NINE-ELEMENT NONPOINT SOURCE IMPLEMENTATION STRATEGIC PLAN (NPS-IS) PRICE'S CREEK WATERSHED HUC-12 (50800020204)

VERSION 1.0:
APPROVED: AUGUST 4, 2022

Preble Soil & Water Conservation District
Conserving our Natural Resources

Chapter 1: **Introduction**

The Nine-Element Nonpoint Source Implementation Strategies Plan (NPS-IS) is a strategic document that provides assurance to nonpoint source grant programs and institutions (i.e., U.S. EPA) that a proposed water quality improvement project meets the nine essential elements per U.S. EPA §319 Program Guidance (April 2013). The NPS-IS ensures that potentially funded projects are scientifically evaluated, that they are located in areas that will address the worst problems; and that that they have the administrative, evaluation, and educational components needed to ensure that the water resources will achieve as much long-term benefit as possible. The NPS-IS is a living strategic planning document that summarizes causes and sources of impairment, establishes critical areas, identifies quantifiable objectives to address causes and sources of impairment, and describes projects designed to meet those objectives.

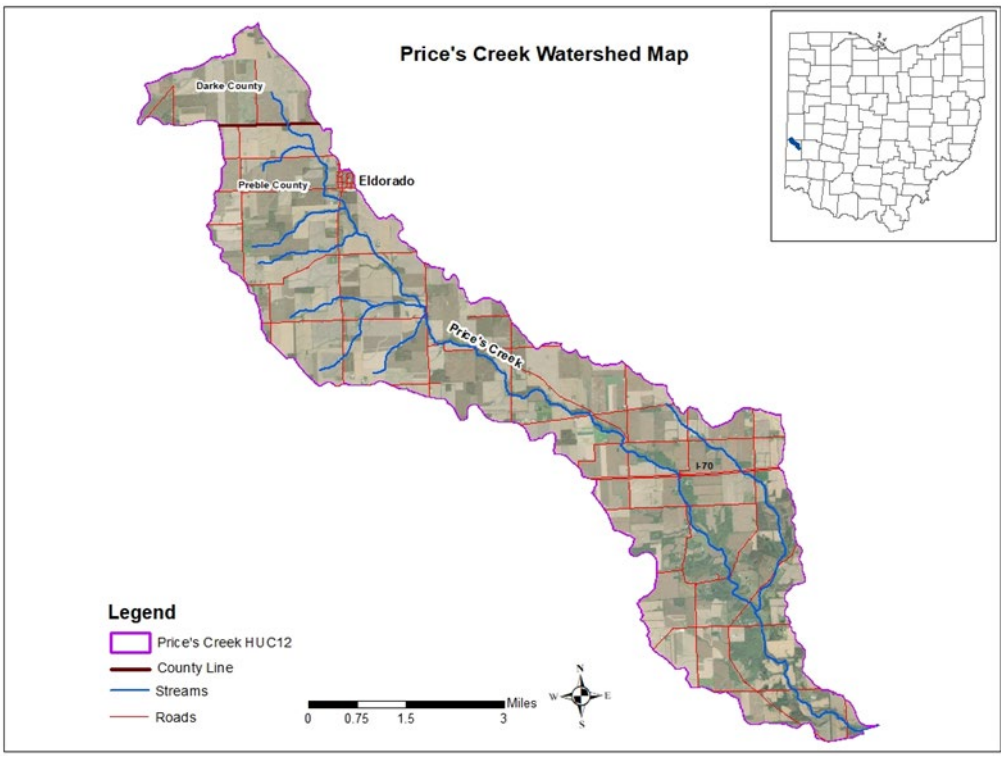


FIGURE 1-1: PRICE'S CREEK IS LOCATED IN SOUTHWEST OHIO WITHIN THE GREAT MIAMI RIVER BASIN.

The Price's Creek HUC-12 (50800020204) (Figure 1-1) has been identified as one of the priority watersheds where USDA models suggest there is high contribution of nutrient loading from agricultural lands. Price's Creek is located within the Great Miami River watershed which is a major contributor of nutrients to the Gulf of Mexico (OEPA, 2020a; Goolsby et al., 1999). The Great Miami River basin watershed had the highest soluble reactive phosphorus concentrations and the highest time-weighted average total P concentration amongst 10 streams studied in Ohio (Baker, 2006).

The Preble Soil and Water Conservation District (SWCD) has partnered with Environmental Solutions AQ, a local environmental consultant, for the preparation of this Nine-Element NPS-IS for Price's Creek HUC-12 watershed.

One important element of Nine Element NPS-IS is the education and outreach activities that will be conducted while implementing the plan. Preble SWCD is dedicated not only engaging the public and informing them of important events and projects, but also to educating them about

the existing condition of the streams, about managing nutrient loads by implementing BMPs and about improving and preserving the quality streams such as Price's Creek.

An Outreach Coordinator is employed at the SWCD, who presents at local schools and special interest groups, completing more than 12 presentations each year. The Preble SWCD hosts annual workshops and field days where local producers come together to discuss relevant topics. In the past these workshops have focused on forestry, invasive weeds, pollinator habitat, soil testing, manure management, and pesticide application. In addition, the SWCD conducts one-on-one meetings with landowners to look at drainage and erosion issues on their properties. A quarterly newsletter is published that reaches more than 1600 local residents with relevant conservation updates. As the opportunities included in this NPS-IS are further evaluated and implemented in the watershed, the Preble SWCD will utilize these opportunities to engage the public about additional conservation practices. A small portion of the headwaters of Price's Creek is in Darke County, so the Darke SWCD will also engage in education and outreach efforts as part of this plan.

FIGURE 1-2 HEADWATER OF PRICE'S CREEK IS LOCATED IN DARKE COUNTY AND NORTHERN PREBLE COUNTY

1.1. Report Background

Ohio has been leading Watershed Based Planning (WBP) for a long time. It is a process that often results in a document used to guide projects within a geographic area defined by the flow of water. WBP is used to coordinate activities related to water resources including: water quality and/or quantity management, ecological protection and restoration, or the strategic guidance of development, infrastructure improvement, transportation, and recreation among others. WBP is an effective approach to solving difficult water-related problems because it is locally led, collaborative, data driven, and consensus based (OEPA, 2016a).

Ohio EPA developed the Ohio Guide for Development of Watershed Action Plans in 1997 and in 2016, in collaboration with Ohio Department of Agriculture, the Nine-Element NPS-IS template was issued to guide the completion of a state and federal approvable Nine-Element NPS-IS (OEPA, 2016b).

A Nine-Element NPS-IS is a specific type of watershed-based planning that will allow local entities to effectively propose and implement nonpoint source pollution projects utilizing funding made available through the Clean Water Act Section 319 (§319), H2Ohio or the Great Lakes Restoration Initiative. In Ohio, eligibility for these grant programs is restricted to projects delineated within a critical area of an approved NPS-IS.

Nine Elements of NPS-IS
Source: OEPA, 2016a

a) An identification of the causes and sources or groups of similar sources that will need to be controlled to achieve the load reductions estimated in this watershed-based plan.

b) An estimate of the load reductions expected for the management measures described under paragraph (c) below.

c) A description of the NPS management measures (solutions) that will need to be implemented to achieve the load reductions estimated under paragraph (b) above and an identification (using a map or a description) 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 the 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 management measures identified in this plan 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 and, if not, the criteria for determining whether this watershed-based plan needs to be revised or, if a NPS TMDL has been established, whether the NPS TMDL needs to be revised.

i) A monitoring component to evaluate the effectiveness of the implementation efforts over time, measured against the criteria established under item (h) immediately above.

Price's Creek Watershed (a subwatershed of Twin Creek) was characterized in the 2010 endorsed Twin Creek Watershed Action Plan (WAP). The Twin Creek WAP concluded that although much of the watershed was very high quality, portions of Twin Creek and its tributaries

were not meeting aquatic life and recreational use standards (IES, 2010). In the 2010 Twin Creek Watershed TMDL report, OEPA concluded that fecal coliform and sediment are the pollutants that need to be reduced. The causes of impairment to aquatic life and primary recreation use at Price's Creek HUC-12 include low DO, ammonia, phosphorus, bacteria and low flow (OEPA, 2007).

The Price's Creek HUC-12 Nine-Element NPS-IS has been prepared based on knowledge from the WAP, OEPA report, and TMDL documents and follows the OEPA Nine-Element NPS-IS template (OEPA, 2016b).

1.2. Watershed Profile & History

The Price's Creek HUC-12, located in Preble and Darke counties, Ohio is one of the subwatersheds of the Twin Creek Basin located in southwest Ohio (Figure 1-3). The Twin Creek watershed drains an area of 316 mi^2 in southwestern Ohio. Twin Creek, 47.03 miles long, originates in Darke County and flows southeast into Preble County and generally south through the eastern portion of the county, then southeast through the southwest corner of Montgomery County, and then into Warren County, Franklin Township, where it meets the Great Miami River. The Price's Creek and Twin Creek watersheds are part of the Lower Great Miami Watershed HUC 05080002 (Figure 1-4).

The main stem of Price's Creek is 14.6 miles long, approximately 5 miles of which has been modified through channelization, riparian removal or leveed (Twin Creek WAP, 2010). The HUC-12 watershed is 18,707 acres in size. Significant tributaries in the Price's Creek HUC-12 watershed include Jims Run and several unnamed tributaries.

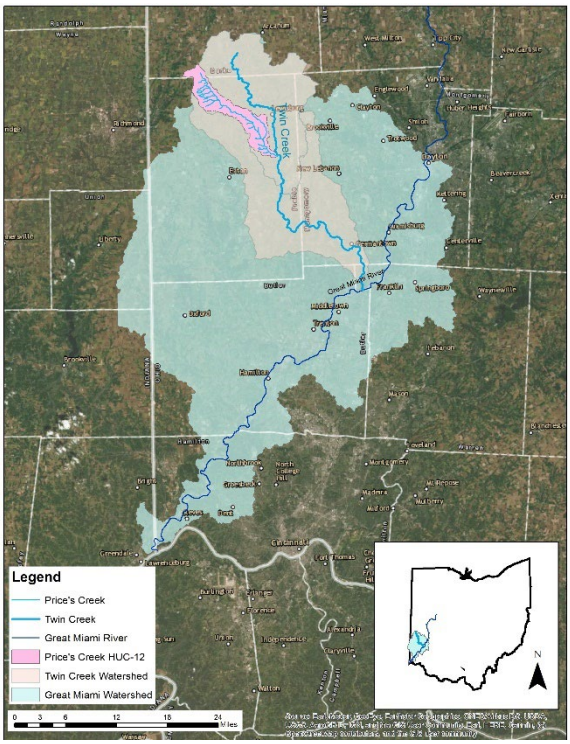


FIGURE 1-3: PRICE'S CREEK IS LOCATED WITHIN THE TWIN CREEK WATERSHED.

The Price's Creek watershed is primarily a rural, agricultural watershed in Preble County. The village of Eldorado (458 people, according to the 2020 U.S. Census) is the only populated area within the Price's Creek HUC-12. There are no housing developments, and only a few industrial, or large-scale commercial facilities within the watershed. Eldorado Wastewater Treatment Plant, which provides sewage treatment services for the village, is the only permitted NPDES facility within the Price's Creek HUC-12 watershed.

Most of the watershed is composed of farmland that is owned by private landowners.

According to the 2010 Twin Creek WAP, the Price's Creek HUC-12 was designated as mostly Warmwater Habitat (WWH) which defined as the "typical" warm water assemblage of aquatic organisms for Ohio rivers and streams. The downstream reach of Price's Creek was designated as Exceptional Warm Water Habitat (EWH) with the recommendation it be adjusted to Warm Water Habitat since most of the stream was designated as WWH. These designations were based on the Biological and Water Quality Study of Twin Creek and Selected Tributaries

conducted by Ohio EPA in 2005 (OEPA, 2007). OEPA collected samples from three locations along Price's Creek.

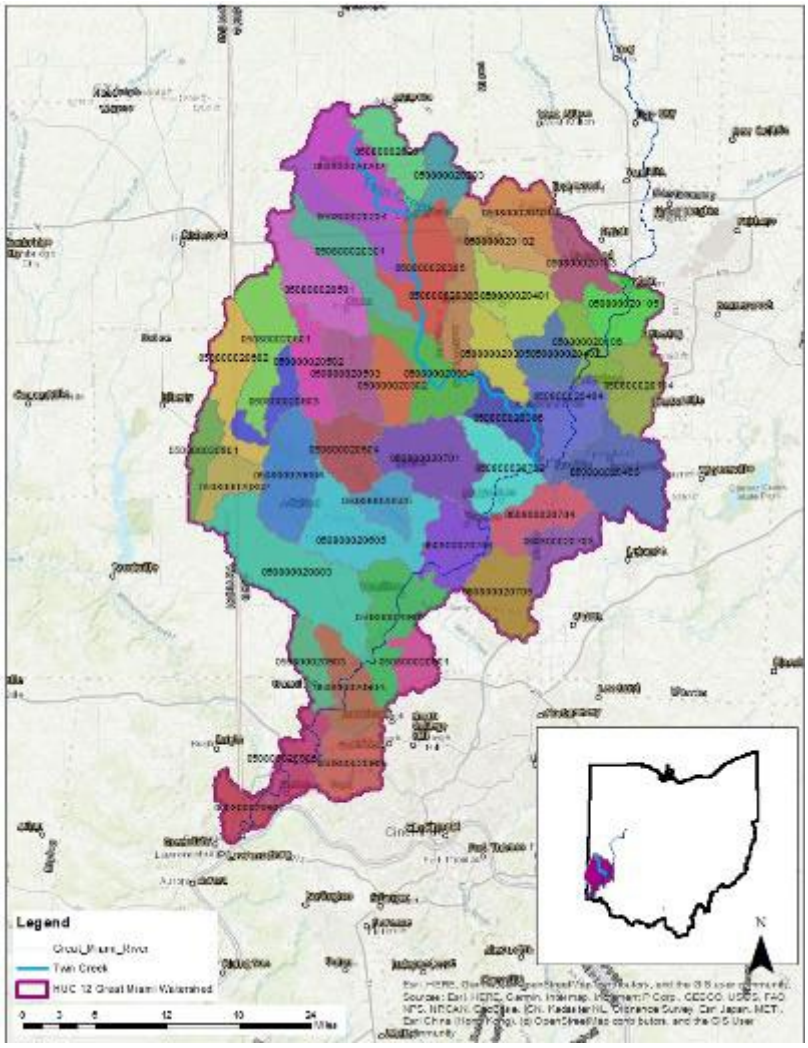


FIGURE 1-4: LOWER GREAT MIAMI WATERSHED WITH TWIN CREEK HIGHLIGHTED

WWH is defined in the State water quality standards as follows (Ohio Administrative Code 3745-1-07(B)(1)(a)):

> "…these are waters capable of supporting and maintaining a balanced, integrated, adaptive community of warm water aquatic organisms having a species composition, diversity, and functional organization comparable to the twenty-fifth percentile of the identified reference sites within each of the following ecoregions: the interior plateau ecoregion, the Erie/Ontario lake plains ecoregion, the western Allegheny plateau ecoregion and the eastern corn belt plains ecoregion. For the Huron/Erie lake plains ecoregion, the comparable species composition, diversity and functional organization are based upon the ninetieth percentile of all sites within the ecoregion. For all ecoregions, the attributes of species composition, diversity and functional organization will be measured using the index of biotic integrity,

> the modified index of well-being and the invertebrate community index as defined in "Biological Criteria for the Protection of Aquatic Life: Volume II, User's Manual for Biological Field Assessment of Ohio Surface Waters," as cited in paragraph (B) of rule 3745-1-03 of the Administrative Code."

EWH is defined in the State water quality standards as follows (Ohio Administrative Code 3745-1-07(B)(1)(c)):

> (c) "Exceptional warmwater" - these are waters capable of supporting and maintaining an exceptional or unusual community of warmwater aquatic organisms having a species composition, diversity, and functional organization comparable to the seventy-fifth percentile of the identified reference sites on a statewide basis. The attributes of species composition, diversity and functional organization will be measured using the index of biotic integrity, the modified index of well-being and the invertebrate community index as defined in "Biological Criteria for the Protection of Aquatic Life: Volume II, Users Manual for Biological Field Assessment of Ohio Surface Waters," as cited in paragraph (B) of rule 3745-1-03 of the Administrative Code. In addition to those water body segments designated in rules 3745-1-08 to 3745-1-32 of the Administrative Code, all lakes and reservoirs, except up ground storage reservoirs, are designated exceptional warmwater habitats. Attainment of this use designation (except for lakes and reservoirs) is based on the criteria in table 7-1 of this rule. A temporary variance to the criteria associated with this use designation may be granted as described in paragraph (F) of rule 3745-1-01 of the Administrative Code.

The 2007 report provides details about why the designation of EWH for the most downstream sampling site (RM 0.6) was recommended for adjustment to WWH. When the EWH aquatic life use designation was made in 1995, there was not clear evidence that the site then met, or would meet EWH criteria in the future. This condition persisted during OEPA's 2005 research and any resemblance to EWH was likely due to the proximity of the EWH conditions in the Twin Creek mainstem nearby.

