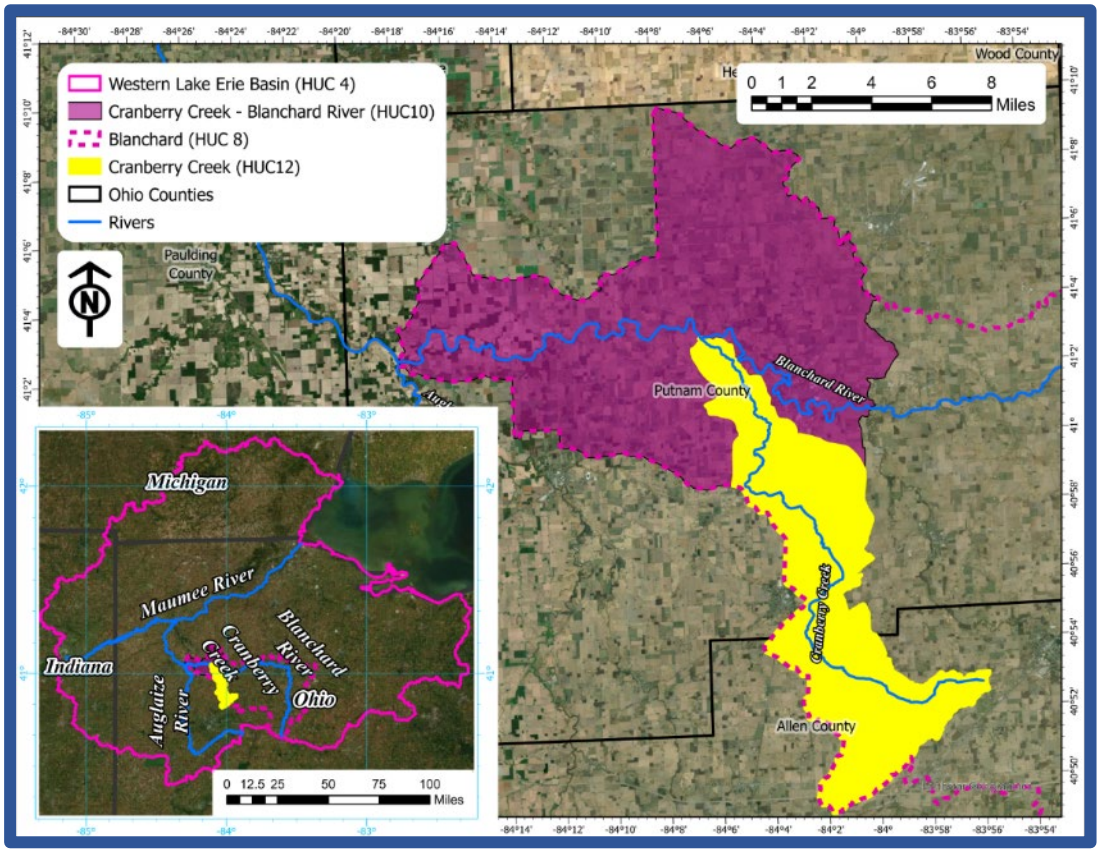
Nine-Element Nonpoint Source Implementation Strategy (NPS-IS) for Cranberry Creek- Blanchard River HUC-12 (04100008 06 01)



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ACKNOWLEDGEMENTS

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
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

CHAPTER 1: INTRODUCTION 1

1.1 Report Background 2

1.2 Watershed Profile and History 3

1.3 Public Participation and Involvement 4

2.1 Summary of HUC-12 Watershed Characterization 6

2.1.1 Physical and Natural Features 6
2.1.2 Land Use and Protection 8
2.2 Summary of HUC-12 Biological Trends 12

2.3 Summary of HUC-12 Pollution Causes and Associated Sources 12

2.4 Additional Information for Determining Critical Areas and Developing Implementation Strategies 13

CHAPTER 3: CRITICAL AREA CONDITIONS & RESTORATION STRATEGIES 15

3.1 Overview of All Critical Areas 15

3.2 Critical Area #1 Detailed Characterization: Conditions Goals & Objectives for Nutrient Reduction on Prioritized Agricultural Land 16

