the site are listed. When quantitative scores are available, the top three species by number are listed.

Tolerance Categories: VT=Very Tolerant, T=Tolerant, MT=Moderately Tolerant, F=Facultative, MI=Moderately Intolerant, I=Intolerant

WWH Warmwater Habitat

[^] No complete biological sampling sites exist in the Headwaters Clear Fork Mohican River HUC-12; therefore, attainment will be compared to sampling sites downstream in the Town of Lexington-Clear Fork Mohican River HUC-12

3.2.3 Detailed Causes and Associated Sources

One sampling location in the Clear Fork Mohican River is located in the **Headwaters Clear Fork Mohican River HUC-12** and is in *Full Attainment* of the WWH designation. Attainment at this location (RM 35.68) is based on one biological index and habitat was not assessed during the sampling event in 2007. Included in Table 13 (p.22) as a reference point, habitat was assessed in the next downstream adjacent sub-watershed, approximately seven miles downstream. Habitat at this location (RM 23.35) scored within the Exceptional range; however, forested/undeveloped land use upstream of this sample point substantiated a fairly wide riparian corridor along much of the Clear Fork Mohican River length downstream from the **Headwaters Clear Fork Mohican River HUC-12**. This site, in its pristine nature, is likely not a good proxy for habitat at RM 35.68. Siltation issues observed today, as well as during the 2007 study, are a limiting factor in aquatic habitat within the **Headwaters Clear Fork Mohican River HUC-12**.

These noted siltation issues are likely a result of land use activities, which includes impacts from agricultural operations within the watershed. From a far-field perspective, agricultural land use activities contribute to excessive nutrient loadings to the Ohio River, eventually reaching the Mississippi River and then the Gulf, contributing to its extensive hypoxic zone. The use of a variety of BMPs on private agricultural lands, at both in-field and edge-of-field locations can help reduce the amount and concentration of nutrient-laden surface runoff and tile drainage. Many BMPs can not only address the reduction of nutrients in surface and drainage water, but they can also simultaneously address the loss of

sediment from agricultural lands, which contributes to sediment-covered substrates in local waterways. In addition, a reduction of sediment loss to local waterways can also reduce nutrient loss to near-field and far-field waterbodies, as nutrients will also adsorb to sediment particles, potentially becoming dissolved at a later time. The implementation of BMPs on agricultural lands that are prone to sediment and nutrient loss serves as a benefit for both near-field and far-field waterbodies.

3.2.4 Outline Goals and Objectives for the Critical Area

The overarching goal of any NPS-IS is to improve water quality scores or meet nutrient reduction goals in order to remove a waterbody's impairment status and reach attainment of WQS for the WAU⁴. Agricultural land use activities in *Critical Area #1* contribute to far-field impairment through excessive nutrient loss to local waterways that flow eventually to the Ohio River, which also impacts near-field impairment and stressed aquatic communities in the Clear Fork Mohican River and its tributaries. The Ohio EPA has estimated nutrient loadings associated with various land uses and sources within targeted watersheds in the ORB, and has set nitrogen and phosphorus reduction goals for agricultural and urban sources.

Goals

To achieve the desired nutrient reductions from agricultural land use in the **Headwaters Clear Fork Mohican River HUC-12**, the following goals have been established:

Goal 1. Reduce nitrogen loading contributions in the **Headwaters Clear Fork Mohican River HUC-12**, to a level at or below 110,000 lbs/year (~20% reduction).
NOT ACHIEVED: Current estimated load contribution is 140,000 lbs/year.

Goal 2. Reduce phosphorus loading contributions in the **Headwaters Clear Fork Mohican River HUC-12** to a level at or below 6,100 lbs/year (~20% reduction).
NOT ACHIEVED: Current estimated load contribution is 7,600 lbs/year.

Simultaneous goals relate to the improvement of in-stream conditions within the Clear Fork Mohican River and its tributaries in order to improve the health of aquatic communities. Implementation of BMP objectives geared toward nutrient reduction efforts will generally also help make incremental progress toward the following goals:

Goal 3. Maintain an ICI score at or above 34 (Good) at Marion Avenue in the Clear Fork Mohican River (RM 35.68).
✓ ACHIEVED: Site currently has a score of Good (~34).

Goal 4. Achieve an IBI score at or above 40 at Marion Avenue in the Clear Fork Mohican River (RM 35.68).
NOT ACHIEVED: No data currently exists for this metric.

⁴ Defined as the HUC-12.

Goal 5. Achieve a QHEI score at or above 55 at Marion Avenue in the Clear Fork Mohican River (RM 35.68).

NOT ACHIEVED: No data currently exists for this metric.

Additionally, attainment of the current recreational use standards in the Clear Fork Mohican River **Headwaters Clear Fork Mohican River HUC-12** would occur through management of livestock operations and manure, as well as routine repair and replacement of failing HSTS in unsewered areas. The following goal has been set to achieve this for the sub-watershed:

Goal 6. Achieve a 90-day geometric mean value for *E. coli* below 126 colony counts per 100 mL at Marion Avenue in Clear Fork Mohican River (RM 35.68).

NOT ACHIEVED: Site currently has a 90-day geometric mean of 138 colony counts per 100 mL.

Nutrient reduction from agricultural lands will also aid in the prevention of HAB formation and achievement of the *Full Attainment* status of the PWS designation in the Clear Fork Reservoir. The following goal has been set for the sub-watershed:

Goal 7. Achieve a sampling regime in which not more than one excursion above the state drinking water thresholds (microcystins = 1.0 µg/L, cylindrospermopsin = 1.0 µg/L, and saxitoxins = 0.2 µg/L) occurs within the 5-year period at the City of Mansfield intake in the Clear Fork Mohican River/Clear Fork Reservoir at RM 30.6.

NOT ACHIEVED: Two or more excursions above the state drinking water thresholds (microcystins = 1.0 µg/L) have occurred within the 5-year period.

Objectives

In order to make substantive progress toward the achievement of the annual nutrient load reduction goals of 30,000 lbs of total nitrogen and 1,500 lbs of total phosphorus for the **Headwaters Clear Fork Mohican River HUC-12**, efforts must commence on more widespread implementation, according to the following objectives within *Critical Area #1*. Additionally, actions taken to address nutrient reduction will also help reduce stressors on aquatic communities within the Clear Fork Mohican River and its tributaries.

Objective 1: Implement nutrient management (planning and implementation through soil testing and Variable Rate Technology (VRT)) on at least 1,400 additional acres⁵.

Objective 2: Plant cover crops on at least 950 additional acres annually⁶.

⁵ Assumes an increase in implementation of 1,400 acres from baseline of plan approval. No data are currently available for the number of nutrient management plans and VRT implementation in the **Headwaters Clear Fork Mohican River HUC-12**.

⁶ Cover crop usage is estimated to occur on approximately 390 acres, based upon OpTIS data (CTIC, 2024). To reach and maintain the desired nutrient reduction level for this objective on a year over year basis, at least 1,340 acres of cover crops (estimated baseline of 390 + 950 more) would need to be planted each year throughout the **Headwaters Clear Fork Mohican River HUC-12**. Cover crop plantings may be implemented in the absence of grant funding.

-
- Objective 3: Implement conservation tillage (of at least 30% residue) on at least 1,400 additional acres⁷.
- Objective 4: Reduce nutrient loss from subsurface tile drainage through the installation of drainage water management structures that drain at least 190 acres.
- Objective 5: Reduce nutrient loss from subsurface tile drainage through the installation of blind inlet structures that drain at least 240 acres.
- Objective 6: Reduce nutrient loss from fields through the installation of (nitrogen) bioreactors to treat runoff from at least 110 acres.
- Objective 7: Reduce erosion and nutrient loss through the installation or rehabilitation of grassed waterways (as a standalone practice or coupled with erosion control structures/other drainage management practices) that receive/treat surface water from at least 1,450 acres.
- Objective 8: Reduce erosion and nutrient loss through the installation of Water and Sediment Control Basins (WASCOBs) that receive/treat surface water from at least 180 acres.
- Objective 9: Reduce erosion and nutrient loss through the installation of filter strips/buffers (of at least a 35 ft setback) or saturated buffers that receive/treat surface water from at least 1,170 acres.
- Objective 10: Reduce erosion and nutrient loss through the installation of forested riparian buffers (of at least a 100 ft setback) that receive/treat surface water from at least 570 acres.
- Objective 11: Create, enhance and/or restore at least 40 acres of wetlands and/or water retention basins for treatment of agricultural runoff and/or nutrient reduction purposes from 1,000 total agricultural acres.
- Objective 12: Stabilize and reduce erosion from agricultural streambanks and drainage conveyances through the installation of conservation ditches (overwide or two-stage design) for at least 24,200 linear feet (~4.6 miles)⁸.
- Objective 13: Increase the retirement of marginal and highly vulnerable lands by enrolling at least 30 acres into programs such as CRP and the Wetlands Reserve Program (WRP).
- Objective 14: Prevent excessive erosion and nutrient loss from at least 380 acres of pasture/livestock areas through the installation of structures that address and protect heavy use areas, provide alternative water sources and properly store and manage manure .