1.3. Public Participation and Involvement

Public participation and involvement are critical to the success of any NPS-IS. In 2007, the Twin Creek Advisory Committee was formed, and meetings were held regularly to collaborate in the preparation of the Twin Creek WAP and review of the OEPA prepared Twin Creek TMDL. The Twin Creek watershed projects were operated as a collaborative group of organizations, individuals, and agencies with a goal of protecting and improving water quality in Twin Creek and its tributaries. Various partners engaged in the decision-making process, documentation and plan strategy endorsements, and events including education, public outreach, and stream monitoring. The decision-making process was informal, but consensus driven. The public involvement for the Price's Creek HUC-12 Nine-Element NPS-IS development is built on this already established working relationship and trust.

On November 6, 2021 Preble SWCD issued the first press release regarding the Price's Creek HUC-12 NPS-IS development in the local newspaper (Figure 1-5). The announcement got immediate positive responses from landowners and producers in Price's Creek HUC-12. Preble SWCD received emails and phone calls inquiring about the project. The progress of the plan

preparation was posted on social media and Preble SWCD website. Two stakeholder letters were sent to all the landowners who reside in the Price's Creek HUC-12. The first letter dated November 1, 2021 was to inform the residents about the project and background information about the Nine-Element NPS-IS. The second letter, sent on May 9, 2022 was to invite the public to the May 26, 2022 public meeting.

R-H 11-6-2021

Price's Creek Watershed meeting Nov. 16

Submitted by BJ Price
Preble SWCD

The Preble Soil and Water Conservation District (SWCD) is gathering information from landowners in the Price's Creek Watershed. Price's Creek empties into Twin Creek north of New Lexington and south of Lewisburg and drains an area extending northwest from Eldorado and southern Darke County, and southeast as far as S.R. 503 and New Market Banta Road.

The Preble SWCD received a grant from Ohio EPA for the preparation of the 9-Element Nonpoint Source Implementation Strategy (NPS-IS) plan for the Price's Creek watershed. The purpose of the plan is to improve water quality by identifying and evaluating sources of impairment such as: agricultural runoff, stream channel modification, sedimentation, and excessive nutrients; and determine what water quality goals, restoration methods, and conservation practices are needed.

Preble SWCD has partnered with Environmental Solutions AQ, a local environmental consultant, in drafting the plan. To ensure the success of the plan, the Ohio EPA encourages cooperation with local community members who can help to identify the critical areas, develop the watershed restoration and protection strategies, and later implement these strategies. It is important for us to hear from you since your property may qualify to be considered a critical area in the plan.

We invite landowners in the Price's Creek watershed to attend a public meeting which will take place at Eaton First Church of God at 601 E. Lexington Rd, Eaton, on Tuesday, Nov. 16 at 6:30 p.m. Please enter the building at the east carport. Watch for signs.

The purpose of this meeting is to: meet face-to-face with local landowners; better understand local water quality issues; review agricultural conservation planning analyses; discuss potential critical areas, possible grant funding, and future projects; and discuss the next steps in the plan. For more information, please contact BJ Price at Preble SWCD at (937) 456-5159, Jared Coppess at Darke SWCD at (937) 548-1715, or Monica Rakovan at Environmental Solutions AQ at (513) 593-1310.

Heritage Goodhew

FIGURE 1-5: PUBLIC ANNOUNCEMENT IN LOCAL NEWSPAPER

On November 16, 2021, a public meeting was held at the gymnasium of a local high school. Over 50 landowners participated in the in-person public meeting. During the meeting, a presentation was given and after the presentation, the public discussed the scope of the Nine-Element NPS-IS.

At the public meeting, landowners asked questions and discussed the water quality issues at Price's Creek HUC-12 as wells as potential funding opportunities for implementing conservation and restoration projects. In

FIGURE 1-6: PUBLIC MEETING ON NOVEMBER 16, 2021

addition, landowners were invited to complete a 10-item questionnaire. Seven completed questionnaires were collected after the meeting. In summary, the landowners were most concerned about erosion, flooding, and agricultural runoff. If funding were available, the landowners would participate in installing grassed waterways, streambank protection to control erosion and dredging.

The announcement of the project and public meeting have prompted more landowners' interest and inquiries about implementing conservation practices. Field visits were conducted on May 24, 2022, to observe conservation practices within the watershed.

A second press release was issued on June 15, 2022, informing the public that the Draft Nine-Element NPS-IS is complete. The public is encouraged to request a copy of the plan, review it and provide comments. Once comments are received and reviewed, the next version of the Price's Creek HUC-12 Nine-Element NPS-IS will be updated to incorporate the comments.

Preble SWCD is dedicated to continuing to promote conservation practices with public involvement through education and outreach activities. Preble SWCD engages with the public in several ways, including publishing newsletters, in-person farm visits and regularly updating social media outlets such as Facebook and its website. A local watershed partner, Miami Conservancy District, engaged in the review and discussion of the draft Price's Creek HUC-12 NPS and also sponsored the modeling of the Agricultural Conservation Planning Framework (ACPF) (see Section 2.5).

Chapter 2: **Watershed Characterization and Assessment Summary**

The Price's Creek HUC-12 watershed includes five unnamed tributaries and Jims Run (Figure 1-1). In 2005, Ohio EPA conducted the Biological and Water Quality Study of Twin Creek and Selected Tributaries which included Price's Creek (OEPA, 2007). The report stated that the sampling locations from Price's Creek met the WWH aquatic life use and two of the three sites obtained full attainment status. The northern most sampling site near Eldorado received the partial attainment status.

FIGURE 2-1: PRICE'S CREEK NORTHERN SECTION

The Price's Creek HUC-12 is located within the Eastern Corn Belt Plains (ECBP) ecoregion (Figure 2-2). The ECBP ecoregion is a rich agricultural producing area and primarily a rolling till plain with local end moraines that were associated with glacial deposits of Wisconsinian age (7,500 to 11,000 years ago). This region's nutrient-rich soils significantly influence water quality including elevated concentrations of nitrate and phosphorus in many watersheds (USEPA, 2000).

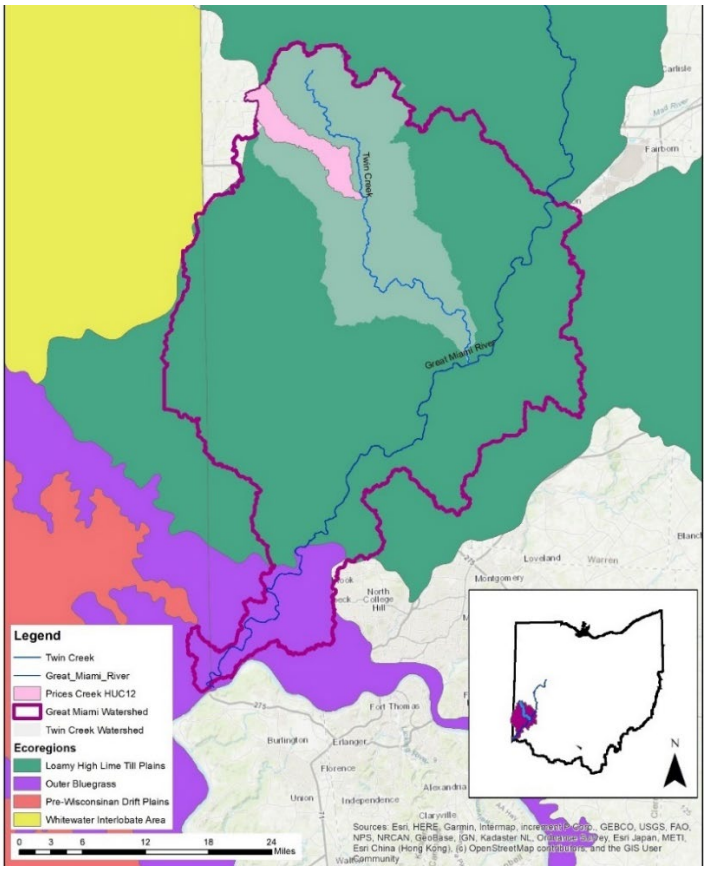


FIGURE 2-2: ECOREGION OF PRICE'S CREEK HUC-12

2.1. Summary of Watershed Characterization for Price's Creek HUC-12

2.1.1. Physical and Natural Features

In the Price's Creek HUC-12 watershed, deposits of glacial till composed of cobbles, gravel, sand, silts, and clays overlay sedimentary bedrock of limestone and shale formations or interbedded limestones and shales (Ohio Geological Survey, 2005). Glacial till, visible as moraines or depositional ridges of glacial outwash, formed lobate ridges according to glacial advance and retreat. Wisconsinian Era end moraine and ground moraine compose most of the unconsolidated sediments in the watershed (Ohio Geological Survey, 2005). Drift thickness, the amount of glacial deposition that occurs above bedrock, varies from as thin as 20 feet in the watershed's uplands to as thick as 200 feet in the outwash areas and bedrock cut valleys that cover ancient river valleys (Ohio Geological Survey, 2005). Bedrock is commonly visible at Price's Creek streambed in the lower portion of the watershed.

Upland soils in the watershed are primarily loamy glacial till that are generally high in fertility and have poor to moderate drainage. Over 70% of the watershed is very limited in drainage (NRCS, 2020). The dominant upland soil association consists of Pyrmont and Crosby silt loams (Table 2-1) which represent soils that have slow and very slow infiltration when thoroughly wet. These soils have a very slow rate of water transmission (Figure 2-3).

These soils are cultivated in large acreages and are important to farming in this watershed. The control of runoff and soil erosion are the main concern in managing these soils for farming while moderately slow permeability and slope are the dominant limitations to many nonfarm uses (NRCS, 2020). Soils along Price's Creek primarily are derived from fine to coarse-grained floodplain deposits that overlie older alluvial or outwash sediments. Such floodplain soils tend to be fertile and well-drained (Figure 2-4). It appears that there is not an abundance of wetlands in the Price's Creek HUC-12 (Figure 2-5). Most natural wetlands in the Price's Creek HUC-12 watershed were likely lost with the installation of field drainage systems that began as long ago as the early to mid-19th century. Wetland restoration on declining agricultural land can improve habitat for native species, reduce flooding, and improve water quality.

The slope appears to be gentle in the northern portion of the Price's Creek HUC-12 but there is higher relief in the southern portion of the watershed. The riparian corridor appears to have moderate to high relief and some of the streambanks have as high as 10-degree slopes which may be the cause of some of the severe streambank erosion observed in the watershed (Figure 2-6).

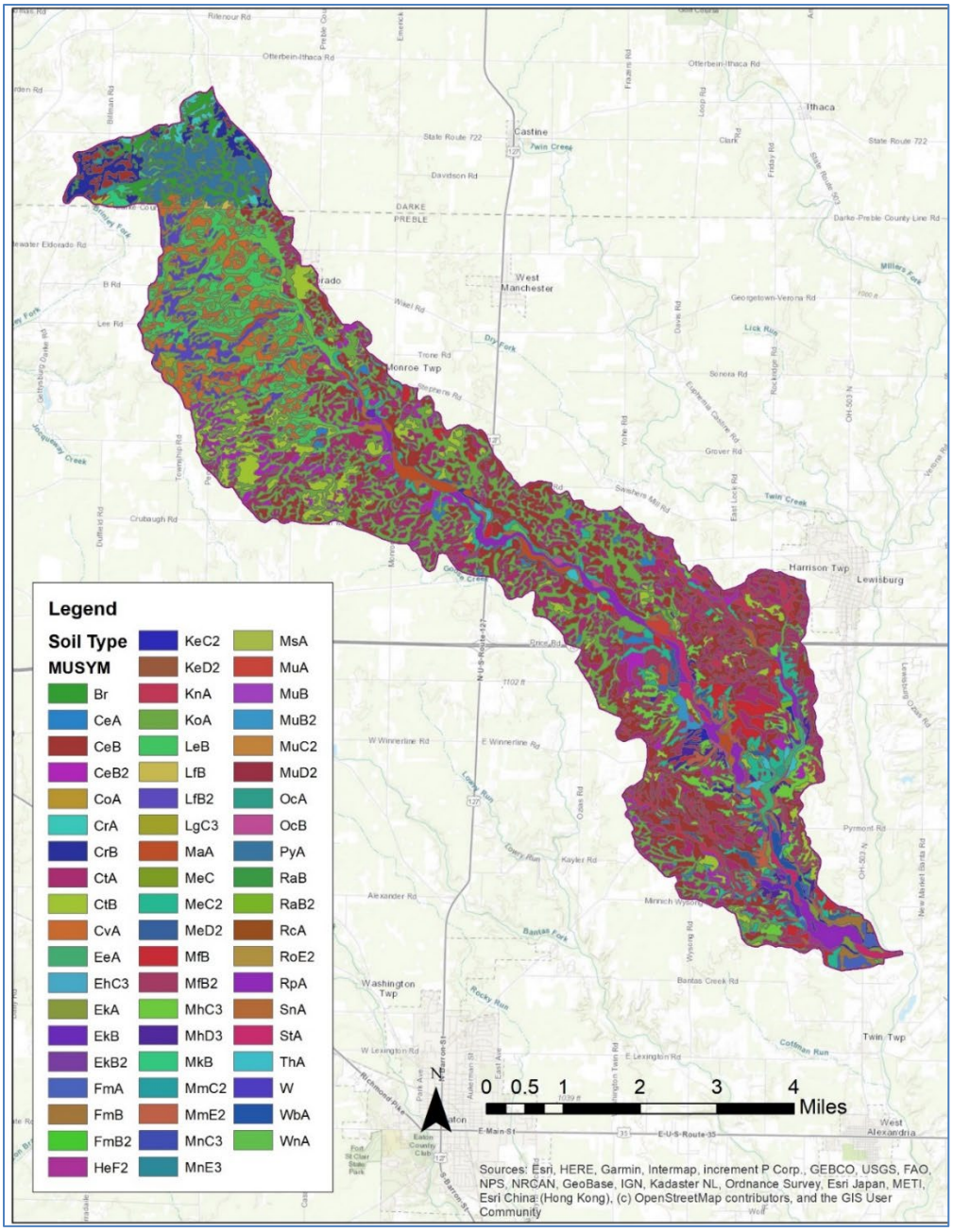


FIGURE 2-3: SOILS MAP OF PRICE'S CREEK HUC-12 (NRCS, 2020)

Table 2-1: Common soil types in the Price's Creek HUC-12 watershed (NRCS, 2020)

Soil Name	Soil Description	Drainage Rating	Area (acre)	Percent of HUC-12
Br	Brookston silty clay loam, fine texture, 0 to 2 percent slopes	Very limited	485.7	2.6%
CeB	Celina silt loam, 2 to 6 percent slopes	Somewhat limited	127.3	0.7%

CrA	Crosby silt loam, Southern Ohio Till Plain, 0 to 2 percent slopes	Very limited	93.0	0.5%
CrB	Crosby silt loam, Southern Ohio Till Plain, 2 to 6 percent slopes	Very limited	297.4	1.6%
CtB	Crosby-Celina silt loams, 2 to 4 percent slopes, eroded	Very limited	10.1	0.1%
CvA	Crosby- Lewisburg silt loams, 0 to 2 percent slopes	Very limited	26.7	0.1%
KoA	Kokomo silty clay loam, 0 to 1 percent slopes	Very limited	30.9	0.2%
LeB	Lewisburg silt loam, 2 to 6 percent slopes	Somewhat limited	39.8	0.2%
LfB	Lewisburg- Celina silt loams, 2 to 6 percent slopes	Very limited	11.0	0.1%
MkB	Miamian-Celina silt loams, 2 to 6 percent slopes	Very limited	35.9	0.2%
MmC2	Miamian silt loam, 6 to 12 percent slopes, eroded	Very limited	18.6	0.1%
MnC3	Miamian clay loam, shallow to dense till substratum, 6 to 12 percent slopes, severely eroded	Very limited	2.6	0.0%
PyA	Pyrmont silt loam, 0 to 3 percent slopes	Very limited	459.0	2.5%
WnA	Westland silt loam, 0 to 2 percent slopes	Very limited	3.5	0.0%
				Darke County Total Area: 1,641.5 Acres/8.8%
CeA	Celina silt loam, 0 to 2 percent slopes	Somewhat limited	119.2	0.6%
CeB	Celina silt loam, 2 to 6 percent slopes	Somewhat limited	2,373.8	12.7%
CeB2	Celina silt loam, 2 to 6 percent slopes, eroded	Somewhat limited	660.2	3.5%
CoA	Corwin silt loam, 0 to 2 percent slopes	Not limited	3.7	0.0%
CtA	Crosby-Celina silt loams, 0 to 2 percent slopes	Very limited	1,953.3	10.4%
CtB	Crosby-Celina silt loams, 2 to 4 percent slopes, eroded	Very limited	853.4	4.6%
CvA	Crosby- Lewisburg silt loams, 0 to 2 percent slopes	Very limited	680.3	3.6%
EeA	Eel silt loam, gravelly substratum, 0 to 1 percent slopes, occasionally flooded	Very limited	88.6	0.5%
EhC3	Eldean gravelly clay loam, 6 to 12 percent slopes, severely eroded	Very limited	11.5	0.1%
EkA	Eldean loam, 0 to 2 percent slopes	Very limited	37.6	0.2%
EkB	Eldean loam, 2 to 6 percent slopes	Very limited	66.9	0.4%
EkB2	Eldean loam, 2 to 6 percent slopes, eroded	Very limited	18.0	0.1%
FmA	Fox silt loam, till substratum, 0 to 2 percent slopes	Very limited	82.0	0.4%

