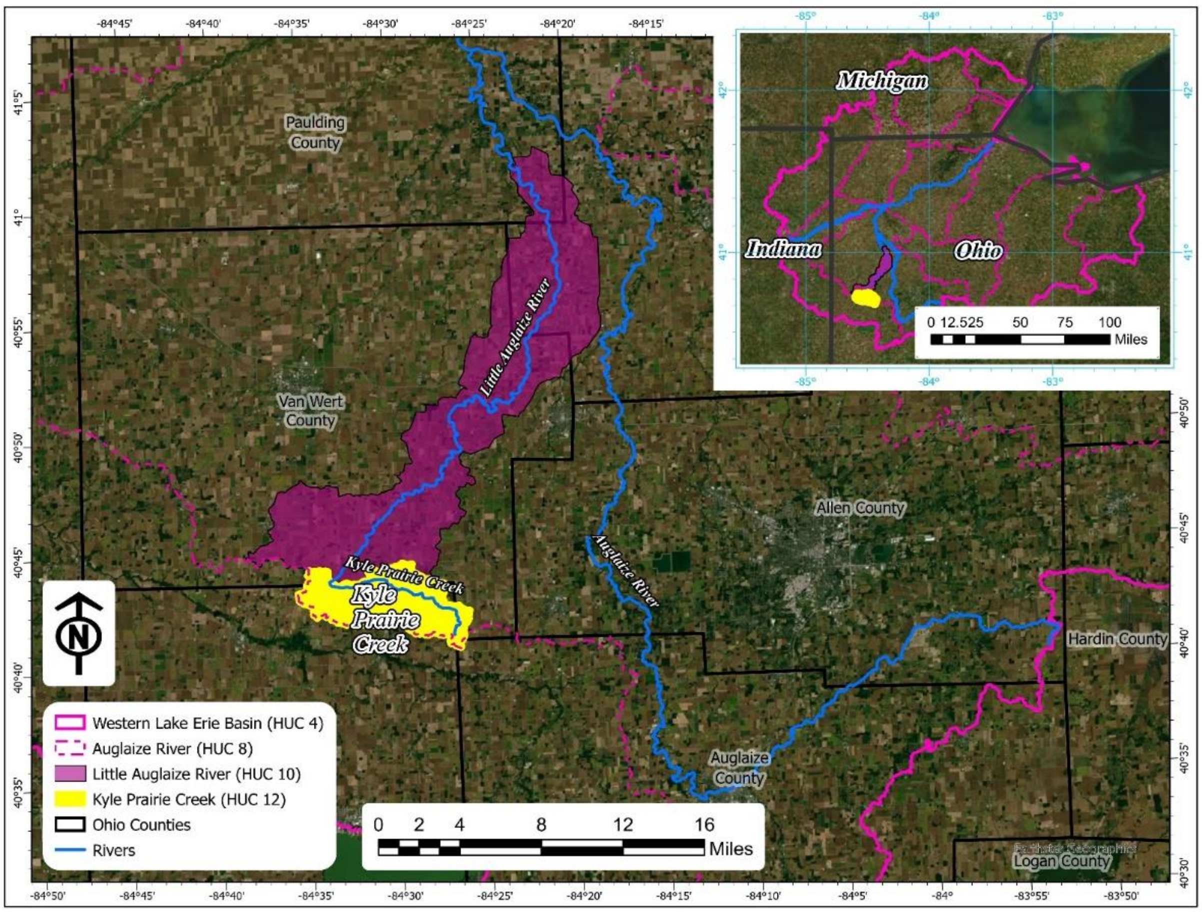
Nine-Element Nonpoint Source Implementation Strategy (NPS-IS) for Kyle Prairie Creek HUC-12 (4100007 06 01)



Prepared for:

Auglaize, Mercer, and Van Wert County Soil and Water Conservation District

Prepared by:

OSU Extension Water Quality Team

Version 1.0: October 2023

Approved: October 27, 2023

THIS PAGE INTENTIONALLY LEFT BLANK.

‘

ACRONYMS AND ABBREVIATIONS

The acronyms and abbreviations are widely used and accepted by organizations working to improve Ohio's water quality and are used throughout this NPS-IS document.

Numbers

§319	Section 319 of the Clean Water Act

A

ACPF	Agricultural Conservation Planning Framework
ALU	Aquatic Life Use
AWS	Agricultural Water Supply

B

BMP	Best Management Practice

C

CAFF	Confined Animal Feeding Facility
CRP	Conservation Reserve Program
CSA	Critical Sewage Area
CWA	Clean Water Act

D

DAP	Domestic Action Plan
DEFA	Division of Environmental and Financial Assistance

E

EQIP	Environmental Quality Incentives Program

F

FLS	Federally Listed Species

G

GLC	Great Lakes Commission
GLRI	Great Lakes Restoration Initiative
GLWQA	Great Lakes Water Quality Agreement

H

H2Ohio	H2Ohio Initiative (State funded program for WQ improvement)
HAB	Harmful Algae Bloom
HELP	Huron-Erie Lake Plains Ecoregion
HSTS	Home Sewage Treatment System
HUC	Hydrologic Unit Code

I

IBI	Index of Biotic Integrity
ICI	Invertebrate Community Index
IJC	International Joint Commission
IWS	Industrial Water Supply

M

MIwb	Modified Index of Well-Being
MTA	Million Tons per Annum
MWH	Modified Warmwater Habitat

N

NPDES	National Pollutant Discharge Elimination System
NPS	Nonpoint Source
NPS-IS	Nonpoint Source-Implementation Strategy
NRCS-USDA	Natural Resources Conservation Service- United States Department of Agriculture

O

ODA	Ohio Department of Agriculture
ODNR	Ohio Department of Natural Resources
OEPA	Ohio Environmental Protection Agency
OLEC	Ohio Lake Erie Commission

P

PMR	Preliminary Monitoring Results
PSS	Project Summary Sheet
PWS	Public Water Supply

Q

QHEI	Qualitative Habitat Evaluation Index

R

RM	River Mile
RRA	Run-Off Risk Assessment

S

STEPL	Spreadsheet Tool for Estimating Pollutant Loads
SWCD	Soil and Water Conservation District

T

TMDL	Total Maximum Daily Load
TSD	Technical Support Document

U

USEPA	United States Environmental Protection Agency
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey

W

WAP	Watershed Action Plan
WLEB	Western Lake Erie Basin
WQ	Water Quality
WQS	Water Quality Standards (Ohio Administrative Code 3745-1)
WRP	Wetland Reserve Program
WWH	Warmwater Habitat

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

CHAPTER 1: INTRODUCTION

The Kyle Prairie Creek watershed, Hydrologic Unit Code (HUC)-12 041000070601, spans 19.03 square miles and 12,179.2 acres and lies within the Little Auglaize River watershed, which is part of the larger Maumee River watershed. This HUC-12 watershed is split between Mercer and Van Wert Counties with a small part in Auglaize County. In Figure 1, Kyle Prairie Creek is highlighted in yellow and the larger HUC-10 Little Auglaize watershed is highlighted in purple. The inset map shows the location of the watershed in context of the Western Lake Erie Basin. Kyle Prairie Creek watershed is primarily composed of agriculture lands, with approximately 90% used for ag practices. Currently, Kyle Prairie creek is listed as an impaired watershed within the Western Lake Erie Basin (WLEB) needing mitigation for recreational uses. The watershed is also part of the drinking water source protection area for the City of Delphos and contributes to downstream drinking water impairment due to nitrates and algae. This improvement effort will mainly focus on reducing nutrients (phosphorus and nitrates) that contribute to downstream recreational and drinking water use impairments.

This non-point source implementation strategy plan (NPS-IS) has been written to remediate non-point source (NPS) pollution throughout the watershed. The plan includes the nine critical elements the U.S. Environmental Protection Agency (U.S. EPA) determined were needed to plan, implement, and fund non-point source remediation projects in HUC 12 scale watersheds. This planning effort, led by Ohio State University and developed with input from local stakeholders, was funded in part through a grant from Ohio EPA.

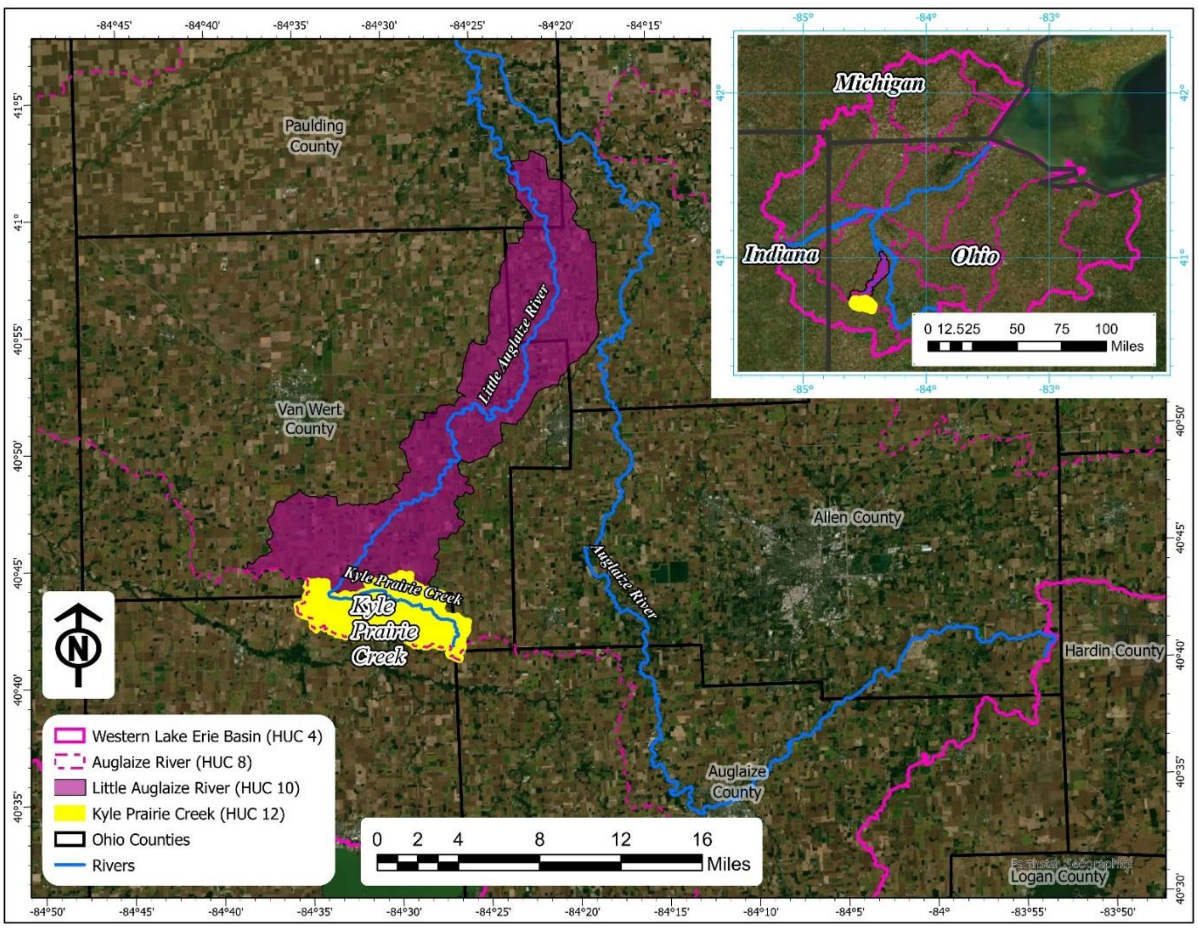


Figure 1: Overview Map of Kyle Prairie Creek HUC-12

1.1 Report Background

The Kyle Prairie Creek watershed (Hydrologic Unit Code- 041000070601) is located in the Maumee River Basin in Northwest Ohio and is a tributary of the Auglaize River, an 8-digit hydrologic unit (sub-basin). Water delivered from Kyle Prairie Creek and its tributaries eventually flows to the western basin of Lake Erie by route of the Maumee River. A watershed-based strategic plan is needed for Kyle Prairie Creek to address near field sources of nutrient losses that contribute to far field recreational and drinking water impairments to the City of Delphos and the western basin of Lake Erie.

The development of local NPS-IS plans is critical to meet Ohio's Domestic Action Plan (DAP) goal to reduce total spring phosphorus loadings to Lake Erie by 40% by 2025. In 2016, the United States began creating a plan specific to Lake Erie, mainly in response to the commitments agreed upon by Canada and the U.S. to set reduction targets for all the Great Lakes. The U.S. along with Canada have each developed similar plans of action for meeting nutrient reduction targets. The U.S. plan was created in collaboration with five federal agencies, five states (Ohio, Michigan, Indiana, New York, and Pennsylvania) and variety of other important stakeholders from sectors such as industry, agriculture, and academia. Each of the five states included in the plan have committed to taking action to meet the nutrient loading reduction goals for Lake Erie. These plans are to be used as a method for tracking progress throughout the regions through time.

Lake Erie is expected to respond well to phosphorus reductions due to its small volume and short residence time (in comparison to the other Great Lakes). It can be difficult to gauge progress with nutrient reduction success by focusing solely on the health of the Lake. We can however, gauge progress on a more local level by looking at progress made toward specific practice implementation related to NPS pollution.

The NPS-IS plan is also critical to meeting the far field nitrate and algae reduction goals that will address the downstream drinking water use impairment. Since agriculture is the predominant land use and likely greatest contributor to nitrate impairments but, simultaneously, costs of nitrogen have been increasing, reducing nitrogen losses from agricultural fields can be seen as a local win-win for the agricultural community and water quality.

The development of NPS-IS plans, such as this one, throughout the WLEB will focus on NPS pollution. This includes near-field (within the watershed) and far-field (within the region) loading effects. The WLEB is impaired due to cyanobacterial blooms caused by nutrient enrichment. Non-point source nutrient reduction goals have been set for all sub-watersheds in the Maumee drainage basin and are outlined in Ohio's Domestic Action Plan 2020. Further delineation and appropriation of these nutrient reduction goals are currently being outlined in Ohio EPA's Maumee Total Maximum Daily Load Report (TDML), which has just been finalized. Kyle Prairie Creek has nutrient reduction goals specific to its hydrology, and land use; therefore, needs strategies specific to these and other factors, such as agricultural practices prevalent in the locale, site suitability and the nature of developed land and infrastructure in the local communities. A TMDL is also under development to address the nitrate and algae related causes of the drinking water source impairment for the City of Delphos.

A thorough understanding of the practices, infrastructure, and culture relevant to a remediation strategy can be obtained only through successful local engagement. This implementation strategy was developed to gain insight and cooperation from local stakeholders, as well as propose and outline remediation strategies that are readily implementable, acceptable, and practical for the specific needs of this sub watershed. All land use categories have nutrient reduction goals, and accordingly, all industries, communities and individuals who comprise the stakeholders of the **Kyle Prairie Creek watershed** have important considerations that are intended to be captured in the planning of this document.

This document outlines the necessary nine elements that U.S. EPA requires in watershed planning to address impairments of water bodies. The framework used in to develop this document was designed by Ohio EPA and the Ohio Department of Agriculture and was approved by U.S. EPA in 2016, meaning that an Ohio NPS-IS Plan meets the requirements of the Clean Water Act (CWA) for watershed planning with a purpose of removing non-point source impairments (NPS-IS Development Guidance Document, pg. 4). The United States Environmental Protection Agency requires watersheds to have approved watershed plans that meet their nine-element criteria, before allocating specific funds for local restoration projects, such as funds coming from CWA, Section 319 grants.

1.2 Watershed Profile and History

The Kyle Prairie Creek watershed is part of the larger Maumee basin that drains to Lake Erie. The Maumee basin is a heavily-agriculturalized relatively flat-lying area with fertile, yet primarily poorly drained soils. This region was historically characterized by forested wetlands that comprised the Great Black Swamp. During European settlement, forests were substantially cleared for settlement and agriculture, and the low-lying swamplands were modified to accommodate agricultural production. The lands were made arable by systematic drainage, both through modifying surface waterways by channelization and eventual use of subsurface drainage systems composed of clay pipes called "tile". This trend has picked up speed in recent years and continues with the installation of additional drainage practices. The modern tile currently being used are PVC drainage tile. Tile density in correlation to increasing nutrient loading is a common assumption. According to the Maumee River TDML draft tile drainage is a key contributor to nutrient loading.

Kyle Prairie Creek is a headwater (near basin divide) watershed that encompasses 12,190 acres located within Auglaize, Mercer and Van Wert counties. All of which are in the northwestern portion of the State of Ohio. Kyle Prairie Creek is a 12-digit hydrologic unit, or a subwatershed, that makes up a portion of the larger, 10-digit hydrologic unit watershed that is called the Little Auglaize River, shown below in Figure 2. It is located centrally of the Little Auglaize River's contributing drainage area. This HUC-10 watershed is one of 6 that make up the larger Auglaize River sub-basin, an 8-digit hydrologic unit. The Auglaize River, in turn, is one of 7 sub-basins that together make up the 6-digit hydrologic unit of the Western Lake Erie Basin. The Little Auglaize River empties into the Auglaize River, which joins the Maumee River, which flows to Lake Erie at Toledo, Ohio.

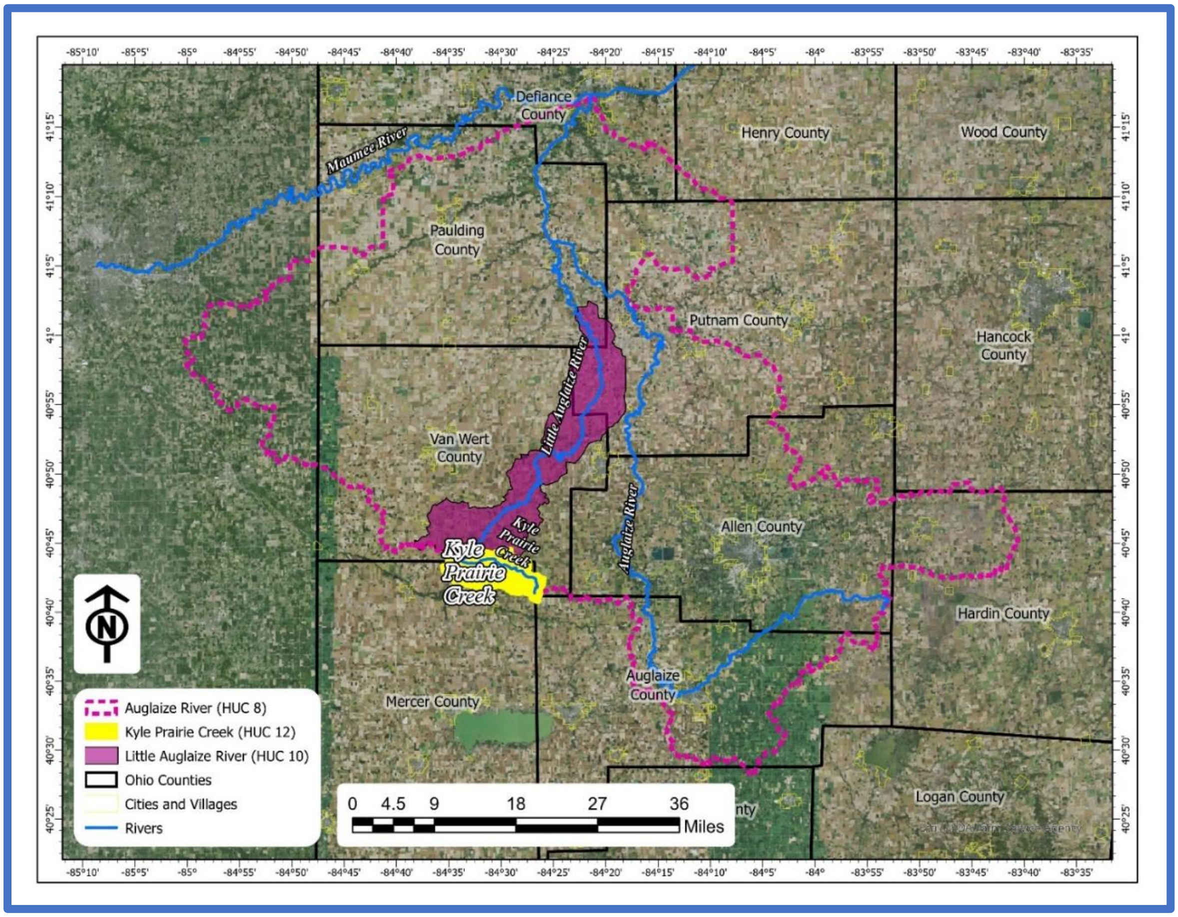
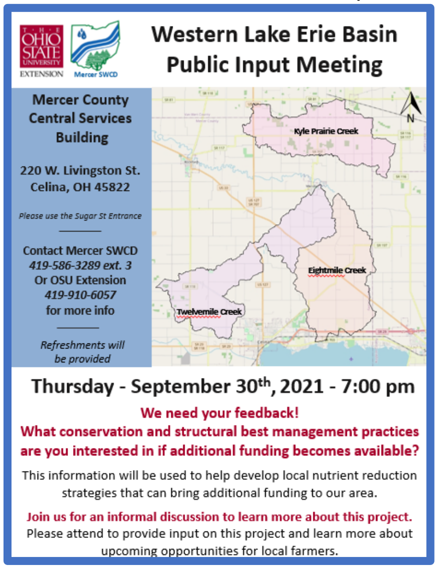


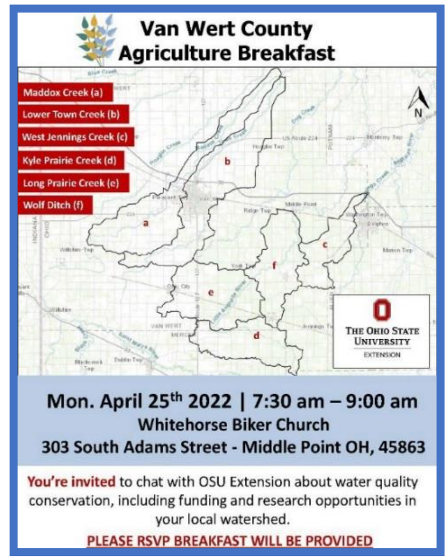
Figure 2: Map showing Larger HUC-8, HUC-10, and Focus Area HUC-12

1.3 Public Participation and Involvement

To obtain accurate, usable information, collaboration, and input from a diverse group of entities, including governmental agencies, private businesses, academia, non-profit groups, neighborhood organizations is critical. The planning effort for this project was led by OSU Extension Water Quality Associates in collaboration with Mercer, Allen, and Putnam County SWCDs and county engineers. The OSU Extension Water Quality team's mission is to engage farmers and their trusted advisors in new production strategies, technologies, and best management practices to improve fertilizer use efficiency and farm profitability while promoting soil health and reducing nutrient and sediment losses within the western Lake Erie basin. Through education, outreach, and demonstrations highlighting the benefits of practices we hope to encourage widespread practice adoption and sustained practice implementation.