⁷ Current estimates indicate reduced tillage occurs on approximately 1,680 acres, based upon OpTis data (CTIC, 2024). To reach and maintain the desired nutrient reduction level for this objective on a year over year basis, at least 3,080 acres of land would need to be maintained under conservation tillage regimes (estimated baseline of 1,680 + 1,400 more) throughout the **Headwaters Clear Fork Mohican River HUC-12**.

⁸ This objective is focused on stabilization through conservation ditch design within agricultural settings, but may have overlap with stabilization/restoration objectives outlined in *Critical Area #2*, within transitional zones between land use types or through incorporation of bioengineering or natural channel design methodology.

Objective 15: Install livestock exclusion fencing along least 15,400 linear feet (~2.9 miles) of surface waters adjacent to or within pastureland.

Objective 16: Enact grazing land management practices, such as rotational grazing, forage planting, and prescribed grazing on at least 280 acres of pastureland.

Objective 17: Provide streambank protection (with or without fencing) along at least 14,000 linear feet (~2.7 miles) of stream adjacent to pastureland.

These objectives will be directed toward implementation on prioritized agricultural lands and are estimated to make progress toward the HTF’s interim and final nutrient reduction goals (Table 23). Additional conservation activities within the **Headwaters Clear Fork Mohican River HUC-12**, both on priority and secondary lands, may also make incremental progress toward nutrient reduction goals. The implementation of BMPs included in these objectives, as well as BMPs implemented through Federal and State programs and other voluntary efforts may be tracked to monitor progress toward nutrient reduction goals within the watershed. Additionally, progress on objectives listed in *Critical Area #2* that occur at the agricultural interface may also make progress toward agricultural nutrient reduction.

Table 23: Estimated Annual Nutrient Load Reductions from Each Objective

Objective Number	Best Management Practice	Total Acreage Treated*	Estimated Annual Nitrogen Load Reduction (lbs)	Estimated Annual Phosphorus Load Reduction (lbs)
1	Nutrient Management (Planning and Implementation through Soil Testing and VRT) ^a	1,400	250	40
2	Cover Crops	950	470	100
3	Conservation Tillage (at least 30% residue)	1,400	1,810	680
4	Drainage Water Management Structures	190	90	10
5	Blind Inlets ^b	240	560	180
6	Bioreactors	110	60	0
7	Grassed Waterways ^c	1,450	2,990	980
8	WASCOBs	180	310	60
9	Filter Strips/Buffers (of at least 35 ft) ^d	1,170	2,100	660
10	Forested Buffers (of at least 100 ft)	570	1,230	360
11	Wetlands ^e and/or Water Retention Basins	1,000 ^f	7,290	410
12	Bank Stabilization/ Conservation Ditches	1,210 ^g (24,200 linear feet)	2,780	790
13	Land Retirement	30	110	30
14	Pasture/Livestock Management Structures	380	1,160	70
15	Livestock Exclusion Fencing	770 (15,400 linear feet)	2,780	390
16	Grazing Land Management	280	1,260	30
17	Streambank Protection (in Pasture Lands)	700 (14,000 linear feet)	4,760	370
TOTAL		12,030*	30,010	5,160

(Source Model: Pollution Load Estimation Tool (PLET), Version 2.0, (USEPA, 2024a))

NOTES

- a *Nutrient Management consists of “managing the amount (rate), source, placement (method of application) and timing of plant nutrients and soil amendments to budget, supply and conserve nutrients for plant production; to minimize agricultural nonpoint source pollution of surface and groundwater resources; to properly utilize manure or organic byproducts as a plant nutrient source; to protect air quality by reducing odors, nitrogen emissions (ammonia, oxides of nitrogen) and the formation of atmospheric particulates; and/or to maintain or improve the physical, chemical and biological condition of soil,” as defined by the PLET guidance documents (USEPA, 2023a)*
- b *Blind inlet phosphorus reduction efficiency estimated from Gonzalez, Smith and Livingston, 2016.*
- c *Grassed waterway nitrogen reduction efficiency estimated from urban grass swale efficiency in PLET and phosphorus reduction efficiency from Ohio State University Extension, 2018.*
- d *Concentrated flow must be distributed so the area can slow, filter, and/or soak in runoff. Design specifications will be Field Office Technical Guide (FOTG) 393 Filter strips/area, and/or CRP CP-11 or CP2 Filter recharge areas. Conservation Cover (FOTG 327 and CRP CP-21) would not be designed to treat contributing runoff.*
- e *Nitrogen load reduction for wetlands was calculated using estimates of 14.57 lbs/acre nitrogen and 0.82 lbs/acres phosphorus for the Muskingum watershed (Ohio EPA, 2024).*
- f *If drainage water is routed through restored/created wetlands, it is assumed a 50% reduction in nitrogen and phosphorus from total nutrient yield for the drainage area, with a 25:1 ratio of drainage area to receiving wetland (Hoffmann et al., 2012; Woltemade, 2000). For this objective of 40 wetland acres, total drainage area is 1,000 acres.*
- g *One linear foot of stream is estimated to drain 0.05 acres in this sub-watershed.*
- * *More than one BMP may be implemented within fields.*

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 toward meeting the goals (i.e., water quality standards and nutrient reduction targets). Through an adaptive management process, the aforementioned objectives will be reevaluated and modified as necessary. Objectives may be added to make further progress toward attainment or reduction goals, or altered, as a systems approach of multiple BMPs can accelerate the improvement of water quality conditions. The *Nonpoint Source Management Plan Update* (Ohio EPA, 2025a) 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.

3.3 Critical Area #2: Conditions, Goals & Objectives for Streambank and Riparian Restoration

3.3.1 Detailed Characterization

Sediment build-up within the Clear Fork Reservoir from its upstream watershed is currently threatening the City of Mansfield’s ability to provide clear, clean drinking water. In January 2025, a water sample yielded a turbidity level of 2.6 turbidity units, exceeding the 1.0 turbidity unit maximum and resulting in a public notice (City of Mansfield, 2025). While turbidity itself has no health effects, it can interfere with

disinfection and provide a medium for microbial growth (City of Mansfield, 2025). The increasing turbidity levels within the reservoir has prompted the City to initiate studying the sedimentation levels and rate of sedimentation within the reservoir in anticipation of potential dredging.

In the absence of forested riparian corridors, streams erode downward and develop a narrow, steeply sloped bed (Montgomery County, 2006). The changing of the natural channel shape not only reduces habitat for aquatic ecosystems and causes water chemistry stress within the stream (i.e., rising temperatures within the stream due to lack of shade, dissolved oxygen (DO) regime swings, promotion of algal growth, etc.), but downcutting combined with large flow events often causes bank undercutting, exacerbating bank failure and streambank erosion. Sediment from streambank failure is a contributing factor to sedimentation in the reservoir. Improvement of stream and riparian habitat within the Clear Fork Mohican River and its tributaries will not only improve the performance of riverine aquatic communities, but will also aid in protection measures within the source water protection area for the Clear Fork Reservoir.