FmB	Fox silt loam, till substratum, 2 to 6 percent slopes	Very limited	77.8	0.4%
FmB2	Fox silt loam, till substratum, 2 to 6 percent slopes, eroded	Very limited	18.5	0.1%
HeF2	Hennepin- Miamian silt loams, 25 to 50 percent slopes, eroded	Very limited	46.0	0.2%
KeC2	Kendallville- Eldean silt loams, 6 to 12 percent slopes, eroded	Very limited	62.3	0.3%
KeD2	Kendallville- Eldean silt loams, 12 to 18 percent slopes, eroded	Very limited	1.5	0.0%
KnA	Kokomo silt loam, 0 to 1 percent slopes	Very limited	660.6	3.5%
KoA	Kokomo silty clay loam, 0 to 1 percent slopes	Very limited	3,409.9	18.2%
LeB	Lewisburg- Celina silt loams, 2 to 6 percent slopes	Very limited	679.4	3.6%
LfB2	Lewisburg- Celina clay loams, 2 to 6 percent slopes, eroded	Very limited	412.9	2.2%
LgC3	Lewisburg clay loam, 6 to 12 percent slopes, severely eroded	Very limited	63.2	0.3%
MaA	Medway silt loam, 0 to 1 percent slopes, occasionally flooded	Very limited	180.5	1.0%
MeC	Miamian silt loam, 6 to 12 percent slopes	Very limited	26.4	0.1%
MeC2	Miamian silt loam, 6 to 12 percent slopes, eroded	Very limited	597.8	3.2%
MeD2	Miamian silt loam, 12 to 18 percent slopes, eroded	Very limited	133.1	0.7%
MfB	Miamian-Celina silt loams, 2 to 6 percent slopes	Very limited	374.4	2.0%
MfB2	Miamian-Celina silt loams, 2 to 6 percent slopes, eroded	Very limited	1,031.5	5.5%
MhC3	Miamian- Losantville clay loams, 6 to 12 percent slopes, severely eroded	Very limited	505.5	2.7%
MhD3	Miamian- Losantville clay loams, 12 to 18 percent slopes, severely eroded	Very limited	173.4	0.9%
MmE2	Miamian- Hennepin silt loams, 18 to 25 percent slopes, eroded	Very limited	135.8	0.7%
MnE3	Miamian- Hennepin clay loams, 18 to 25 percent slopes, severely eroded	Very limited	5.3	0.0%
MsA	Millsdale silt loam, 0 to 2 percent slopes	Very limited	14.7	0.1%
MuA	Milton silt loam, 0 to 2 percent slopes	Very limited	68.5	0.4%
MuB	Milton silt loam, 2 to 6 percent slopes	Very limited	3.1	0.0%
MuB2	Milton silt loam, 2 to 6 percent slopes, eroded	Very limited	59.9	0.3%
MuC2	Milton silt loam, 6 to 12 percent slopes, eroded	Very limited	10.0	0.1%
MuD2	Milton silt loam, 12 to 18 percent slopes, eroded	Very limited	2.7	0.0%
OcA	Ockley silt loam, Southern Ohio Till Plain, 0 to 2 percent slopes	Very limited	23.9	0.1%

OcB	Ockley silt loam, Southern Ohio Till Plain, 2 to 6 percent slopes	Very limited	26.8	0.1%
RaB	Rainsville silt loam, 2 to 6 percent slopes	Somewhat limited	4.6	0.0%
RaB2	Rainsville silt loam, 2 to 6 percent slopes, eroded	Somewhat limited	44.8	0.2%
RcA	Randolph silt loam, 0 to 2 percent slopes	Very limited	6.1	0.0%
RoE2	Rodman- Kendallville complex, 18 to 25 percent slopes, eroded	Very limited	7.8	0.0%
RpA	Rossburg silt loam, moderately wet, sandy substratum, 0 to 1 percent slopes, occasionally flooded	Very limited	461.2	2.5%
SnA	Sloan silt loam, sandy substratum, 0 to 2 percent slopes, frequently flooded	Very limited	122.5	0.7%
StA	Stonelick loam, gravelly substratum, 0 to 1 percent slopes, frequently flooded	Very limited	158.2	0.8%
ThA	Thackery silt loam, 0 to 2 percent slopes	Very limited	69.1	0.4%
W	Water	Not rated	24.0	0.1%
WbA	Warsaw loam, 0 to 2 percent slopes	Very limited	48.5	0.3%
WnA	Westland silt loam, 0 to 2 percent slopes	Very limited	364.8	1.9%
			Preble County Total Area: 17,065.5 Acres/91.28%	

Source: USDA, 2020

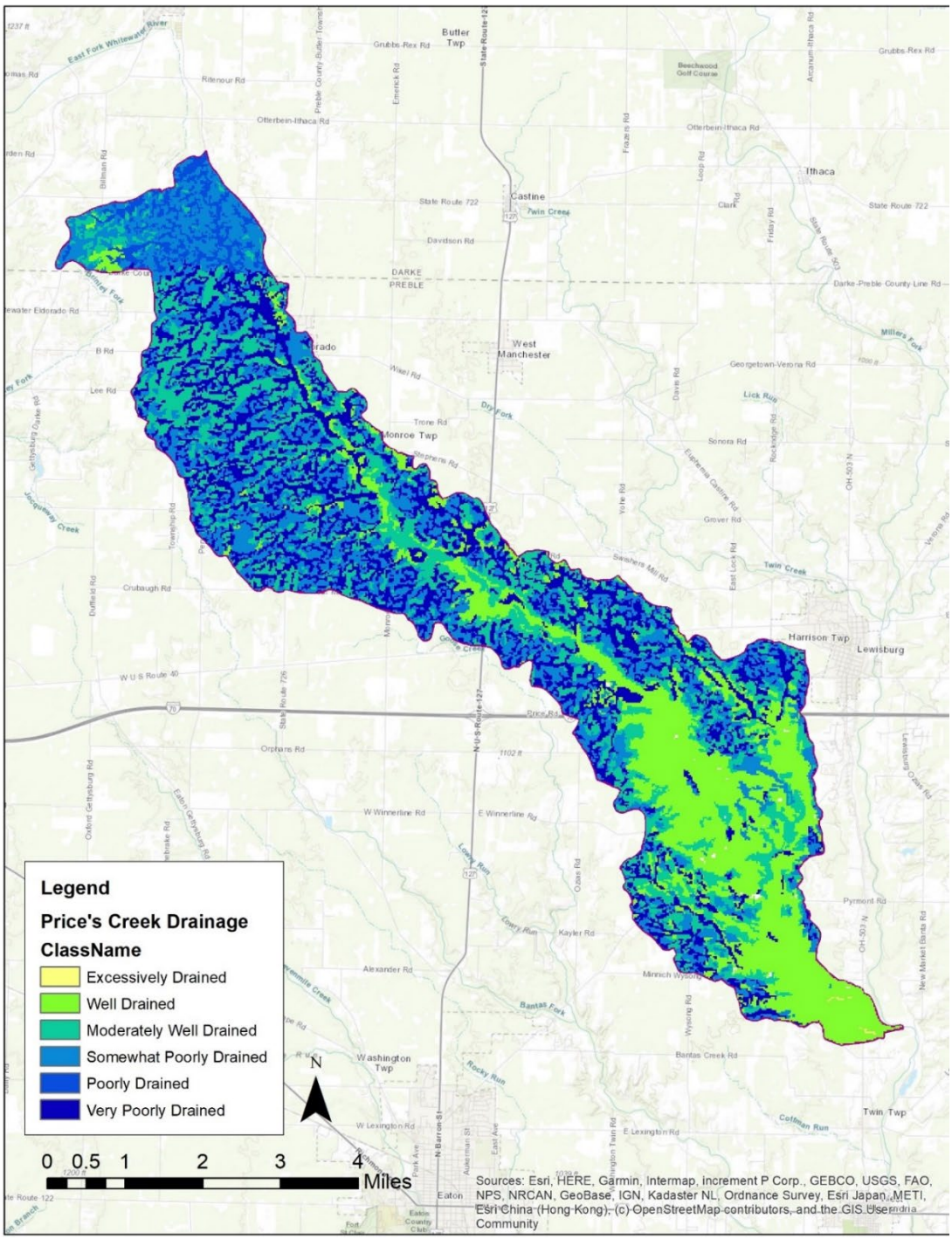


FIGURE 2-4: DRAINAGE CLASS WITHIN PRICE'S CREEK HUC-12 (NRCS, 2020)

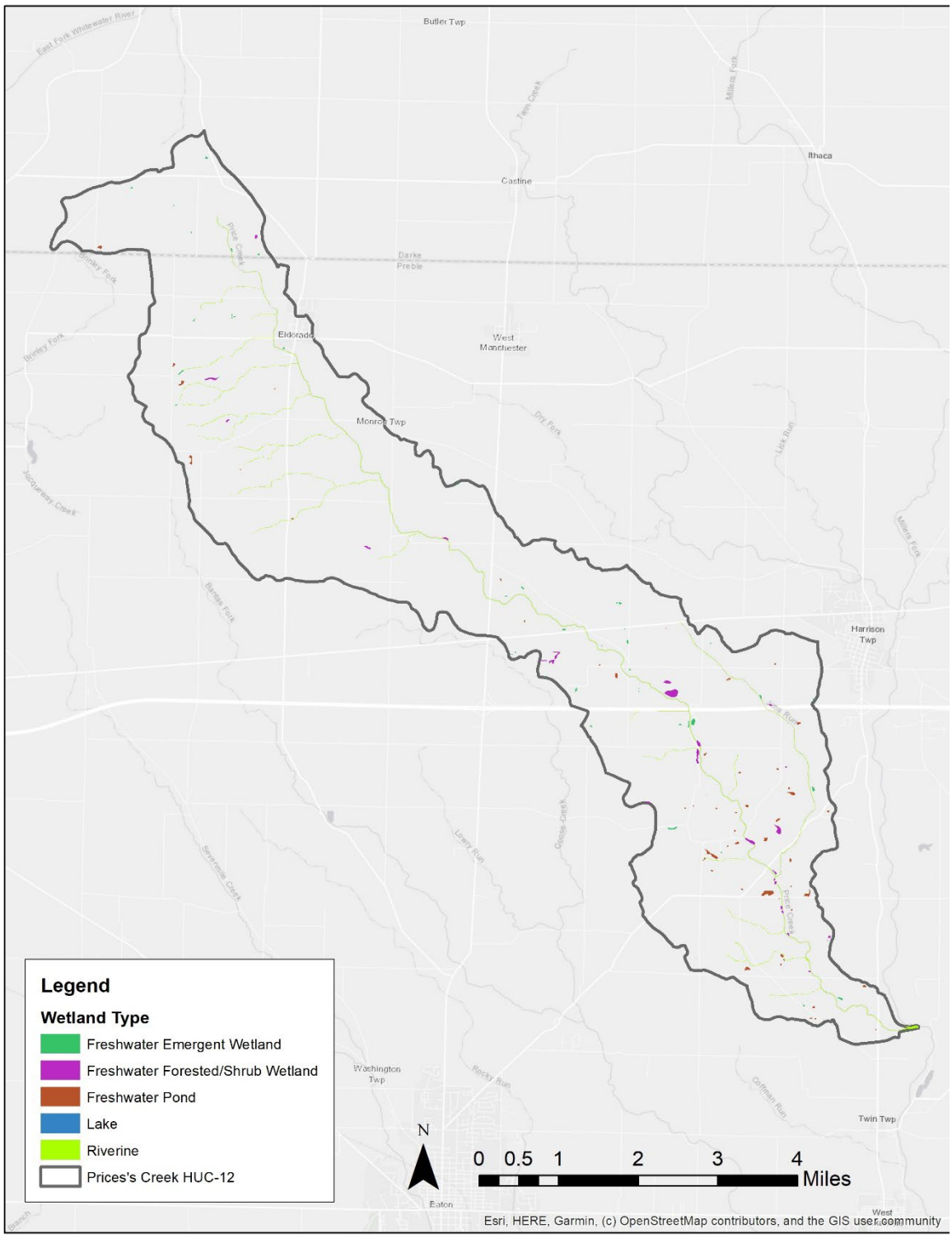


FIGURE 2-5: WETLANDS WITHIN THE PRICE'S CREEK HUC-12 (NRCS, 2020)

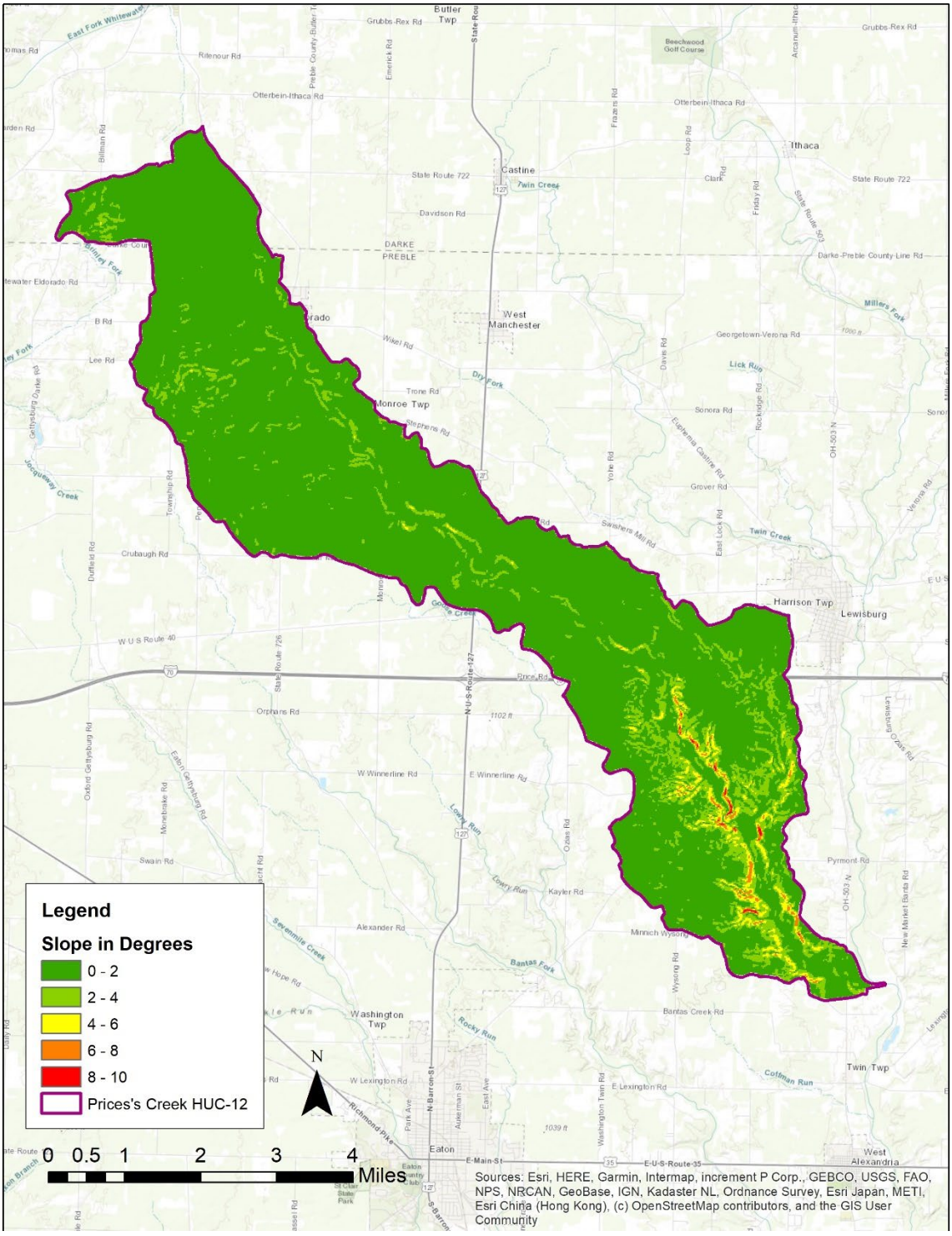


FIGURE 2-6: SLOPES IN DEGREES OF THE PRICE'S CREEK HUC-12. (USDA, 2020)

2.1.2. Land Use and HSTS

Agriculture is the predominant land use in the Price's Creek HUC-12 watershed and will continue to be for the foreseeable future (Figure 2-7). Table 2-2 indicates 80% of the watershed land use is in row crop production, 5% in hay and pasture, 6.3% is forested and less than 6.8% is developed (NLCD, 2011). Eldorado, a small Preble County village with a population of 458 (2020 U.S. Census) is the only community and it is located in the upper portion of the HUC-12. The Eldorado Waste Water Treatment Plant is located within the Price's Creek HUC-12. The WWTP holds the National Pollution Discharge Elimination System permit. No significant enforcement violation was noted in the USEPA detailed facility report. One minor compliance violation was noted in 2020 for its failure to submit the 10/21-12/21 quarterly report.