An initial meeting was held on September 30, 2021 in the Mercer County Central Services building in Celina in coordination with Mercer County SWCD. The team continued a regional outreach process by holding an online watershed planning webinar (part of OSU Water Quality Wednesdays Webinar series) on January 12, 2022. Unfortunately, due to OSU COVID-based restrictions on in-person meetings, follow-up winter in-person outreach meetings had to be postponed. Instead, a targeted NPS-IS public input webinar (surveyed webinar participants on practice adoption and level of interest in new practices) was held on February 22, 2022. Once restrictions were lifted, regional in-person public input meetings were held on March 21 and April 7, 12 , and 25, 2022. Mailers were sent to property owners (targeted owners of >10 acres using GIS data) within each target watershed to raise awareness of the local meetings and planning process taking place. Attendance at these meetings was lower that hoped for, due in part to coincidence with spring field work an inability to host meetings in winter as originally planned. Local SWCDs, County Engineers, County Health Departments, and local governments (township trustees, municipalities, etc.) were also invited to participate.





Pictured: Fliers from outreach events.

Within the Delphos drinking water source protection area, meetings were held on April 7 and 25, 2022, at the OSU Extension Putnam County office and the Whitehouse Biker Church. The meetings began with WQ associates discussing the NPS-IS planning process. Many of the producers in attendance had not heard of NPS-IS plans and wanted to learn more before getting into specific conservation practices. Many participants were curious why this watershed was being focused on and had opinions of the impact of failing septic systems throughout the area. As a follow-up, local health departments were contacted to discuss potential issues with home septic systems and health department planning priorities (see below). All meetings were supported by local SWCDs.

Pictures from the outreach meeting held on April 7th, 2022

Producers that attended the meetings shared that they had already been participating or were interested in conservation practices such as cover crops, grass waterways and two-stage ditches. A few of them already had NMPs in place on their farms. They expressed the need for more education using things like cover crops, as they had seen some issues with weed control in the past. In addition to education, they asked for concrete funding for projects within the watershed. A few of them were interested in BMPs such as two-stage ditches and grass waterways but wanted to discuss further. Lastly, they communicated disappointment in the realm of HSTS and wastewater management. Overall, the outreach meeting was successful and provided the opportunity to connect with those interested and/or involved in conservation practices that will contribute to the reduction of phosphorus loading within the WLEB.

Another important piece of stakeholder engagement meeting was to share new Agricultural Conservation Planning Framework (ACPF) maps with attendees. These maps are interactive and were made available locally using a link to a story map and QR code. We were able to look at specific areas that could potentially be used to implement conservation practices and locals could review the information for their properties. The information provided from the maps was critical to engaging the stakeholder group and developing plans to meet the reduction goal. The ACPF maps are all available at the end of this document in the Appendix beginning on page 34.

Later in the planning process, WQEAs were able to make one on one connections with producers in the area. They also met with several farmers that participated in The Nature Conservancy (TNC) Farmer's Advocate for Conservation program. They provided insight on the overall climate of conservation practices in agriculture in the area as well as some things that have worked well for him and not so well. Connections such as this one, allows for plans to be much more usable and relatable to those in the watershed. Having a smaller impact on the nutrient pollution, but also just as important as agriculture, urban areas were also contacted and invited to participate.

More recently, on February 28, 2023, a meeting was held with Van Wert Soil and water conservation district to gauge what landowners would find helpful and how to get in touch will landowners interested in implementing new conservation practices. Maps were emailed containing generated landowner listings and are being evaluated to find suitable partners.

Additionally, on March 6, 2023, all townships who have at least one portion of the watershed in their township were mailed information on what we are doing, how it can help, contact information and more. All townships have been contacted via email, phone, mail or by attending township meetings. A meeting with Van Wert Health department was held on March 16, 2023, following a chain of emails in order to get more information on Home Sewage Treatment System (HSTS) issues in the area. Efforts toward the goals and objectives in this document will continue to include these partners in future updated plans.

CHAPTER 2: HUC-12 WATERSHED CHRACTERIZATION AND ASSESSMENT SUMMARY

2.1 Summary of HUC-12 Watershed Characterization

2.1.1 Physical and Natural Features

The Kyle Prairie Creek watershed is a 12-digit hydrologic unit shown below in Figure 3. The HUC-10 level watershed in which the Kyle Prairie Creek sub watershed is found, is called the Little Auglaize River. The HUC-8 level sub-basin that encompasses Kyle Prairie Creek is the sub-basin, and the basin is Western Lake Erie, which is part of the Great Lakes Region. Within the Little Auglaize River sub watershed are two waterways. These are Kyle Prairie Creek (proper), which is the primary watercourse, and Little Auglaize River which is a tributary that it converges with before the latter enters the Auglaize River mainstem.

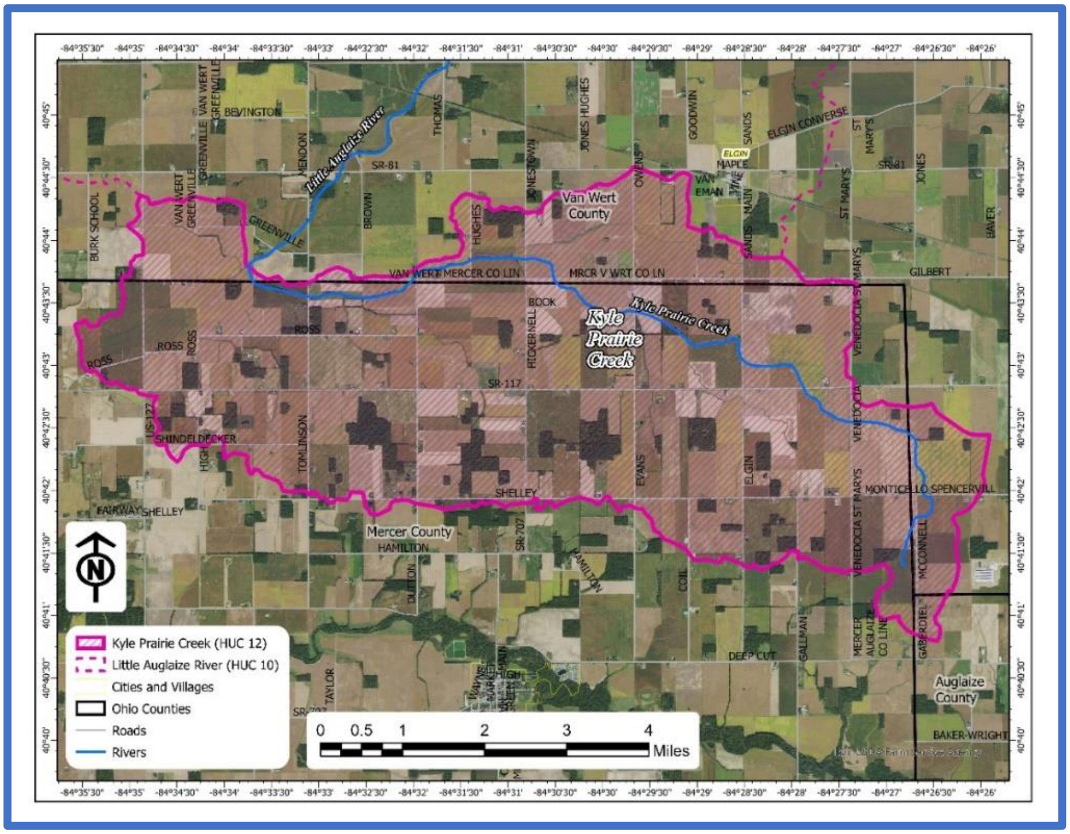


Figure 3: Overview Map of Kyle Prairie Creek HUC-12

The Auglaize River sub watershed is situated across the border of two similar but distinct ecoregions. At the level III classification, the watershed is identified as Ecoregion 55, the Eastern Corn Belt Plains. It is further classified as the clayey, high lime till plains, which is a level IV identifier (55a).

Some common characteristics include topography, current land use and historic land cover. The topography is generally characterized by nearly-level regions, interspersed with end moraines and ridges. The soils are fine-textured and poorly drained, leading to widespread, artificial drainage, and contributing to heavy sediment loads. Furthermore, the region was historically covered by forests and swamp-forests consisting of deciduous tree species.

The soil of the subregion is characterized by impacts of glaciation, soils are broken down in the map below. Glacial till and lacustrine sediments are predominant. Fine textured clays are the characteristic texture, causing poor natural drainage, except in those areas where coarser soil textures are present, along ridges and moraines. The Alfisol soil order is common to all these regions, though the ECBP contain Mollisols, while the HELP contain Inceptisols in addition to the Alfisol order. The low-gradient streams are noted as the predominant type of water course. The hydrologic group for the soils in this region are predominantly C/D and D as depicted in Figure 4, below.

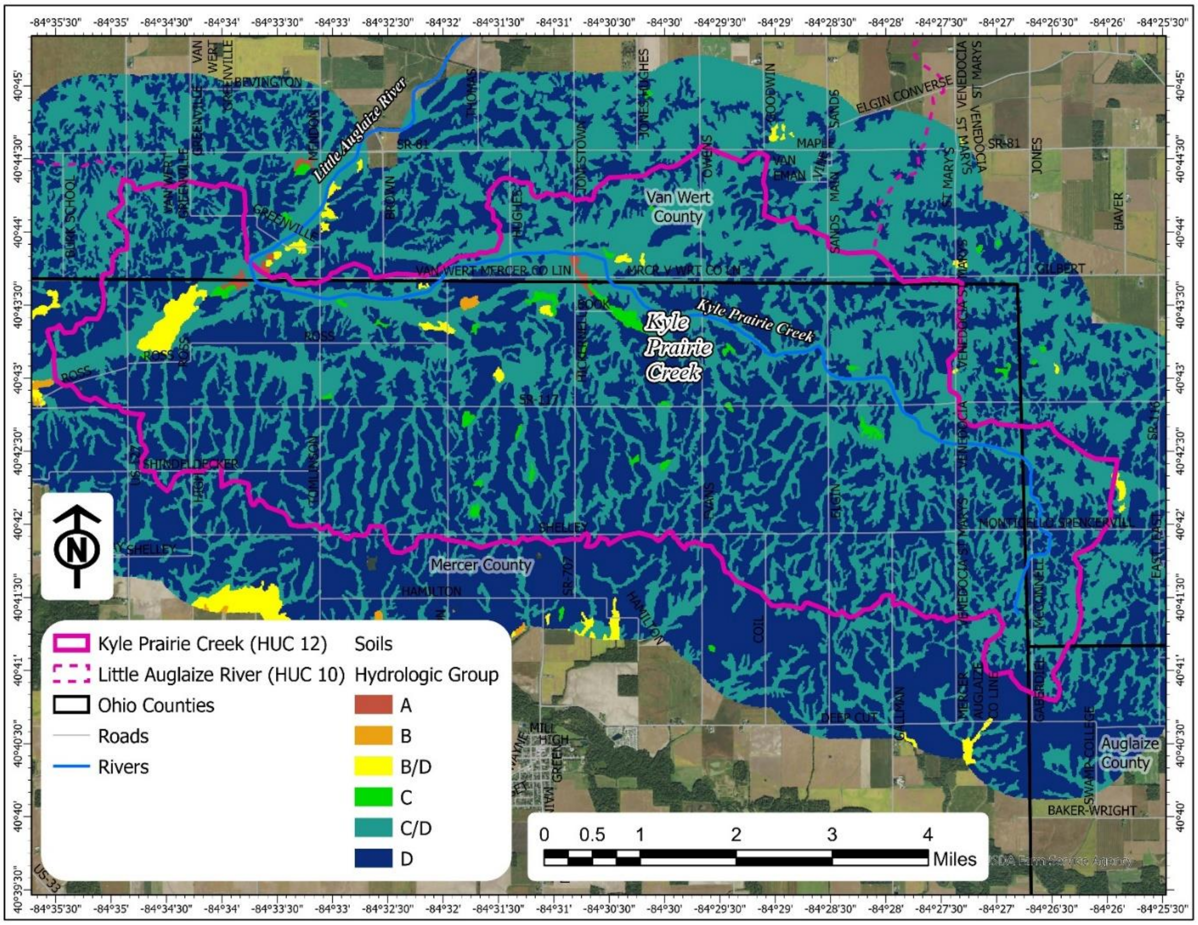


Figure 4: Hydrologic Groups of Soils within Kyle Prairie Creek HUC-12

2.1.2 Land Use and Protection

Land use within the Kyle Prairie Creek HUC-12 is dominated by agricultural land use, with nearly 90% of the acres covered being used for agricultural practices. As you can see by Figure 5, below, much of this is characterized by cultivated crops. According to the 2017 USDA Agricultural Census Van Wert County harvests over 235,808 acres of cropland. About 28% of this land was harvested for corn (grain) and 57% was harvested for soybeans. Additionally, there were 772 farms throughout the county this includes livestock and poultry. Likewise, Mercer County harvests over 268,958 acres of land. About 37% was harvested for corn (grain) and 44% was harvested for soybeans. Additionally, there are 1,231 farms including livestock and poultry farms here. Auglaize County harvests over 210,018 acres of cropland. About 31% of this land was harvested for corn (grain) and 46% was harvested for soybeans. Additionally, there were 976 farms throughout the county, including livestock and poultry. Table 1 displays this information, and an overview of land cover map can be found in Figure 5, below. A breakdown of the types of livestock within the HUC-12 can be found in Table 2, as well.

Table 1: 2017 USDA Census Information on Auglaize, Mercer, and Van Wert Counties

County	Total Cropland Area (ac)	% Grain	% Soybeans	Total Farms
Auglaize	210,018	31%	46%	976
Mercer	248,000	37%	44%	1,231
Van Wert	248,000	28%	57%	772

(Source: USDA, 2017)

Table 2: Estimated Animal Headcounts within Kyle Prairie Creek HUC-12

Type	Animal Units
Beef	606
Dairy	205
Swine	6,608
Sheep	17
Horse	6
Chicken	96,761
Turkey	15,123
Duck	0

Source: USDA 2012 Census of Agriculture, inputed into PLET/STEPL Data Server (Tetra Tech, 2017)

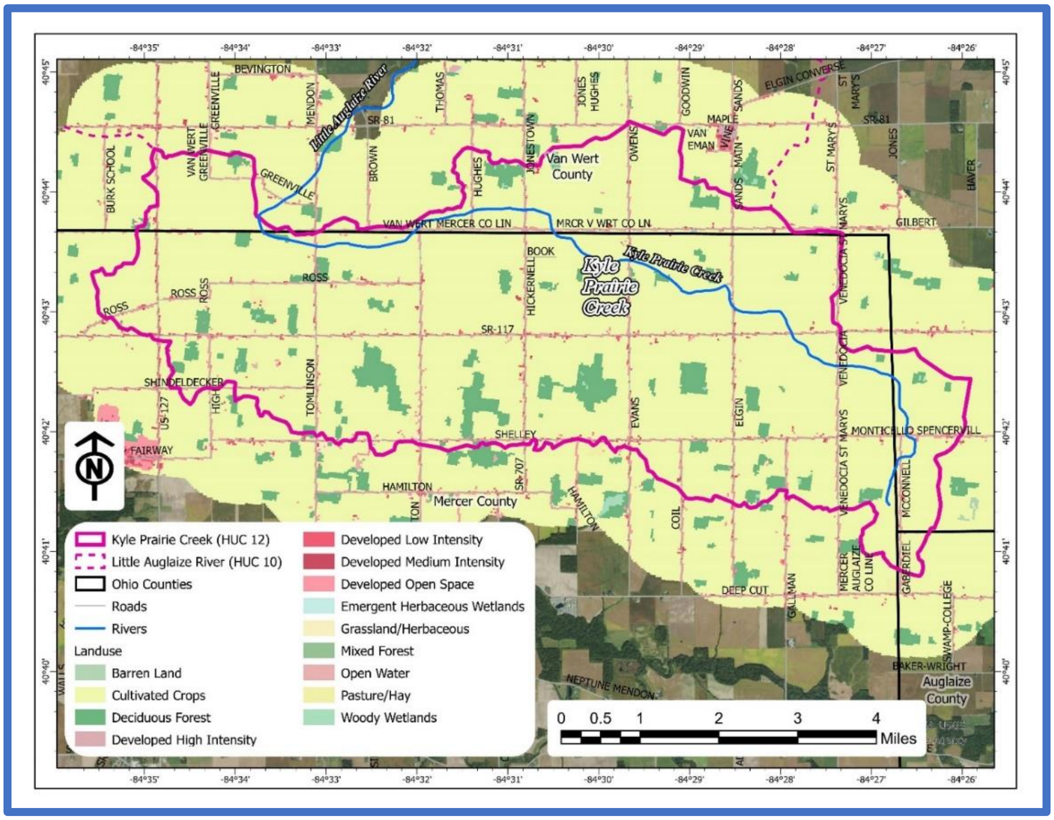


Figure 5: Land Use in Kyle Prairie Creek HUC-12

A breakdown of the overall land use throughout the HUC-12 watershed is show in Table 3. As you can see, the majority of the land is utilised for agriculture (cropland, pasture and feedlot). Only 5.6% is urban and 6.2% is forest.