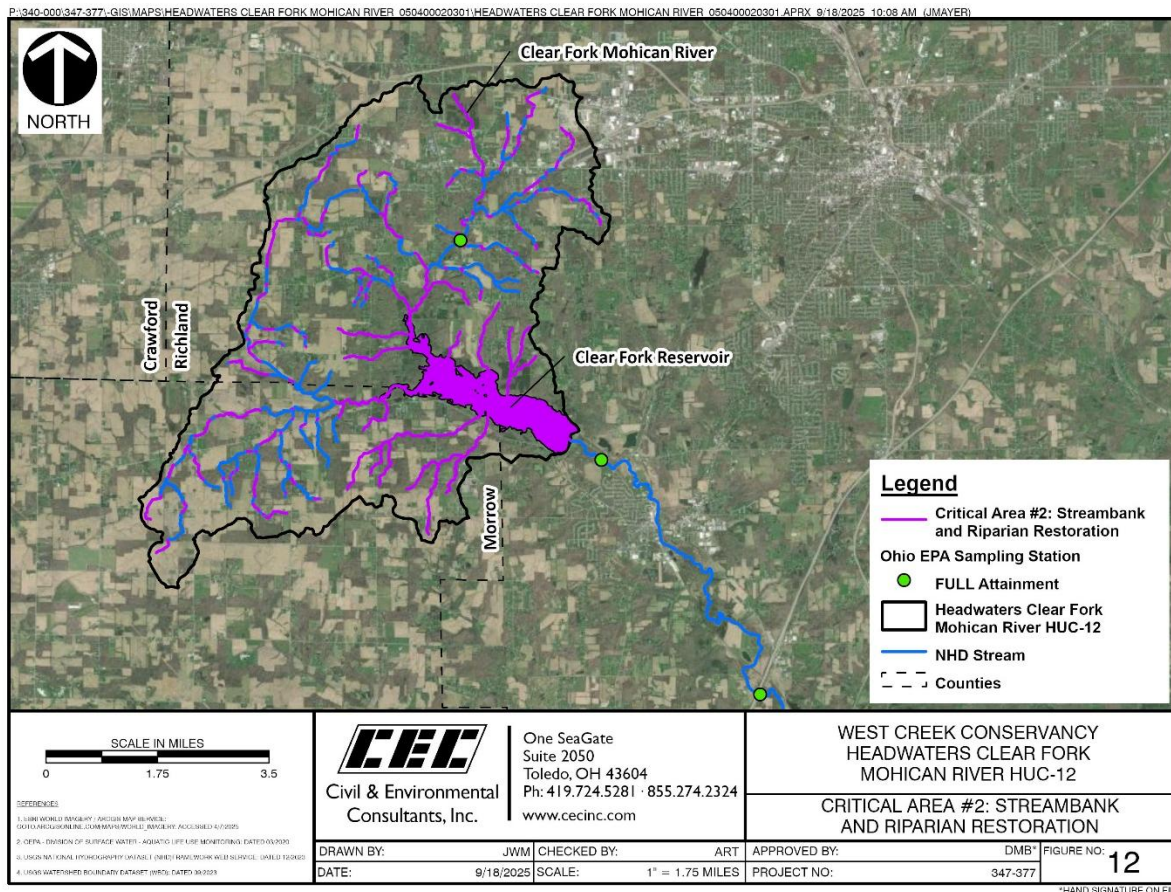


Figure 12: Headwaters Clear Fork Mohican River HUC-12 Critical Area #2

Using the rationale described in the *Handbook for Developing Watershed Plans to Restore and Protect Our Waters* (USEPA, 2008) (Section 10.3.4): “In general, management practices are implemented immediately adjacent to the waterbody or upland to address the sources of pollutant loads”, *Critical Area #2* includes approximately 123,552 linear feet (23.4 miles) of stream length and at least a 75-foot buffer width on

both sides of the banks (Figure 12). The potential for restoration of approximately 425 acres of riparian corridor and floodplain exists in *Critical Area #2*.

3.3.2 Detailed Biological Conditions

Analysis of the abundance, diversity and pollution tolerance of existing fish species found by Ohio EPA at each sampling location, in relation to the corresponding QHEI score, aids in the identification of causes and sources of impairment. No fish community data are available for the single sampling point within the **Headwaters Clear Fork Mohican River HUC-12**, nor at the most immediate downstream location in the *Town of Lexington- Clear Fork Mohican River HUC-12*. Fish communities were monitored at RM 23.35, approximately seven miles downstream of the sub-watershed terminus (Table 24). Here, two species that are becoming increasingly rare in Ohio were found: the bigeye chub and redbreast dace (Ohio EPA, 2009).

Table 24: Critical Area #2 – Fish Community and Habitat Data

Headwaters Clear Fork Mohican River HUC-12 (05040002 03 01)							
River Mile	Drainage Area (mi ²)	Total Species	QHEI	IBI	MIwb ^a	Predominant Species (Percent of Catch)	Narrative Evaluation
Clear Fork Mohican River (WWH)							
35.68 ^H	6.6	--	--	--	N/A	--	--
Town of Lexington-Clear Fork Mohican River HUC-12 (05040002 03 03) [^]							
Clear Fork Mohican River (WWH)							
29.57 ^W	39.6	--	--	--	--	--	--
23.35 ^W	63.0	25	86.5	44	8.9	Creek chub (22%), mottled sculpin (22%), greenside darter (10%)	Good – Very Good

(Source: Ohio EPA, 2009)

NOTES

IBI Index of Biotic Integrity

^a The Modified Index of Well Being (MIwb) is not applicable to headwater sites (drainage ≤20 mi²).

QHEI Qualitative Habitat Evaluation Index

W Wading site

N/A Not applicable

-- No data available

WWH Warmwater Habitat

[^] No complete biological sampling sites exist in the Headwaters Clear Fork Mohican River HUC-12; therefore, attainment will be compared to sampling sites downstream in the Town of Lexington-Clear Fork Mohican River HUC-12

Characteristics of the aquatic macroinvertebrate community for the **Headwaters Clear Fork Mohican River HUC-12** sampling location in *Critical Area #2* are summarized below (Table 25). Analysis of the abundance, diversity, and pollution tolerance of existing aquatic macroinvertebrates (bugs) found by Ohio EPA at these sampling locations, related to QHEI scores, can aid in the identification of causes and sources of impairment. Communities at RM 35.68 performed well, with a substantial number of EPT taxa. For reference, communities at the next closest downstream location in the *Town of Lexington-Clear Fork Mohican River HUC-12* showed impact from an observed septic discharge at RM 35.67, reflected in the

decrease of EPT taxa and diversity. However, communities still marginally met WWH attainment (Ohio EPA, 2009).

Table 25: Critical Area #2 - Macroinvertebrate Community Data

Headwaters Clear Fork Mohican River HUC-12 (05040002 03 01)		
River Mile	ICI Score-Narrative ^a	Predominant Species ^b
Clear Fork Mohican River (WWH)		
35.68 ^H	N/A – Good 11 qualitative EPT taxa	<i>Hydra sp</i> (F), <i>Turbellaria</i> (F), <i>Oligochaeta</i> (T), <i>Caecidotea sp</i> (T), <i>Lirceus sp</i> (MT), <i>Hyaella Azteca</i> (F), <i>Orconectes sp</i> (F), <i>Hydrachnidia</i> (F), <i>Baetis flavistriga</i> (F), <i>Baetis intercalaris</i> (F) <i>Centroptilum sp</i> (w/o hindwing pads) (MI), <i>Stenonema femoratum</i> (F), <i>Caenis sp</i> (F), <i>Calopteryx sp</i> (F), <i>Coenagrionidae</i> (T), <i>Argia sp</i> (F), <i>Corduliidae</i> , <i>Leuctra sp</i> (MI), <i>Sialis sp</i> (MT), <i>Polycentropus sp</i> (MI), <i>Cheumatopsyche sp</i> (F), <i>Ceratopsyche morosa group</i> (MI), <i>Ceratopsyche slossonae</i> (MI), <i>Hydroptila sp</i> (F), <i>Enochrus sp</i> (MT), <i>Helophorus sp</i> (MT), <i>Laccobius sp</i> (F), <i>Paracymus sp</i> (MT), <i>Dubiraphia quadrinotata</i> (F), <i>Stenelmis sp</i> (F), <i>Hexatoma sp</i> (MI), <i>Tipula sp</i> (F), <i>Anopheles sp</i> (F), <i>Simulium sp</i> (F), <i>Ceratopogonidae</i> (T), <i>Conchapelopia sp</i> (F), <i>Helopelopia sp</i> (F), <i>Pentaneura inconspicua</i> (F), <i>Procladius (Holotanypus) sp</i> (MT), <i>Brillia flavifrons group</i> (F), <i>Cricotopus (C.) bicinctus</i> (T), <i>Eukiefferiella claripennis group</i> (MT), <i>Orthocladius (O.) sp</i> (F), <i>Parametrioctenus sp</i> (F), <i>Tvetenia bavarica group</i> (MI), <i>Chironomus (C.) decorus group</i> (T), <i>Cryptochironomus sp</i> (F), <i>Dicrotendipes fumidus</i> (F), <i>Paratendipes albimanus</i> or <i>P. duplicatus</i> (F), <i>Polypedilum (Uresipedilum) flavum</i> (F), <i>Polypedilum (P.) illinoense</i> (T), <i>Polypedilum (Tripodura) scalaenum group</i> (F), <i>Stictochironomus sp</i> (F), <i>Rheotanytarsus sp</i> (MI), <i>Tanytarsus sp</i> (F), <i>Tanytarsus glabrescens group sp 7</i> (F), <i>Eristalis sp</i> (VT), <i>Limnophora aequifrons</i> (F)
Town of Lexington-Clear Fork Mohican River HUC-12 (05040002 03 03)[^]		
Clear Fork Mohican River (WWH)		
29.57 ^W	N/A – Marginally Good ^{ns} 7 qualitative EPT taxa	<i>Eunapius fragilis</i> (F), <i>Turbellaria</i> (F), <i>Oligochaeta</i> (T), <i>Lirceus sp</i> (MT), <i>Hyaella Azteca</i> (F), <i>Hydrachnidia</i> (F), <i>Stenonema femoratum</i> (F), <i>Leptophlebia sp</i> (F) or <i>Paraleptophlebia sp</i> (F), <i>Caenis sp</i> (F), <i>Calopteryx sp</i> (F), <i>Coenagrionidae</i> (T), <i>Cheumatopsyche sp</i> (F), <i>Hydropsyche depravata group</i> (F), <i>Hydroptilidae</i> (F), <i>Neophylax sp</i> (MI), <i>Stenelmis sp</i> (F), <i>Conchapelopia sp</i> (F), <i>Helopelopia sp</i> (F), <i>Natarsia species A (sensu Roback, 1978)</i> (T), <i>Cricotopus (C.) bicinctus</i> (T), <i>Chironomus (C.) decorus group</i> (T), <i>Polypedilum (Uresipedilum) flavum</i> (F),
Town of Lexington-Clear Fork Mohican River HUC-12 (05040002 03 03)[^]		
Clear Fork Mohican River (WWH)		
		<i>Polypedilum (P.) illinoense</i> (T), <i>Polypedilum (Tripodura) scalaenum group</i> (F), <i>Stictochironomus sp</i> (F), <i>Elimia sp</i> (MI), <i>Dreissena polymorpha</i> (F)
23.35 ^W	42 – Very Good 13 qualitative EPT taxa	<i>Polypedilum (Uresipedilum) flavum</i> (F), <i>Lirceus sp</i> (MT), <i>Ceratopsyche morosa group</i> (MI)