Home Sewage Treatment Systems (HSTS) are small wastewater treatment units that serve individual homes or businesses in the majority of the Price's Creek HUC-12. The effectiveness of each HSTS depends on its age, maintenance records, and characteristics of the site including soil drainage, depth to water table, bedrock depth, land slope, and household size. HSTS are considered a major bacteria contributor affecting the water quality of Price's Creek as indicated in the 2007 OEPA report. The NRCS Soil Web Survey for Septic Tank Absorption Fields for Price's Creel HUC-12 indicated that 99.6% of the watershed is very limited. The evaluation is based on soil properties that affect adsorption of the effluent, construction and maintenance of the system and public health. The 2020 OKI report on management of onsite systems did not provide the number of failing home systems in this watershed but concluded that better septic system management was recommended for the entire Twin Creek Watershed (OKI, 2020).

HSTS are regulated by the Preble County Health Department (PCHD). To educate the public about failed HSTS and water quality, a septic system workshop was hosted by Preble SWCD and sponsored by Ohio Farm Bureau Water quality Grant on October 25, 2021. The workshop was attended by 25 participants and featured talks from a soil scientist who does investigations for septic systems at Ohio State University and Preble SWCD staff. Because of the poor soil drainage, shallow depth to bedrock and the lack of coordinated outreach effort, it is likely that failed HSTS is prevalent and widespread in this watershed. Better resources and coordination from local partners are needed to address the failed HSTS in this rural community and in the region. Once more information is available for the HSTS/urban loading and improved collaboration with PCHD, the next version of the Nine-Element NPS-IS will be updated to include an urban load estimate and reduction.

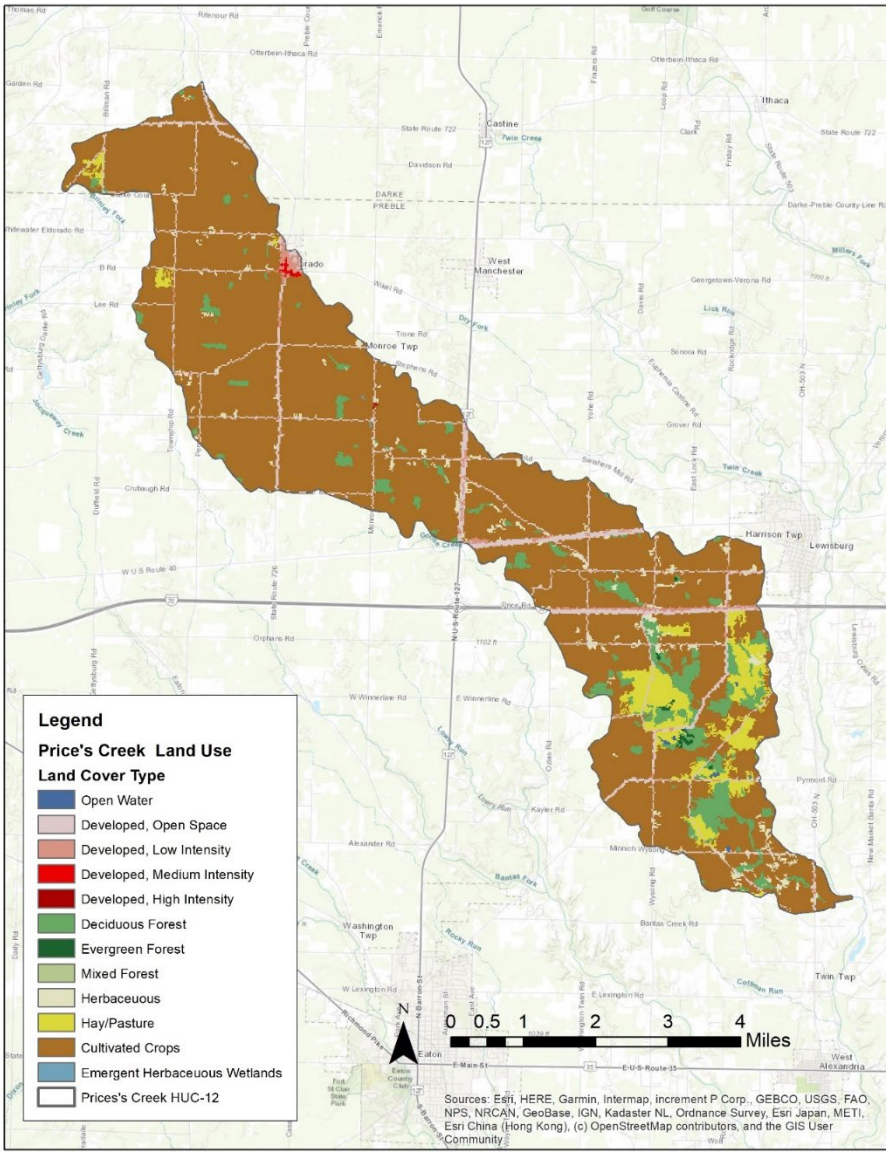
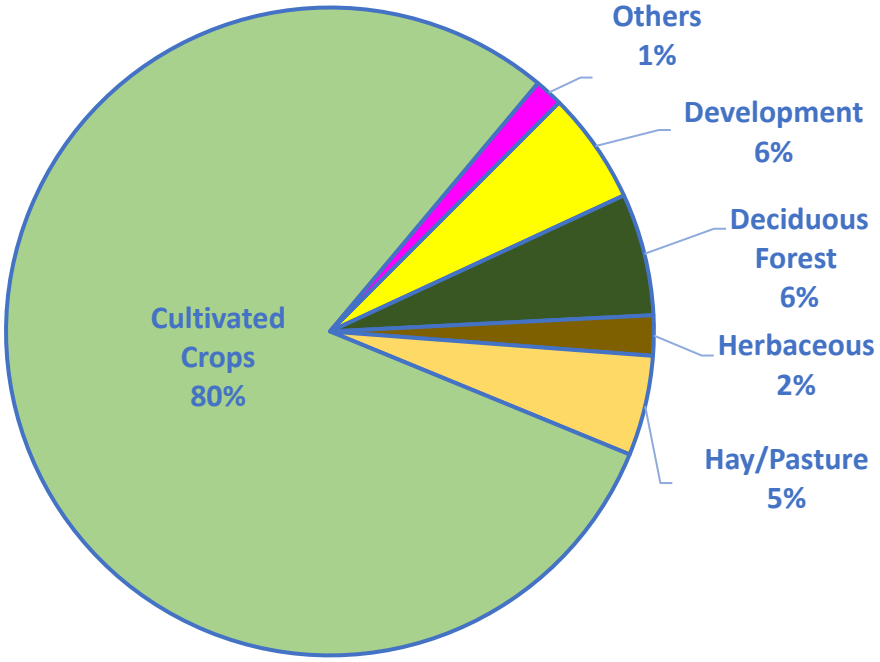


FIGURE 2-7: LAND USE MAP OF PRICE'S CREEK HUC-12 (NLCD, 2011)

Table 2-2. Land use in Price's Creek HUC-12 (NLCD, 2011)



The deciduous forests in the Price's Creek HUC-12 only occupy about 6% of the watershed and are primarily located in the riparian zone of Price's Creek and its tributaries. The riparian area is also where the steeper slopes are within the southern section of this watershed (Figure 2-6). The quality of the riparian zone is moderate with a mixture of high-quality native trees and grasses as well as the dominant invasive such as bush honeysuckle.

Corn and soybeans are the major crops produced in the Price's Creek HUC-12. In between 2014 and 2020 there was a combined average of approximately 13,565 acres of corn and soybeans produced in this watershed each year.

Table 2-3: Cropland areas in acreage in the Price's Creek HUC-12

Crop	2021	2019	2017	2015
Corn	5,816	5,789	5,711	5,703
Soybean	7,749	8,042	8,053	7,971
Winter wheat	525	196	227	272
Alfalfa	184	119	121	91
Hay	85	102	53	56
Grass/Pasture	1,231	1,160	1,709	1,724

Source: USDA NASS CropScape, 2021

Several rare, threatened, and endangered plant and animal species are known to live in the Price's Creek HUC-12 and have some level of state or federal protection or concern (Table 2-4). Loss of riparian and poor water quality conditions can contribute to the degradation of their natural habitats.

Table 2-4: Rare, threatened, and endangered species in Preble County

Species	Status	Habitat Characteristics
Indiana bat (*Myotis sodalis*)	Endangered	Hibernates in caves and mines and forages in small stream corridors with well-developed riparian woods, aswell as upland forests
Northern long-eared bat(*Myotis septentrionalis*)	Threatened	Hibernates in caves and mines and swarms in surroundingwooded areas in autumn; roosts and forages in upland forests during late spring and summer
Eastern massasauga *(Sistrurus catenatus)*	Threatened	Live in wet areas including wet prairies, marshes and low areas along rivers and lakes. In many areas massasaugas also use adjacent uplands during part of the year. They often hibernate in crayfish burrows but may also be found under logs and tree roots or in small mammal burrows.

Source: US Fish and Wildlife Service, 2017

Numerous invasive plant species occur throughout the Price's Creek HUC-12. Common invasive species include bush honeysuckle (*Lonicera species*), Japanese honeysuckle (*Lonicera japonica*), multi- flora rose (*Rosa multiflora*), and garlic mustard (*Alliaria petiolata*), These Invasive plants have negative impacts on native vegetation and animals within the watershed. Bush and Japanese honeysuckle out-compete and displace native plants and alter natural habitats by decreasing light availability and depleting soil moisture and nutrient content. Exotic bush honeysuckle competes with native plants for pollinators, resulting in a reduced seed set for native species. Multiflora rose forms dense thickets, excluding most native shrubs and herbs from establishing, and may be detrimental to nesting of native birds. Garlic mustard invades areas disturbed by human activities and displaces many native wildflowers.

LIVESTOCK OPERATIONS

No concentrated animal feeding facility (CAFF) and one permitted concentrated animal feeding operations (CAFOs) are in the Price's Creek HUC-12. Eleven small-sized livestock operations were identified (Table 2-5), and no medium-sized operations were identified.

Table 2-5. Livestock operations in the Price's Creek HUC 12

Livestock Species	Operations	No. of animals per operation
Beef cattle	11	<300
Beef Cattle	1	700
Poultry	1	8,000-10,000
Hog	1	4,800*

*Permitted CAFO facility

Most land within the Price's Creek HUC-12 is privately owned; therefore, agency knowledge of the individual conservation practices may be limited. Some conservation practices can be estimated through program enrollment initiated through the SWCD/NRCS and Farm Service Agency, as well as the annual crop tillage survey performed by Miami University, Oxford OH. Current and recent past (0-5 years) estimates of several practices within the Price's Creek HUC-12 are provided in Table 2-6. With 65% of the watershed currently implementing conservation tillage, this watershed has already made good progress in nutrient management. The total estimate of nitrogen load reduction when combining all of the current and recent past conservation practices is 33,046 lb/yr using STEPL tool (Table 2-6).

Table 2-6: Current and Recent Past Conservation Practice Estimates using STEPL*

Practice Type	Estimated Acreage Treated/ Number of Structures Installed	Estimated Nitrogen Load (lb/yr)	Estimated Phosphorous Load (lb/yr)
Conservation Tillage (no till, reduced till)	9,700 acres	24,552	10,015
Cover Crops	2,500 acres	2,844	309
Buffer - Whole-Field Warm Season Grass, Cool Season Grass Filter Strip, Warm Season Grass Field Border, Grassed Waterways	445 acres	1,226	331
Grade Stabilization Structure	35	NA	NA
Gypsum Application	750 acres	NA	NA
Nutrient Management (Variable Rate Fertilization)	3,750 acres	4,424	1,584
Land Retirement (WRP easement)	0 acres (see Protection Land section below)	NA	NA

**Estimates calculated using Spreadsheet Tool for Estimating Pollutant Loads (STEPL), Version 4.4 (USEPA, 2019).*

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PROTECTED LAND

CONSERVATION EASEMENT

Thirteen properties, totaling 1,400 acres located within the Price's Creek HUC-12 are currently protected from development through the Three Valley Conservation Trust easement program (Figure 2-8). All the easement properties are located in the lower portion of the watershed. In 2010, there were only 2 easements totally 150 acres. The expansion of the easement program in this watershed is a major achievement and significant effort by Three Valley Conservation Trust. Many of the conservation easements held by nonprofit or governmental entities such as Three Valley Conservation Trust requires that best management practices be used by the landowner as part of a Whole Farm Conservation Plan, an active management plan through US Fish and Wildlife Service, and/or habitat enhancement through the soil and water conservation districts and habitat groups such as Pheasants Forever and Quail Unlimited.

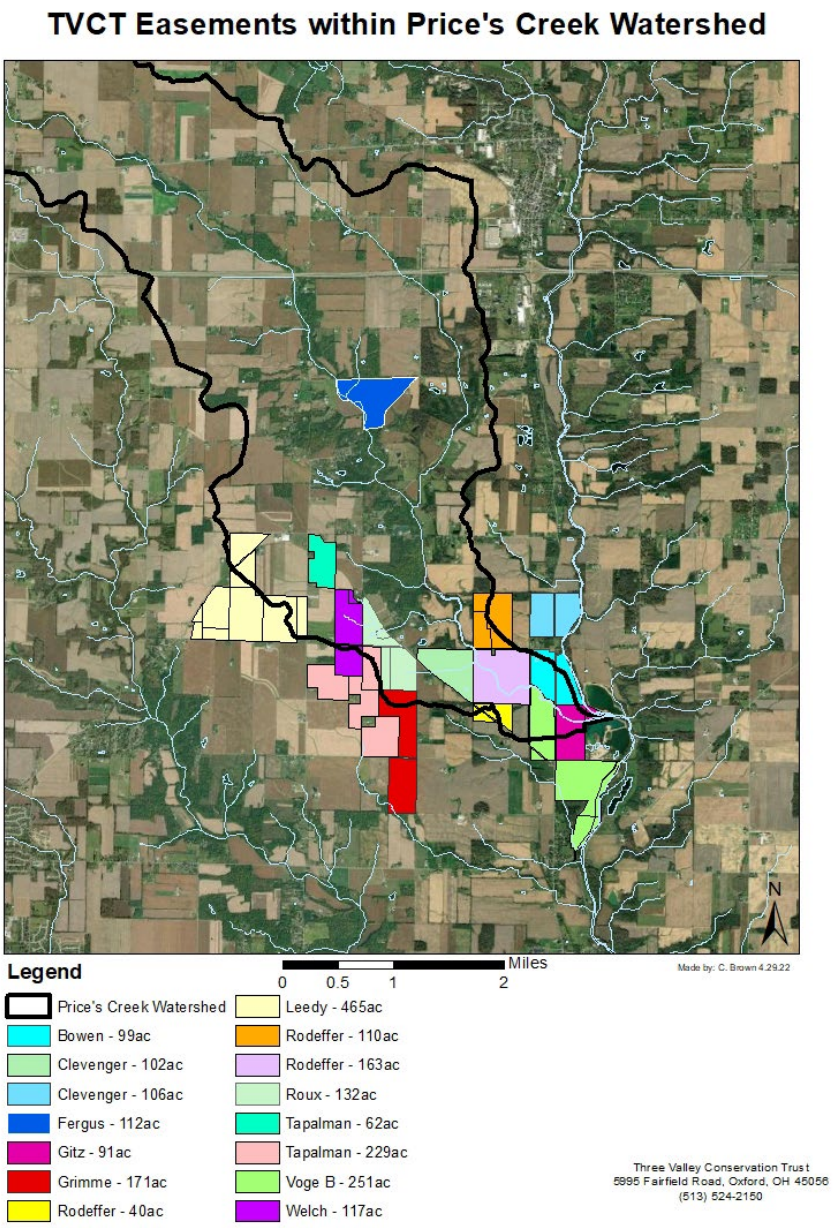

FIGURE 2-8: EASEMENTS LOCATED WITH PRICE'S CREEK WATERSHED

2.2. Summary of Biological Trends for Price's Creek HUC-12

Ohio EPA Biological and Water Quality Study of the Twin Creek and selected Tributaries 2005 was the only comprehensive sampling data of Twin Creek and Price's Creek HUC-12 watershed. Using the data from this report, OEPA prepared the TMDL for the Twin Creek Watershed. This section summarizes the findings of the 2005 OEPA sampling report (OEPA, 2007) and the OEPA TMDL Report (OEPA, 2010).

Four sampling locations were selected in the Price's Creek HUC-12 during the 2005 OEPA sampling event (Figure 2-9 Table 2-7). All of the sampling locations are located along Price's Creek. Only three locations were analyzed for biological parameters. Table 2-8 shows the biological indices scores for the three sampling sites in Price's Creek HUC-12.