Table 3: Land Use Classifications within Kyle Praire Creek HUC-12

Land Use	Kyle Prairie Creek HUC-12 (04100007 06 01)		
	Area (mi^2)	Area (acres)	% of Watershed Area
Cropland	16.48	10,548.17	86.5%
Urban	1.07	686.53	5.6%
Pasture	0.29	187.48	1.5%
Forest	1.18	760.14	6.2%
Feedlot	0.01	7.82	<1%

Source: USDA 2012 Census of Agriculture, inputed into PLET/STEPL Data Server (Tetra Tech, 2017))

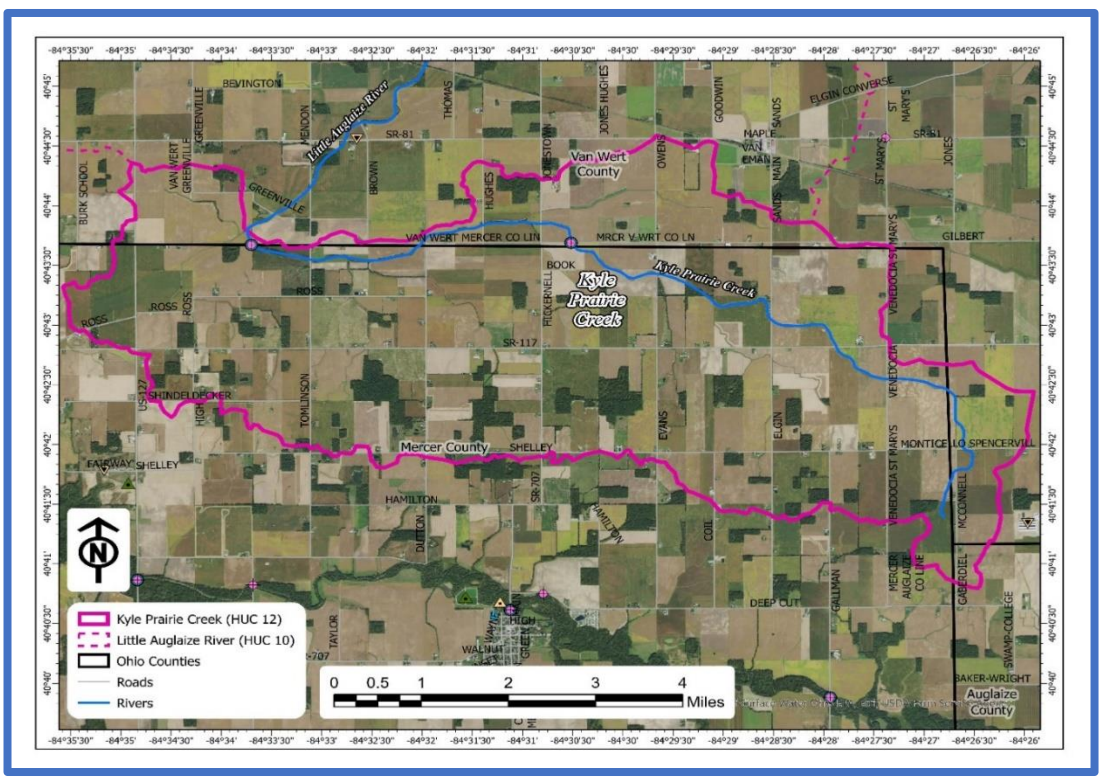
No areas with the watershed have been publically noted as being habitat for endangered or threatened species. Privatley owned land within the watershed, however, may be providing ciritcal habitat for wildlife species. Therefore, it is important to mention the species listed as federally endangered or threatened in the three counties. The results are broken down below in Table 4.

Table 4: Federally Threatened and Endangered Species in Allen, Mercer and Van Wert County

County	Species	Status	Type
Van Wert	Indiana Myotis (Bat)	Endangered	Mammal
Van Wert	Esatern Massasauga	Threatened	Reptile
Allen	Clubshell	Endangered	Mollusk
Allen	Rayed Bean	Endangered	Mollusk
Van Wert	Northern Long-eared Bat	Threatened	Mammal
Mercer	Upland Sandpiper	Endangered	Bird
Mercer	Pirate Perch	Endangered	Fish
Mercer	Pugnose Minnow	Endangered	Fish
Mercer	Pondhorn	Threatened	Mollusk

(Source: USFWS, 2020)

It is important to mention other potential point pollution sources within the watershed that may be contriuting to impairments. Although these facilities are considered point sources and will not be mitigated under these plans, understanding the over all pollution impacts will facilitate remdiation of non-point source issues. Within this HUC-12 watershed there are no NPDES regulated facilities. An overview map of the NPDES regulated facilites is shown in Figure 6, the map also includes a legend that explains the symbols used. There are two water quality sampling stations (pink circles on map) located within the watershed.



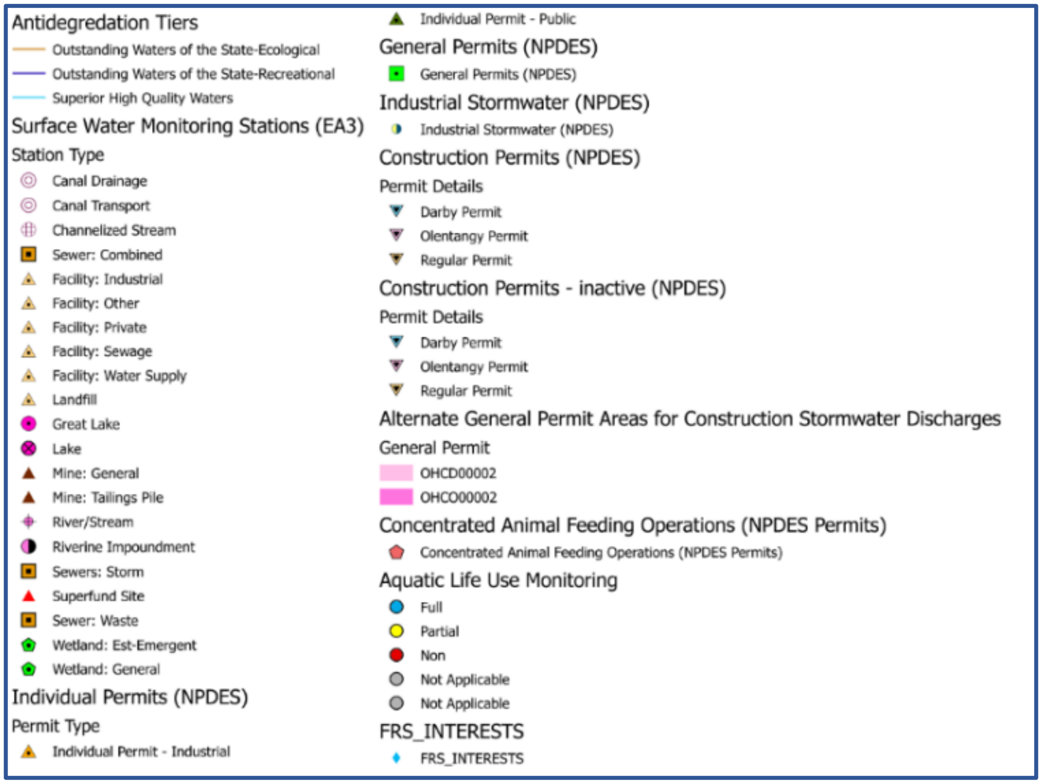


Figure 6: Location of Monitoring Points in and Around Kyle Prairie Creek HUC-12

<u>2.1.3 Public Water Supply Targets:</u>

Kyle Prairie Creek is within the drinking water source protection are for the City of Delphos Drinking Water Treatment Plant (see Figure 7). Approximately 7,000 people are served through this facility. A drinking water source assessment was first issued in 2002 and updated in 2007 (Ohio EPA). Based on repeated exceedances within the source water of the maximum contaminant level of 10 mg/L for nitrates and the state drinking water threshold of 1.6 ug/L for microcystins, the drinking water use was listed as impaired due to nitrate and algae in the 2022 Ohio Integrated Report (see Table 5 and Figure 8, below). The algae impairment is linked to elevated nutrient (nitrogen and phosphorus) conditions.

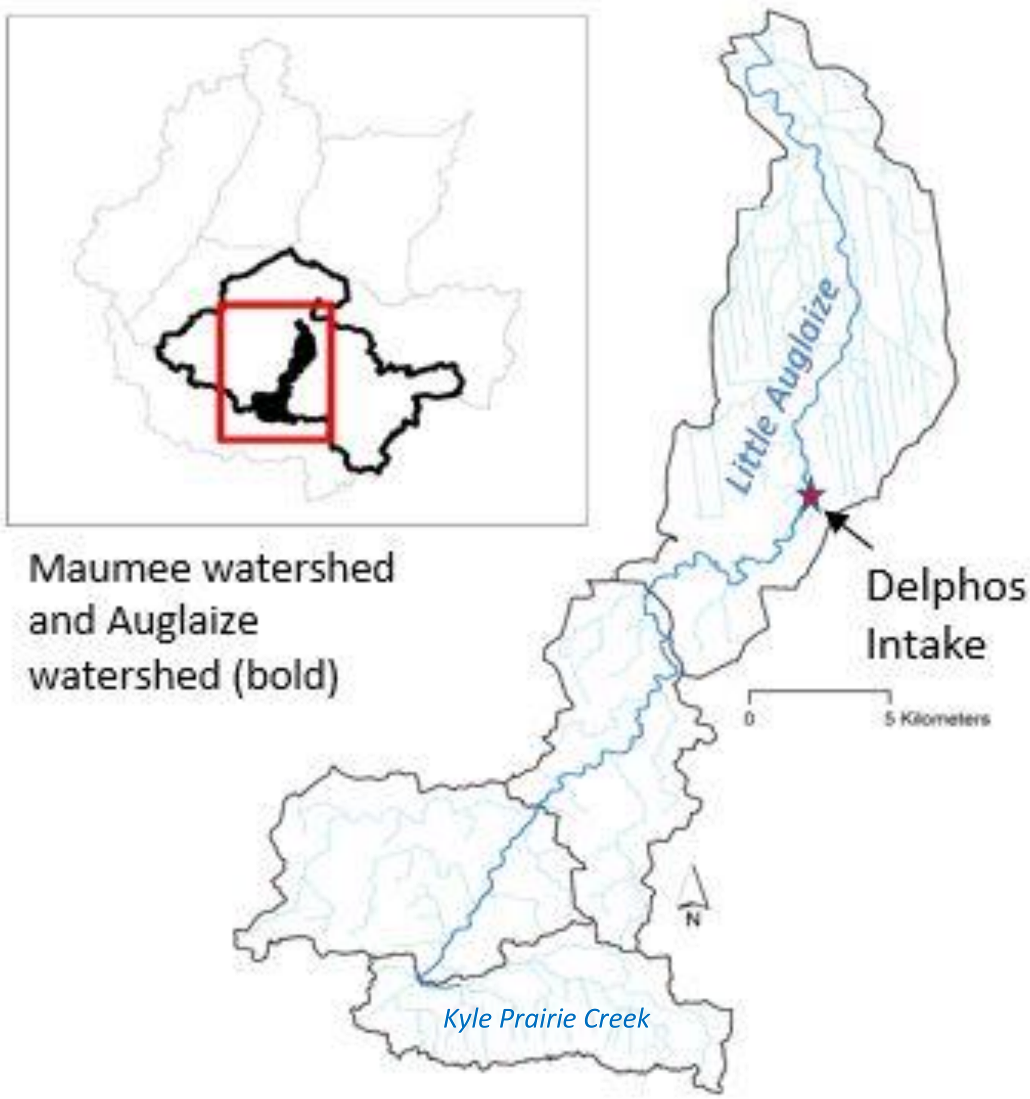


Figure 7. Location of Kyle Prairie Creek in relation to Delphos drinking water intake.

Table 5. Drinking water use impairment causes and water quality data summary.

Location	Cause of Impairment	Summary of Key Water Quality Data
Dry Fork-Little Auglaize River HUC 04100007 06 04	Nitrate One public water system had two excursions above the Nitrate 10.0 mg/L WQC. Algae One public water system had at least two source water samples above the threshold for microcystins.	Nitrate samples collected from the source water for City of Delphos public water system exceeded the WQC in 2015 and 2017. Included were 15.9 mg/L on 6/10/15 and 15.6 mg/L on 12/2/17. The City of Delphos' raw water had microcystins exceeding the threshold in 2016, 2018, and 2019 (maximum concentration 19 µg/L). *Note: Additional source water intake sampling completed by OSU showed continued excursions of the WQC 2021-2023 (see Figure 8).*

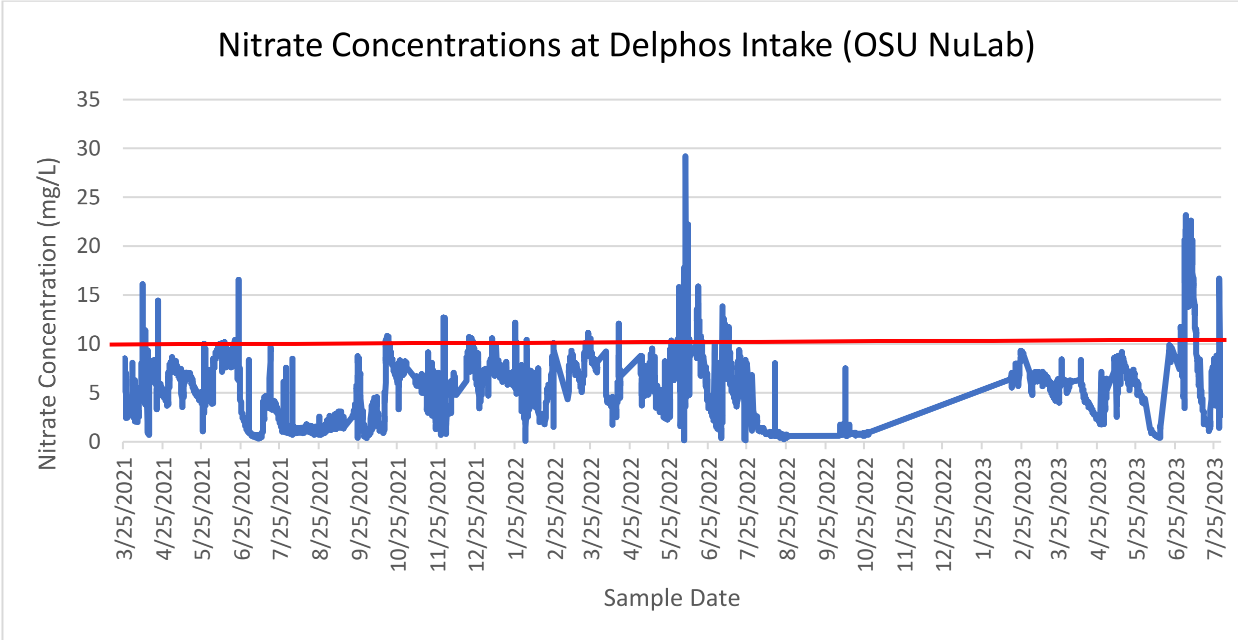


Figure 8. Source water nitrate concentrations and exceedances of use criteria (results above red line) at City of Delphos Drinking water intake (results from OSU NuLab water quality station).

In addition to sampling at the intake, OSU has conducted grab sampling at nine sampling stations upstream of the Delphos intake, including two stations within Kyle Prairie Creek. Nitrate concentrations within Kyle Prairie Creek have exceeded the nitrate drinking water maximum contaminant level within Kyle Prairie Creek and have been higher than downstream sampling locations (see Figure 9). OSU has also observed elevated nitrate concentrations at tile outlets within the watershed.

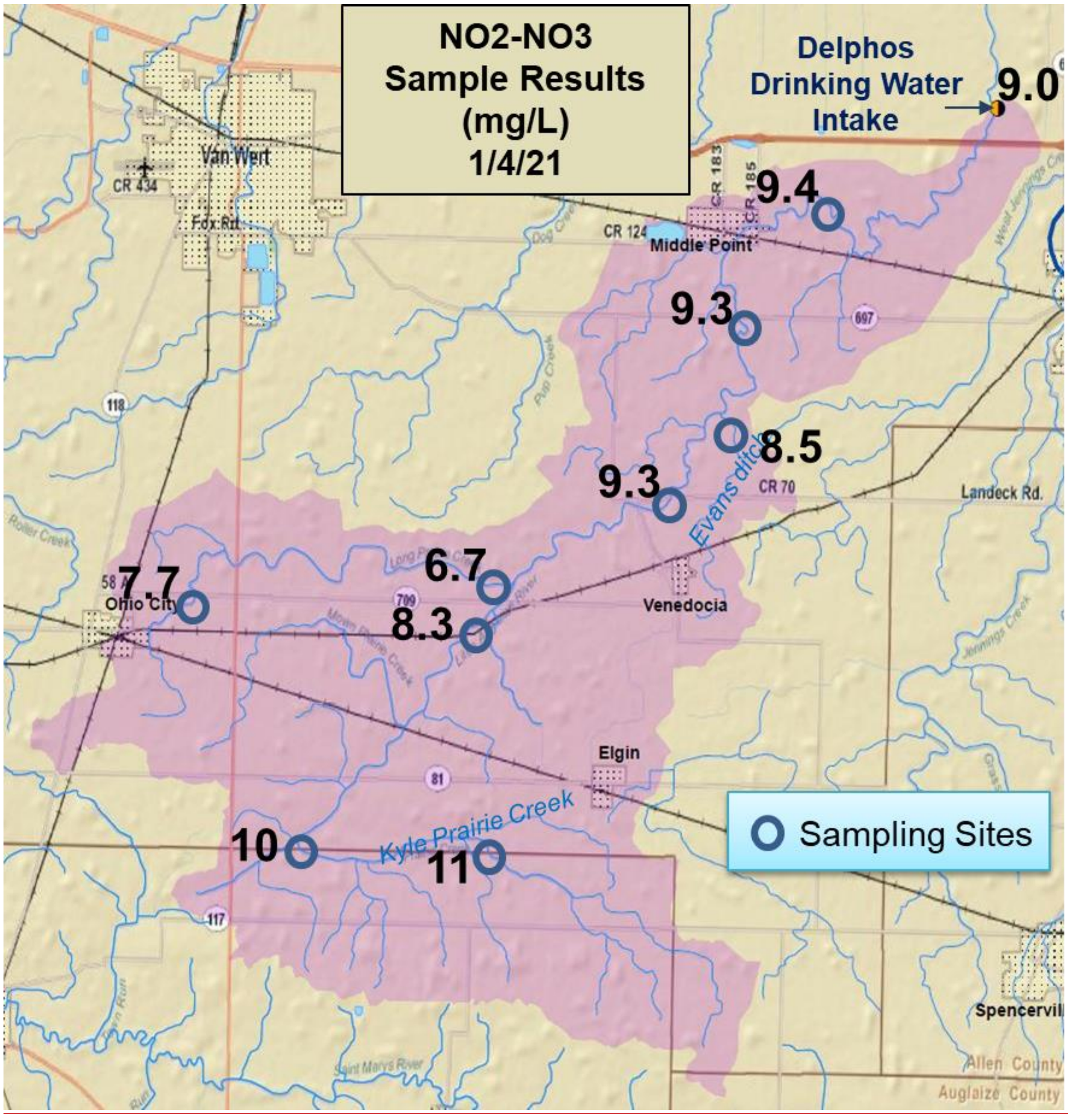


Figure 9. Nitrate concentrations on January 4, 2021, within Delphos Drinking Water Source Protection Area. Kyle Prairie Creek detections exceeded the use criteria concentration of 10 mg/L.

Additional work completed by OSU included collecting discharge measurements at multiple sites within the drinking water source protection area and development of discharge rating curves, to assist with estimating nutrient loading from intake and upstream sampling locations (Pace, 2022). The USGS gage is several miles downstream from the Delphos intake and its proximity to the mouth of the Auglaize River leads to backwater situations and potential errors in load calculations from the downstream site. Preliminary analyses of sampling data indicate that nutrient loading was highest for both phosphorus and nitrogen during major precipitation events (Pace et. al., 2022).

It is also worth noting that the Delphos microcystins exceedances (algae impairment indicator) occurred in the fall and winter and were associated with atypical harmful algal blooms dominated by *Planktothrix rubescens*. Since microcystins are a nitrogen rich chemical, the late fall blooms with high microcystins content could be due to fall and winter nitrate loading from the Little Auglaize to the reservoir. Therefore, unlike phosphorus, more attention on fall nitrate loading is needed to address the nitrate and algae causes of drinking water impairment.

A TMDL is currently under development to address the causes of the public drinking water supply (PDWS) use impairment. The Lower Auglaize Tributaries Loading Analysis Plan is complete (TMDL Step 3). Preliminary modeling results (STEP 4) in underway and will focus specifically on the nitrate impairment-related loading goals for meeting attainment of PDWS Standards at Delphos (Ohio EPA, 2023). See: https://epa.ohio.gov/static/Portals/35/tmdl/LAPs/2014_LowerAuglaize_LAP.pdf

2.2 Summary of HUC-12 Biological Trends

Biological trends in the larger Auglaize River watershed have been monitored for many years, with an original report published in 1992, "Biological and Water Quality of the Auglaize River and Selected Tributaries." This study designated the waterway as Warm Water Habitat, but no biological records were contained in the report. The Auglaize River Watershed Rapid Assessment, published in May 2009, contained riparian zone analysis maps along with various other materials. However, in this publication no specifics were determined for this area. Later, in the 2016 report "Lower Auglaize River Tributaries Watershed", use designations for the drainage basin were assigned, water quality samples -including phosphorus and nitrates- were collected, habitat, macroinvertebrates, and fish populations were assessed and attainment status was determined. According to the 2016 Lower Auglaize River Tributaries Watershed report, both sample sites located in the **Kyle Prairie Creek HUC-12** watershed are in full attainment of Modified Warmwater Habitat (MWH) as the sites were designated by the Ohio EPA. Therefore, there were no listed sources for impairments (Table 6). Additionally, the water quality standards for the ecoregion are shown below for reference in Table 7. However, there were issues listed regarding E Coli. and its effect on the recreational use for the HUC-12. The use designation for areas within Kyle Prairie Creek are also listed in Table 8. Within Table 8 you will see that the water is used primarily for agricultural water supply (AWS) and industrial water supply (IWS), although this watershed is upstream from the Delphos intake and within the Drinking Water Source Protection Area for Delphos.