(Source: Ohio EPA, 2009)

NOTES

H Headwater site

W Wading site

ns Nonsignificant departure from ecoregion biocriteria (≤4 IBI or ICI units, ≤0.5 MIwb units).

a Narrative evaluation used in lieu of ICI

b When scored qualitatively, all species observed at the site are listed. When quantitative scores are available, the top three species by number are listed.

Tolerance Categories: VT=Very Tolerant, T=Tolerant, MT=Moderately Tolerant, F=Facultative, MI=Moderately Intolerant, I=Intolerant

WWH Warmwater Habitat

^ No complete biological sampling sites exist in the Headwaters Clear Fork Mohican River HUC-12; therefore, attainment will be compared to sampling sites downstream in the Town of Lexington-Clear Fork Mohican River HUC-12

3.3.3 Detailed Causes and Associated Sources

One sampling location in the Clear Fork Mohican River is located in the **Headwaters Clear Fork Mohican River HUC-12** and is in *Full Attainment* of the WWH designation. Attainment at this location (RM 35.68) is based on one biological index and habitat was not assessed during the sampling event in 2007. Included in Table 13 (p.22) as a reference point, habitat was assessed in the next downstream adjacent sub-watershed, approximately seven miles downstream. Habitat at this location (RM 23.35) scored within the Exceptional range; however, forested/undeveloped land use upstream of this sample point substantiated a fairly wide riparian corridor along much of the Clear Fork Mohican River length downstream from the **Headwaters Clear Fork Mohican River HUC-12**. This site, in its pristine nature, is likely not a good proxy for habitat at RM 35.68. Siltation issues observed today, as well as during the 2007 study, are a limiting factor in aquatic habitat within the **Headwaters Clear Fork Mohican River HUC-12**.

Sampling conducted by a private firm in 2024 on behalf of West Creek to support a potential restoration project in the west-central portion of the sub-watershed documented QHEI scores at one location and Headwater Habitat Evaluation Index (HHEI) scores at three locations (Biohabitats, 2024). The QHEI score at the interstitial stream was 67, with a recovering channel, low sinuosity, slow current and fair to good development. The HHEI scores at three ephemeral tributary locations ranged from 28-42. Silty substrates and low to moderate sinuosity were noted at all three locations. Riparian width ranged from moderate to wide across the three sites. Improvements in stream and riparian habitat will help prevent excessive sedimentation in the riverine habitat, as well as within the Clear Fork Reservoir.

Habitat, as scored by the QHEI, is not a WQS; however, habitat is highly correlated with the performance of aquatic communities. In general, sites that score at least 60 (or 55 for headwater streams) are successful at supporting WWH aquatic assemblages. Projects that address excessive siltation through streambank stabilization and in-stream and riparian restoration will have a positive effect on future measured QHEI scores. As the habitat score (QHEI) becomes better, IBI, MIwb and ICI index scores are also expected to improve.

3.3.4 Outline Goals and Objectives for the Critical Area

The overarching goal of any NPS-IS is to improve water quality scores or meet nutrient reduction goals in order to remove a waterbody's impairment status and reach attainment of WQS for the WAU. For *Critical Area #2*, addressing streambank and riparian habitat conditions within the Clear Fork Mohican River and its contributing tributaries will help ameliorate stresses from land use and boost index values for aquatic communities.

Goals

The remaining goals for *Critical Area #2* of the **Headwaters Clear Fork Mohican River HUC-12** are to reduce sedimentation (and associated nutrient) effects to improve the aquatic scores through stabilizing streambanks and restoring floodplains and riparian corridors. These goals are to specifically:

Goal 1. Maintain an ICI score at or above 34 (Good) at Marion Avenue in the Clear Fork Mohican River (RM 35.68).

✓ **ACHIEVED:** Site currently has a score of Good (~34).

Goal 2. Achieve an IBI score at or above 40 at Marion Avenue in the Clear Fork Mohican River (RM 35.68).

NOT ACHIEVED: No data currently exists for this metric.

Goal 3. Achieve a QHEI score at or above 55 at Marion Avenue in the Clear Fork Mohican River (RM 35.68).

NOT ACHIEVED: No data currently exists for this metric.

Objectives

The implementation of these objectives, partnered with implementation throughout other identified critical areas will help ameliorate negative impacts from sedimentation and excessive nutrient loss within the **Headwaters Clear Fork Mohican River HUC-12**, and positive gains will be made toward maintaining near-field attainment and removing far-field impairments. In order to achieve the overall NPS restoration goals of maintaining *Full Attainment* within the Clear Fork Mohican River and its tributaries, the following objectives⁹ need to be achieved within *Critical Area #2*.

Objective 1: Stabilize and restore at least five miles (26,400 linear feet) of degraded/downcut streambanks and channel habitat through natural channel design methods and bioengineering techniques¹⁰.

Objective 2: Create, enhance or restore at least 400 acres¹¹ of woody riparian corridor and/or riparian floodplain wetlands.

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 toward meeting the goals (i.e., water quality standards and nutrient reduction targets). Through an adaptive management process, the aforementioned objectives will be reevaluated and modified as necessary. Objectives may be added to make further progress toward attainment or reduction goals, or altered, as a systems approach of

⁹ These objectives may occur at the agricultural or urban interface and may make progress toward goals listed across multiple critical areas.

¹⁰ The focus of this objective should be in improvement of channel form. While it is recognized that healthy streams are in a state of dynamic equilibrium and require adequate space for fully functioning systems, land use constraints may exist that limit the amount of improvement that can be made to channel design and form in an effort to provide stability to the system. Stabilization may be independent of in-channel work; however, bank armoring and excessive use of stone, concrete or other unnatural hardening agents is discouraged (Ohio EPA, 2025a).

¹¹ With a 75-foot buffer on one river side, this equates to riparian corridor restoration along ~232,266 linear feet (~44.0 miles).

multiple BMPs can accelerate the improvement of water quality conditions. The *Nonpoint Source Management Plan Update* (Ohio EPA, 2025a) will be utilized as a reevaluation tool, as well as other state and federal agency resources for its listing of all eligible NPS management and nutrient reduction 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.