Table 2-7: 2005 OEPA Sampling location within Price's Creek HUC-12

Stream Mile	Drainage Area (mi^2)	Cross Road	Longitude	Latitude
13.7	5.2	Pence-Shewman Road	-84.6809	39.9019
10.9	11.4	Shurley Road	-84.6527	39.8726
3.8	20.1	Jim's Run Road	-84.5669	39.8131
0.6*	29.0	Upstream SR 503	-84.5354	39.7802

**Conventional water chemistry sampling only*
Source: OEPA, 2007

Table 2-8: Biological Indices Scores for three sampling sites

Price's Creek Stream Mile	IBI	MIwb	ICI	QHEI	Aquatic Life Use Designation	Attainment Status
13.7	38	N/A	LF	47.0	WWH	Partial
10.9	46	N/A	G	62.5	WWH	Full
3.8	36	8.4	50	65.5	EWH, but WWH recommended	Full

Source: OEPA, 2007
IBI Index of Biotic Integrity
The Modified Index of Well Being (MIwb) is not applicable to headwater sites (drainage ≤20 mi2).
ICI - Invertebrate Community Index (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
WWH Warmwater Habitat – ECBP Ecoregion

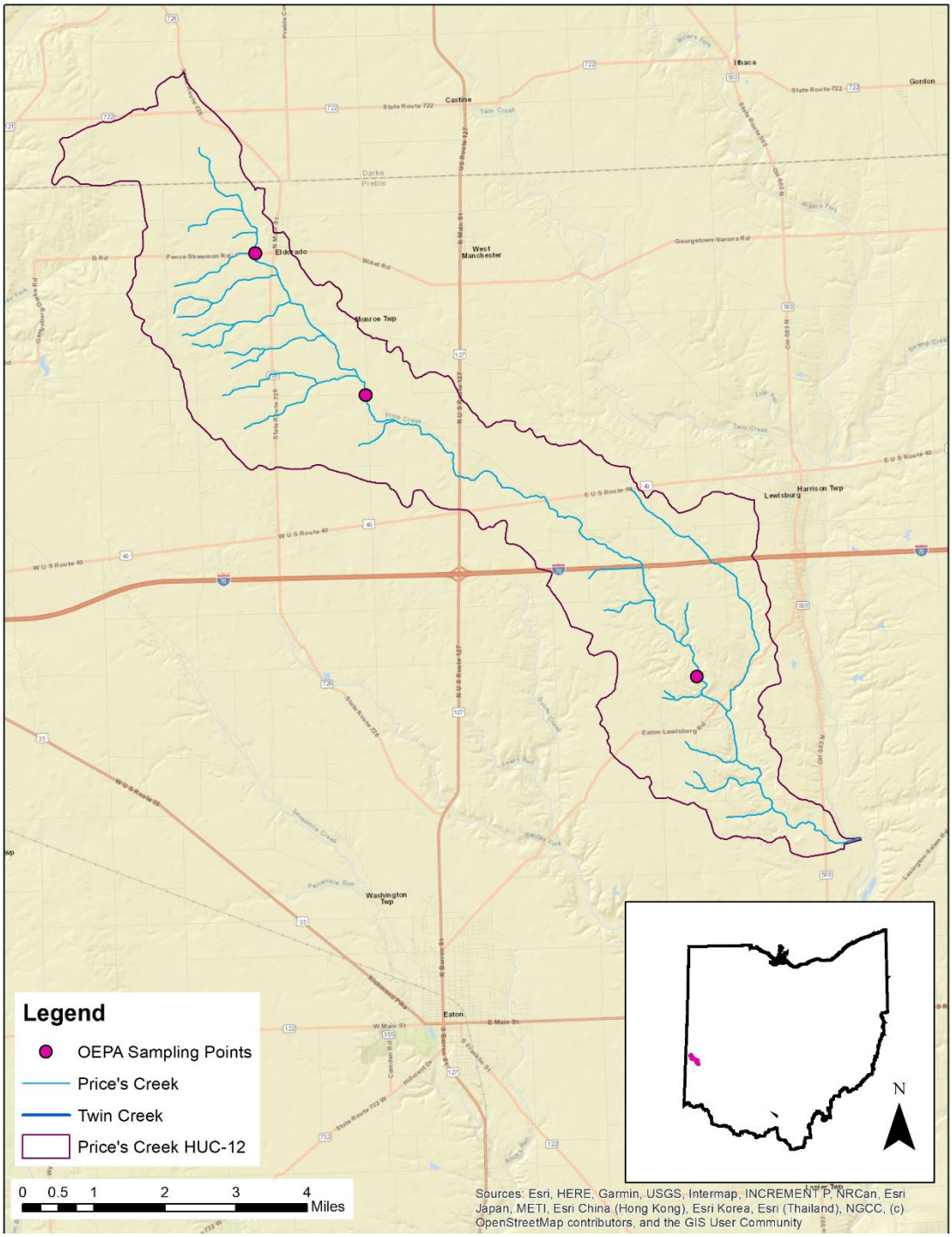

FIGURE 2-9: 2005 OEPA SAMPLING LOCATIONS (OEPA, 2007)

2.2.1. Biological Assessment: Fish Assemblages

The fish assemblages of Twin Creek and its tributaries which included Price's Creek were surveyed and assessed by OEPA in 2005. A total of 35,596 fish comprising 42 species and six hybrids was collected from all Twin Creek tributaries, between July and September 2005. Based on aggregated catch statistics from all tributaries, numerically predominant species included

Central stoneroller (30.0%), Northern creek chub (16.1%), white sucker (7.2%), rainbow darter (6.1%), mottled sculpin (5.1%), and striped shiner (3.6%). In terms of relative biomass (kg/0.3km), dominant species were, Central stoneroller (30.2%), Northern creek chub (23.6%), white sucker (14.1%), striped shiner (6.4%), rockbass (3.6%), and mottled sculpin (3.2%). In terms of ranked abundance and biomass measures, these dominant species are typical associates of headwater or brook environments. Community indices and accompanying narrative evaluations from these waters ranged between exceptional (IBI=56/MIwb=9.8) and marginally good (IBI=36/MIwb=8.0). Taken together with the entire Twin Creek tributaries, the fish assemblages were collectively characterized in the narrative as very good. The Twin Creek tributaries including Price's Creek were found to support fish assemblages fully consistent with the biocriteria applicable to existing and recommended Aquatic Life Uses.

Table 2-9. Price's Creek fish community and descriptive statistics

Stream **River Mile**	**Mean Number Species**	**Cumu-lative Species**	**Mean Rel. No. (No./km)**	**Mean Rel. Wt. (Wt./km)**	**MeanIBI**	**MeanMIwb**	**QHEI**	**Narrative Evaluation**
13.7/13.6	14.0	14	1582.00	2.37	38	N/A	47.0	Marginally Good
10.9^{H}	17.0	17	2103.00	10.90	42	N/A	62.5	Good
3.8^{W}/3.9	15.0	15	4342.50	18.22	36	8.4	65.5	Marginally Good/Good

Source: OEPA 2007

2.2.2. Biological Assessment: Macroinvertebrate Community

The macroinvertebrate community in Price's Creek was evaluated at three sampling locations. Samples collected at RM 10.9 and RM 3.9 met the current or recommended WWH aquatic life use and received good and exceptional qualitative evaluation. The non-attaining upstream site at RM 13.6 received a qualitative evaluation of low fair. Nearly a third of the community at this site were tolerant taxa, with sow bugs, beetles, midges, and snails comprising the majority of the organisms which indicated that degradation at this site was beyond the low to near interstitial flow conditions encountered at the time of sampling. In combining with the chemistry sampling results of high bacteria concentrations, low dissolved oxygen, and elevated ammonia levels suggested that possible failing septic tanks in the area or possibly a nonpoint source impact at location 13.6 stream mile (which is also near the Eldorado WWTP).

Table 2-10 Macroinvertebrate sampling results

Stream RM	Dr. Area (Sq. mi.)	Data Codes	Qual. Taxa	EPT Ql/Total	Sensitive Taxa Ql./Total	Density Ql. Qt.	CW Taxa	Predominant Organisms on the Natural Substrates With Tolerance Category(ies) in Parentheses	ICI	Narrative Evaluation

13.6	5.2	-	33	3	5	L	0	Sow bugs (F), Beetles (MT, F, MI), midges (T,F,MI), pouch snails (F)	-	Low Fair
10.9	11.4	-	55	12	21	M	1	Net-spinning caddisflies (F,MI), *Helicopsyche* caddisflies (MI), waterpenny beetles (MI), *Caenis* mayflies (F), midges (T,MT,F,MI)	-	Good
3.9	20.1	-	42	16/20	20/32	M-L	2	Caddisflies (F,MI), mayflies (F,MI,I) *Elimia* snails (MI), *Petrophlic* moths (I), waterpenny beetles (MI)	52	Exceptional

Source: OEPA. 2007
RM: River Mile.
Dr. Ar.: Drainage Area
Data Codes: 8=Non-Detectable Current, 9=Intermittent or Near-Intermittent Conditions, 12=Suspected High Water Influence/Disturbance, 13=Suspected Disturbance by Vandalism, 15=Current >0.0 fps but <0.3 fps, 29=Primary Headwater Habitat Stream.
QI.: Qualitative sample collected from the natural substrates.
Sensitive Taxa: Taxa listed on the Ohio EPA Macroinvertebrate Taxa List as MI (moderately intolerant) or I (intolerant).
Qt.: Quantitative sample collected on Hester-Dendy artificial substrates, density is expressed in organisms per square foot.
Qualitative sample relative density: L=Low, M=Moderate, H=High.

2.2.3. Physical Habitat - Qualitative Habitat Evaluation Index QHEI

OEPA assessed the habitat characteristics through the Qualitative Habitat Evaluation Index (QHEI), which provides an understanding of existing habitat features important to fish communities and is based upon methodologies established by Rankin's habitat assessments (Rankin 1989, Rankin 1995, OEPA 2006). During this evaluation, several habitat characteristics are assessed on the stream reach, such as type/quality of substrate, amount/quality of in-stream vegetative cover, channel morphology, extent/quality of riparian vegetation, pool/run/riffle quality, etc. Mean QHEI values from rivers or river segments equal to or greater than 60.0 generally indicate a level of macrohabitat quality sufficient to support an assemblage of aquatic organisms fully consistent with the WWH aquatic life use designation. Average reach values at greater than 75.0 are generally considered adequate to support fully exceptional (EWH) communities (Rankin 1989 and Rankin 1995). Values between 55 and 45 indicate limiting components of physical habitat are present and may exert a negative influence upon ambient biological performance. However, due to the potential for compensatory stream features (e.g., strong ground water influence) or other watershed variables, QHEI scores within this range do not necessarily exclude WWH or even EWH assemblages. Values below 45 indicate a higher probability of habitat derived aquatic life use impairment. From the 2005 OEPA sampling results, the QHEI scores (65.5 to 47) at Price's Creek were determined to support the WWH aquatic life use designation.

Table 2-11: QHEI Matrix and Scores (source: OEPA 2007)

		Price's Creek		
Key QHEI Elements	River Mile	13.7	10.9	3.8
	QHEI Score	47.0	62.5	65.5
	Gradient (ft/mi)	12.35	6.8	13.51
WWH Attributes	Not Channelized or Recovered		•	•
	Boulder/Cobble/Gravel Substrates	•	•	•
	Silt Free Substrates			
	Good/Excellent Development		•	
	Moderate/High Sinuosity		•	
	Extensive/Moderate Cover			
	Fast Current/Eddies			
	Low/Normal Embeddedness		•	•
	Max Depth >40 cm		•	
	Low/Normal Riffle Embeddedness			•
	WWH Attributes	1	6	4
MWH Attributes – Hi Influence	Channelized/No Recovery			
	Silt/Muck Substrates			
	No Sinuosity	•	•	
	Sparse/No Cover	•	•	•
	Max Depth <40 cm	•		•
	Hi-Influence Modified Attributes	3	2	2
MWH Attributes – Moderate Influence	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	•	•	
M.I. MWM Attributes		7	4	3
MWH H.I.+1/WWH+1 Ratio		2.0	0.43	1.00
MWH M.I.+1/WWH+1 Ratio		5.50	1.00	1.20

Biological performance for Price's Creek was determined to be good to marginally good communities. The lower reach of Price's Creek was designated EWH based upon the recommendations of the 1995 Twin Creek survey (Ohio EPA 1997). All other sampling locations were determined to be WWH. Results from the 2005 sampling survey found similar conditions, confirming the absence of reasonable EWH potential except at the downstream sampling location. Therefore, OEPA concluded that Price's Creek was a poor candidate for the EWH use for the entire stream system, and therefore recommended the designation be WWH.

2.2.4. Water Quality

In addition to the biological and physical monitoring discussed above, OEPA collected water samples from Twin Creek and selected tributaries and analyzed the water quality to understand existing conditions in 2005. Results from the study indicated conventional water chemistry was good and all samples taken for cadmium, chromium, copper, mercury, nickel, and selenium were below the detection limit (BDL) in water column samples. Water column calcium, iron, manganese, magnesium, zinc, hardness, BOD5, chloride, and sulfate were within acceptable ranges. Sediment samples at RM 0.6 contained arsenic levels in the acceptable range, but Dieldrin – likely from agricultural insecticide use and subsequent runoff – were discovered at levels high enough to cause adverse effects. The VOC Acetone was found but not evaluated in the sediments. At this same downstream site, the highest level of ammonia in all of Twin Creek watershed was also discovered, probably caused by land application of animal manure.

Most water column samples were below the 90th percentile background level for total phosphorus, NH3-N and NO3-N in the Price's Creek samples.

Table 2-12: Price's Creek nutrient sampling results

Stream (RM)	area mi^2	Frequency of Phosphorus >90th Percentile	Phosphorus Median (mg/l)	Frequency of NH_3>90th Percentile	NH_3 Median (mg/l)	Frequency of NO_3 >90th Percentile	NO_3 Median (mg/l)
Price's Creek (13.7)	5.2	1/4	0.1955	¾	0.1575	0/5	0.1
Price's Creek (10.9)	11.4	2/5	0.203	4/5	0.124	0/5	.0.55
Price's Creek (3.8)	20.1	0/5	0.030	1/5	0.065	0/5	2.46
Price's Creek (0.60)	29	0/5	0.012	0/5	0.06	0/5	0.84

Source: OEPA 2007

2.3. Summary of TMDL

The Twin Creek watershed TMDL was required because portions of the Twin Creek and its tributaries did not attain their water quality goals for aquatic life and recreation (OEPA, 2010). The TMDL stated that low DO, ammonia, phosphorus, bacteria (recreation use) and low flow are the causes of impairment. The sources of the impairment included natural and agriculture fat the upper reach of the watershed. The TMDL did not find the Eldorado WWTP as a source of impairment in Price's Creek. Grazing livestock with stream access was also considered a source of high bacteria in the upper portion of Twin Creek including Price's Creek. Low flow impairment in the upper portion of Price's Creek HUC-12 also contributed to the impairment causing distress in the macroinvertebrates community.

The TMDL recommended the following restoration strategies for Price's Creek HUC-12:

Table 2-13: Price's Creek HUC-12 Restoration Strategies

Impairment	Agricultural BMPs	Bank and Riparian Restoration	Stream Restoration	Wetland Restoration
Agricultural (low DO, ammonia, phosphorus)	Plant cover crops and buffer strips, conduct soil testing, develop nutrient/manure management plans, install livestock exclusion fencing	Plant native grasses and trees/shrubs	install in-stream structures and recontour channel planform to restore natural channel functions; widen riparian corridor to improve habitats; connect stream with floodplain to promote natural stream and riparian habitats.	Connect wetland to stream, restore wetlands, plant wetland plants

2.3.1. Baseline Load Estimates

Estimated baseline nutrient loads and estimated target load reduction for the Price's Creek HUC-12 were calculated using a mass balance equation was provided by Rick Wilson, OEPA (Table 2-13). The goal loads presented are 20 percent of the total estimated baseline loads for annual Nitrogen contribution in the Price's Creek watershed.

The 2020 report on management of onsite systems did not report the number of failing home systems at this watershed (OKI, 2020). Since there are no populated areas and communities, the main source of nutrient impairment in this watershed is primarily agriculture (OEPA, 2020). Water quality modeling of the Lower Great Miami River Basin was performed by Miami Conservancy District in 2017 and provided great insights into the significant nutrient loadings and reduction scenarios and single point sampling limitation in this watershed (MCD, 2017).

Information about urban loading is limited since there are no communities in this agricultural watershed and this is not the top priority issue at the PCHD. This version of the Nine-Element

NPS-IS for Price's Creek HUC-12 will be focusing on reducing agricultural nutrient loads. Once more information is available for the urban loading, the next version of the plan will be updated to include them.

Table 2-13: Estimated Nitrogen and Phosphorus Loadings from Contributing NPS Sources in Price's Creek HUC-12

	Agricultural Load (lbs Nitrogen/acre)	Agricultural Load (lbs Phosphorus/acre)
Current Estimates*	229,088	14,178
Target Reduction Goals*	45,818	2,836
Current load reduction estimates based on SWCD inventory**	33,046	12,239

*Estimates were calculated using mass balance spreadsheet provided by Rick Wilson, OEPA in May 2022.

** See Table 2-6 for conservation practices. Estimates calculated using STEPL, 2019

2.4. Summary of Pollution Causes and Sources

Price's Creek HUC-12 and Twin Creek were surveyed in 2005 and the results showed that Price's Creek had good and marginally good water quality and were able to support WWH (Figure 2-10). The biological indicators suggested that water quality improvement through BMPs in the upland and nutrient management are important and required to support any high-quality habitats in Price's Creek and its tributaries. At the Price's Creek HUC-12, row crop agriculture is the main source of impairment locally. Nutrients in the form of nitrogen and phosphorus support the growth of algae and aquatic plants, which provide food and habitat for fish, shellfish and smaller organisms that live in water but too much nutrients in the water causes algae to grow faster than ecosystems can handle (USEPA, 2022). Nitrogen loss from row-crop agriculture in rural watersheds which drain to the Gulf of Mexico is also the primary source of Gulf Hypoxia -- caused by excess nutrient (Nitrogen) loading, siltation/sedimentation from cropland, and intense runoff delivery via drainage tiles to the waterbodies.