3.2.1 Critical Area #1 Detailed Characterization on Prioritized Agricultural Land 16
3.2.2 Critical Area #1 Detailed Biological Conditions on Prioritized Agricultural Land 17
3.2.3 Critical Area #1 Detailed Causes and Associated Sources on Prioritized Agricultural Land 18
3.2.4 Critical Area #1 Outline of Goals and Objectives on Prioritized Agricultural Land 18
3.3 Critical Area #2: Conditions, Goals & Objectives for Riparian Corridors 22

3.3.1 Critical Area #2 Detailed Characterization for Riparian Corridors 22
3.3.2 Critical Area #2 Detailed Biological Conditions for Riparian Corridors 24
3.3.3 Critical Area #2 Detailed Causes and Associated Sources for Riparian Corridors 24
3.3.4 Critical Area #2 Outline Goals and Objectives for the Critical Area for Riparian Cooridors 25
3.4 Critical Area #3 Detailed Characterization: Conditions, Goals & Objectives for Nutrient Reduction in Critical Unsewered Areas 27

3.4.1 Critical Area #3 Detailed Characterization for Nutrient Reduction in Critical Unsewered Areas 27
3.4.2 Critical Area #3 Detailed Biological Conditions for Nutrient Reduction in Critical Unsewered Areas 27
3.4.3 Critical Area #3 Detailed Causes and Associated Sources for Nutrient Reduction in Critical Unsewered Areas 27
3.4.4 Critical Area #3 Outline Goals and Objectives for the Critical Area for Nutrient Reduction in Critical Unsewered Areas 28
CHAPTER 4: PROJECTS AND IMPLEMENTATION STRATEGY 29

4.1 Critical Area #1 Projects and Implementation Strategy Overview Table(s) 30

4.1.1 Project Summary Sheet(s) 30
CHAPTER 5: WORK CITED 32

APPENDIX: ACPF OUTPUTS 33

LIST OF FIGURES

Figure 1: Overview Map of Cranberry Creek HUC-12 1
Figure 2: Map showing Larger HUC-8, HUC-10, and Focus Area HUC-12 4
Figure 3: Overview Map of Cranberry Creek HUC-12 6
Figure 4: Hydrologic Groups of Soils within Cranberry Creek HUC-12 7
Figure 5: Land Use in Cranberry Creek HUC-12 9
Figure 6: Location of NPDES Permits in and around Cranberry Creek HUC-12 11
Figure 7: Overview Map of Critical Area #1, Depicting Areas with Cultivated Cropland 16
Figure 8: Run-Off Risk Assessment Output for Cranberry Creek 17
Figure 9: Overview Map of Critical Area #2, Highlighting the Riparian Corridor 23
Figure 10: Riparian Catchment Function Output for Cranberry Creek HUC-12 24
Figure 11: TMACOG, 2018 Map of P loading from HSTS within the WLEB 27

LIST OF TABLES

Table 1: 2017 USDA Census Information on Putnam and Allen County 8
Table 2: Estimated Animal Headcounts within Cranberry Creek HUC-12 8
Table 3: Land Use Classifications within Cranberry Creek HUC-12 9
Table 4: Federally Threatened and Endangered Species in Allen and Putnam County 10
Table 5: Biological Indices Scores for Cranberry Creek HUC-12 12
Table 6: Water Quality Standards for the Huron-Erie Lake Plains (HELP) Ecoregion 12
Table 7: Water Use Designations for Cranberry Creek HUC-12 12
Table 8: Fecal Bacterial Results Collected (CFU/mL) from 12 Survey Sites within the Greater HUC-11 Cranberry Creek and Coordinating Thresholds for Denoting Impaired Recreational Use 13
Table 9: Predicted Fecal Coliform Existing Load for Cranberry Creek, HUC-10 during the Recreational Season and Required Load Reduction and Equivalent Percent 13
Table 10: Estimated Spring Nutrient Loadings from Contributing NPS Sources in the Cranberry Creek HUC-12 13
Table 11: Summary of ACPF Outputs for Cranberry Creek HUC-12 14
Table 12: Runoff Risk Assessment throughout Cranberry Creek HUC-12 16
Table 13: Critical Area #1- Fish Community and Habitat Data 18
Table 14: Estimated Nutrient Loading Reductions from Each Proposed Objective 21
Table 15 : Riparian Function Assessment ACPF Outputs for Cranberry Creek HUC-1214 23
Table 16: Cranberry Creek (HUC-12) (41000070601) —Critical Area #1 30
Table 17: Critical Area #1- Project # 31