3.4 Critical Area #3: Conditions, Goals & Objectives for Urban Runoff Reduction

3.4.1 Detailed Characterization

In urban environments, NPS contributions to stormwater runoff can come from a variety of sources, including fertilizers, detergents, leaves and detritus, wild and domesticated animal excrement, lubricants, sediment erosion, and organic and inorganic decomposition processes (Carpenter *et. al*, 1998; Burton and Pitt, 2001). Urbanization and development often lead to increased pollutant availability, runoff, peak flows, stream “flashiness” and stream instability, along with decreased stream function, storage and retention capabilities and pollutant assimilation in soils (ODNR, 2006). Many of these effects have a direct impact on aquatic life. Degradation to stream ecosystems has been shown even in areas of low amounts of urbanization (5-10% imperviousness) (Schueler, 1994).

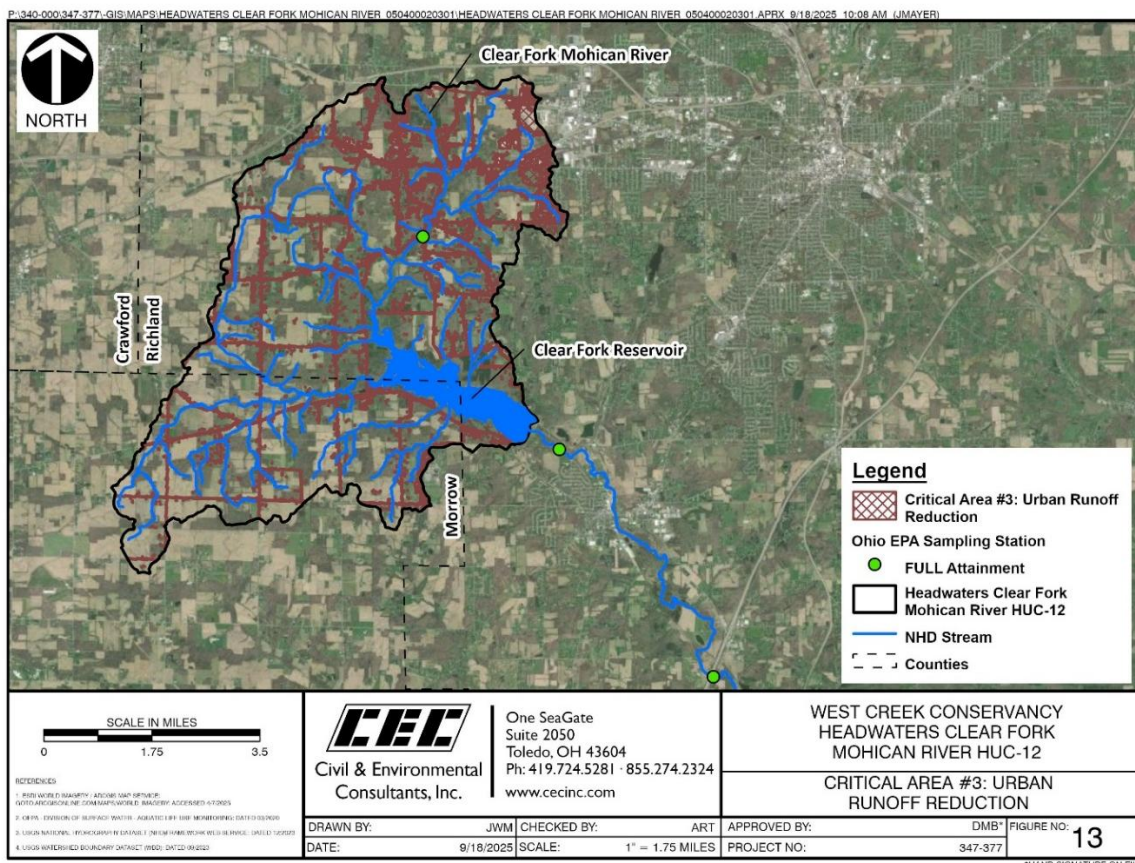


Figure 13: Headwaters Clear Fork Mohican River HUC-12 Critical Area #3

The urban area within the **Headwaters Clear Fork Mohican River HUC-12** is small—approximately 12%, with most of these lands concentrated in the northeast quadrant of the sub-watershed within or adjacent to the City of Ontario (Figure 13). Approximately 48% of Ontario is contained within the sub-watershed, and of these 3,360 acres, approximately one third are classified as developed. Richland and Morrow Counties are predicted to have a drop in population size by 9% and 13%, respectively, by 2050 (ODD, 2022). However, the City of Ontario has seen a 17.4% increase in population over the last 10 years (City of Ontario, 2025). The City of Ontario manages stormwater under a Phase II MS4 permit. While the contributing runoff throughout MS4s is dispersed from urban nonpoint sources, the runoff is permitted through the City’s MS4 permit and is therefore allocated as a point source in TMDL development. While these urban contributions from within the MS4 area are not considered a nonpoint source, reductions on these lands will help make progress toward the 20% nitrogen and phosphorus reduction goals outlined by the HTF.

3.4.2 Detailed Biological Conditions

Analysis of the abundance, diversity and pollution tolerance of existing fish species found by Ohio EPA at each sampling location, in relation to the corresponding QHEI score, aids in the identification of causes and sources of impairment. No fish community data are available for the single sampling point within the **Headwaters Clear Fork Mohican River HUC-12**, nor at the most immediate downstream location in the *Town of Lexington- Clear Fork Mohican River HUC-12*. Fish communities were monitored at RM 23.35, approximately seven miles downstream of the sub-watershed terminus (Table 26). Here, two species that are becoming increasingly rare in Ohio were found: the bigeye chub and reddsides dace (Ohio EPA, 2009).

Table 26: Critical Area #3 – Fish Community and Habitat Data

Headwaters Clear Fork Mohican River HUC-12 (05040002 03 01)							
River Mile	Drainage Area (mi ²)	Total Species	QHEI	IBI	MIwb ^a	Predominant Species (Percent of Catch)	Narrative Evaluation
Clear Fork Mohican River (WWH)							
35.68 ^h	6.6	--	--	--	N/A	--	--
Town of Lexington-Clear Fork Mohican River HUC-12 (05040002 03 03) [^]							
Clear Fork Mohican River (WWH)							
29.57 ^w	39.6	--	--	--	--	--	--
23.35 ^w	63.0	25	86.5	44	8.9	Creek chub (22%), mottled sculpin (22%), greenside darter (10%)	Good – Very Good

(Source: Ohio EPA, 2009)

NOTES

IBI Index of Biotic Integrity

^a The Modified Index of Well Being (MIwb) is not applicable to headwater sites (drainage ≤20 mi²).

QHEI Qualitative Habitat Evaluation Index

W Wading site

N/A Not applicable

-- No data available

WWH Warmwater Habitat

[^] No complete biological sampling sites exist in the Headwaters Clear Fork Mohican River HUC-12; therefore, attainment will be compared to sampling sites downstream in the Town of Lexington-Clear Fork Mohican River HUC-12

Characteristics of the aquatic macroinvertebrate community for the **Headwaters Clear Fork Mohican River HUC-12** sampling location in *Critical Area #3* are summarized below (Table 27). Analysis of the abundance, diversity, and pollution tolerance of existing aquatic macroinvertebrates (bugs) found by Ohio EPA at these sampling locations, related to QHEI scores, can aid in the identification of causes and sources of impairment. Communities at RM 35.68 performed well, with a substantial number of EPT taxa. For reference, communities at the next closest downstream location in the *Town of Lexington-Clear Fork Mohican River HUC-12* showed impact from an observed septic discharge at RM 35.67, reflected in the decrease of EPT taxa and diversity. However, communities still marginally met WWH attainment (Ohio EPA, 2009).