FIGURE 2-10: PRICE'S CREEK UNDER I-70

2.5. Additional Information for Determining Critical Areas and Developing Implementation Strategies

2.5.1. Agricultural Conservation Planning Framework

The Agricultural Conservation Planning Framework (ACPF) is an agricultural watershed management tool using high-resolution spatial data and ArcGIS to identify opportunities for installing conservation practices within a watershed (Tomer et al., 2013). Developed by the US Department of Agriculture, the ACPF is being used in hundreds of watersheds to inform and engage local communities in agricultural conservation. The program spatially combines high resolution terrain, drainage, soils, land use and crop land data, and identifies and prioritizes potential areas for conservation (ARS, 2019). ACPF can engage stakeholders in the watershed planning process by proposing conservation solutions. The program is not prescriptive but provides various options and scenarios that can be evaluated at watershed and farm levels including in-field, below-field and in the riparian zone (Tomer et al., 2013). The following ACPF conservation practices -- both for in-field and below-field -- and riparian buffers are found applicable in our region:

Grassed Waterway – NRCS Practice code 412
Nutrient Removal Wetlands – NRCS Practice code 658
Water and Sediment Control Basin (WASCOB) – NRCS Practice code 638
Riparian Buffer – NRCS Practice code 391
Streambank Stabilization – NRCS Practice code 580
Buffer Contour Strip – NRCS Practice code 332

Filter Strip – NRCS Practice code 393 - Filter Strips are not specifically identified in the ACPF but it is very applicable in this region. This practice would be situated parallel to a perennial stream and consists of a strip of dense perennial cool-season or warm-season grasses, often with additional broadleaf species mixed in. The thick vegetation removes nutrients and sediment from overland flow and stabilizes floodplains when out-of-bank-flow occurs. This has been a very effective nutrient removal and treatment practice in Preble County and will replace the Contour Buffer Strips identified in the ACPF.

One of the important outputs generated by the ACPF is the riparian assessment. The ACPF riparian assessment (riparian buffer and streambank stabilization) utilizes a matrix of two variables: the width of the riparian zone and runoff delivery. This analysis provides better options to improve the effectiveness of riparian conservation planting where field runoff occurs. The output further provides specific riparian design types based on the cross-classification matrix which include critical zone for sensitive sites, multi-species buffer for water uptake, nutrient and sediment trapping, stiff-stemmed grasses for trapping runoff and sediment, deep-rooted vegetation tolerant of saturated soil, and sections emphasize streambank stability because the narrow buffer width. The purpose of this riparian management assessment is to provide the most water quality benefits by identifying segments to install permanent vegetation specifically designed to intercept surface runoff, protect shallow groundwater in low-lying areas and stabilize stream banks. This type of treatment is especially applicable in this watershed since the riparian zone is steep (Figure 2.6) and many bare and exposed banks are the source of stream erosion and siltation/sedimentation.

2.5.2. ACPF modeling for Price's Creek HUC-12

The ACPF model was performed for the Price's Creek HUC-12 using a 2.5 ft LIDAR DEM from Ohio Geographically Referenced Information Program (OGRIP) and a file geodatabase provided by ARS (USDA, 2020).

The ACPF model identified a number of possible in-field conservations practices, below-field practices and also riparian zone designs in the Price's Creek HUC-12. At the Price's Creek HUC-12, 44% of the fields are considered high and very high runoff risks and 87% of the watershed is tile-drained agricultural fields as estimated by the ACPF (Table 2-14). Figures 2-11 to 2-15 depict the ACPF model results.

Outputs from the ACPF model were discussed at stakeholder meeting on May 10, 2022, and at follow up field visits and ground verification at selected locations on May 25, 2022. The ACPF maps provide a visual tool, making field visits and discussions more effective and efficient. It is noted that although the ACPF recommended contoured buffer strips, it is not a practice that is common in the region. Therefore, instead of contoured buffer strips, the in-field practice of riparian filter strips is more appropriate.

The ACPF output shows an abundant of grassed waterways as a significant way to improve water quality in this watershed. The recommendation was based on the topography and drainage of the watershed. These locations were field verified on May 25, 2022.

Table 2-14 Conservation Practices at Price's Creek HUC-12 suggested by the ACPF
(ACPF maps and estimates are only for planning purposes)

Practice	Unit	Length (miles)	Average Length (feet)	Total Area (Acres)	Average Area (Acres)	Storage (Acre-Feet)
In-Field Practices						
Grassed Waterways	871 sites	96.9	587.6	352.5*	0.4*	NA
Contoured Buffer Strips	113 sites	24.1	1127.9	87.8*	0.8*	NA
Tile Drainage Management	83 sites	NA	NA	7143.3	86.1	NA
Depressions (potential wetland restoration sites)	16 depressions	NA	NA	390.7**	25.9**	NA
Below-Field Practices						
Nutrient Removal Wetlands	16 wetlands	NA	NA	3940.3** Pools:46.2 Buffers: 123.3	Pool: 2.9 Buffer: 7.7	Pool: 102.5 Buffer: 483.2
WASCOBs	57 sites	NA	NA	713.5***	12.5***	No Data
Denitrifying Bioreactors	129 sites	NA	NA	30.6	0.2****	NA
Farm Ponds	6	NA	NA	79.9**	Pool: 0.6	Pool: 22.6

				Pools: 4.0 Buffer: 2.2	Buffer:0.4	Buffer: 16.8
Riparian Zone Practices						
High Nutrient Sensitive Buffers	NA	2.8	NA	NA	NA	NA
Riparian Buffers Filters (various plants)	NA	69.9	NA	NA	NA	NA
Stream Bank Stabilization	NA	21.2	NA	NA	NA	NA
Saturated Buffer	NA	21.3	NA	NA	NA	NA
Saturated Buffer Requiring Carbon Enhancement	NA	3.4	NA	NA	NA	NA

**Assuming 30 feet wide*
*** Total potentially treated area*
**** Contributing area*
***** Average surface area of potential bioreactor*
NA – Not applicable