CHAPTER 1: INTRODUCTION

The **Cranberry Creek- Blanchard River, Hydrologic Unit Code (HUC)-12 (04100008 06 01)** spans 45.3 mi^2 and 28,969.4 acres in the Blanchard River watershed, part of the larger Maumee River watershed. This HUC is essentially split between Allen and Putnam County. The area is shown in Figure 1, the entire HUC-10 watershed is purple and the HUC-12, the focus of this document, is highlighted yellow. This area is primarily composed of agricultural lands, about 80% is utilized for agricultural activities. Currently, Cranberry Creek has been labeled as an impaired watershed within the Western Lake Erie Basin (WLEB) needing mitigation. These improvement efforts will mainly focus on nutrient reduction of total and dissolved phosphorus that makes its way to Lake Erie. However, in this specific HUC-12, a major concern is the E. coli concentration and its effect on recreational water use.

This non-point source implementation strategy plan (NPS-IS) has been written to remediate non-point source (NPS) pollution throughout the watershed. The Federal Environmental Protection Agency (EPA) determined nine critical elements that should be used to plan, implement, and fund projects in watersheds, specific relative to HUC-12 watersheds. Moreover, on May 1, 2021, the Ohio Environmental Protection Agency (OEPA) granted The Ohio State University funds to develop 9-Element NPS-IS Plans for priority watershed in the Western Lake Erie Basin. Thus, this plan has been developed under this approved grant.