Table 27: Critical Area #3 - Macroinvertebrate Community Data

Headwaters Clear Fork Mohican River HUC-12 (05040002 03 01)		
River Mile	ICI Score-Narrative ^a	Predominant Species ^b
Clear Fork Mohican River (WWH)		
35.68 ^H	N/A – Good 11 qualitative EPT taxa	<i>Hydra sp</i> (F), <i>Turbellaria</i> (F), <i>Oligochaeta</i> (T), <i>Caecidotea sp</i> (T), <i>Lirceus sp</i> (MT), <i>Hyaella Azteca</i> (F), <i>Orconectes sp</i> (F), <i>Hydrachnidia</i> (F), <i>Baetis flavistriga</i> (F), <i>Baetis intercalaris</i> (F) <i>Centroptilum sp</i> (w/o hindwing pads) (MI), <i>Stenonema femoratum</i> (F), <i>Caenis sp</i> (F), <i>Calopteryx sp</i> (F), <i>Coenagrionidae</i> (T), <i>Argia sp</i> (F), <i>Corduliidae</i> , <i>Leuctra sp</i> (MI), <i>Sialis sp</i> (MT), <i>Polycentropus sp</i> (MI), <i>Cheumatopsyche sp</i> (F), <i>Ceratopsyche morosa group</i> (MI), <i>Ceratopsyche slossonae</i> (MI), <i>Hydroptila sp</i> (F), <i>Enochrus sp</i> (MT), <i>Helophorus sp</i> (MT), <i>Laccobius sp</i> (F), <i>Paracymus sp</i> (MT), <i>Dubiraphia quadrinotata</i> (F), <i>Stenelmis sp</i> (F), <i>Hexatoma sp</i> (MI), <i>Tipula sp</i> (F), <i>Anopheles sp</i> (F), <i>Simulium sp</i> (F), <i>Ceratopogonidae</i> (T), <i>Conchapelopia sp</i> (F), <i>Helopelopia sp</i> (F), <i>Pentaneura inconspicua</i> (F), <i>Procladius (Holotanypus) sp</i> (MT), <i>Brillia flavifrons group</i> (F), <i>Cricotopus (C.) bicinctus</i> (T), <i>Eukiefferiella claripennis group</i> (MT), <i>Orthocladius (O.) sp</i> (F), <i>Parametrioctenus sp</i> (F), <i>Tvetenia bavarica group</i> (MI), <i>Chironomus (C.) decorus group</i> (T), <i>Cryptochironomus sp</i> (F), <i>Dicrotendipes fumidus</i> (F), <i>Paratendipes albimanus</i> or <i>P. duplicatus</i> (F), <i>Polypedilum (Uresipedilum) flavum</i> (F), <i>Polypedilum (P.) illinoense</i> (T), <i>Polypedilum (Tripodura) scalaenum group</i> (F), <i>Stictochironomus sp</i> (F), <i>Rheotanytarsus sp</i> (MI), <i>Tanytarsus sp</i> (F), <i>Tanytarsus glabrescens group sp 7</i> (F), <i>Eristalis sp</i> (VT), <i>Limnophora aequifrons</i> (F)
Town of Lexington-Clear Fork Mohican River HUC-12 (05040002 03 03)[^]		
Clear Fork Mohican River (WWH)		
29.57 ^W	N/A – Marginally Good ^{ns} 7 qualitative EPT taxa	<i>Eunapius fragilis</i> (F), <i>Turbellaria</i> (F), <i>Oligochaeta</i> (T), <i>Lirceus sp</i> (MT), <i>Hyaella Azteca</i> (F), <i>Hydrachnidia</i> (F), <i>Stenonema femoratum</i> (F), <i>Leptophlebia sp</i> (F) or <i>Paraleptophlebia sp</i> (F), <i>Caenis sp</i> (F), <i>Calopteryx sp</i> (F), <i>Coenagrionidae</i> (T), <i>Cheumatopsyche sp</i> (F), <i>Hydropsyche depravata group</i> (F), <i>Hydroptilidae</i> (F), <i>Neophylax sp</i> (MI), <i>Stenelmis sp</i> (F), <i>Conchapelopia sp</i> (F), <i>Helopelopia sp</i> (F), <i>Natarsia species A (sensu Roback, 1978)</i> (T), <i>Cricotopus (C.) bicinctus</i> (T), <i>Chironomus (C.) decorus group</i> (T), <i>Polypedilum (Uresipedilum) flavum</i> (F), <i>Polypedilum (P.) illinoense</i> (T), <i>Polypedilum (Tripodura) scalaenum group</i> (F), <i>Stictochironomus sp</i> (F), <i>Elimia sp</i> (MI), <i>Dreissena polymorpha</i> (F)
23.35 ^W	42 – Very Good 13 qualitative EPT taxa	<i>Polypedilum (Uresipedilum) flavum</i> (F), <i>Lirceus sp</i> (MT), <i>Ceratopsyche morosa group</i> (MI)

(Source: Ohio EPA, 2009)

NOTES

H Headwater site

W Wading site

ns Nonsignificant departure from ecoregion biocriteria (≤ 4 IBI or ICI units, ≤ 0.5 MIwb units).

a Narrative evaluation used in lieu of ICI

b When scored qualitatively, all species observed at the site are listed. When quantitative scores are available, the top three species by number are listed.

Tolerance Categories: VT=Very Tolerant, T=Tolerant, MT=Moderately Tolerant, F=Facultative, MI=Moderately Intolerant, I=Intolerant

WWH Warmwater Habitat

[^] No complete biological sampling sites exist in the Headwaters Clear Fork Mohican River HUC-12; therefore, attainment will be compared to sampling sites downstream in the Town of Lexington-Clear Fork Mohican River HUC-12

3.4.3 Detailed Causes and Associated Sources

One sampling location in the Clear Fork Mohican River is located in the **Headwaters Clear Fork Mohican River HUC-12** and is in *Full Attainment* of the WWH designation. Attainment at this location (RM 35.68) is based on one biological index and habitat was not assessed during the sampling event in 2007. Included in Table 13 (p.22) as a reference point, habitat was assessed in the next downstream adjacent sub-watershed, approximately seven miles downstream. Habitat at this location (RM 23.35) scored within the Exceptional range; however, forested/undeveloped land use upstream of this sample point substantiated a fairly wide riparian corridor along much of the Clear Fork Mohican River length downstream from the **Headwaters Clear Fork Mohican River HUC-12**. This site, in its pristine nature, is likely not a good proxy for habitat at RM 35.68. Siltation issues observed today, as well as during the 2007 study, are a limiting factor in aquatic habitat within the **Headwaters Clear Fork Mohican River HUC-12**. Siltation, along with nutrients and other contaminants in urban runoff, pose a threat to near-field attainment and contribute to far-field impairment in the Clear Fork Reservoir and the end-most receiving waterbody, the Gulf.

Many of the negative habitat attributes found during a QHEI sampling event result from land use activities, including impacts from urban development within the watershed. From a far-field perspective, urban land use activities contribute to excessive nutrient loadings to the Clear Fork Mohican River, reaching the Mohican River and eventually, the Ohio River, Mississippi River and the Gulf. Reduction in nutrients in urban areas through the use of green infrastructure for the retention, detention and filtration of urban pollutants can also help decrease overall NPS pollution and improve aquatic communities. Compared with natural land cover, shallow and deep infiltration and evapotranspiration decreases while surface runoff increases in urban lands (USEPA, 2003). When watersheds have as little as 10% impervious surface, studies have shown that not only does runoff increase substantially, but pollutant loads also increase (CWP, 1998). Given the proximity of urban development in the northern portion of the sub-watershed in the City of Ontario, actions taken in *Critical Area #3* will help make progress toward overall local nutrient reduction goals.

3.4.4 Outline Goals and Objectives for the Critical Area

The overarching goal of any NPS-IS is to improve water quality scores or meet nutrient reduction goals in order to remove a waterbody's impairment status and reach attainment of WQS for the WAU. Urban land use activities in *Critical Area #3* not only contribute to stress on aquatic communities in the Clear Fork Mohican River and its tributaries, but also far-field impairment through excessive nutrient loss to local waterways that flow to the Ohio River. The Ohio EPA has estimated nutrient loadings associated with various land uses and sources within targeted watersheds in the ORB, and has set nitrogen and phosphorus reduction goals for agricultural and urban sources.

Goals

To achieve the desired phosphorus reduction from urban land use in the **Headwaters Clear Fork Mohican River HUC-12**, the following goals have been established:

Goal 1. Reduce urban nitrogen loading contributions in the **Headwaters Clear Fork Mohican River HUC-12** to a level at or below 15,000 lbs/year (20% reduction).

NOT ACHIEVED: Current estimated load contribution is 19,000 lbs/year.

Goal 2. Reduce urban phosphorus loading contributions in the **Headwaters Clear Fork Mohican River HUC-12** to a level at or below 880 lbs/year (20% reduction).

NOT ACHIEVED: Current estimated load contribution is 1,100 lbs/year.

Simultaneous goals relate to the attainment or maintenance of WQS for aquatic communities within the Clear Fork Mohican River outside of *Critical Area #3*. Implementation of BMP objectives geared toward nutrient reduction efforts will generally also help make incremental progress toward the following goals:

Goal 3. Maintain an ICI score at or above 34 (Good) at Marion Avenue in the Clear Fork Mohican River (RM 35.68).