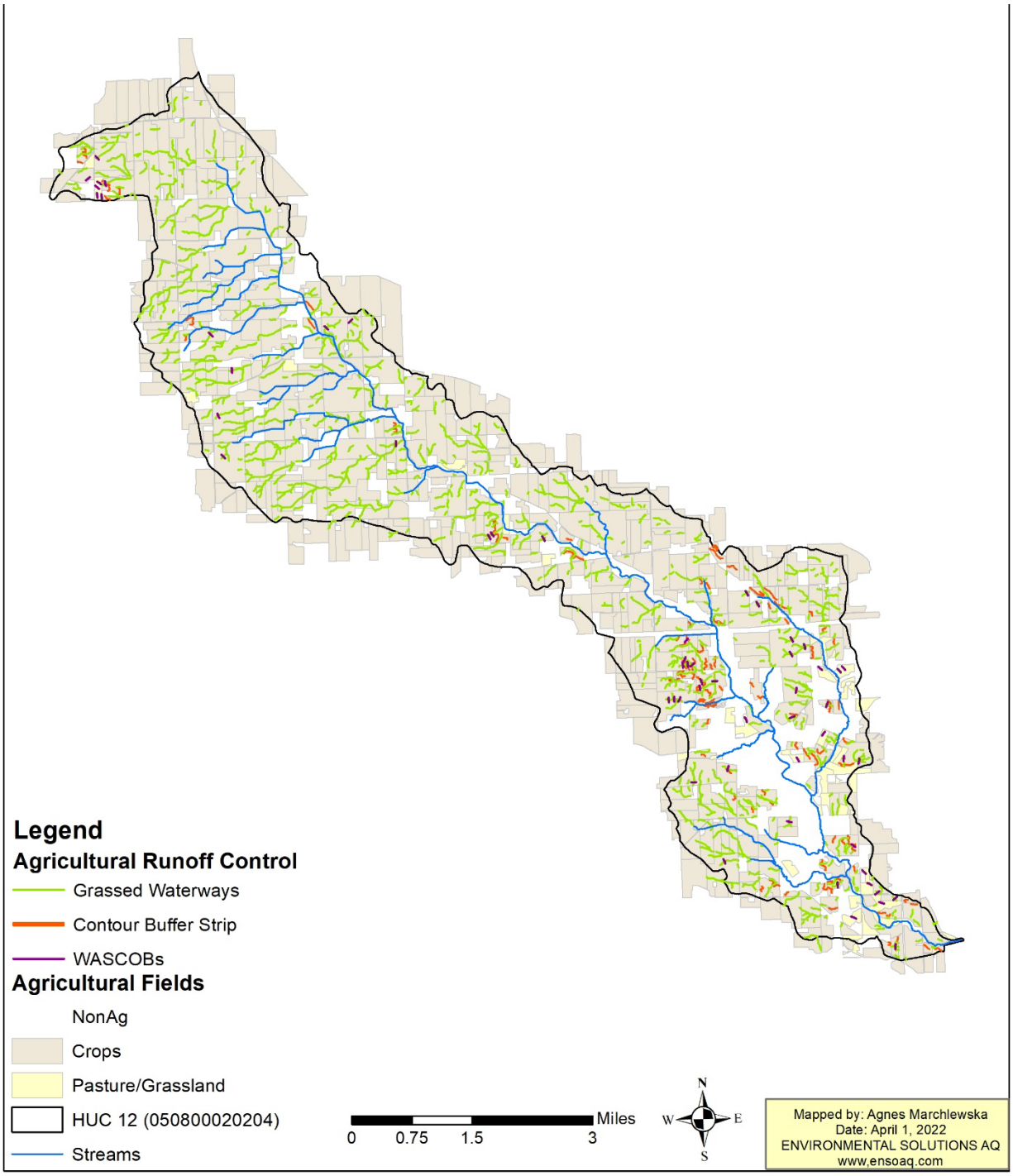

FIGURE 2-11: IN-FIELD PRACTICES SUGGESTED BY ACPF: RUNOFF CONTROL

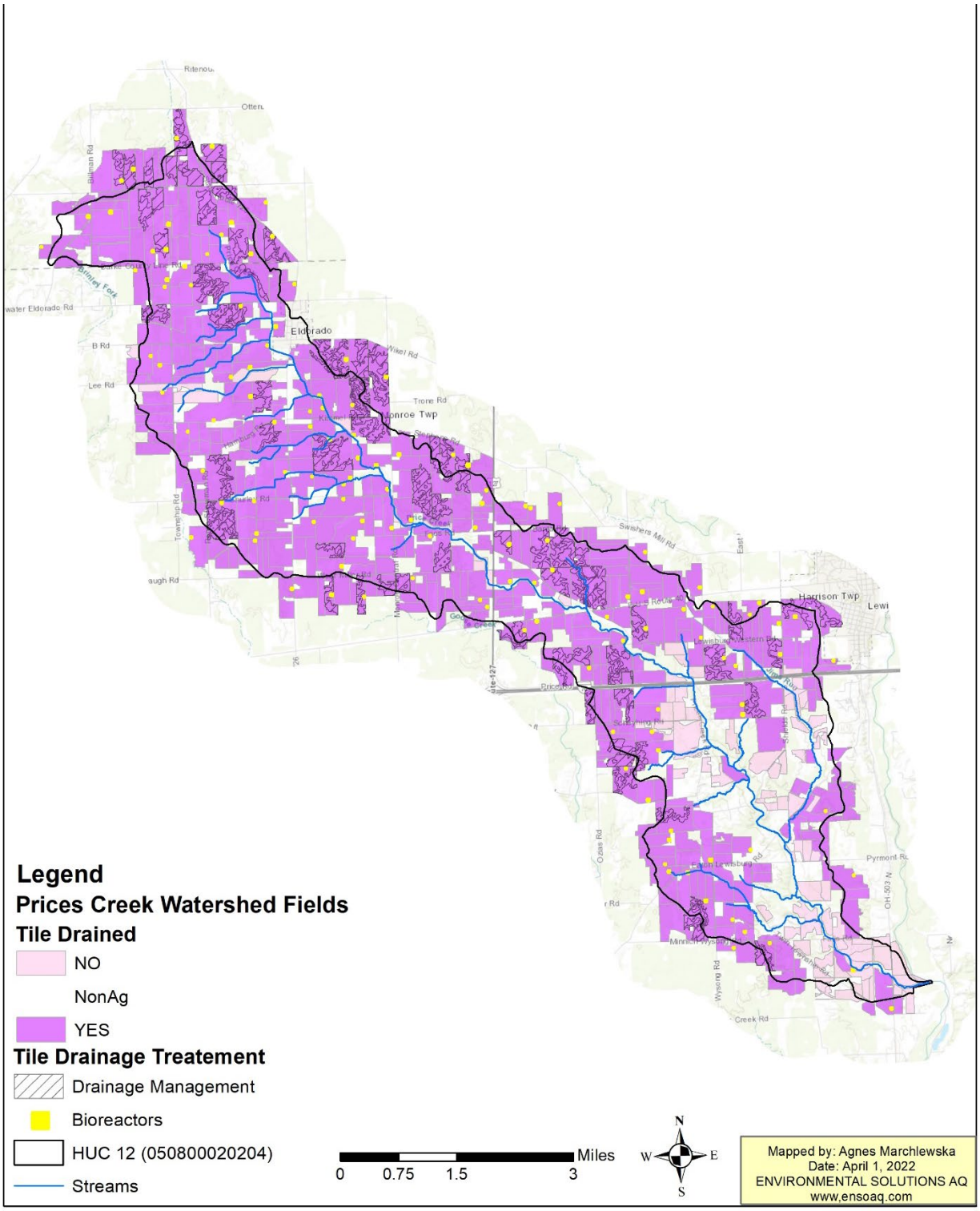

FIGURE 2-12 IN-FIELD PRACTICES SUGGESTED BY ACPF: TILE DRAINAGE CONTROL MAP

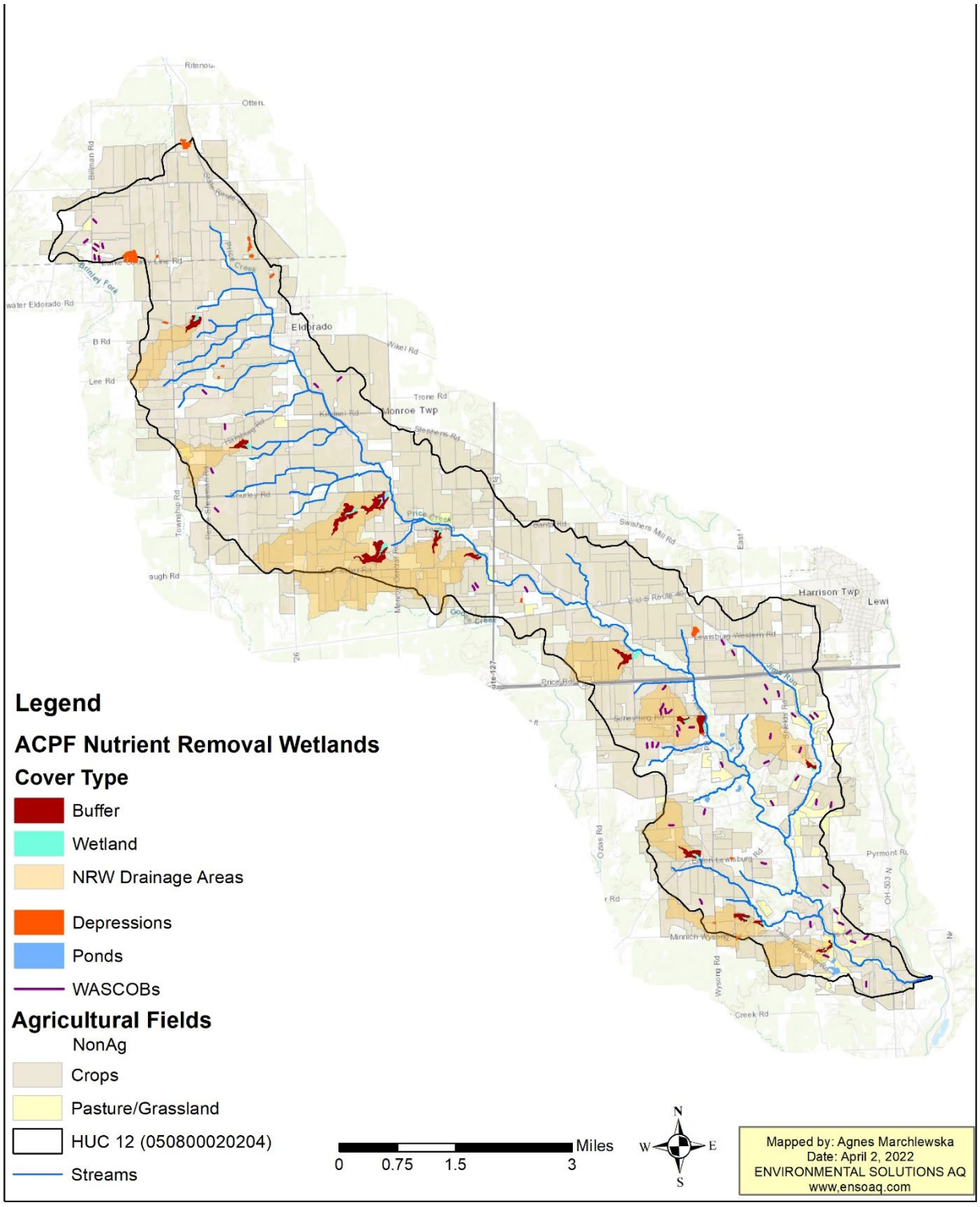

FIGURE 2-13: BELOW-FIELD PRACTICES SUGGESTED BY ACPF: WATER RETENTION AND STORAGE

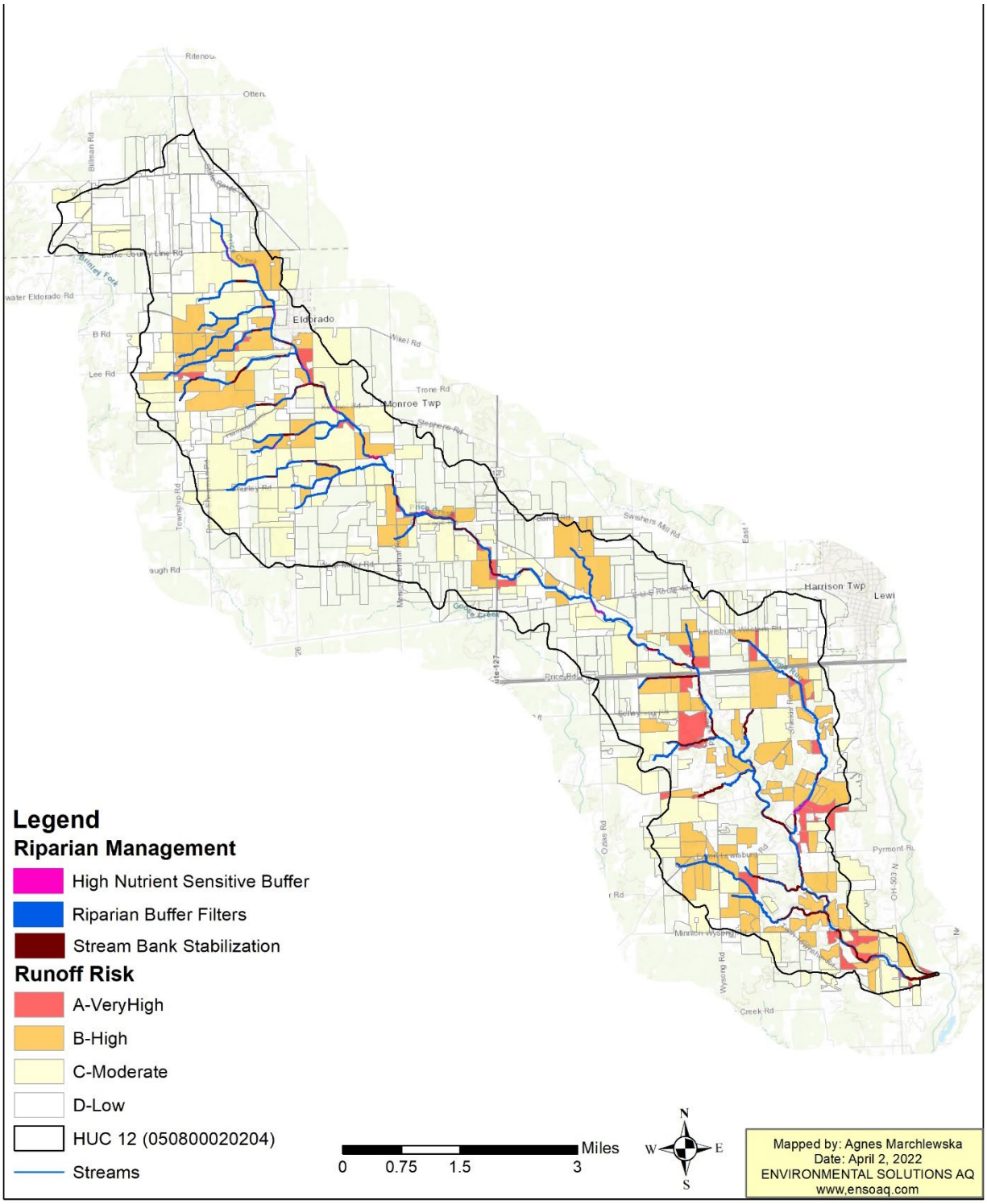

FIGURE 2-14: RIPARIAN FUNCTIONS SUGGESTED BY ACPF: RIPARIAN MANAGEMENT MAP

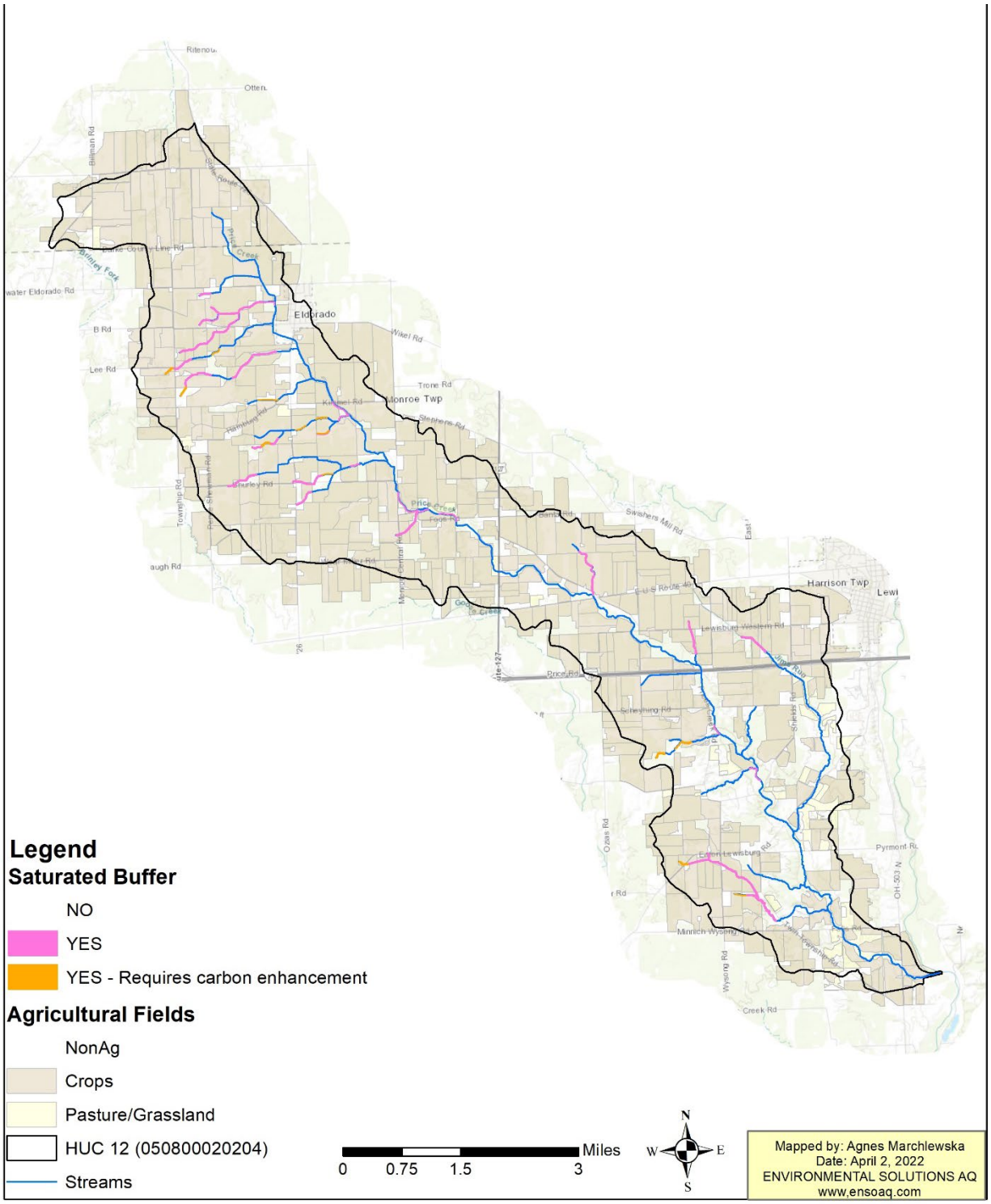

FIGURE 2-15 RIPARIAN FUNCTIONS SUGGESTED BY ACPF: DENITRIFYING PRACTICES

Chapter 3: Conditions & Restoration Strategies for Price's Creek HUC-12 Critical Areas

3.1 Overview of Critical Areas

Two critical areas have been identified within the Price's Creek HUC-12. The critical areas were identified to address the in-field and below-field nutrient management. Additional critical areas such as failed HSTS may be identified in subsequent versions of this Nine-Element NPS-IS when information about HSTS becomes available.

Price's Creek and an unnamed tributary were assessed during Ohio EPA's 2005 Twin Creek and selected tributaries survey (OEPA, 2007). Of the three samples taken in the Price's Creek HUC-12, two of them were in full attainment and the sample from the upper portion of the watershed was partial attainment. The 2010 TMDL provided impairment causes and restoration strategies. Meeting the goal of nutrient reductions requires targeted programs that expand existing partnerships and build new partnerships while supporting education and outreach to promote on-the-ground implementation (USEPA, 2014). Implementation of effective actions and progress must be verified with improved tracking mechanisms and watershed monitoring, and modeling tools (USEPA, 2014).

Price's Creek HUC-12 is dominated by tile-drained agricultural fields and landowners have voiced their concerns about nutrient loss and severe erosion during the public meeting and through other forms of communication. To address the nutrient management and riparian functions, Critical Area 1 is identified to reduce nutrient loading from croplands and Critical Area 2 targets improving the riparian zone.

Table 3-1. Critical Areas of Price's Creek HUC-12

Critical Area	Area Description	Impairment Being Addressed	Size
1	Tile-drained row crop agricultural fields as determined by ACPF	Nutrient management using BMPs (N and P reduction recommended by the ACPF.	16,370 Acres
2	Upper reach of Price's Creek and tributaries	Improve habitat scores (IBI, ICI, QHEI) and stream health at the upper section of Price's Creek by reducing nutrients through stream and riparian restoration.	0.7 miles

3.2. Critical Area 1: Conditions, Goals, &Objectives for Nutrient Reduction and Management in Price's Creek HUC-12 tiled agricultural fields.

3.2.1. Detailed Characterization

The Great Miami River basin in Ohio is one of the major nutrient contributors to the Gulf of Mexico according to the Ohio's Nutrient Mass Balance Study for Ohio's Major Rivers 2020 (OEPA, 2020). In the 7 years between 2013 to 2019, there had been no reduction or change in the loadings for total phosphorus (P) or total nitrogen (N) and the data demonstrated that the nonpoint source was the largest proportion of the total P and total N load in the Great Miami River at 66 and 83 percent, respectively (OEPA, 2020).

Given the dominance of agricultural land use in the Price's Creek HUC-12, nutrient management with the use of BMPs is the best way to reduce nutrient loss from high runoff fields to the nearby waterways. Critical Area 1 is comprised of all tile-drained agricultural fields as determined by the ACPF model (Figure 3-1). ACPF also determined the specific high runoff fields based on slope steepness and the fields' close proximity to the stream.

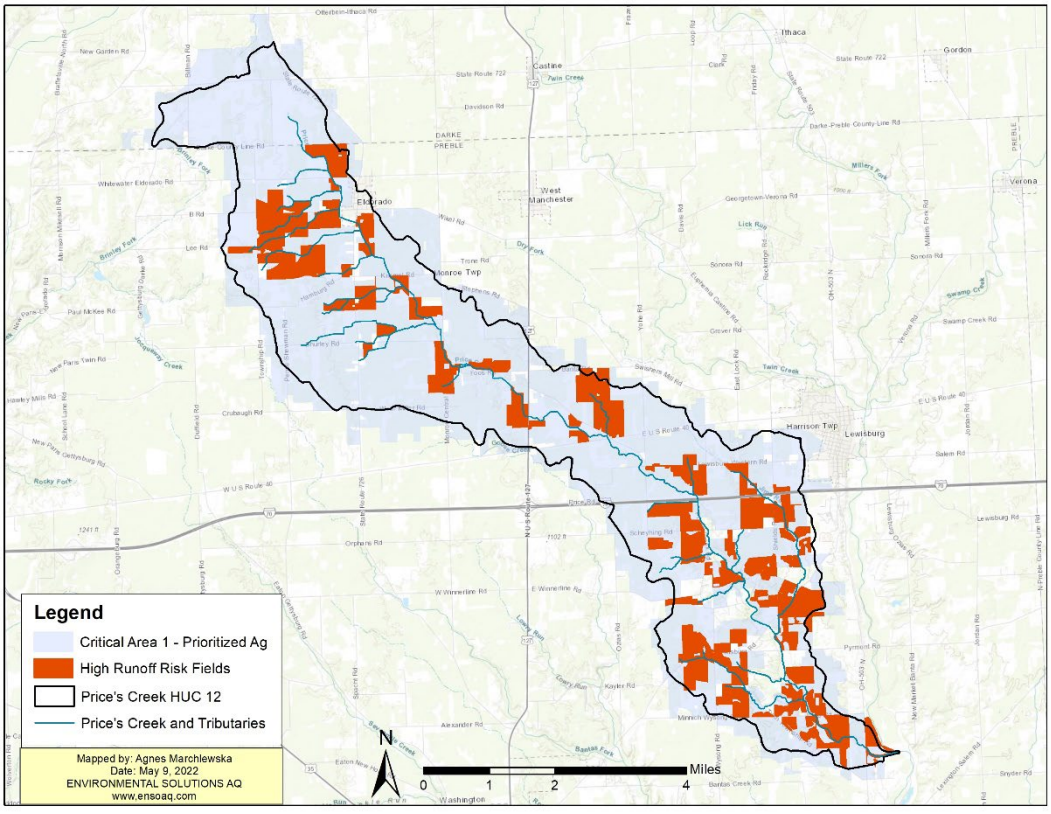

FIGURE 3-1. CRITICAL AREA 1

Using soil characterization and slopes, the ACPF determined that a total of 16,369.7 acres of agricultural fields within the HUC-12 are tile-drained. Using the ACPF, 3,900 acres (21%) of the tile-drained fields are determined to be high runoff risk. Based on stakeholder inputs, the prioritized areas and potential projects may meet the following criteria:

- Areas of high runoff fields determined by ACPF
- Areas that Price's Creek or its tributaries flow through and/or adjacent of
- Areas with limited use or underutilization of BMPs at the tile-drained agricultural fields

3.2.2. Detailed Biological Conditions

The 2005 sampling conducted by OEPA at three sampling points in this HUC-12 indicates that conditions were suitable for supporting WWH. Table 3-2 illustrates the attributes of the fish sampled in 2005 at each monitoring location, resulting in IBI scores of 50 at the upstream site and 46 at the downstream site. Table 3-2 also includes the habitat assessment scores, represented by QHEI values.

Table 3-2, Fish community and habitat Data

RM	QHEI	Drainage Area (mi^2)	Mean # of Species	Predominant species (% of catch) *	IBI	Narratives
13.7	47	5.2	14	Central Stoneroller (30%), Northern Creek chub (16.1%), white sucker (7.2%), rainbow darter (6.1%), mottled sculpin (5.1%) and Striped shiner (3.6%).	38	Marginally Good
10.9	62.5	11.4	17		42	Good
3.8	65.5	20.1	15		36	Marginally Good/Good

*only aggregate sampling results from the tributaries were reported (OEPA, 2007)
** Unnamed tributary to Price's Creek
Source: OEPA, 2007

OEPA reports that QHEI scores from streams across the state indicate that values greater than 55 are generally conducive of supporting warmwater faunas (OEPA, 2007). The habitat assessment at the upstream site scored 47 and downstream site scored 65.5. Biological performance for Price's Creek is good to marginally good. OEPA recommended the designation for Price's Creek is WWH. The OEPA report concluded that tolerant taxa like sow bugs, beetles, midges, and snails comprising comprised nearly a third of the community at this site suggesting some degradation at this site beyond low to near interstitial flow conditions. High bacteria counts, low dissolved oxygen, and elevated ammonia levels were indicative of possible failing septic tanks in this watershed.

Table 3-3. Macroinvertebrate Data

Stream RM	Dr. Area (Sq. mi.)	Density Ql. Qt.	Predominant Organisms on the Natural Substrates; With Tolerance Category(ies) in Parentheses	ICI	Narrative Evaluation
13.6	5.2	L	Sow bugs (F), Beetles (MT, F, MI), midges (T,F,MI), pouch snails (F)	-	Low Fair
10.9	11.4	M	Net-spinning caddisflies (F,MI), *Helicopsyche* caddisflies (MI), waterpenny beetles (MI), *Caenis* mayflies (F), midges (T,MT,F,MI)	-	Good
3.9	20.1	M-L	Caddisflies (F,MI), mayflies (F,MI,I) *Elimia* snails (MI), *Petrophlic* moths (I), waterpenny beetles (MI)	52	Exceptional

Source: OEPA, 2007
Tolerance Categories: VT=Very Tolerant, T=Tolerant, MT=Moderately Tolerant, F=Facultative, MI=Moderately Intolerant, I=Intolerant.