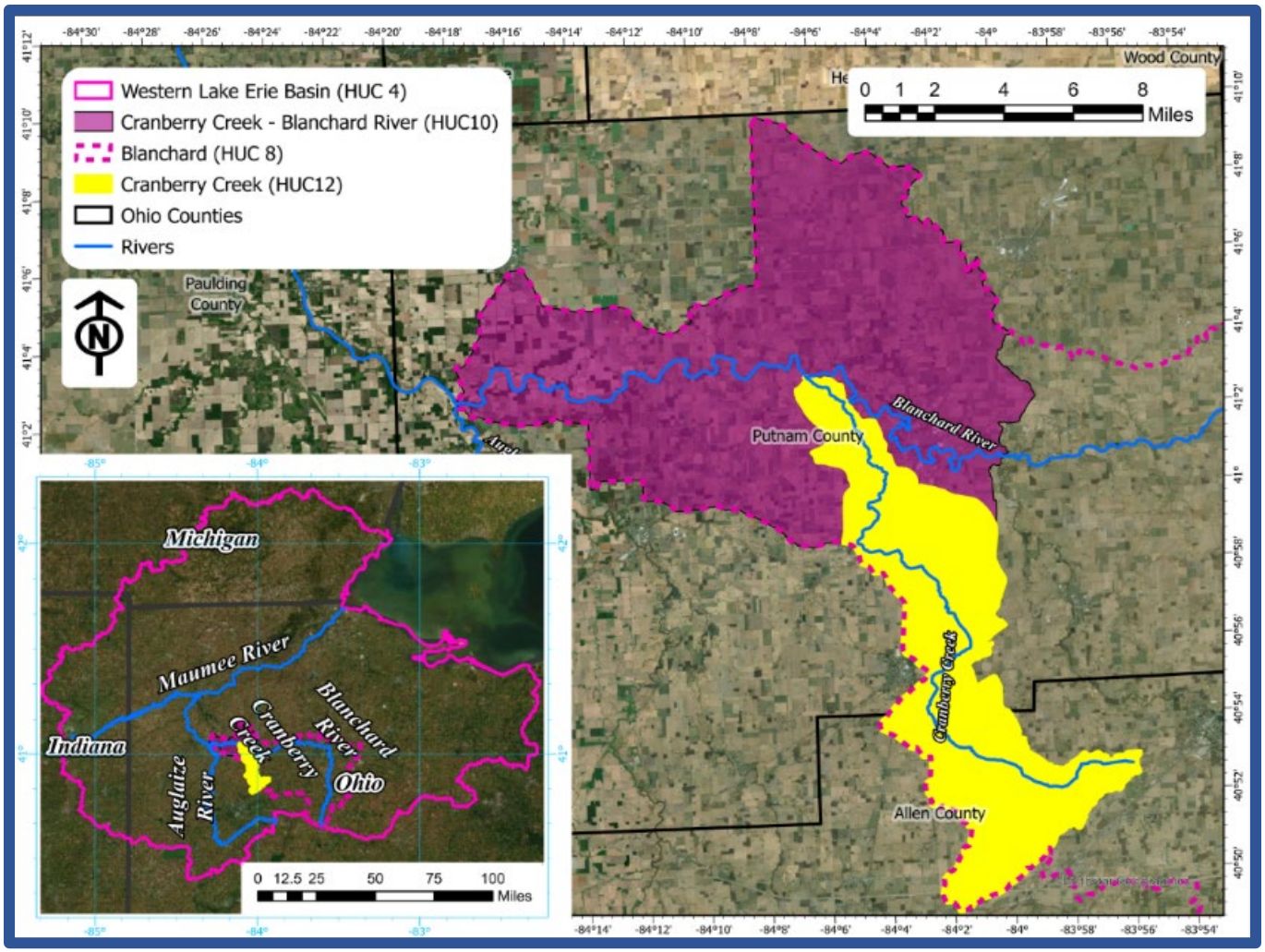


Figure 1: Overview Map of Cranberry Creek HUC-12

1.1 Report Background

The Cranberry Creek sub watershed **(Hydrologic Unit Code - 041000080601)** is located in the Maumee River Basin in northwest Ohio and is a tributary of the Blanchard River, an 8- digit hydrologic unit (sub-basin). Water delivered from this Cranberry Creek tributary eventually flows to the western basin of Lake Erie by route of the Maumee River. The Cranberry Creek sub watershed has been determined to need a watershed-based strategic plan to address near field impairments for recreational use, as well as the far field nutrient reduction goals set for the impaired waters of the Western Lake Erie Basin, of which it is a part.

The development of NPS-IS plans is critical to meet Ohio's Domestic Action Plan (DAP) goal to reduce total spring nutrient 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 in 2012. The U.S. along with Canada have each developed similar plans to convey a plan of action for meeting nutrient reduction targets. Our plan, here in the states 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 and responsibility to meet the nutrient loading into 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 (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 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 (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 is in the third phase of development. Cranberry 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.

Furthermore, a TMDL was developed for the entire Blanchard River (HUC-040100008) sub basin, and was finalized by Ohio EPA in 2009 (the document can be found here https://epa.ohio.gov/dsw/tmdl/MaumeeRiver#119943136-blanchard-river). This approved TMDL was intended to address near-field impairments and was utilized in this planning process. However, the findings of an inter-agency Work Group (https://www.epa.gov/tmdl/methodology-connecting-annex-4-water-quality-targets-tmdls-maumee-river-basin), found that TMDLs lack the directive to address soluble reactive phosphorous goals, are focused on near-field impairments, are not ubiquitous enough to fully address impairments to Lake Erie. This shows the necessity of local watershed planning to address nutrient reduction goals.

More recently, OEPA released more data regarding the Maumee Watershed Nutrient TMDL. A draft was published on June 30, 2022, from there 160 pages of comments were submitted through August 17,2022. A fact sheet was then released to the public in November 2022. The following information is pulled from the fact sheet, (the document can be found here: https://epa.ohio.gov/static/Portals/35/tmdl/MaumeeNutrient/Maumee_PMR%20FS_Final.pdf) The Preliminary Modeling Results (PMR) outline the analytical methods that are used to create the TMDL. By state law the PMR must include management choices, load allocations, waste load allocations, margin of safety, allowances for future growth, necessary permit limits, and a preliminary TMDL implementation plan. A summary of the comments received was also provided in the fact sheet. OEPA found that the comments could be encompassed in six categories: contribution of manure to phosphorus

loads, regulation of confined animal feeding operations (CAFOs), allocations for regulated treatment facilities and implementation of permits, allocations for regulated stormwater and implementation in permits, considerations for future growth, and lastly, the margin of safety and model verification. Currently the draft is being reviewed with the comments mentioned above. When approved, details from the final Maumee Watershed Nutrient TMDL report will be added to this document.

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 Cranberry Creek sub 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 Cranberry Creek sub watershed is part of the larger Maumee basin that drains to Lake Erie. The Maumee basin is a heavily-agriculturalized area with fertile, yet primarily poorly drained soils. This region was historically characterized by forest-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”.