Table 6: Biological Indices Scores for Kyle Prairie Creek HUC-12

River Mile	Type	Drainage Area *(mi^2)*	IBI	MIwb[a]	ICI[B]	QHEI	Attainment Status	Location
3.23	WWH	6.9	38	N/A	N/A	35.3	FULL	Mercer- Van Wert County Rd. 18
0.20	WWH	15.9	42	N/A	N/A	45.0	FULL	Mercer County Rd. 18

(Source: Ohio EPA, 2017)

Table 7: Water Quality Standards for the Huron-Erie Lake Plains (HELP) Ecoregion

HELP Ecoregion	WWH WQS			MHW WQS		
	Headwater	Wading	Boat	Headwater	Wading	Boat
IBI	28	32	34	20	22	20
Miwb	N/A	7.3	8.6	N/A	5.6	5.7
ICI	34	34	34	22	22	22
QHEI[a]	55	60	60	43.5	43.5	43.5

(Source: OEPA, 2010)

Table 8: Water Use Designations for Kyle Prairie Creek HUC-12

Location	Aquatic Life Habitat	Water Supply	Recreation
Kyle Prairie Ditch	MWH	AWS, IWS	SRC
Green Ditch	MWH	AWS, IWS	SRC

(Source: OEPA 2017 Water Use Designation)

2.3 Summary of HUC-12 Impairment Causes and Associated Sources

The study plan for the lower Auglaize River tributaries (Biological and water quality study of the Lower Auglaize River tributaries, OEPA, 2016) indicated that Kyle Prairie Creek had higher than average total phosphorus loads. Reasons listed included wildlife, home sewage systems, and livestock having direct access to streams. There is also the potential for other contaminants, such as E. coli, from failed, abandoned, or malfunctioning septic systems. Fecal bacterial counts were collected throughout the Lower Auglaize River watershed, a total of 34 sites. The results were compiled and included in the 2014 Study Plan for the Lower Auglaize Tributaries (OEPA, 2016); the results are displayed in Table 8. Results of these samples indicate chronic water quality problems. The likelihood of someone becoming sick from using the water for recreation is significant. Geometric mean for E. Coli is measured with colony forming units (cfu) per 100 ml of water. 630 cfus/ per 100ml is the limit on geometric mean for hazards to be put into place. Geometric mean for Kyle Prairie is 1250, almost double the desired values. Out of all the Lower Auglaize tributaries it scored 7th highest on the list, out of 34 sites sampled.

Table 9: Fecal Bacterial Results Collected (CFU/mL) from Kyle Prairie Creek

Location	# of samples	Geometric mean	Attainment Status
Kyle Prairie Creek (302567)	5	1250	NON

The 2020 Ohio Domestic Action Plan (DAP) estimated the spring loadings of individual HUC 12 watersheds through the WLEB to calculate a 40% reduction goal. These findings included breakdowns of estimated loads from contributing sources from agricultural land, developed land, and natural land. In agricultural lands, sediment loss not only contributes to near field impairments, but far field nutrient loading as well. **Kyle Prairie Creek, HUC 12** had an estimated agricultural loading of 11,000 lbs/year which translates to a reduction of 4,600 lbs/year for a new goal of 6,400 lbs./year. Table 9, below, explains the breakdown further providing a nutrient loading estimate for each NPS with the new target circled in red.

Table 10: Estimated Spring Nutrient Loadings (lbs.) from Contributing NPS Sources in the Kyle Prairie HUC-12

Auglaize River	Load in Pounds				Landscape		
Kyle Prairie Creek	Agricultural Land	Developed Land	Natural Land	HSTS	Total	Target	Difference
	10,000	340	<100	110	11,00	6,400	4,600

(Ohio DAP, 2020)

2.4 Additional Information for Determining Critical Areas and Developing Implementation Strategies

The Agricultural Conservation Planning Framework (ACPF) is a free ArcGIS toolbox to support agricultural and watershed management conservation planning. The software utilizes high resolution geospatial data, such as soil, land-use, and a digital elevation model, to generate detailed output maps identifying potentially successful locations for conservation practices at the HUC 12 level. This planning tool, in conjunction with targeted in field validation, was used to assist in identifying critical source areas and supporting community engagement by encouraging conversations among partners. Table 11 shows a summary identified practices using ACPF for **Kyle Prairie Creek HUC-12**. All potential practice locations can be viewed in the Appendix of this plan.

Table 11: Summary of ACPF Outputs for Kyle Prairie Creek HUC-12

Practice	Locations Identified	Average Size/Length/Contributing area/Controlled Area	Max	Total
Nutrient Removal Wetlands	17	242.9 (drainage)	653.8 ac	-
Bioreactor	101	-	-	-
Contoured Buffer Strips	19	1,132 feet	2,546 feet	-
WASCOBs	8	16.1 ac	36.1 ac	112.5 ac
Drainage Water Management	136	15.6 ac	62.7 ac	3,879.2 ac
Saturated Buffers	7.6	-	-	-
Depressions	148	2.7 ac	25.2 ac	3,656.8 ac

(Source: OSU Extension WQ Team-ACPF)

CHAPTER 3: CRITICAL AREA CONDITIONS & RESTORATION STRATEGIES

3.1 Overview of All Critical Areas

According to Biological and Water Quality Study of Lower Auglaize River Tributaries publication, the Auglaize River HUC 10 Watershed (of which **Kyle Prairie, HUC 12** is nested within) has consistently poor habitat along much of the tributaries and streams, in addition to the highest level of bacteria impairment and organic loads. Three critical areas have been identified in **Kyle Prairie Creek, HUC 12** to address similar impairments. One critical area will address near-field effects of E. Coli contamination and recreational use impairment for upper Kyle Prairie Creek. Another critical area identifies additional near field sediment loading from eroded streambanks and overall riparian corridors. Although all sampled locations in this area were found to be in their full biological use attainment, addressing these near-field impairments will still contribute to maintaining this status and provide additional water quality milestones for future sampling. It could even potentially lead to upgrading to warmwater habitat (versus modified warmwater). The last critical area, and by far the largest is prioritized agricultural land and high-risk run-off areas. Best management practices that target nutrient and sediment losses un run-off and drainage waters from agricultural area and waterways, while also providing far field nutrient reduction.

3.2 Critical Area #1 Detailed Characterization: Conditions Goals & Objectives for Nutrient Reduction on Prioritized Agricultural Land

3.2.1 Critical Area #1 Detailed Characterization on Prioritized Agricultural Land

Critical Area #1 is characterized as prioritized agricultural land and is shown in Figure 10. Agricultural activity, especially intensive land use such as conventional tillage or fertilizer use is the largest contributor to nonpoint source pollution in the Western Lake Erie Watershed. While sample locations within this watershed meet full attainment, there are water quality stressors present. Nutrients also contribute to both the downstream drinking water impairment (Delphos and Lake Erie) and recreational algae impairment (Lake Erie). Minimal adoption of BMPS have been in Kyle prairie Creek so much of the land here is at risk for excessive sedimentation, nutrient losses, and streambank erosion. It is likely that cultivated cropland is contributing significantly to the nutrient and sediment loads in this watershed. To investigate further, the OSU Extension WQ Team employed the use of ACPF's Runoff Risk Assessment (RRA).

The RRA tool identifies field locations where erosion and sediment transport can be reduced through runoff control. The RRA is determined based on a location's slope steepness and proximity to the waterway, combined with a sediment delivery ratio from the Minnesota Phosphorus Index to determine each category. The Runoff Risk Assessment for Kyle Prairie Creek identified 13 locations (474.2 acres) as very high risk, 49 locations (49 acres) as high risk, and 77 locations (3117.1 acres) as moderate risk (Table 12). Additionally, the actual output of the RRA tool is shown in Figure 11 with the red areas being very high risk for run-off. The areas found to be in with very high or high risk of run-off will be the focus of most of the objectives listed for *Critical Area #1*.

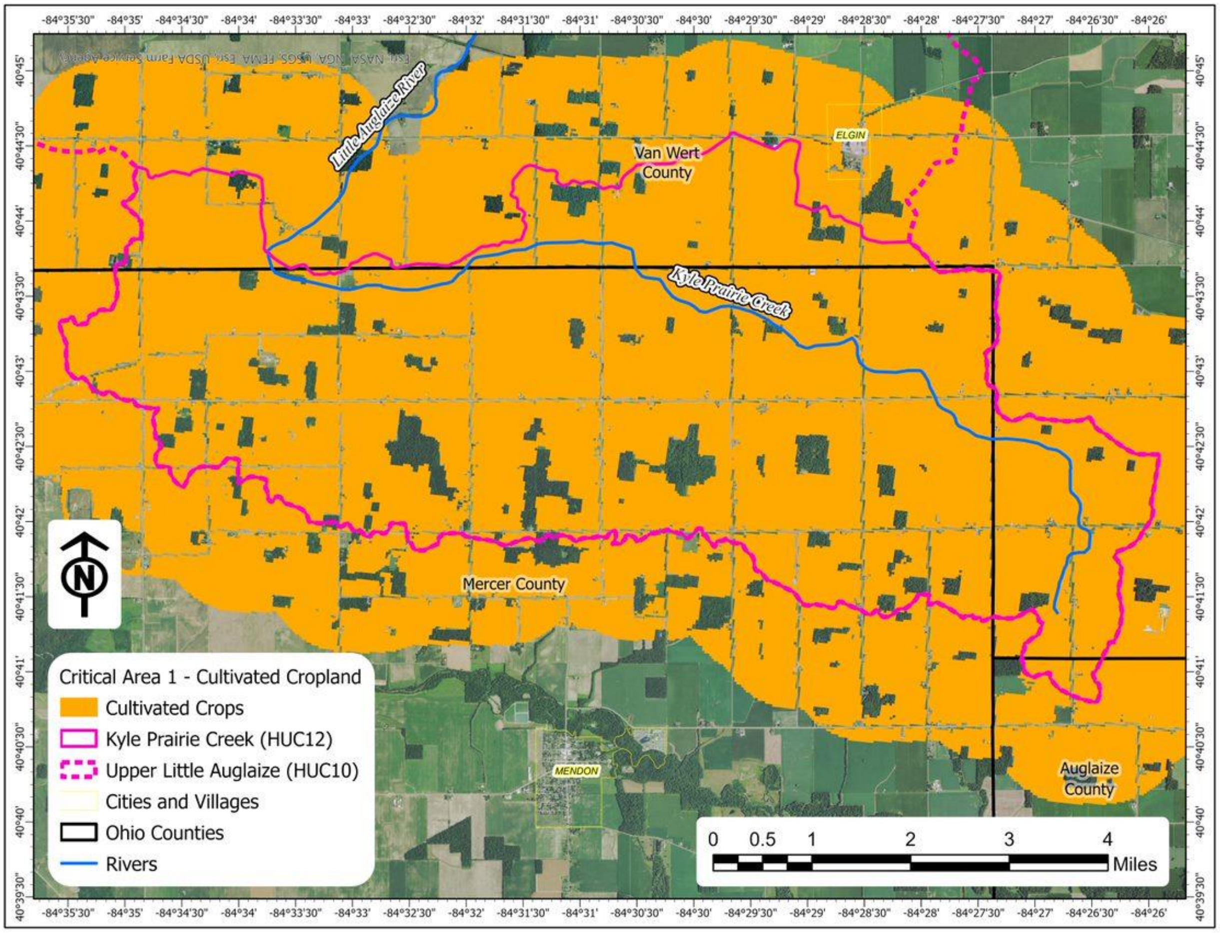


Figure 10: Overview Map of Critical Area #1, Depicting Areas with Cultivated Cropland

Table 12: Runoff Risk Assessment throughout Kyle Prairie Creek HUC-12

Runoff Risk Assessment	Unique Locations Identified	Total Area (ac)
Very High Risk	13	474.2
High Risk	49	1,883.7
Moderate Risk	77	3,117.1

(Source: OSU Extension WQ Team-ACPF)

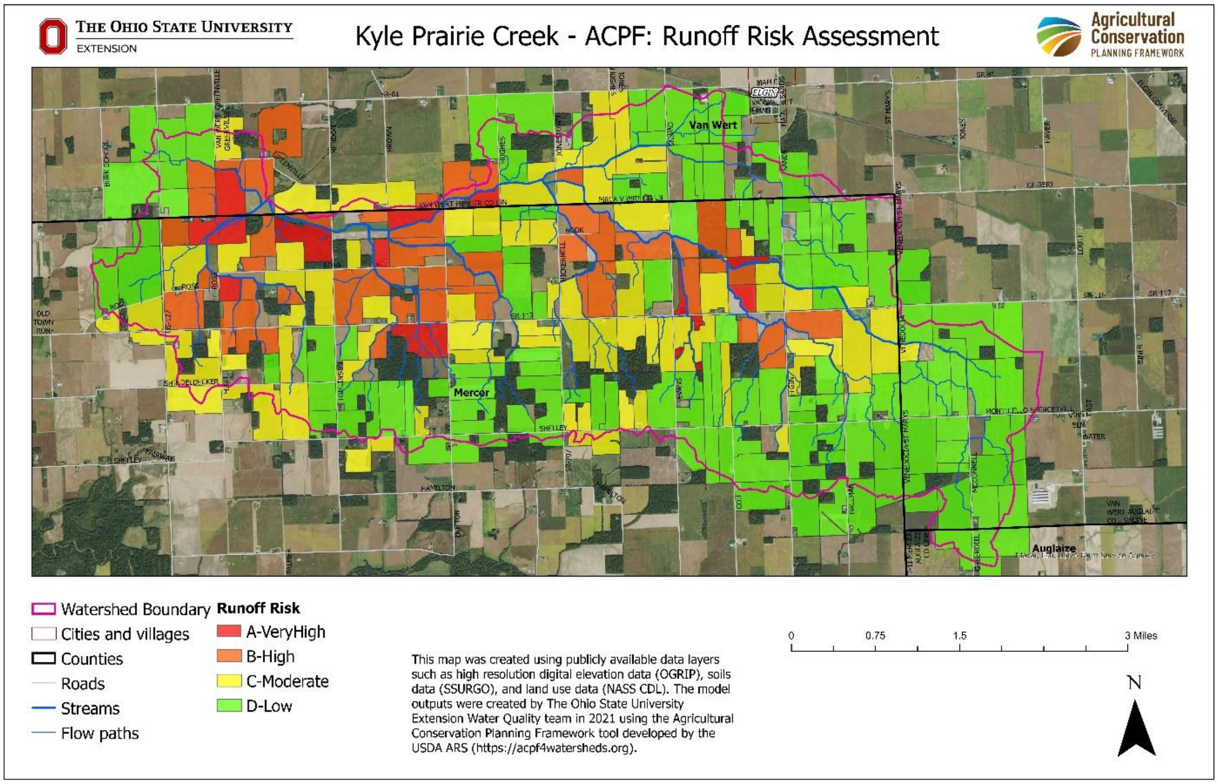


Figure 11: Run-Off Risk Assessment Output for Kyle Prairie Creek

3.2.2 Critical Area #1 Detailed Biological Conditions on Prioritized Agricultural Land

All in full attainment however invertebrates only Fair, and QHEI below 60. Maintain levels and potentially raise invertebrate score from fair to good. It would greatly benefit the larger HUC-10 to maintain and even enhance these scores, as other areas within the watershed are not in attainment. As shown in Table 13, each of the two sampling locations are either fair or marginally good, which means there is opportunity for improvement. In this study one catfish was found to have abnormal lesions on its head. It is unclear the cause as other fish in other channels has lesions as well.

Table 13: Critical Area #1- Fish Community and Habitat Data

River Mile	Drainage Area *(mi²)*	Total Species	QHEI	IBI	MIwb[a]	Narrative Evaluation
3.23	6.9	22	35.3	38	-	Marginally Good
0.2	15.9	20	45	42	-	Good

(Source: Ohio EPA, 2007)

3.2.3 Critical Area #1 Detailed Causes and Associated Sources on Prioritized Agricultural Land

Even though there is no impairment status here, attainment can be maintained, and individual metrics can be raised and tracked through additional monitoring from current sample locations. We know agricultural activities within the WLEB contribute to nutrient loading in Lake Erie which causes eutrophication and the creation of HABs. Implementation of various BMPs will help reduce the overall nutrient loading number. Many of the recommended BMPs in this section not only reduce nutrient loading from run-off and tile drainage, but also the amount of sediment that makes it our waterways. It has been proven time and time that implementation of BMPs on agricultural lands that have a history of nutrient and sediment loss benefit both far and near-field waterbodies.

3.2.4 Critical Area #1 Outline of Goals and Objectives on Prioritized Agricultural Land

The goals and objectives within Critical Area #1, 12,190 acres of agricultural land, are consistent with the overarching goals of any NPS-IS, which is to improve overall WQ and meet the nutrient reduction goals. More specifically, those prioritized agricultural lands with higher risks for run-off, which accounts for about 19% of the total agricultural land within the watershed. It is evident that the agricultural activities within Kyle Prairie HUC-12, Critical Area #1 add to far-field impairment via excessive nutrient loss, specifically phosphorus and nitrate, into waterways that lead to the City of Delphos intake and Lake Erie. The DAP created for the state of Ohio contains target loads for waterbodies through the WLEB. The goals for phosphorus are 40% lower than the current baseline for each HUC-12. In addition to this information, we know through Ohio's Nutrient Mass Balance Study that much of the nutrient loading into Lake Erie occurs with spring rainfall events (OEPA, 2018).

Moreover, the objectives contained in this plan for **Kyle Prairie, HUC-12** also align with the priorities included in the H2Ohio Initiative, which kicked off in 2020 and focuses heavily on phosphorus reduction and improving the health of Lake Erie. A great focus of this project is nutrient reduction through nutrient management, erosion management and water management. This program provides another avenue for economic incentives when producers implement BMPs on their land within the counties covered (Putnam and Allen are covered). Much of the BMPs covered in the objectives for Critical Area #1 of this plan coincide with economic incentive from H2Ohio.

In addition to H2Ohio economic incentives, OEPA has also put a great emphasis on using Great Lakes Research Initiative (GLRI) funding for long-term, structural, conservation practices within priority watersheds, such as Kyle Prairie Creek HUC-12. GLRI has been a great proponent for protection and restoration of our Great Lakes. Over a period of just over ten years (2010-2021) the project received nearly 4 billion dollars in funding for projects. Projects include remediation of toxic substances, control of invasive species, habitat and species restoration, foundation for future restoration, and our focus, nonpoint source pollution impacts. Through this project producers could obtain up to 100% of the implementation cost, if approved. It is intended, through this plan and use of ACPF technology to connect producers interested with the funding to execute these projects as well as the reasoning behind implementation to meet phosphorus reduction.

Lastly, Environmental Quality Incentives Program (EQIP) funding is also another significant source for implementation of these practices. This program was developed by NRCS and provides technical and financial support to producers specifically for improving water quality. Through this program, producers work together with NRCS and create a conservation plan that helps identify on farm issues and provides conservation practices that could solve the issues. EQUIP connects farmers not only with the information to apply practices on their land but also matches them with payments for practice implementation. Detailed information provided by Van Wert County SWCD is shown in Table 14.