3.2.3. Detailed Causes and Associated Sources

The 2005 OEPA survey demonstrated that the streams in this HUC-12 were of marginally good/good quality, therefore, nutrient management may be necessary to improve and maintain stream health. Cropland activities in the Great Miami River basin can contribute to excessive nutrient loadings to local streams and small tributaries and ultimately contributing to in Gulf Hypoxia. Practical and property specific BMPs can help reduce the amount and concentration of nutrient-laden surface runoff. These BMPs can also address the loss of sediment /topsoil from agricultural lands and retain and maximize the nutrients in the fields. The implementation of BMPs on tiled agricultural lands can address the causes of sediment/topsoil and nutrient loss in the fields and reduce the sources of this excess nutrient and sediment into the waterways.

3.2.4. Outline Goals and Objectives for the Critical Area

The goal of the NPS-IS is to improve water quality, meet nutrient reduction goals, and improve impairment status. In Critical Area 1, the samples collected in 2005 showed that Price's Creek to be in partial attainment at the upper watershed sampling location and full attainment at the two lower watershed sampling locations. However, over 80% of the Critical Area 1 is tile-drained agricultural fields. Drain tiles can act as conduits and directly transport nutrients to waterways. They must be well-managed to reduce risk of nutrient loss and to maximize fertilizer use efficiency. This plan and future funding will provide opportunities to promote BMPs that are appropriate and cost effective in this region.

GOALS

To achieve the nutrient loading goals at the Price's Creek HUC-12, the following goal and objectives have been established:

Goal 1 – Reduce nitrogen loading contributions in Critical Area 1 by 20%. Current total nitrogen load is estimated to be 229,088 lb and the reduction goal is 45,818 lb.

NOT ACHIEVED: Based on the STEPL calculation, the load reduction is 33,046 lb/yr (see page 20 for practices and estimated loads). We will need an additional 12,772 lb/yr to meet the nitrogen reduction goal.

Goal 2 – Reduce phosphorus loading contributions in Critical Area 1 by 20%. Current total phosphorus load is estimated to be 12,239 lb and the reduction goal is 2,836 lb.

ACHIEVED: Based on the STEPL calculation, the load reduction has exceeded the target goal. The significant reduction is largely due to practice of conservation tillage that is very common in this watershed.

OBJECTIVES

In order to reach the nitrogen load reduction goal of 20% within the Price's Creek HUC-12, effort will include implementing a variety of appropriate BMPs within Critical Area 1. However, the effort must also balance resources and willing landowners. With the ACPF output, a number of in-field and below-field practices are identified that are applicable in this region (Table 3-4).

Objective 1: Implement an additional 500 acres of conservation tillage to add to the current 9,700 acres.

Objective 2: Plant additional 650 acres of cover crops to augment the 2,500 acres that have already been planted per year.

Objective 3: Reduce nutrient loss through the installation of in-field BMPs such as grassed waterways and filter strips (NRCS code 393, see page 32 for description) on at least 35 acres per year at locations suggested by the ACPF model. These practices are deemed most effective in removing and treating nutrient runoff in this region.

Objective 4: Reduce nutrient loss from subsurface tile drainage or below-field practices through the installation of drainage water management structures such as WASCOBs or nutrient removal wetlands on at 15 acres at locations suggested by the ACPF model.

Table 3-4: Estimated Nutrient Loading Reductions from Each Objective

Objective Number	Best Management Practice	Acreage Treated per year	Estimated Nitrogen (N)/Phosphorus (P) Load Reduction (lbs/yr)*
1	Conservation Tillage	500	1,267 lbs/yr (N)/517 lbs/yr (P)
1	Cover Crops	650	1,921 lbs/yr (N)/520 lbs/yr (P)
2	In-field BMPs: Grassed Waterway	15	40 lbs/yr (N)/11 lbs/yr (P)
2	In-field BMP: Filter Strips	20	50 lbs/yr (N)/14 lbs/yr (P)
3	Below-field BMPs: Controlled drainage BMP such as nutrient removal wetlands or WASCOBs	15	185 lbs/yr (N)/26 lbs/yr (P)
	TOTAL	1200	3463 lb/yr (N)/1088 lb/yr (P)

**Estimates calculated using Spreadsheet Tool for Estimating Pollutant Loads (STEPL), Version 4.4 (USEPA, 2019)*

These objectives will be directed towards implementation on prioritized tile-drained agricultural lands using the stakeholders/landowners agreed criteria. The implementation of BMPs included

in these objectives, as well as BMPs implemented through federal and state programs and other voluntary efforts will be recorded to track progress towards nutrient reduction goals within Price's Creek HUC-12.

There are significant demands for grass waterway installation in this HUC-12 especially in the northern portion of the watershed. Erosion and gully formations are common and visible in many fields. The Preble SWCD staff has limited resources to keep up with the grass waterway installation requests.

FIGURE 3-2 - FIELDS WITH GULLY DEVELOPMENT

The practices of nutrient removal wetlands and WASCOBs are uncommon in this region due to the soils and drainage conditions and the lack of examples in the area. Extra outreach effort will be required in the coming years to promote these water management practices.

Currently there is no routine monitoring or sampling in the Price's Creek HUC-12. But the future project-specific monitoring efforts will verify progress towards meeting the goals identified in the plan. The objectives, projects and implementation strategies presented herein will be reevaluated and modified if determined necessary, as several versions of this NPS-IS are expected.

This Price's Creek NPS-IS presents an adaptive and living watershed planning approach and is anticipated to be dynamic as critical areas are identified and objectives are implemented, and other objectives recognized. The objectives listed above will be reevaluated, fine-tuned and modified as necessary when more information becomes available or conditions change. Additional objectives may also be included to make progress towards further reduction goals, as new and additional BMPs can improve nutrient reduction.

The OEPA Nonpoint Source Management Plan Update, which includes a full list of nonpoint source management strategies, will be utilized. Strategies, as presented in the overview tables of Chapter 4, include the following:

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

3.4. Critical Area 2:Conditions, Goals, & Objectives for Nutrient Reduction and Management in Price's Creek and Tributaries.

3.3.1. Detailed Characterization

There are a total of 119 miles of riparian area within the Price's Creek HUC-12. Most of the riparian area is vegetated with deciduous forests and very steep slopes. In 2005, three samples

were collected from the stream and sampled for biological indices and water quality. The sample from the upper watershed showed that the location was in partial attainment and the two samples from the lower watershed showed full attainment. The biological indicators showed the stream was marginally good/good conditions.

Because of the tile-drained agricultural fields, nutrients from upland are transported directly into the streams and in high speed and volume during and after storms which appear to be more intense in recent years. In the upper portion of the watershed, Price's Creek is typically channelized and with very narrow riparian buffer. The lack of riparian buffer effects the water quality and habitant.

In this Critical Area 2, the ACPF offers riparian design using the two variables of runoff delivery and width of the shallow water table zone. By applying these strategies, the riparian zone will have better function in nutrient removal, water quality improvement, and restore natural stream functions.

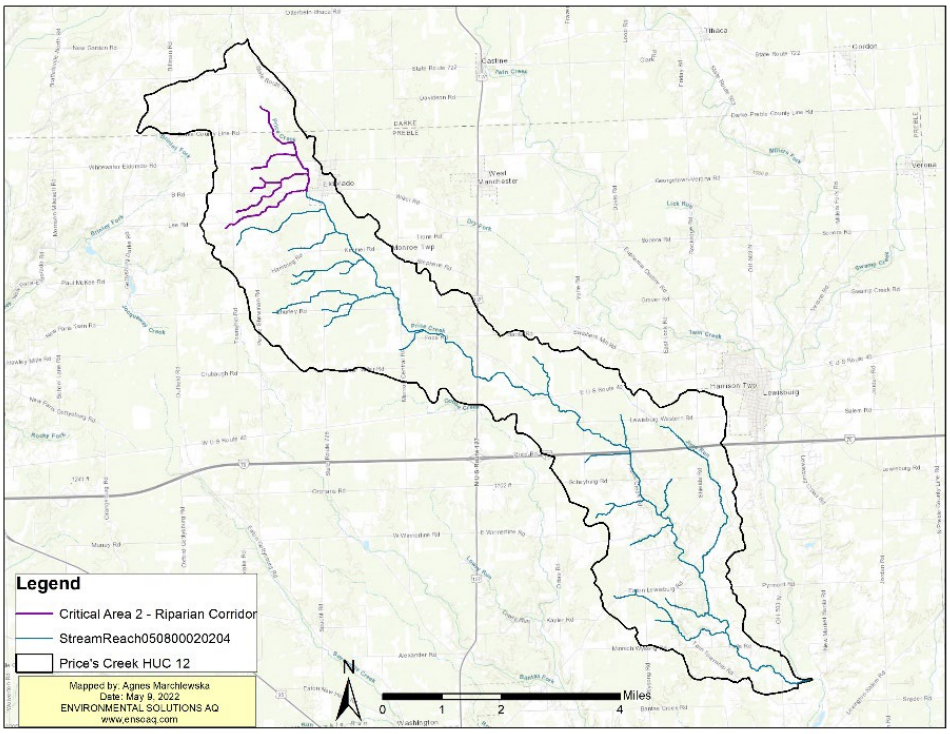

FIGURE 3-3: CRITICAL AREA 2 – PRICE'S CREEK HUC-12 RIPARIAN ZONE

Based on inputs from landowners and stakeholders, the prioritized areas and potential projects in Critical Area 2 may meet the following criteria:

- Riparian area of Price's Creek and tributaries at the upper reach upstream of the OEPA sampling station that did not receive full attainment (Table 2-8)
- Riparian area with narrow, lack of vegetations or with little or no riparian buffer

3.3.2 Detailed Biological Conditions

As previously shown in Tables 3-2 and 3-3, the 2005 sampling conducted by OEPA at three sampling points in this HUC-12 indicates that conditions were suitable for supporting warmwater aquatic habitat with the QHEI scores of 47 at the upstream site and 65.5 at the downstream sampling site. The low scores reflected the low quality of Price's Creek especially the northern section because of channelization, narrow or no riparian buffer and moderate stream erosion. The biological and chemical indicators in 2005 demonstrated that the water quality and habitats were only marginally good/good.

FIGURE 3-4: CHANNELIZED PRICE'S CREEK

3.3.3 Detailed Causes and Associated Sources

The biological indices, habitat and water quality data collected in 2005 showed Price's Creek marginally good/good quality. The QHEI scores ranged from 47 to 65.5. The majority of Price's Creek in the upper section of the watershed has been channelized and with narrow or no riparian buffer. Crops are planted very close to the stream and excess nutrients are directly flows into the creek. The implementation of planting of riparian buffers and stream restoration can slow the runoff from the fields and reduce the amount of nutrients washing directly into the streams.

3.3.4 Outline Goals and Objectives for the Critical Area

The goal of the NPS-IS is to improve water quality and meet nutrient reduction goals and improve impairment status. In Critical Area 2, the samples collected in 2005 showed the Price's to be in partial attainment in the northern section and full attainment in the southern section. The biological indicators shows marginally good/good (IBI: 36-42; ICI: 52; QHEI: 47-65.5). Water quality degradation contributes to Gulf Hypoxia. Currently BMPs are underutilized in most of the Price's Creek HUC-12. To improve the habitat, natural stream segments need to be restored and buffers need to be planted for specific and effective plant species. Riparian buffer planting will provide great benefits such as increase habitat and restore stream functions to maintain and improve stream health and aquatic life attainment. No stream restoration projects have been implemented in this HUC-12.

Goal 1 – To improve the IBI score of 38 and QHEI score above 47 at the upper reach sampling location and maintain ICI score of 52 and QHEI score of 65.5 at the lower reach sampling location.

NOT ACHIEVED: Upper reach of Price's Creek HUC-12 was in partial attainment in 2005. This section is typically channelized and very narrow or no riparian buffer effecting the quality of the stream and habitat.

Objectives

Price's Creek and its tributaries comprise of a total of 118 miles of riparian corridor. The upper section of the creek is in partial attainment with low QHEI and IBI scores and improvement is

needed. The lower section of the creek is in full attainment and needs to be protected for degradation.

Objective 1: Restore 1.38 miles of the upper reach at Price's Creek and tributaries.

Objective 2: Create, enhance and/or restore floodplain/riparian buffer for at least 28 miles.

Table 3-5: Estimated Nutrient Reductions from Each Objective

Objective Number	Best Management Practice	Total Length/Acreage Treated	Estimated Load Reduction using STEPL*
1	Stream restoration	0.7 miles/4 Acres (avg 50 feet wide)	23 lbs/yr (N)/5 lbs/yr (P)
2	Riparian Buffer as designed using ACPF modeling based on the width of the riparian zone and runoff delivery (see Section 2.5.1).	14 miles/85 Acres (avg 50 feet wide)	204 lbs/yr (N)/55 lbs/yr (P)

*Estimated using Spreadsheet Tool for Estimating Pollutant Loads (STEPL), Version 4.4 (USEPA, 2019)
N-Nitrogen; P-Phosphate

Currently there is no routine monitoring or sampling in the Price's Creek HUC-12. But the future project specific monitoring efforts will verify progress towards meeting the goals identified in the plan. The objectives, projects and implementation strategies presented herein will be reevaluated and modified if determined necessary, as several versions of this NPS-IS are expected.

This NPS/IS will employ an adaptive management process. As objectives and implementation projects are reevaluated, objectives listed above will be reevaluated, fine-tuned and modified as necessary when more information become available or conditions change. Additional objectives may also be included to make progress towards further reduction goals or water quality improvement goals, as new and additional BMPs can improve nutrient reduction and sedimentation in streams.

The OEPA Nonpoint Source Management Plan Update, which includes a full list of nonpoint source management strategies, will be utilized. Strategies, as presented in the overview tables of Chapter 4, include the following:

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

Chapter 4: Projects and Implementation Strategy

The Great Miami River Basin is one of the major nutrient contributors to Ohio River and Gulf Hypoxia (OEPA, 2020). It is important and beneficial for the NPS-IS initiatives to be

implemented in this region as soon as possible. Price's Creek HUC-12 is an agricultural watershed and implementation of proposed conservation practices is targeted to reduce nutrient load reduction by 20%. Based on the 2005 OEPA sampling, the Price's Creek HUC-12 was a marginally good/good quality stream and therefore, the goal is to improve and protect its stream and habitat health.

The Project and Implementation Strategy of the Price's Creek HUC-12 NPS-IS includes an action plan based on the cause and source of NPS pollution which are described in the previous Chapter. Chapter 3 presented the two Critical Areas and their goals, objectives, and potential projects. These critical areas will be reevaluated through time to monitor progress towards meeting their NPS goals and objectives. Some of the positive impacts may be slow and take years to show progress towards recovery.

4.1 Overview Tables and Project Sheets for Critical Areas

Two Project and Implementation Strategy Overview tables and associated project summary sheets for each of the critical areas (Tile-drained agricultural fields and riparian areas of Price's Creek and tributaries) are presented in this Chapter. The presented opportunities provide a general concept and will be further evaluated as landowners provide additional feedback on the projects and each project is adequately funded. The estimated project costs and the time frame are both dependent upon funding opportunities and coordination with landowners and project partners.

In addition to the detail provided in previous chapters, the project summary sheets outline how the nine minimum elements of watershed planning are being met by each opportunity, as shown in the first column of each table. Moreover, this NPS-IS will be updated periodically to address stakeholder input and additional project opportunities may be added. If a future critical area is identified (e.g. HSTS nutrient loading) within the Price's Creek HUC-12, supplemental information will be provided as funding allows.

4.2 Project Tables

The Project Overview Table for each Critical Area presents a summary of each strategy identified for each critical area. BMP strategies are divided into several categories, including urban storm water runoff management, altered stream and habitat restoration strategies, and other nonpoint source causes and associated sources of impairment.

TABLE 4-1 PRICE'S CREEK NINE-ELEMENT CRITICAL AREA TABLES

For Price's Creek HUC-12 (050800020204) Critical Area 1							
Goal	**Objective**	**Project**	**Project Title (EPA Criteria g)**	**Lead Organization (EPA Criteria f)**	**Time Frame (EPA Criteria f)**	**Estimated Cost (EPA Criteria d)**	**Funding/Actual Sources (EPA Criteria d)**
Urban Sediment and Nutrient Reduction Strategies							
Altered Stream and Habitat Restoration Strategies							
Agricultural Nonpoint Source Reduction Strategies							
1	1	1	Agricultural BMP – 650 Acres Cover Crops	Preble SWCD	TBD	TBD	TBD
1	2	2	Agricultural BMP – 15 Acres Grassed Waterways	Preble SWCD	TBD	TBD	TBD
1	2	2	Agricultural BMP – 20 Acres Filter Strips	Preble SWCD	TBD	TBD	TBD
1	2	2	Agricultural BMP- 15 Acres of Drainage Control BMP such as nutrient control wetlands/ WASCOB	Preble SWCD	TBD	TBD	TBD
High Quality Waters Protection Strategies							
Other NPS Causes and Associated Sources of Impairment							

For Price's Creek HUC-12 (050800020204) Critical Area 2							
Goal	**Objective**	**Project**	**Project Title (EPA Criteria g)**	**Lead Organization (EPA Criteria f)**	**Time Frame (EPA Criteria f)**	**Estimated Cost (EPA Criteria d)**	**Funding/Actual Sources (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							
1	1	TBD	Streambank Stabilization	TBD	TBD	TBD	TBD
1	2	TBD	Riparian Buffer	TBD	TBD	TBD	TBD
Other NPS Causes and Associated Sources of Impairment							

APPENDIX – References

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