The **Cranberry Creek HUC-12**, sub-watershed encompasses 28,946 acres located within Putnam and Allen counties. Both of which are in the northwestern portion of the State of Ohio. Main cities in the vicinity include Lima, Ohio to the south, and Toledo, Ohio to the north. More locally, villages and settlements falling partially within the sub watershed include the Village of Ottawa, the Village of Columbus Grove, the village of Glandorf and the unincorporated community of Rockport.

Cranberry Creek is a 12-digit hydrologic unit, or a sub watershed, that makes up a portion of the larger, 10-digit hydrologic unit watershed that is also called Cranberry Creek, shown below in Figure 2. It located on the far western extremity of the Blanchard River’s contributing drainage area. This HUC-10 watershed is one of 6 that make up the larger Blanchard River sub-basin, an 8-digit hydrologic unit. The Blanchard 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 Blanchard River empties into the Auglaize River, which joins the Maumee River, which flows to Lake Erie at Toledo, Ohio.

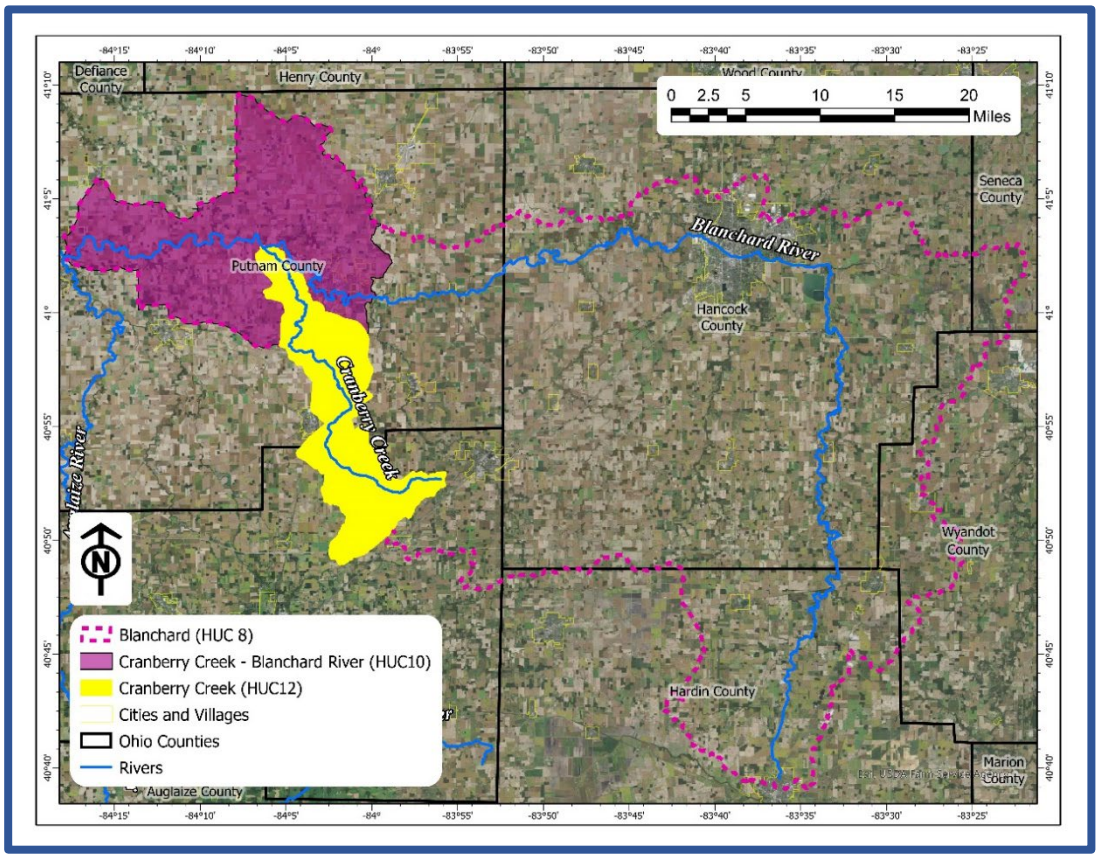


Figure 2: Map showing Larger HUC-8, HUC-10, and Focus Area HUC-12

The term watershed can be used in multiple ways, one of which is the specific use where it refers to a 10-digit hydrologic unit level of classification. Another use, however, is the general definition of: "a region... draining ultimately to a particular watercourse of body of water" (NPS-IS Planning Guidance Document, pg. 1). In this sense, the Cranberry Creek watershed drains ultimately to Cranberry Creek proper. However, it does so from two different pathways, or two main tributaries. These tributaries are "Little Cranberry Creek" and "Cranberry Creek". Little Cranberry Creek originates west of Beaverdam, Ohio and north of U.S. Route 30 in Allen County and flows northwest to its confluence with Cranberry Creek. Before this confluence, Cranberry Creek originates southwest of Bluffton, Ohio in Allen County. Here, it begins as an ephemeral waterway 1300 feet east of North Phillips Road, 375 feet north of Rockport Road. It continues for 1.5 miles flowing west, until turning south and then meandering west and eventually north to its confluence with Little Cranberry Creek. The confluence is southeast of Columbus Grove, north of Searfoss Road and East of Slabtown Road, in Allen County, at RM 17.05 of Cranberry Creek. The consolidated tributary then continues to flow north and slightly west until joining the main stem of the Blanchard River at RM 17.30.

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 local Allen and Putnam County SWCD 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. In addition, throughout the Blanchard River watershed, Putnam SWCD does a fantastic job to promoting conservation, addressing NPS pollution and implementing water quality projects. Having the support of this SWCD made the planning process for this project much smoother.

The team began the outreach process by gathering addresses of landowners within the watershed owning at least 10 acres using GIS-based data. From there, they planned an outreach meeting and created a flyer to mail to each of the potential stakeholders in the area. The flyer was a callout to any stakeholder in the area. Team was hoping to have interest specifically from producers that farmed in the HUC-12 watershed, Cranberry Creek. In addition to producers, the team was looking for participation from landowners and county representatives.