Table 14: EQIP Data for Van Wert County

CRP-327 Conservation Cover		EQIP/CSP		H2Ohio- NMP		Working Land Hay Buffers	
Contracts	827	Total Contacts	288	Total Acres	86,318	Total Contracts	15
Acres	1,943	Total Acres	16,776	[redacted]			
TOTAL CONTRACTS	1,130			TOTAL ACRES		105,037	

Table 14: H2Ohio Data for Van Wert, Mercer, and Auglaize Counties

County	Auglaize	County	Auglaize
Crop Year	2021	Crop Year	2022
Row Labels	Sum of Actual Acres	Row Labels	Sum of Actual Acres
H2Ohio-1- VNMP Development	38461	H2Ohio-1- VNMP Development	559
H2Ohio-1- VNMP Implementation	42853	H2Ohio-1- VNMP Implementation	37424
H2Ohio-2- VRT Phosphorus Application	9051	H2Ohio-2- VRT Phosphorus Application	7649
H2Ohio-3- Subsurface Phosphorus Place	4441	H2Ohio-3- Subsurface Phosphorus Place	4014
H2Ohio-4- Manure Incorp. - All Other	1599	H2Ohio-4- Manure Incorp. - All Other	1267
H2Ohio-4- Manure Incorp. - Poultry Dry	250	H2Ohio-4- Manure Incorp. - Poultry Dry	189
H2Ohio-5a- Cons. Crop Rota. - S. Grain	2379	H2Ohio-5a- Cons. Crop Rota. - S. Grain	2425
H2Ohio-5b- Cons. Crop Rota. - Forage	199	H2Ohio-5b- Cons. Crop Rota. - Forage	209
H2Ohio-6- Overwintering Cover Crop	5959	H2Ohio-6- Overwintering Cover Crop	4703
H2Ohio-7- DWM Structure	0	H2Ohio-7- DWM Structure	0

County	Mercer
Crop Year	2021
Row Labels	Sum of Actual Acres
H2Ohio-1- VNMP Development	43772
H2Ohio-1- VNMP Implementation	39233
H2Ohio-2- VRT Phosphorus Application	10719
H2Ohio-3- Subsurface Phosphorus Place	2305
H2Ohio-4- Manure Incorp. - All Other	2480
H2Ohio-4- Manure Incorp. - Poultry Dry	1755
H2Ohio-5a- Cons. Crop Rota. - S. Grain	3311
H2Ohio-5b- Cons. Crop Rota. - Forage	842
H2Ohio-6- Overwintering Cover Crop	13821
H2Ohio-7- DWM Structure	0

County	Mercer
Crop Year	2022
Row Labels	Sum of Actual Acres
H2Ohio-1- VNMP Development	0
H2Ohio-1- VNMP Implementation	45823
H2Ohio-2- VRT Phosphorus Application	7876
H2Ohio-3- Subsurface Phosphorus Place	2157
H2Ohio-4- Manure Incorp. - All Other	3449
H2Ohio-4- Manure Incorp. - Poultry Dry	1816
H2Ohio-5a- Cons. Crop Rota. - S. Grain	3564
H2Ohio-5b- Cons. Crop Rota. - Forage	1097
H2Ohio-6- Overwintering Cover Crop	16771
H2Ohio-7- DWM Structure	0

County	Van Wert
Crop Year	2021
Row Labels	Sum of Actual Acres
H2Ohio-1- VNMP Development	82963
H2Ohio-1- VNMP Implementation	73444
H2Ohio-2- VRT Phosphorus Application	11649
H2Ohio-3- Subsurface Phosphorus Place	22538
H2Ohio-4- Manure Incorp. - All Other	2338
H2Ohio-4- Manure Incorp. - Poultry Dry	1338
H2Ohio-5a- Cons. Crop Rota. - S. Grain	3422
H2Ohio-5b- Cons. Crop Rota. - Forage	265
H2Ohio-6- Overwintering Cover Crop	13196
H2Ohio-7- DWM Structure	0

County	Van Wert
Crop Year	2022
Row Labels	Sum of Actual Acres
H2Ohio-1- VNMP Development	3567
H2Ohio-1- VNMP Implementation	80503
H2Ohio-2- VRT Phosphorus Application	9574
H2Ohio-3- Subsurface Phosphorus Place	21764
H2Ohio-4- Manure Incorp. - All Other	4849
H2Ohio-4- Manure Incorp. - Poultry Dry	2035
H2Ohio-5a- Cons. Crop Rota. - S. Grain	2803
H2Ohio-5b- Cons. Crop Rota. - Forage	289
H2Ohio-6- Overwintering Cover Crop	18506
H2Ohio-7- DWM Structure	0

It is important to note that some of the funding sources listed above have programs that cannot be used in conjunction with each other. Producers interested in these funding sources should talk openly with representatives from each agency to ensure there are no conflicts between the various funding sources. It is also important to note that these are county wide based practices not HUC-12 based, as there is not enough information available yet to do so. This is also not a fully inclusive list. Other best management practices may be in place in agricultural settings to reduce runoff and not be documented.

Overall Goal

Ohio EPA has determined nutrient loading estimates throughout the WLEB. With this, they have created phosphorus reduction goals focusing on springtime load estimates. To achieve the required phosphorus reduction goal imposed on agricultural land in **Kyle Prairie Creek HUC-12** and to reduce source water nitrate concentrations at the Delphos intake to no more than one excursion above 10mg/L, the following goals have been identified:

Goal 1. Achieve the 40% phosphorus reduction in springtime load. In Critical Area 1# this means decreasing the springtime phosphorus load to at least 11,340 lbs./year.
X NOT ACHIEVED: Current baseline contribution is estimated to be 19,000 lbs./year.

Goal 2. Reduce nitrogen loading such that in-stream nitrate concentrations at the downstream Delphos drinking water intake do not exceed 10 mg/L on more than one occurrence (more than 30 days apart) within five years. A nitrate TMDL is under development to develop load reduction targets. *This goal should be updated in the future to mirror the updated TMDL nitrate load reduction goals.*
X NOT ACHIEVED: Currently the watershed is contributing to the downstream drinking water impairment for nitrate. Nitrate concentrations in the source waters continued to exceed the drinking water Maximum Contaminant Level of 10 mg/L in 2023 (see above).

Goal 3. Reduce nitrogen and phosphorus contributing to algae impairment, such that microcystins do not exceed 1.6 ug/L in the Delphos source water reservoir. Cyanobacteria (toxin producing algae of concern) are fueled by elevated nutrient concentrations, and microcystins are nitrogen dependent molecules. By reducing nutrients (goal 1 and 2) cyanobacteria will be less abundant and result in reduced microcystins concentrations in the source reservoir.
X NOT ACHIEVED: Currently the watershed is contributing to the downstream drinking water impairment for algae (microcystins indicator). Microcystins most recently exceeded the drinking water threshold in 2019. More recent exceedances have been avoided but require expensive source water control strategies (algaecides) to maintain (not necessarily reflective of improved source water quality).

These goals relate to improvement throughout the greater HUC-10 watershed. Such improvements will enrich the health and habitat of aquatic life and meet the WQS. Implementation of BMPs focusing on nutrient reduction will also help achieve progress toward the following other goals. Goal one relates to Far field impairment for the Western Basin assessment unit. Goal 2-3 for Delphos water supply and Goals 4-7 are for this Kyle Prairie Assessment Unit.

Goal 4. Maintain an IBI score at or above 40 Mercer Van Wert County Road 18, RM 3.23.
X NOT ACHIEVED: Currently the site is at 38.

Goal 5. Maintain a QHEI score at or above 40 at Mercer Van Wert County Road 18, RM 3.23.
X NOT ACHIEVED: Currently the site is at 35.3.

Goal 6. Maintain an IBI score at or above 40 at upstream at Frisinger ditch At Van Wert Mercer CR 18, RM 0.2.
✓ACHIEVED: IBI is currently 42 here.

Goal 7. Maintain an QHEI score at or above 45 at upstream at Frisinger ditch At Van Wert Mercer CR 18, RM 0.2.
✓ACHIEVED: QHEI score is currently 45 here.

Overall Objective

To achieve progress toward reducing the springtime phosphorus load (reduction of 11,000 lbs./year) and reduced nitrate concentrations in the watershed, efforts must focus on widespread implementation of BMPs. Descriptions and estimations of each BMP are broken down below:

Objective 1: Plant cover crops on at least 2,000 acres annually throughout the HUC-12 watershed.

Objective 2: Implement conservation tillage practices (30-60% residue) on at least 5,000 acres.

Objective 3: Reduce erosion and therefore sediment and nutrient loss by installing grassed waterways that receive water from at least 1,000 acres.

Objective 4: Reduce erosion and sediment loss further by installing filter or buffer strips (with at least a 35ft setback) and/or saturated buffers that receive/treat water from at least 500 acres. *(This can also be achieved through the stacking of practices such as using multiple types of practices in a set area. Check dams, treatment areas, and wetlands on top of a filter strip are all ways to stack practices.)*

Objective 5: Create and implement nutrient management plans for producers, covering at least 5,000 additional acres.

Objective 6: Create or improve at least 50 acres of wetlands and/or water retention basins that treat agricultural runoff from at least 1,250 acres of agricultural land.

Objective 7: Reduce nutrient loss via subsurface tile drainage by installing blind inlets that drain at least 100 acres.

Objective 8: Reduce nutrient loss from subsurface tile drainage by installing water management structures that drain at least 50 acres.

Objective 9: Implement streambank stabilization and/or two stage ditches on at least 20,000 linear feet (1.1 miles) to reduce erosion from agricultural lands and drainage areas.

Table 15: Estimated Nutrient Loading Reductions from Each Proposed Objective

Obj. #	Best Management Practice	Total Acreage Treated	Estimated Annual P Load Reduction *(lbs.)*	Estimated Annual N Load Reduction *(lbs.)*	Estimated Spring P Load Reduction *(lbs.)*
1	Cover Crops	2,000	140	392	91
2	Conservation Tillage (30-60% Residue)	5,000	1,780	750	1,151.66
3	Grassed Waterways [a]	1,000	500	338	323.5
4	Buffer Strips/Saturated Buffers (34'<) [b]	500	29.5	7,000	19
5	Nutrient Management Planning [c]	5,000	2,250	770	1,455.75
6	Wetlands and/or Water Retention [d]	50	625	12,500	404
7	Blind Inlets [e]	100	500	[f]	323.5
8	Drainage Water Management	50	17.5	19.4	11
9	Stream Stabilization/Two-Stage Ditches	1,000	280	-	181
	TOTAL	**14,700***	**6,122**	**21,769**	**3,960.41**
				Overall Total P Reduction Required by DAP	**4,871.6**

(Primary Source: Spreadsheet Tool for Estimating Pollutant Loads (STEPL), Version 4.4b (USEPA, 2020))

NOTES

a *Grassed Waterway: phosphorus reduction value is from OSU Extension, 2018*

b *Buffer Strips and Saturated Buffers: design must be conducive with FOTG 393 Filter strips and or CRP-CP-11 or CP2 Filter recharge areas. This ensures that flow can be slowed enough to allow filtration. Nitrate reduction for saturated buffers between 41-98%, 70% assumed for this estimate (assumes avg. N loss of 20 lbs/acre, not calculated by STEPL).*

c *Nutrient Management must manage the rate, source, and timing of nutrient applications.*

d *Wetlands and Water retention: phosphorus load reduction value from Ohio's DAP (OLEC, 2020). If drainage water is diverted through a wetland, we can assume a 50% P reduction for that drainage area. Here with 50 wetland acres, using a 25:1 ratio we can in theory, treat 1,250 total acres. Similar load reductions have been estimated for nitrate (3-71%, based on multiple variables including initial load), 50% assumed for this estimate (assumes avg. N loss of 20 lbs/acre, not calculated by STEPL).*

e *Blind Inlets: phosphorus reduction value from Iowa State (2020)*

f *If modify to include woodchip bioreactor can also assist with nitrogen reduction*

* *Acres treated will likely have overlapping conservation practices*

Collectively these objectives will work towards the goal of reaching the phosphorus and nitrate reduction from prioritized agricultural lands in **Kyle Prairie Creek HUC-12**. Any additional conservation practices implemented within the watershed will make additional progress toward the overarching goal. The implementation of the objectives listed below will be tracked and monitored closely to ensure progress toward the nutrient reduction goals in place. Please note these objectives provide an outline of the intended track for improvements within *Critical Area #1*. Through outreach and stakeholder engagement we believe these objectives will be met. However, they are intended to be flexible, at times, some objectives may be increased in intensity and others decreased. Many of the objectives rely on equipment and supplies that can be greatly affected with the economy and availability. Therefore, flexibility is a necessity to allow the goals to be met within a timely manner. Monitoring of the affect these objectives have on WQ as critical here, as in any NPS-IS plan. The Nonpoint Source Management Plan Update (OEPA, 2013a) will be used as a tool to reevaluate all NPS eligible for management strategies including, but not limited to:

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

3.3 Critical Area #2 Conditions, Goals and Objectives for Riparian Cooridors

3.3.1 Critical Area #2 Detailed Characterization for Riparian Coridors

As previously mentioned in 2016 Biological and Water Quality Study of Lower Auglaize River Tributaries, the condition of Kyle Prairie Creek tributaries and streams is a considerable source of sediment transport and nutrient loading into the watershed. In terms of channelization the plan advised that streams be restored with natural channelization, using two-stage ditches when appropriate. Through restoration, the in-stream habitat would be created and protected using bioengineering. The plan also suggested reducing overland sediment loading by adding protective cover and utilizing conservation tillage practices. Additionally, they recommended establishing filter strips on all tributaries and permanent protection of all buffers along streams. This issue was resonated in our outreach meeting with stakeholders within the watershed. Figure 12 shows the riparian corridor within the watershed, focus of this critical area.

This is consistent with reports from local conservation and engineering offices within Kyle Prairie Creek, who provided detailed locations for highly eroded streambanks that have been sources of considerable erosion for the last several years. In addition to stakeholder input, an ACPF assessment Riparian Function Assessment provided additional targeted areas to implement conservation practices that would directly reduce nutrient and sediment loading into Lake Erie. The overall output of the assessment is shown in Table 16. The Riparian zone of a stream is defined as within 90 meters of the stream chancel. The goal of the Riparian Function Assessment ACPF output is to determine site specific designs for riparian buffers by analyzing upslope runoff characteristics and denitrification potential, and then each catchment is classified based on the catchment size and near stream topography. These attributes are then matched to the most functional riparian buffer design for each specific site. *Critical Area #2* includes riparian and in-stream segments of 14.7 miles of streambanks within the riparian zone improvement. Adding a 75-foot buffer width on each side would allow for the potential restoration of up to 267 acres within this *Critical Area #2.*

Table 16: Riparian Function Assessment (ACPF) Outputs for Kyle Prairie Creek, HUC-12

Classification	Locations Identified	Contributing Acres
Critical zone	0.5 mi	890.2 ac
Deep rooted vet	8.5 mi	364.5 ac
Multi-species buffer	2.9 mi	2,077.5 ac
Stiff stemmed grasses	3.5 mi	2,019.1 ac
Stream bank stabilization	14.7 mi	831.9 ac

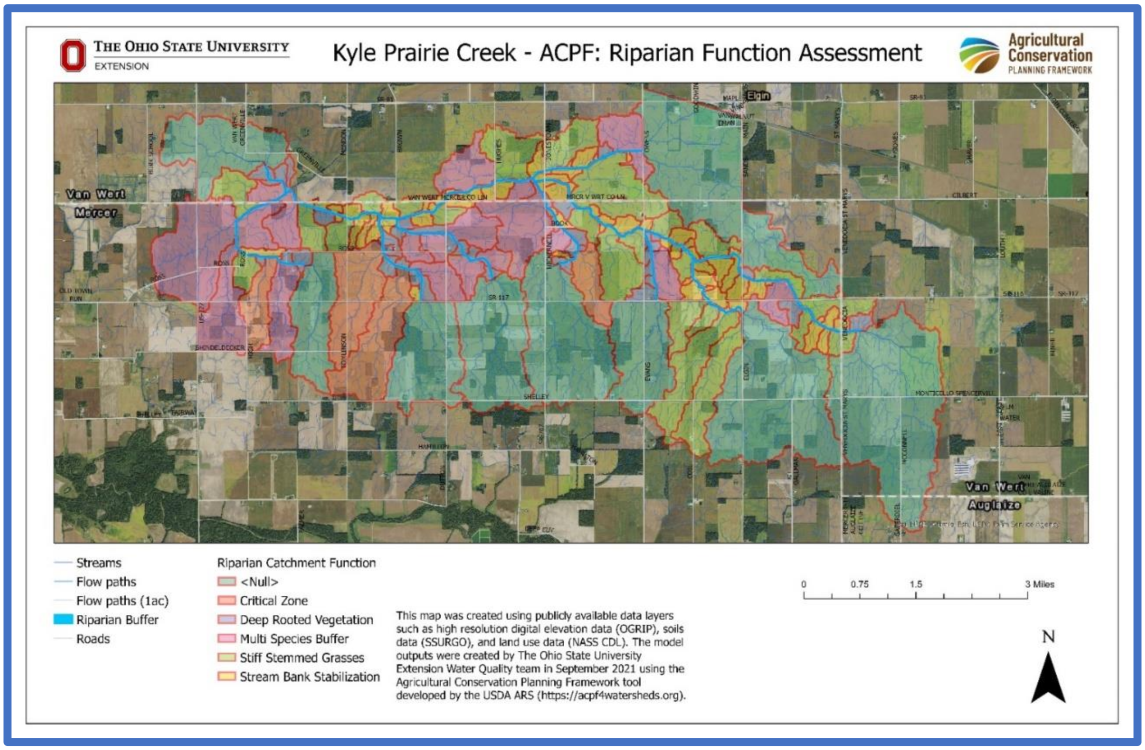


Figure 12: Riparian Catchment Function Output for Kyle Prairie Creek HUC-12 (Source: OSU Extension WQ Team-ACPF)

<u>3.3.2 Critical Area #2 Detailed Biological Conditions for Riparian Cooridors</u>

No additional biological data is available, a summary of biological trends within the watershed can be found in section 2.2 of this document.

<u>3.3.3 Critical Area #2 Detailed Causes and Associated Sources for Riparian Cooriors</u>

The overall run-off risk assessment for **Kyle Prairie HUC-12** is shown in Figure 11. The ACPF assessment in **Figure 12** highlighted adjacent approximate 890 acres in (blue) have high and very high runoff risk. Additionally, there are at least four streams with eroded banks: South of 117 to west of Tomlinson Road, south of 117 to east of Tomlinson Road, south of 117 intersecting Tomlinson Road just north of Shindeldecker Road, 117 and west Evans rd. The critical zones identified are shown in Figure 12, shaded purple.

<u>3.3.4 Critical Area #2 Outline Goals and Objectives for the Critical Area for Riparian Cooridors</u>

Priority within any NPS-IS is to improve overall water quality scores and/or meet nutrient reduction goals to bring a waterbody out of impairment. Within Critical Area #2, focusing on in-stream and riparian habitat conditions throughout the HUC-12 will reduce sediment transport and improve overall habitat for aquatic life. Goals listed here coincide with many of the goals listed earlier within Critical Area #1.

<u>Goal 1.</u> Maintain an IBI score at or above 40 at Mercer-Van Wert County Road 18, RM 3.23.
X NOT ACHIEVED: Currently site measures 38.

<u>Goal 2.</u> Maintain a QHEI score at or above 40 at Mercer-Van Wert County Road 18, RM 3.23.
X NOT ACHIEVED: Currently site measures 35.3.

<u>Goal 3.</u> Maintain an IBI score at or above 40 at upstream at Frisinger Ditch at Van Wert-Mercer CR 18, RM 0.2.
✓ACHIEVED: IBI is currently 42 here.

<u>Goal 4.</u> Maintain a QHEI score at or above 45 at upstream at Frisinger Ditch at Van Wert-Mercer CR 18, RM 0.2.
✓ACHIEVED: QHEI score is currently 45 here.

Overall Objective

Through implementation of the objectives below in conjunction with the objectives listed in Critical Area #1, there will be a significant reduction in the impact of excessive nutrients and sediments within **Kyle Prairie Creek, HUC-12.** Moreover, there will be progress in reducing both far-field and near-field impairments. Though **Kyle Prairie Creek, HUC-12**. has been listed as being within attainment, there are still goals that can be met, and improvements made within Critical Area #2. All projects in this area will aid in load reduction.

Objective 1: Stabilize at least 8 miles (42,240 linear feet) of degraded streambanks by implementing two-stage ditches specifically within floodplain areas.

Objective 2: Protect, restore, or create at least 20 acres of riparian buffer zones and floodplain wetlands identified within the critical zones of the watershed.