✓ **ACHIEVED:** Site currently has a score of Good (~34).

Goal 4. Achieve an IBI score at or above 40 at Marion Avenue in the Clear Fork Mohican River (RM 35.68).

NOT ACHIEVED: No data currently exists for this metric.

Goal 5. Achieve a QHEI score at or above 55 at Marion Avenue in the Clear Fork Mohican River (RM 35.68).

NOT ACHIEVED: No data currently exists for this metric.

Objectives

In order to make substantive progress toward the achievement of the urban nitrogen load reduction goal of 4,000 lbs/year and the phosphorus load reduction goal of 220 lbs/year for the **Headwaters Clear Fork Mohican River HUC-12**, efforts must commence on more widespread implementation, according to the following objectives within *Critical Area #3*. Additionally, actions taken to address nutrient reduction will

also help reduce stressors on aquatic communities within the Clear Fork Mohican River and its tributaries to attain and maintain WQS.

Objective 1: Reduce stormwater inputs and impacts in the sub-watershed by implementing green infrastructure projects within *Critical Area #3* to retain, detain, and/or treat runoff from at least 1,500 acres of urbanized impermeable surfaces (i.e., parking lots, roads, etc.).

Objective 2: Reduce stormwater inputs and impacts in the sub-watershed by restoring and/or creating floodplain/riparian areas and wetland detention/storage basins to retain, detain and/or treat urban drainage from at least 900 acres.

Depending on the specific green infrastructure approach chosen, reduction efficiencies for these objectives may not reach the intended nutrient reduction goals for urban lands in this sub-watershed. Stakeholders in this watershed acknowledge that additional and/or altered objectives may be needed in future versions of this NPS-IS but underscore the exigence in beginning to implement projects that incrementally make progress toward achieving the aforementioned objectives as soon as possible. The objectives, as written, are reflective of what stakeholders gage as reasonable and implementable in the **Headwaters Clear Fork Creek HUC-12** incrementally, over time.

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 toward meeting the goals (i.e., water quality standards and nutrient reduction targets). Through an adaptive management process, the aforementioned objectives will be reevaluated and modified as necessary. Objectives may be added to make further progress toward attainment or reduction goals, or altered, as a systems approach of multiple BMPs can accelerate the improvement of water quality conditions. The *Nonpoint Source Management Plan Update* (Ohio EPA, 2025a) 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

Projects and evaluation needs identified for the **Headwaters Clear Fork Mohican River HUC-12** are based upon identified causes and associated sources of NPS pollution. Over time, these critical areas will need to be reevaluated to determine progress toward meeting restoration, attainment and nutrient reduction goals. Time is an important variable in measuring project success and overall status when using biological indices as a measurement tool. Some biological systems may show fairly quick response (i.e., one season), while others may take several seasons or years to show progress toward recovery. In addition, reasons for the impairment other than those associated with NPS sources may arise. Those issues will need to be addressed under different initiatives, authorities or programs that may or may not be accomplished by the same implementers addressing the NPS issues.

Implementation of practices described in this NPS-IS may also contribute to nutrient load reduction (specifically the interim 20% reduction in nitrogen and phosphorus loading in the MARB). Nutrient load reduction efforts are consistent with the HTF Action Plan and New Goal Framework (HTF, 2014).

For the **Headwaters Clear Fork Mohican River HUC-12** there are three *Project and Implementation Strategy Overview Tables* (subsection 4.1, 4.2 and 4.3). Future versions of this NPS-IS may include subsequent sections as more critical areas are refined and more projects become developed to meet the requisite objectives within a critical area. The projects described in the *Overview Table* have been prioritized using the following three-step prioritization method:

- Priority 1 Projects that specifically address one or more of the listed Objectives for the Critical Area.

- Priority 2 Projects where there is land-owner willingness to engage in projects that are designed to address the cause(s) and source(s) of impairment or where there is an expectation that such potential projects will improve water quality in the **Headwaters Clear Fork Mohican 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) follow the *Overview Tables*, if projects were identified; these 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 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).

4.1 Critical Area #1 Project and Implementation Strategy Overview Table

Table 28: Headwaters Clear Fork Mohican River HUC-12 (05040002 03 01) — Critical Area #1							
Goal	Objective	Project #	Project Title (EPA Criteria g)	Lead Organization (EPA criteria d)	Time Frame (EPA Criteria f)	Estimated Cost (EPA Criteria d)	Potential/Actual Funding Source (EPA Criteria d)
Urban Sediment and Nutrient Reduction Strategies							
Altered Stream and Habitat Restoration Strategies							
Agricultural Nonpoint Source Reduction Strategies							
High Quality Waters Protection Strategies							
Other NPS Causes and Associated Sources of Impairment							

At this time, no short-term projects have been identified for *Critical Area #1*; therefore, no Project Summary Sheets are included.

4.2 Critical Area #2 Project and Implementation Strategy Overview Table

Table 29: Headwaters Clear Fork Mohican River HUC-12 (05040002 03 01) — Critical Area #2							
Goal	Objective	Project #	Project Title (EPA Criteria g)	Lead Organization (EPA criteria d)	Time Frame (EPA Criteria f)	Estimated Cost (EPA Criteria d)	Potential/Actual Funding Source (EPA Criteria d)
Urban Sediment and Nutrient Reduction Strategies							
Altered Stream and Habitat Restoration Strategies							
1-3	2	1	Clear Fork North – Phase II	West Creek & RCPD	Short (1-3 years)	\$540,966	Ohio EPA §319, Ohio EPA Gulf Hypoxia, Clean Ohio, WRRSP
Agricultural Nonpoint Source Reduction Strategies							
High Quality Waters Protection Strategies							
Other NPS Causes and Associated Sources of Impairment							

4.2.1 Summary Sheet(s)

The Project Summary Sheets provided below were developed based on the actions or activities needed to achieve nutrient reduction targets in the **Headwaters Clear Fork Mohican River HUC-12**. These projects are considered next step or priority/short term projects and are considerably ready to implement. Medium and longer-term projects will not have a Project Summary Sheet, as these projects are not ready for implementation or need more thorough planning.

Table 30: Critical Area #2 – Project #1		
Nine Element Criteria	Information needed	Explanation
<i>n/a</i>	Title	Clear Fork North – Phase II
<i>criteria d</i>	Project Lead Organization & Partners	West Creek Conservancy (West Creek) Richland County Park District (RCPD)
<i>criteria c</i>	HUC-12 and Critical Area	Headwaters Clear Fork Mohican River HUC-12 (05040002 03 01); <i>Critical Area #2</i>
<i>criteria c</i>	Location of Project	Private lands located south of Millsboro Road between Lohr and Stevens Roads
<i>n/a</i>	Which strategy is being addressed by this project?	Altered Stream and Habitat Restoration Strategies Nonpoint Source Reduction Strategies
<i>criteria f</i>	Time Frame	Short (1-3 years)
<i>criteria g</i>	Short Description	Restoration of approximately 90.4 acres of agricultural land to riparian and floodplain wetlands
<i>criteria g</i>	Project Narrative	<p>The Project will convert approximately 90.4 acres of agricultural land use that is directly adjacent to small tributaries to floodplain and riparian wetlands through various restoration techniques, including microdepressional grading of hummocks and hollows and inclusion of woody debris to not only provide habitat, but create opportunities for longer water retention.</p> <p>The restoration approach for the Project focuses on preserving existing important headwater stream systems and expanding the riparian forest corridor on site. To assist in jumpstarting the restoration trajectory, the approach includes the following restoration techniques:</p> <ul style="list-style-type: none"> ▪ Native seeding of former agricultural fields (90.4 acres); ▪ Native planting of trees and shrubs in protected pods (90 pods/1,620 trees and shrubs); ▪ Targeted invasive species management to prevent invasive species invasion of fallow fields; ▪ Establishment of seasonal wetland pools through tile drain disruption; ▪ Expansion of existing wetlands through installation of 10 woody debris jams in agricultural ditches to reconnect hydrology; ▪ Addition of microtopography through hummock and hollow grading to diversify the landscape and expand wetland habitat; and,