The meeting was held on April 7th, 2022, at the OSU Extension Putnam County office from 7:30-9:00 am. The meeting began with WQ associates diving into 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 strong opinions of the impact of failing septic systems throughout the area. Support from Putnam County Soil and Water as well as Allen County Engineers posed much benefit to the meeting.

All producers that attended the meeting explained 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 even 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.

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

Another important piece of stakeholder engagement meeting was to show attendees the Agricultural Conservation Planning Framework (ACPF) maps. These maps are interactive, which allowed us to open them look at specific areas that could potentially be used to implement conservation practices. 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.

The Ottawa River Coalition Group was another important stakeholder relied upon through the process. This Group was formed to protect and preserve the Ottawa River Watershed. The group is a combination of important stakeholders throughout the area, from farmers to township trustees, the list goes on. The OSU Extension Water Quality team shared the draft versions of these plans with the groups to obtain input and ideas for further improvement of plans. Meeting regularly, this was an important connection made to maintain connection with stakeholders in the area.

Later in the planning process, WQEAs were able to make more one on one connections with producers in the area. Meeting with a farmer that farms within Cranberry Creek and is a part of The Nature Conservancy (TNC) Farmer's Advocate for Conservation group. He gave us 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. After the on-farm meeting, we took the information and overlaid it with maps we had created to find areas for potential

projects to be implemented. Connections such as this one, allows for plans to be much more usable and relatable to those in the watershed.

Lastly, having a smaller impact on the nutrient pollution, but also just as important as agriculture, urban areas were also identified and contacted. Within **Cranberry Creek, HUC-12** all townships were contacted either via email or phone, at times a combination of the two. Townships within the watershed include Ottawa and Pleasant in Putnam County as well as Monroe and Richland in Allen County. None of the outreach done in this sector was successful. Additionally, the Putnam and Allen County Health Departments were contacted to provide insight on Home Sewage Treatment System (HSTS) issues in the area. Allen County was the only department the cooperated with the efforts and provided information. 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 Cranberry Creek watershed is a 12-digit hydrologic unit, a sub watershed, shown below in Figure 3. The HUC-10 level watershed in which the Cranberry Creek sub watershed is found, is likewise called Cranberry Creek. The HUC-8 level sub-basin that encompasses Cranberry Creek is the Blanchard sub-basin, and the basin is Western Lake Erie, which is part of the Great Lakes Region. Within the Cranberry Creek sub watershed are two waterways. These are Cranberry Creek (proper), which is the primary watercourse, and Little Cranberry Creek which is a tributary that converges with Cranberry Creek before the latter enters the Blanchard River mainstem.