Monitoring water quality throughout the process of implementing these objectives is critical to the success and understanding of the plan. Collectively these objectives will work towards improving overall WQ within **Kyle Prairie Creek, HUC-12**. Any additional projects completed in within the watershed will make additional progress toward the overarching goal. The implementation of the objectives listed below will be tracked and monitored closely to ensure progress towards WQ standards. Please note these objectives provide an outline of the intended track for improvements within *Critical Area #2*. Through outreach and stakeholder engagement we believe these objectives will be met. However, they are intended to be flexible, at times, some objectives may be increased in intensity and others decreased. Many of the objectives rely on equipment and supplies that can be greatly affected with the economy and availability. Therefore, flexibility is a necessity to allow the goals to be met within a timely manner. The Nonpoint Source Management Plan Update (OEPA, 2013a) will be used as a tool to reevaluate all NPS eligible for management strategies including, but not limited to:

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

3.4 Critical Area #3 Detailed Characterization: Conditions, Goals & Objectives for Nutrient Reduction in Critical Unsewered Areas

3.4.1 Critical Area #3 Detailed Characterization for Nutrient Reduction in Critical Unsewered Areas

Critical Area #3 focuses on effluent loading from failing or nonexistent HSTS. OEPA released a study in 2020 the *Nutrient Mass Balance Study*, this provided an estimate that about 3% of the nutrient loadings in Lake Erie derive from failing HSTS. The estimate is consistent with other estimates given in studies done throughout the WLEB. Like the other NPS, OEPA set phosphorus reduction goals for failing or inefficient HSTS, based on the springtime load estimate. The HSTS current and target estimated loading was mentioned earlier. Currently HSTS land has a springtime load of approximately 110 lbs. of phosphorus. The DAP recommends a target reduction of 44 lbs.

3.4.2 Critical Area #3 Detailed Biological Conditions for Nutrient Reduction in Critical Unsewered Areas

No additional information is available. See section 3.4.3 for more information.

3.4.3 Critical Area #3 Detailed Causes and Associated Sources for Nutrient Reduction in Critical Unsewered Areas

Records given by the Van Wert Health Department provided little to no insight into the status of HSTS. On file there was less than 5 inspection reports for this area and around 15 files with known status in them but minimal details. Pumping reports were present for almost 20 HSTS. Van Wert Health Department indicated there is a possibility of systems that have been set and forgot or that may have not even been known to them. As far as systems installed prior to 1974, approximately five were on record and are likely failing or they only have a septic tank or tanks that directly discharge into an agricultural field or conduit. The homes that have been declared as unknown will be those of focus for the objective below.

<u>3.4.4 Critical Area #3 Outline Goals and Objectives for the Critical Area for Nutrient Reduction in Critical Unsewered Areas</u>

Contributions from home sewage treatment systems should be addressed as potential nutrient contributions to meet the 40% overall nutrient reduction goals in the Ohio DAP. Estimates show current nutrient loading from HSTS at 110 lbs., with a necessary reduction of 44 lbs. to meet the target goal of 66 lbs.

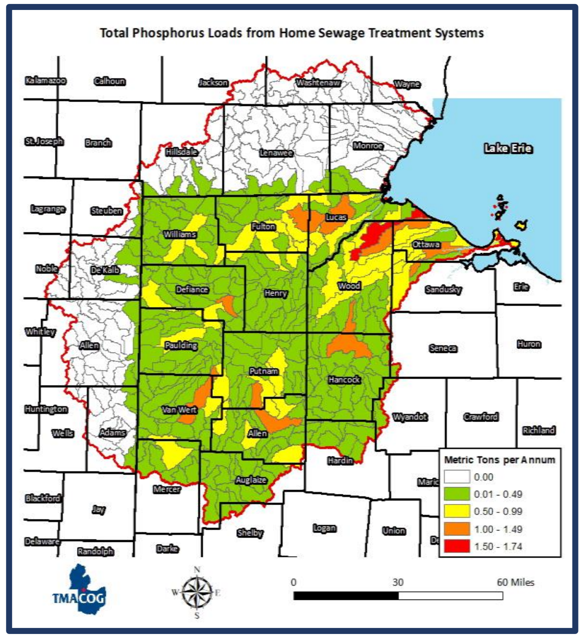


Figure 13: TMACOG, 2018 Map of P loading from HSTS within the WLEB

<u>Overall Goal</u>

Ohio EPA has determined nutrient loading estimates throughout the WLEB. With this, they have created phosphorus reduction goals focusing on springtime load estimates. To achieve the required phosphorus reduction goal imposed on HSTS in **Kyle Prairie Creek HUC-12** and to address contributions to the recreational non-attainment status, the following goals have been recognized:

<u>Goal 1.</u> Achieve the 40% phosphorus reduction in springtime load. In Critical Area #3 this means decreasing the springtime phosphorus load to at least 66 lbs./year.
X NOT ACHIEVED: Current estimated load contribution is 110 lbs./year.

<u>Goal 2.</u> Achieve Geometric Mean of recreation data for E. Coli of 126 colonies per 100ml.
X NOT ACHIEVED: Current estimated mean exceedances at Kyle Prairie Creek UST Firsinger Ditch @ Van Wert Mercer CR 18 is 1250

This goal relates to improvement throughout the greater HUC-10 watershed. Such improvements will improve the health and habitat of aquatic life and meet the WQS. Implementation of systems where nonexistent and improvement failing HSTS as well as managing grazing livestock will provide a decrease in the overall Phosphorus loading and reduce E-coli concentrations in the watershed.

<u>Overall Objective</u>

To achieve progress toward reducing the springtime load (reduction of 44 lbs./year) within the realm of effluent loading in the watershed and reduce e-coli concentrations, efforts must focus on widespread implementation of the below objectives within the critical area.

<u>Objective 1:</u> Repair and replace at least 45 identified failing or malfunctioning HSTS within the watershed. This project will be a collaboration between county health departments and DEFA and other funding sources.

WQ monitoring is an important piece of this overall process. Monitoring will be done routinely and on specific projects. The results will be used to ensure that progress is being made toward the goals in this plan. Objectives may be added to obtain further progress in reaching attainment or reduction goals. Additionally, they may be altered, as necessary throughout the process. The Nonpoint Source Management Plan Update (OEPA, 2013a) will be used as a tool to reevaluate all NPS eligible for management strategies including, but not limited to:

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

CHAPTER 4: PROJECTS AND IMPLEMENTATION STRATEGY

Overall projects and implementation needs identified for **Kyle Prairie Creek, HUC-12** have been determined through sources of NPS pollution in the watershed. As the objectives in this plan are implemented, the critical areas will need to be reassessed to ensure that progress is being made toward the goals of this plan. The overall evaluation will not be able to be completed over a short period of time. As some of the biological indices might respond to the projects quicker than other, others may take several months or years to show progress. If any additional impairments occur within **Kyle Prairie Creek, HUC-12** watershed, those issues must be addressed using another initiative and or program.

> Implementation of all practices included in this NPS-IS will contribute to the overall nutrient load reduction (40% P reduction) to protect and restore the use attainment within Lake Erie.
> The phosphorus reduction goal will also assist in addressing the drinking water use impairment for Delphos as it relates to the algae impairment indicator.
> The nutrient load reduction efforts align with the Lake Erie Collaborative Agreement and Ohio's DAP (OLEC, 2018).
> The practices will also reduce nitrate concentrations within the watershed and help restore the drinking water use for the City of Delphos.

For **Kyle Prairie Creek, HUC-12**, included in this version there are X Project and Implementation Strategy Overview Tables (subsection x). There may be future versions developed including additional projects that have been developed to meet the goals and objectives within this plan.

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 within **Kyle Prairie Creek, HUC-12**.

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

Project Summary Sheets (PSS) will complement the *Overview Tables* when projects are identified. These outline the essential nine elements for short-term and/or next step projects that are being developed and may need funding. As projects are being carried out and new projects being developed these sheets will be updated. Any new PSS that is added will be submitted to the state of Ohio for funding eligibility verification (note: all nine elements must be included).

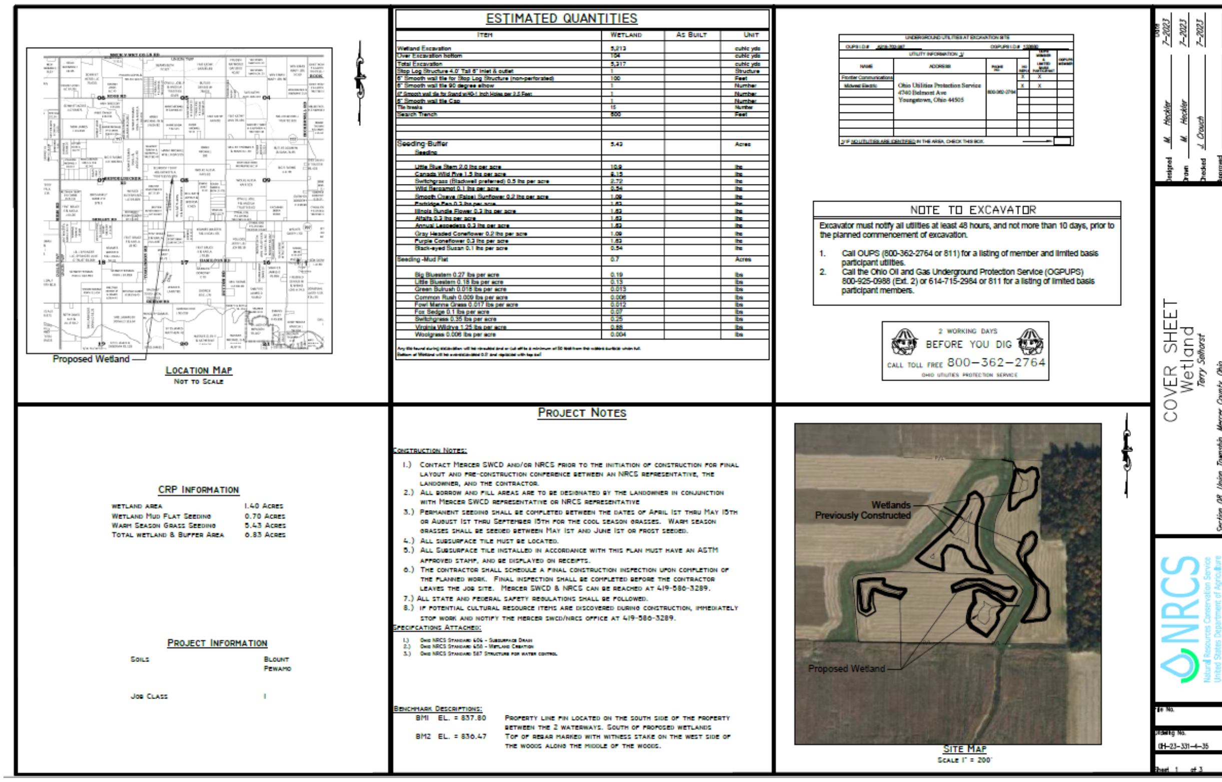
4.1 Critical Area #1 Projects and Implementation Strategy Overview Table(s)

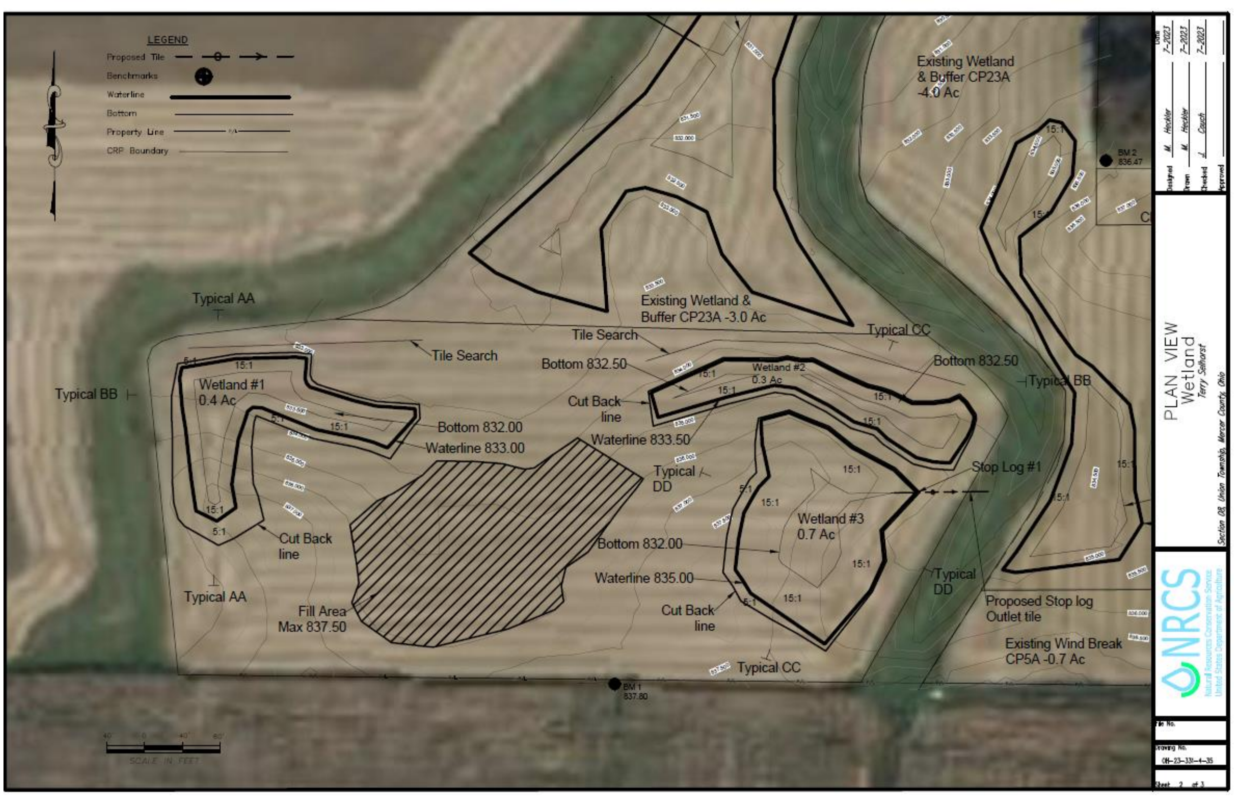
4.1.1 Project Summary Sheet(s)

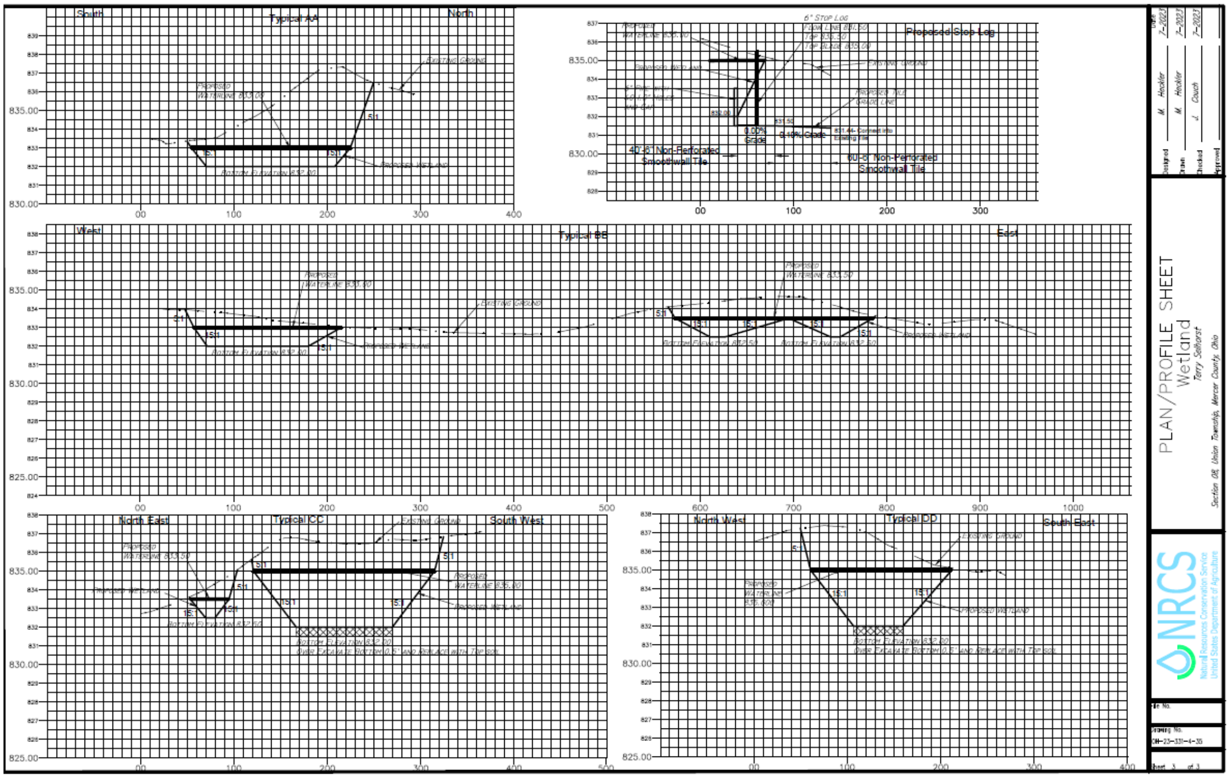
The sheets in this section have been developed based on the actions needed to achieve nutrient reduction goals within Kyle Prairie Creek HUC-12. These projects are either in the next step phase or priority, short-term projects and are ready to implement. Longer term projects will not have a PSS, as these require much more planning before implementation.

Table 17: Kyle Prairie Creek (HUC-12) (41000070602) —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							
Nutrient Reduction on Prioritized Agricultural Land	Objective 6: Create or improve at least 50 acres of wetlands and/or water retention basins that treat agricultural runoff from at least 1,250 acres of agricultural land.	1	Terry Selhorst	Mercer County Soil and Water Conservation District	2023/2024	$50,000	CRP/H2Ohio
High Quality Waters Protection Strategies							
Other NPS Causes and Associated Sources of Impairment							
Other NPS Causes and Associated Sources of Impairment							

Table 18: Critical Area #1- Project #		
Nine Element Criteria	**Information needed**	**Explanation**
n/a	**Title**	Terry Selhorst Wetland
criteria d	**Project Lead Organization & Partners**	*Mercer County Soil and Water Conservation District*
criteria c	**HUC-12 and Critical Area**	41000070602
criteria c	**Location of Project**	Tomlinson Rd. South of SR 117
n/a	**Which strategy is being addressed by this project?**	Create or improve at least 50 acres of wetlands and/or water retention basins that treat agricultural runoff from at least 1,250 acres of agricultural land.
criteria f	**Time Frame**	2023/2024
criteria g	**Short Description**	1.4 acres of prioritized ag land being converted into wetland for nutrient reduction strategies Total wetland and buffer area 0.83 acres on Blount and Pewamo soils.
criteria g	**Project Narrative**	To reduce agricultural runoff and provide biological improvement to the area
criteria d	**Estimated Total cost**	$50,000
criteria d	**Possible Funding Source**	CRP & H2Ohio
criteria a	**Identified Causes and Sources**	Cause: Nutrient loading Source: Field Run off
criteria b & h	**Part 1: How much improvement is needed to remove the NPS impairment for the whole Critical Area?**	Reducing nutrient applications to cropland that is at or above maintenance level for crop removal is a necessary goal. 4871.6 P/ year is required. Nitrogen TMDL under development.
	Part 2: How much of the needed improvement for the whole Critical Area is *estimated* to be accomplished by this project?	It is recognized that there is a lag time associated with nonpoint source-related projects and stream response. This area will help reduce <1% of P/ year.
	Part 3: Load Reduced?	*18 lbs P/ year and 350 lbs N/ year*
criteria i	**How will the effectiveness of this project in addressing the NPS impairment be measured?**	*Effectiveness can be determined by the downstream effects on the Delphos Drinking Water. Samples pulled here (Kyle Prairie stations) may denote a reduction from this BMP.*
criteria e	**Information and Education**	*The Mercer County Soil and Water Conservation District will use this as they please for promotional information and educational events such as but not limited too* public meetings, press releases, news articles, and social media.