Table 30: Critical Area #2 – Project #1		
Nine Element Criteria	Information needed	Explanation
		<ul style="list-style-type: none"> ■ Addition of 29 wood habitat features including standing snags, downed logs, and brush piles for terrestrial species.
<i>criteria d</i>	Estimated Total cost	\$540,966
<i>criteria d</i>	Possible Funding Source	Ohio EPA §319, Ohio EPA Gulf Hypoxia, Clean Ohio, WRRSP
<i>criteria a</i>	Identified Causes and Sources	Cause: Nutrients and sediment Source: Surrounding agricultural land use
<i>criteria b & h</i>	Part 1: How much improvement is needed to remove the NPS impairment for the whole Critical Area?	The overall goal in Critical Area #2 is to improve habitat-related attributes (e.g., channelization, vegetative cover, etc.) through in-stream and riparian restoration in order to have a positive effect in the QHEI scoring index. Current data shows that the QHEI in an unnamed tributary to Clear Fork in Critical Area #2 is 67 and HHEI scores for three unnamed tributaries range between 28-42.
	Part 2: How much of the needed improvement for the whole Critical Area is estimated to be accomplished by this project?	It is estimated that this project will cause an incremental increase in the QHEI scoring by 1-3 points and/or in the HHEI scoring by 5-15 points over time through Objective #2: Create, enhance or restore at least 90.4 acres of 400 acres of woody riparian corridor and/or riparian floodplain wetlands (23%).
	Part 3: Load Reduced?	Estimated annual reduction: 2,815 #N/year; 237 #P/year; 183 tons sediment/year
<i>criteria i</i>	How will the effectiveness of this project in addressing the NPS impairment be measured?	Ambient water quality monitoring is conducted throughout the ORB by organizations such as Ohio EPA and Heidelberg University. These entities will continue long term monitoring on various tributaries in the ORB to track load reduction trends. Staff from the Ohio EPA-Division of Surface Water Ecological Assessment Unit may also perform both pre- and post-project in-stream monitoring.
<i>criteria e</i>	Information and Education	<p>West Creek will take a multi-faceted approach to project outreach and public notification, keeping key audiences informed of project activities in compliance with any requirements and/or guidelines set forth by funding agencies. In addition to a project kick-off/ground-breaking event that will be open to the public and project stakeholders (including representatives from applicable funding agencies), the public will be kept informed by way of social media, the organization's website (westcreek.org), on-site signage, and West Creek's quarterly e-newsletters and printed newsletters. Representatives from appropriate government agencies and elected officials will be kept informed through personalized briefings, site visits, and tailored reports highlighting project milestones and alignment with policy objectives. West Creek will strive to foster transparency and accessibility by providing readily understandable information, opportunities for feedback, and avenues for questions or concerns.</p> <p>Following successful conservation and restoration of property, the project site will be utilized by RCPD for public conservation education. RCPD provides a variety of free educational and public programming covering a wide range of topics related to the natural history of Ohio and Richland County. In conjunction with the adjacent 213-acre Clear Fork Preserve (Bloomingrove Phase I), the project site will serve as a</p>

Table 30: Critical Area #2 – Project #1		
Nine Element Criteria	Information needed	Explanation
		suitable location for watershed-related educational opportunities and guided nature hikes hosted by RCPD.

4.3 Critical Area #3 Project and Implementation Strategy Overview Table

Table 31: Headwaters Clear Fork Mohican River HUC-12 (05040002 03 01) — Critical Area #3							
Goal	Objective	Project #	Project Title (EPA Criteria g)	Lead Organization (EPA criteria d)	Time Frame (EPA Criteria f)	Estimated Cost (EPA Criteria d)	Potential/Actual Funding Source (EPA Criteria d)
Urban Sediment and Nutrient Reduction Strategies							
1-3	1	1	Camp Avery Hand	West Creek & RCPD	Short (1-3 years)	\$115,000	Ohio EPA §319, Ohio EPA Gulf Hypoxia, Clean Ohio
Altered Stream and Habitat Restoration Strategies							
Agricultural Nonpoint Source Reduction Strategies							
High Quality Waters Protection Strategies							
Other NPS Causes and Associated Sources of Impairment							

4.3.1 Summary Sheet(s)

The Project Summary Sheets provided below were developed based on the actions or activities needed to achieve nutrient reduction targets in the **Headwaters Clear Fork Mohican River HUC-12**. These projects are considered next step or priority/short term projects and are considerably ready to implement. Medium and longer-term projects will not have a Project Summary Sheet, as these projects are not ready for implementation or need more thorough planning.

Table 32: Critical Area #3 – Project #1		
Nine Element Criteria	Information needed	Explanation
<i>n/a</i>	Title	Camp Avery Hand
<i>criteria d</i>	Project Lead Organization & Partners	West Creek Conservancy (West Creek) Richland County Park District (RCPD)
<i>criteria c</i>	HUC-12 and Critical Area	Headwaters Clear Fork Mohican River HUC-12 (05040002 03 01); <i>Critical Area #3</i>
<i>criteria c</i>	Location of Project	Private lands near Marion Avenue Road N and Orweiler Road
<i>n/a</i>	Which strategy is being addressed by this project?	Urban Sediment and Nutrient Strategies
<i>criteria f</i>	Time Frame	Short (1-3 years)
<i>criteria g</i>	Short Description	Conversion of 30 acres of mowed turf to native meadow
<i>criteria g</i>	Project Narrative	A 30-acre parcel of mowed turf will be converted to native meadow over two growing seasons. At “spring green up” in Year 1, existing vegetation will receive non-selective glyphosate herbicide treatment. Following herbicide treatment, no till drill seeding of native seed mix will occur at a rate of 20 lbs/acre, with 40 lb/acre of oat cover crop. The site will be mowed three times throughout the growing season. In Year 2, the site will be mowed in the spring to clip cool season non-native plants and again in the dormant season in the fall to clip dead duff. Additionally, dilapidated structures and impervious surface will be removed from the site.
<i>criteria d</i>	Estimated Total cost	\$115,000
<i>criteria d</i>	Possible Funding Source	Ohio EPA §319, Ohio EPA Gulf Hypoxia, Clean Ohio
<i>criteria a</i>	Identified Causes and Sources	Cause: Sediment and nutrients Source: Urban runoff
<i>criteria b & h</i>	Part 1: How much improvement is needed to remove the NPS impairment for the whole Critical Area?	The overall goal in <i>Critical Area #3</i> is to reduce urban nitrogen loading contributions by 4,000 lbs/year and urban phosphorus loadings by 220 lbs/year.

Table 32: Critical Area #3 – Project #1		
Nine Element Criteria	Information needed	Explanation
	Part 2: How much of the needed improvement for the whole Critical Area is estimated to be accomplished by this project?	It is estimated that this project will decrease urban nitrogen loading contributions by 20 lbs/year (0.5%) and urban phosphorus loadings by 2 lbs/year (0.9%) through Objective #1: Reduce stormwater inputs and impacts in the sub-watershed by implementing green infrastructure projects within <i>Critical Area #3</i> to retain, detain, and/or treat runoff from at least 30 acres of 1,500 acres of urbanized impermeable surfaces (i.e., parking lots, roads, etc.) (2.0%).
	Part 3: Load Reduced?	Estimated annual reduction: 20 #N/year; 2 #P/year; 0.9 tons sediment/year
<i>criteria i</i>	How will the effectiveness of this project in addressing the NPS impairment be measured?	Ambient water quality monitoring is conducted throughout the ORB by organizations such as Ohio EPA and Heidelberg University. These entities will continue long term monitoring on various tributaries in the ORB to track load reduction trends. Staff from the Ohio EPA-Division of Surface Water Ecological Assessment Unit may also perform both pre- and post-project in-stream monitoring.
<i>criteria e</i>	Information and Education	<p>West Creek will take a multi-faceted approach to project outreach and public notification, keeping key audiences informed of project activities in compliance with any requirements and/or guidelines set forth by funding agencies. In addition to a project kick-off/ground-breaking event that will be open to the public and project stakeholders (including representatives from applicable funding agencies), the public will be kept informed by way of social media, the organization’s website (westcreek.org), on-site signage, and West Creek’s quarterly e-newsletters and printed newsletters. Representatives from appropriate government agencies and elected officials will be kept informed through personalized briefings, site visits, and tailored reports highlighting project milestones and alignment with policy objectives. West Creek will strive to foster transparency and accessibility by providing readily understandable information, opportunities for feedback, and avenues for questions or concerns.</p> <p>Following successful conservation and restoration of property, the project site will be utilized by RCPD for public conservation education. RCPD provides a variety of free educational and public programming covering a wide range of topics related to the natural history of Ohio and Richland County.</p>

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