ESTIMATED QUANTITIES
Location Map
Not to Scale
Proposed Wetland
NOTE TO EXCAVATOR
2 WORKING DAYS BEFORE YOU DIG
CALL TOLL FREE 800-362-2764
CRP Information
Wetland Area 1.40 Acres
Wetland Mud Flat Seeding 0.70 Acres
Warm Season Grass Seeding 5.43 Acres
Total Wetland & Buffer Area 6.83 Acres
Project Information
Project Notes
Site Map
Wetlands Previously Constructed
Proposed Wetland
COVER SHEET
Wetland
Terry Selhorst
NRCS


LEGEND
Proposed Tile
Benchmarks
Waterline
Bottom
Property Line
CRP Boundary
Existing Wetland & Buffer CP23A -4.0 Ac
Existing Wetland & Buffer CP23A -3.0 Ac
Typical AA
Typical BB
Typical CC
Typical DD
Tile Search
Wetland #1 0.4 Ac
Wetland #2 0.3 Ac
Wetland #3 0.7 Ac
Bottom 832.50
Bottom 832.00
Waterline 833.00
Waterline 833.50
Waterline 835.00
Cut Back line
Fill Area Max 837.50
Stop Log #1
Proposed Stop log Outlet tile
Existing Wind Break CP5A -0.7 Ac
BM 1 837.80
BM 2 836.47
PLAN VIEW
Wetland
Terry Selhorst
NRCS


Typical AA
South
North
Proposed Stop Log
Typical BB
West
East
Typical CC
North East
South West
Typical DD
North West
South East
40'-6" Non-Perforated Smoothwall Tile
60'-6" Non-Perforated Smoothwall Tile
PLAN/PROFILE SHEET
Wetland
Terry Selhorst
Section 08, Union Township, Mercer County, Ohio
Designed M. Heckler 7-2023
Drawn M. Heckler 7-2023
Checked J. Couch 7-2023
Approved
NRCS
Natural Resources Conservation Service
United States Department of Agriculture
File No.
Drawing No. OH-23-331-4-35
Sheet 3 of 3

H2Ohio Initiative (H2Ohio). 2019. http://h2.ohio.gov/governor-dewine-announces-h2ohio-waterquality-plan/. Accessed January 28, 2023.

International Joint Commission (IJC). 2012. The Great Lakes Water Quality Agreement (GLWQA) Nutrients (Annex 4). https://binational.net/annexes/a4/. February 3, 2023.

Ohio Department of Agriculture (ODA). 2018. Distressed Watershed Designation Analysis: Selected Western Lake Erie Basin Watersheds. https://agri.ohio.gov/wps/portal/gov/oda/divisions/soil-andwater-conservation/forms/lewshdindistressanalysis. Accessed February 3, 2023

Association between Nutrients, Habitat and the Aquatic Biota of Ohio's Rivers and Streams. https://www.epa.ohio.gov/portals/35/lakeerie/ptaskforce/AssocLoad.pdf. Accessed February 7, 2023.

Ohio Environmental Protection Agency (Ohio EPA). 2003. Drinking Water Source Assessment for the City of Delphos, 2007, Public Water System# 0200412, Van Wert and Allen Counties. https://cityofdelphos.com/sites/default/files/Surface%20Water%20Assessment%20Plan.pdf. Accessed March 3, 2023.

Ohio Environmental Protection Agency (Ohio EPA). 1992. Biological and Water Quality Study of the Auglaize River and Selected Tributaries, 1991, Technical Report EAS/1992. Auglaize1992.pdf (ohio.gov). Accessed January 21, 2023.

Ohio Environmental Protection Agency (Ohio EPA). 2014 and 2015. Biological and Water Quality Study of Lower Auglaize River Tributaries, 2014 and 2015, Technical Report EAS/2016. 2014 Lower Auglaize River Tributaries TSD.pdf (ohio.gov). Accessed January 21, 2023.

Ohio Environmental Protection Agency (Ohio EPA). 2009. Total Maximum Daily Loads for the Lower Auglaize River Tributaries Basin. Microsoft Word - TMDL_Load_Plan_Auglaize (ohio.gov)Accessed February 3, 2023.

Ohio Environmental Protection Agency (Ohio EPA). 2016. Guide to Developing Nine-Element Nonpoint Source Implementation Strategic Plans in Ohio. https://epa.ohio.gov/Portals/35/nps/319docs/NPSISPlanDevelopmentGuidance816.pdf. Accessed January 30, 2023.

Ohio Environmental Protection Agency (Ohio EPA). 2020a. 2020 Ohio Integrated Report. https://www.epa.ohio.gov/dsw/tmdl/OhioIntegratedReport#123145148-2018. Accessed January 23, 2023

Ohio Environmental Protection Agency (Ohio EPA). 2020b. Nonpoint Source Management Plan Update (FY2019-2024). https://epa.ohio.gov/Portals/35/nps/2019-NPS-Mgmt-Plan.pdf. Accessed February 10, 2023.

Ohio Environmental Protection Agency (Ohio EPA). 2022. Loading Analysis Plan and Supporting Data Acquisition Needed for the Lower Auglaize River Tributaries Basin. https://epa.ohio.gov/static/Portals/35/tmdl/LAPs/2014_LowerAuglaize_LAP.pdf. Accessed May 1, 2023.

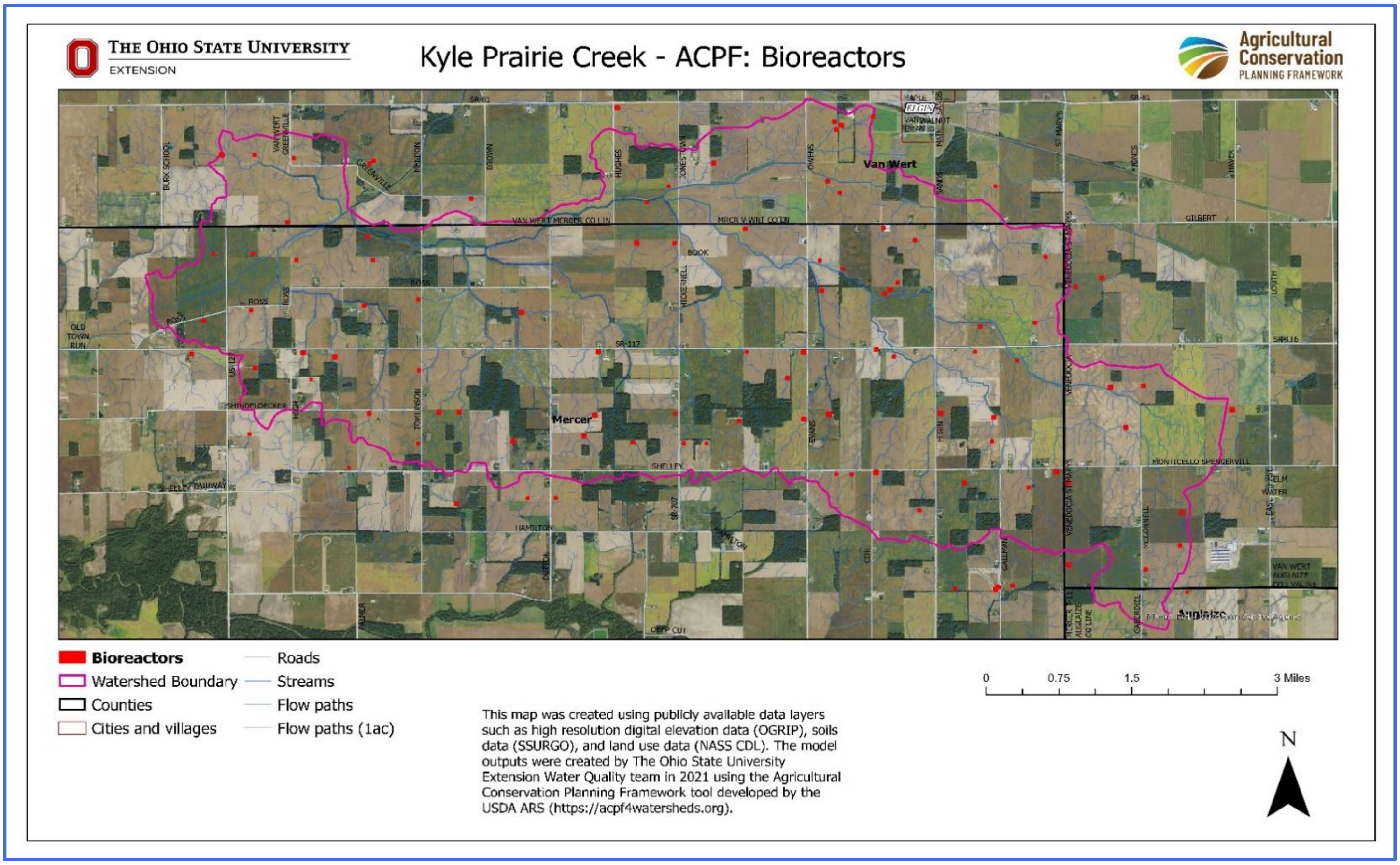
Ohio Environmental Protection Agency (Ohio EPA). 2022. Fact Sheet: Loading Analysis Plan – Lower Auglaize River Tributaries Watershed. https://epa.ohio.gov/static/Portals/35/tmdl/LAPs/2014_LowerAuglaize_LAP_factsheet.pdf. Accessed May, 1 2023.

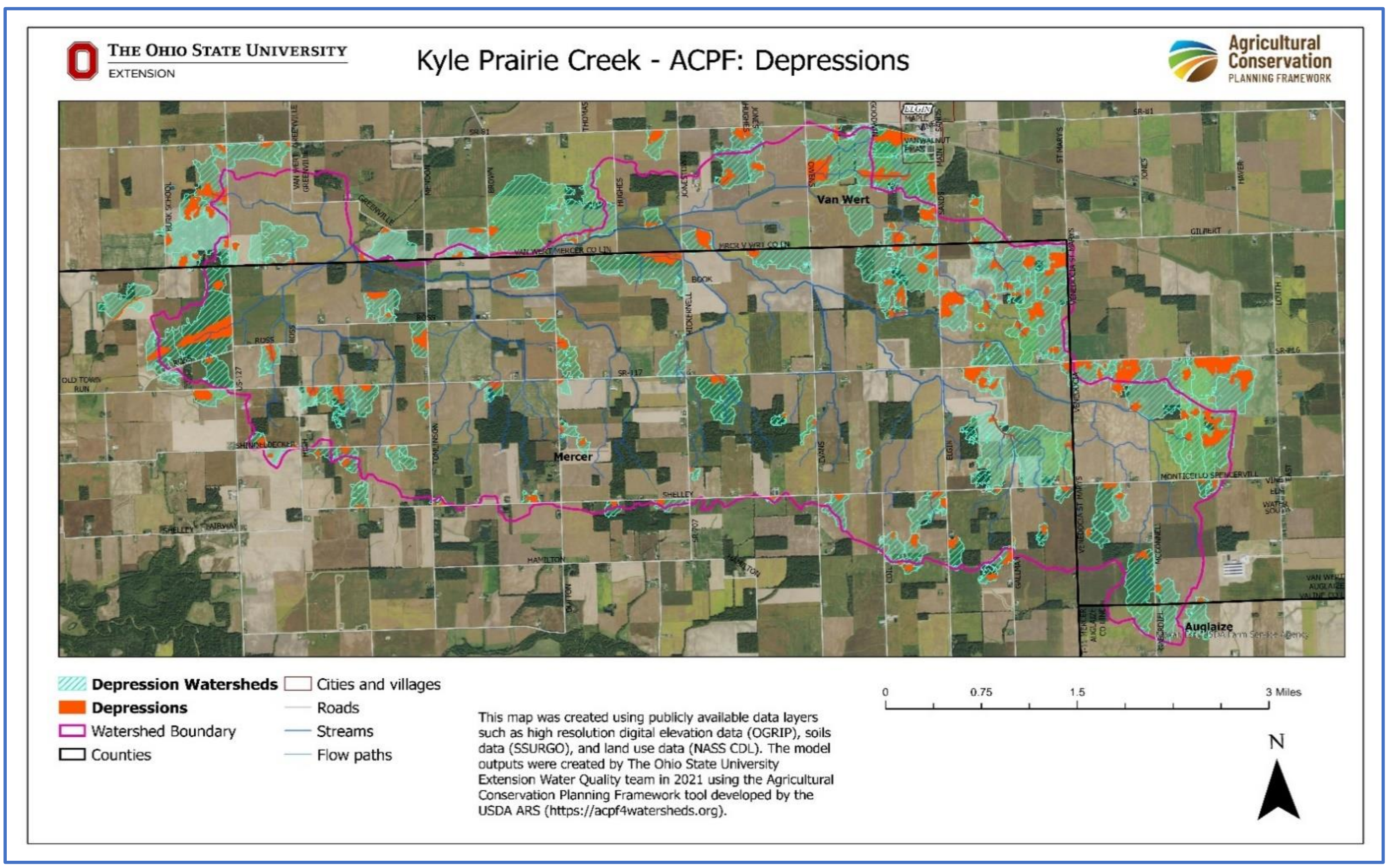
Pace, Shannon and Hood, J.M.; Raymond, H.; Moneymaker, B.; Lyon, S.W. 2022. "High-Frequency Monitoring to Estimate Loads and Identify Nutrient Transport Dynamics in the Little Auglaize River, Ohio." *Sustainability* **2022**, 14, 16848. https://doi.org/10.3390/su142416848

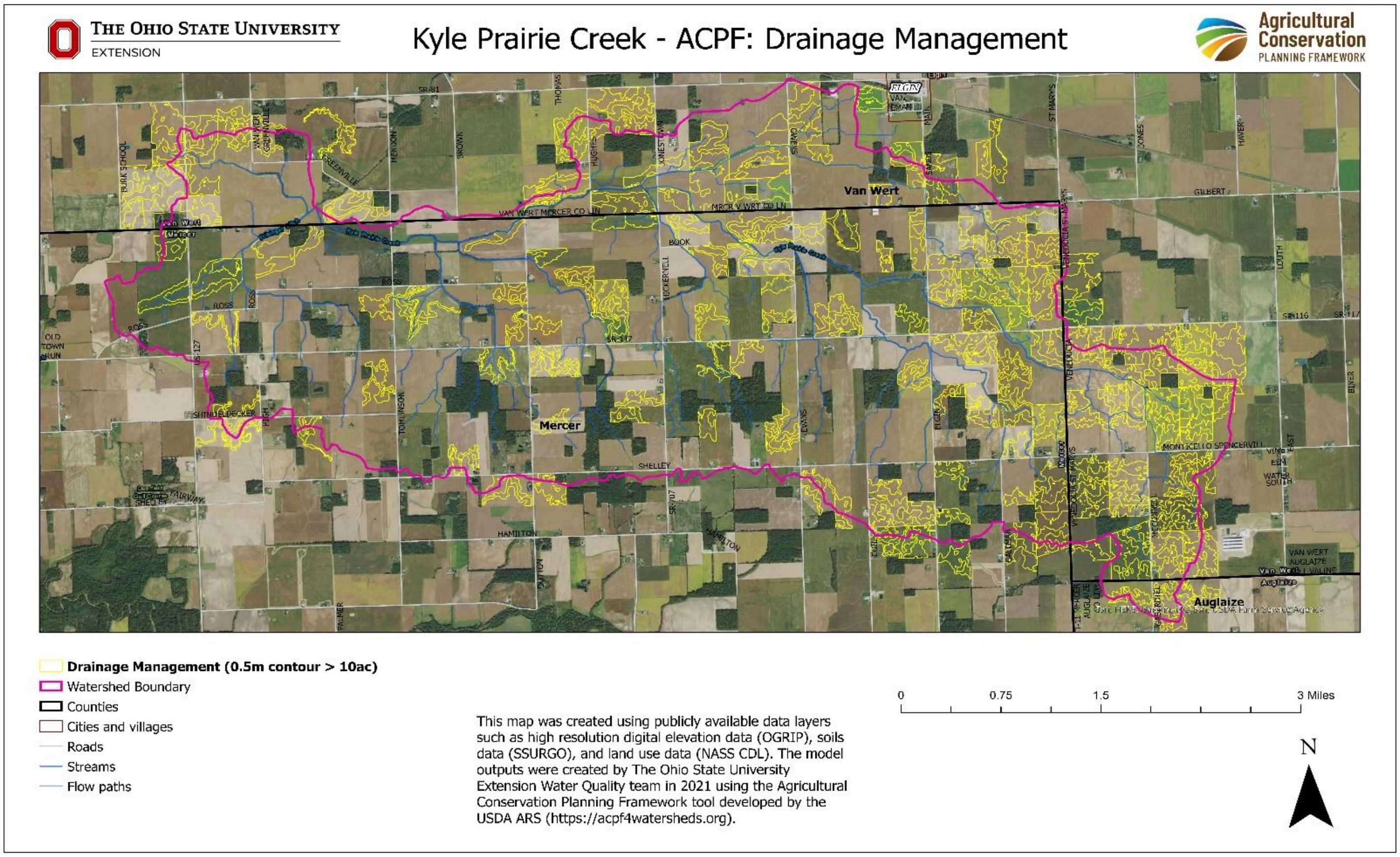
Pace, Shannon. 2022. *Impacts of spatiotemporal data resolution on monitoring nutrient concentrations and estimating nutrient loads in The Little Auglaize River.* Masters Thesis. The Ohio State University.

APPENDIX: ACPF OUTPUTS

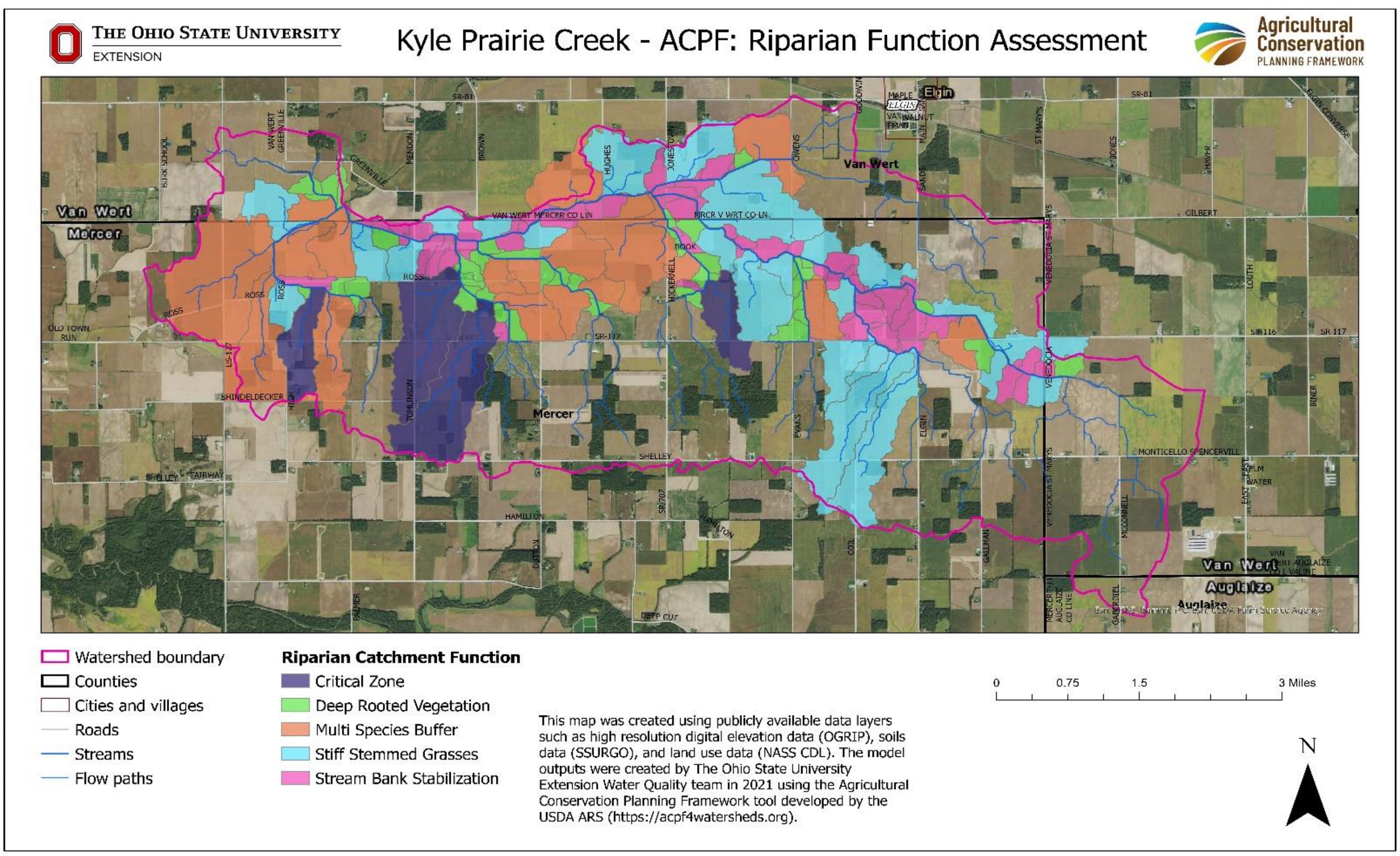
The maps displayed in this portion of the plan have been developed by OSU Extension WQ Associate, Matthew Romanko using publicly available data layers and outputs created using the Agricultural Framework tool developed by the USDA ARS.


THE OHIO STATE UNIVERSITY
EXTENSION
Kyle Prairie Creek - ACPF: Bioreactors
Agricultural Conservation PLANNING FRAMEWORK
Van Wert
Mercer
Auglaize
Bioreactors
Watershed Boundary
Counties
Cities and villages
Roads
Streams
Flow paths
Flow paths (1ac)
0 0.75 1.5 3 Miles
This map was created using publicly available data layers such as high resolution digital elevation data (OGRIP), soils data (SSURGO), and land use data (NASS CDL). The model outputs were created by The Ohio State University Extension Water Quality team in 2021 using the Agricultural Conservation Planning Framework tool developed by the USDA ARS (https://acpf4watersheds.org).
N

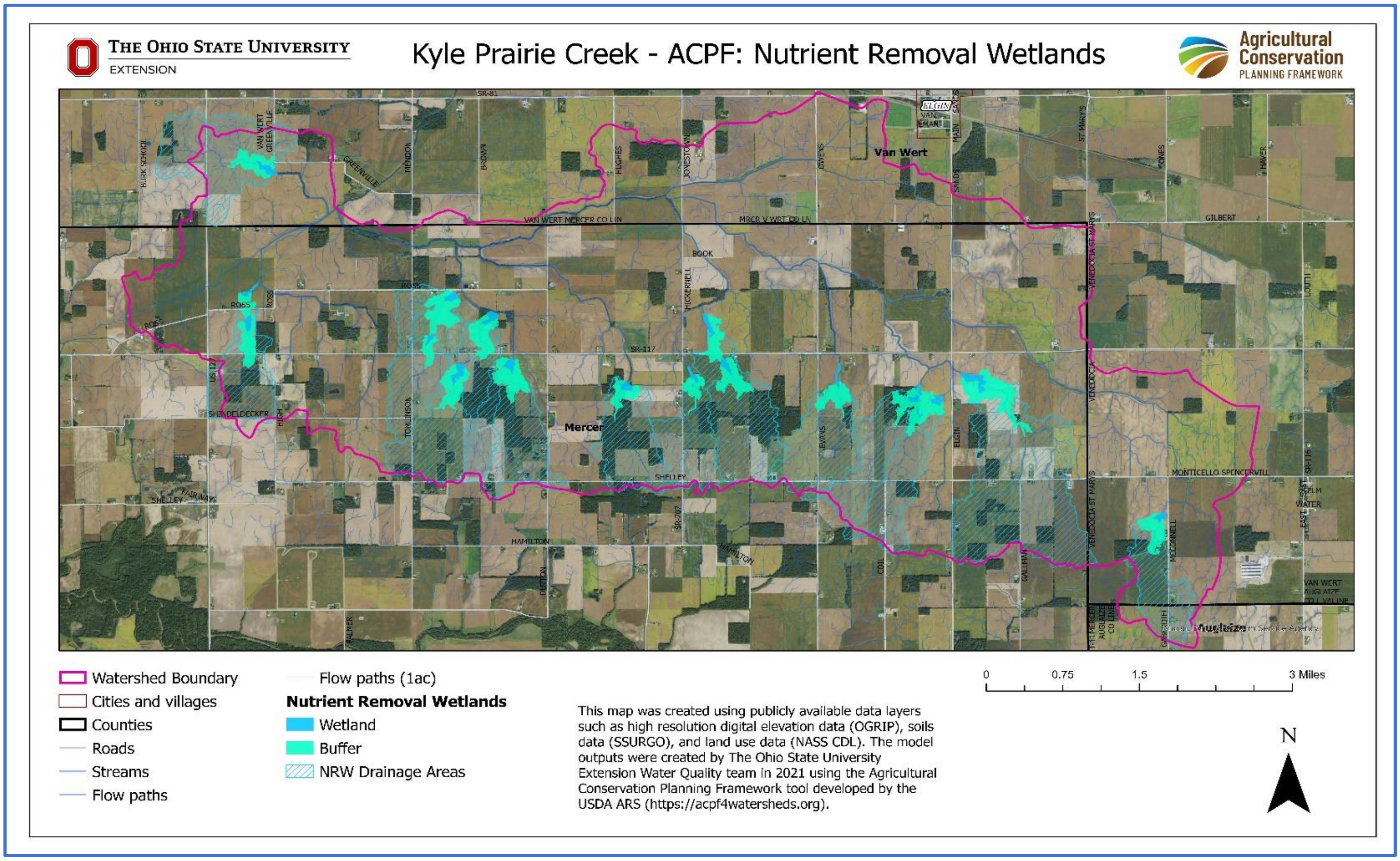

THE OHIO STATE UNIVERSITY
EXTENSION
Kyle Prairie Creek - ACPF: Depressions
Agricultural Conservation PLANNING FRAMEWORK
Van Wert
Mercer
Auglaize
Depression Watersheds
Depressions
Watershed Boundary
Counties
Cities and villages
Roads
Streams
Flow paths
0 0.75 1.5 3 Miles
This map was created using publicly available data layers such as high resolution digital elevation data (OGRIP), soils data (SSURGO), and land use data (NASS CDL). The model outputs were created by The Ohio State University Extension Water Quality team in 2021 using the Agricultural Conservation Planning Framework tool developed by the USDA ARS (https://acpf4watersheds.org).
N

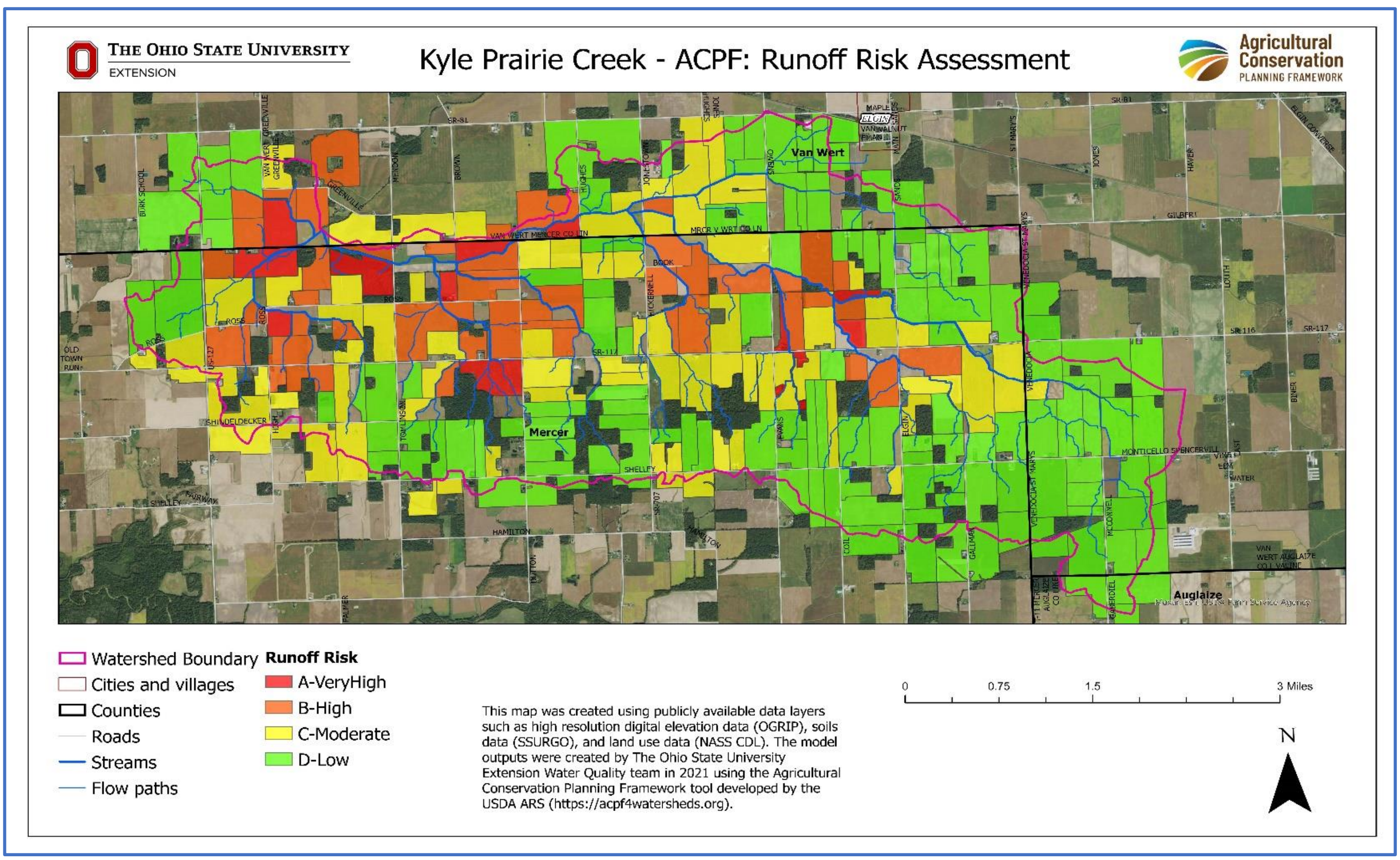


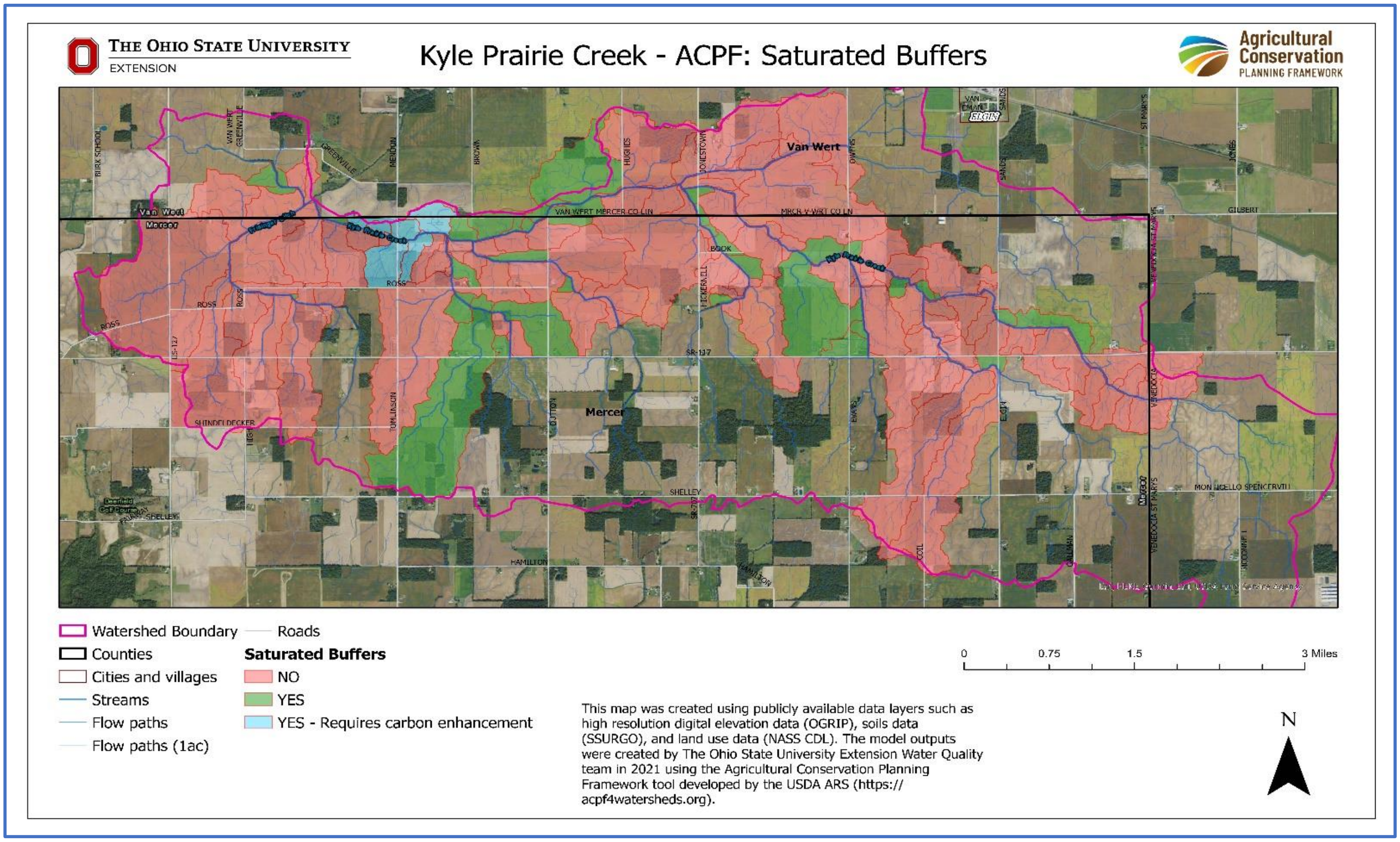
THE OHIO STATE UNIVERSITY
EXTENSION
Kyle Prairie Creek - ACPF: Drainage Management
Agricultural Conservation PLANNING FRAMEWORK
Van Wert
Mercer
Auglaize
Drainage Management (0.5m contour > 10ac)
Watershed Boundary
Counties
Cities and villages
Roads
Streams
Flow paths
This map was created using publicly available data layers such as high resolution digital elevation data (OGRIP), soils data (SSURGO), and land use data (NASS CDL). The model outputs were created by The Ohio State University Extension Water Quality team in 2021 using the Agricultural Conservation Planning Framework tool developed by the USDA ARS (https://acpf4watersheds.org).
0
0.75
1.5
3 Miles
N



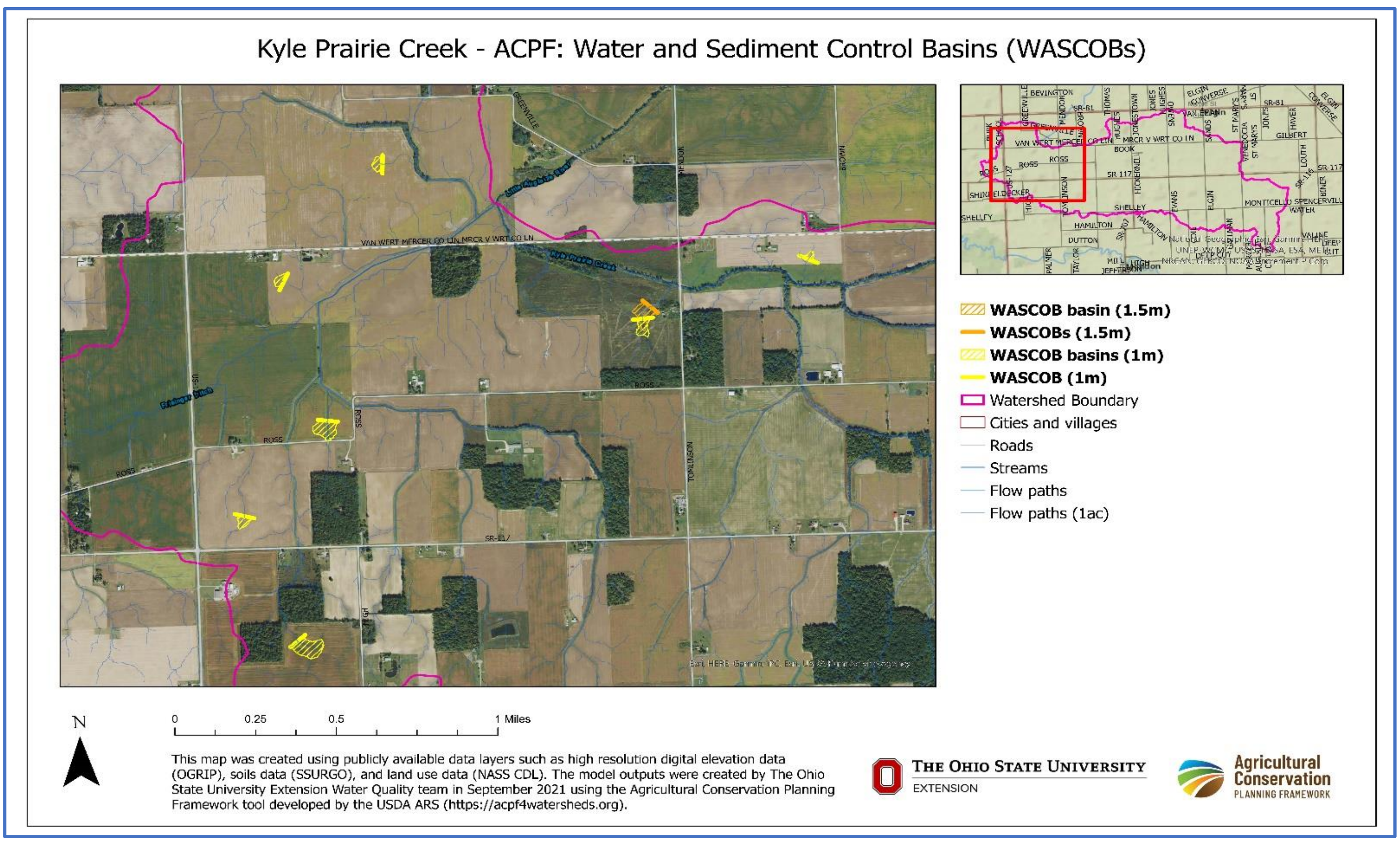
THE OHIO STATE UNIVERSITY
EXTENSION
Kyle Prairie Creek - ACPF: Riparian Function Assessment
Agricultural Conservation PLANNING FRAMEWORK
Van Wert
Mercer
Auglaize
Watershed boundary
Counties
Cities and villages
Roads
Streams
Flow paths
Riparian Catchment Function
Critical Zone
Deep Rooted Vegetation
Multi Species Buffer
Stiff Stemmed Grasses
Stream Bank Stabilization
This map was created using publicly available data layers such as high resolution digital elevation data (OGRIP), soils data (SSURGO), and land use data (NASS CDL). The model outputs were created by The Ohio State University Extension Water Quality team in 2021 using the Agricultural Conservation Planning Framework tool developed by the USDA ARS (https://acpf4watersheds.org).
0
0.75
1.5
3 Miles
N


The Ohio State University
Extension
Kyle Prairie Creek - ACPF: Nutrient Removal Wetlands
Agricultural Conservation Planning Framework
Van Wert
Mercer
Watershed Boundary
Cities and villages
Counties
Roads
Streams
Flow paths
Flow paths (1ac)
Nutrient Removal Wetlands
Wetland
Buffer
NRW Drainage Areas
This map was created using publicly available data layers such as high resolution digital elevation data (OGRIP), soils data (SSURGO), and land use data (NASS CDL). The model outputs were created by The Ohio State University Extension Water Quality team in 2021 using the Agricultural Conservation Planning Framework tool developed by the USDA ARS (https://acpf4watersheds.org).
0 0.75 1.5 3 Miles
N


The Ohio State University
Extension
Kyle Prairie Creek - ACPF: Runoff Risk Assessment
Agricultural Conservation Planning Framework
Van Wert
Mercer
Auglaize
Watershed Boundary
Cities and villages
Counties
Roads
Streams
Flow paths
Runoff Risk
A-VeryHigh
B-High
C-Moderate
D-Low
This map was created using publicly available data layers such as high resolution digital elevation data (OGRIP), soils data (SSURGO), and land use data (NASS CDL). The model outputs were created by The Ohio State University Extension Water Quality team in 2021 using the Agricultural Conservation Planning Framework tool developed by the USDA ARS (https://acpf4watersheds.org).
0 0.75 1.5 3 Miles
N



The Ohio State University
Extension
Kyle Prairie Creek - ACPF: Saturated Buffers
Agricultural Conservation Planning Framework
Van Wert
Mercer
Watershed Boundary
Counties
Cities and villages
Streams
Flow paths
Flow paths (1ac)
Roads
Saturated Buffers
NO
YES
YES - Requires carbon enhancement
0
0.75
1.5
3 Miles
N
This map was created using publicly available data layers such as high resolution digital elevation data (OGRIP), soils data (SSURGO), and land use data (NASS CDL). The model outputs were created by The Ohio State University Extension Water Quality team in 2021 using the Agricultural Conservation Planning Framework tool developed by the USDA ARS (https://acpf4watersheds.org).



Kyle Prairie Creek - ACPF: Water and Sediment Control Basins (WASCOBs)
WASCOB basin (1.5m)
WASCOBs (1.5m)
WASCOB basins (1m)
WASCOB (1m)
Watershed Boundary
Cities and villages
Roads
Streams
Flow paths
Flow paths (1ac)
N
0
0.25
0.5
1 Miles
This map was created using publicly available data layers such as high resolution digital elevation data (OGRIP), soils data (SSURGO), and land use data (NASS CDL). The model outputs were created by The Ohio State University Extension Water Quality team in September 2021 using the Agricultural Conservation Planning Framework tool developed by the USDA ARS (https://acpf4watersheds.org).
The Ohio State University
Extension
Agricultural Conservation Planning Framework