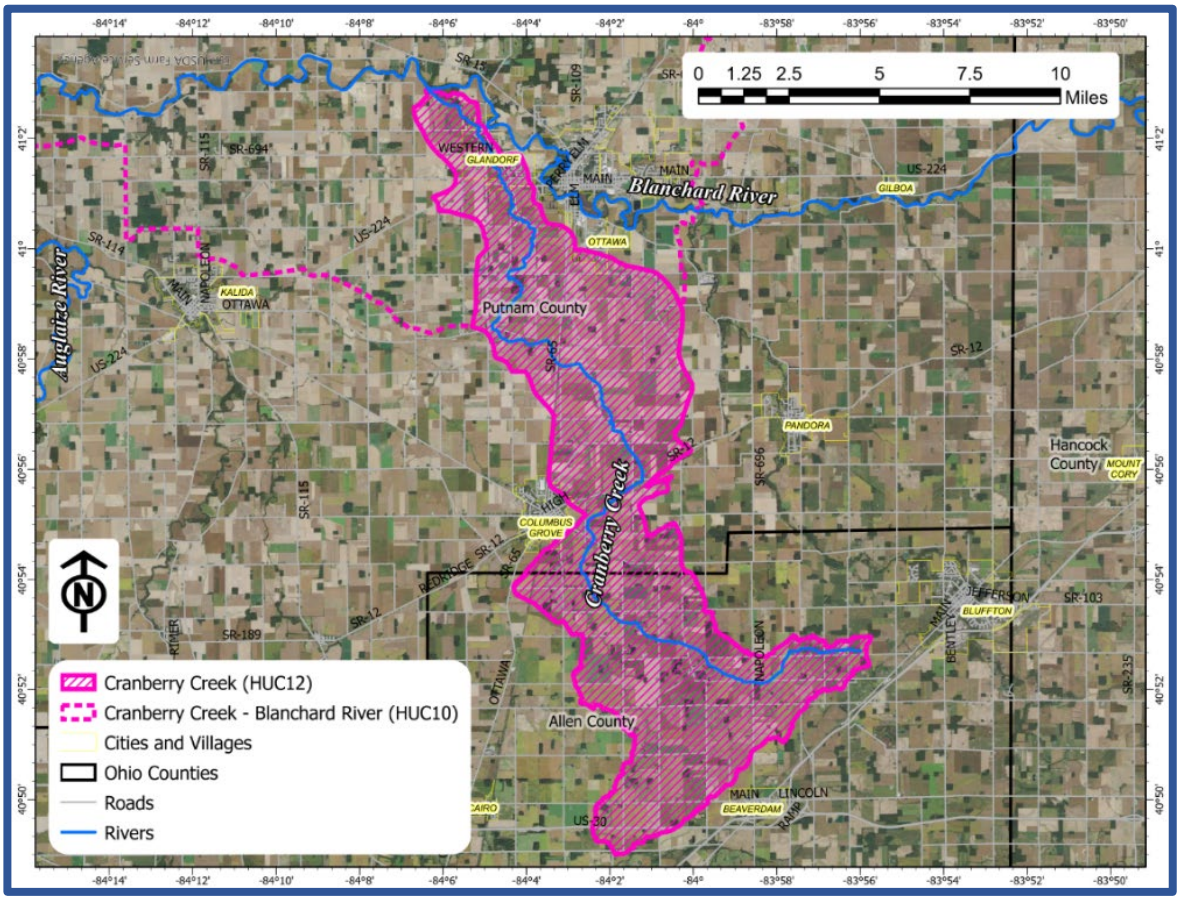


Figure 3: Overview Map of Cranberry Creek HUC-12

The Cranberry Creek sub watershed is situated across the border of two similar but distinct ecoregions. At the level III classification, the southern portion of 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). The second ecoregion, which encompasses the northern portion of the sub watershed is the Huron/Erie Lake Plains. Within this Level III classification the Maumee Lake Plains (57a) are predominant, though a small portion of the area is considered part of the Paulding Plains (57c) region, both of which are Level IV ecoregion classes.

Though unique, these ecoregions have many similarities, so much so that the TMDL does not stratify habitat evaluations based on the two (Level III) classifications present (Blanchard TMDL, page 123). 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 soils of each of the three subregions are characterized by impacts of glaciation, soils are broken down in the map below, Figure 3. Gallial 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 three 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 throughout the watershed is depicted in Figure 4 below.

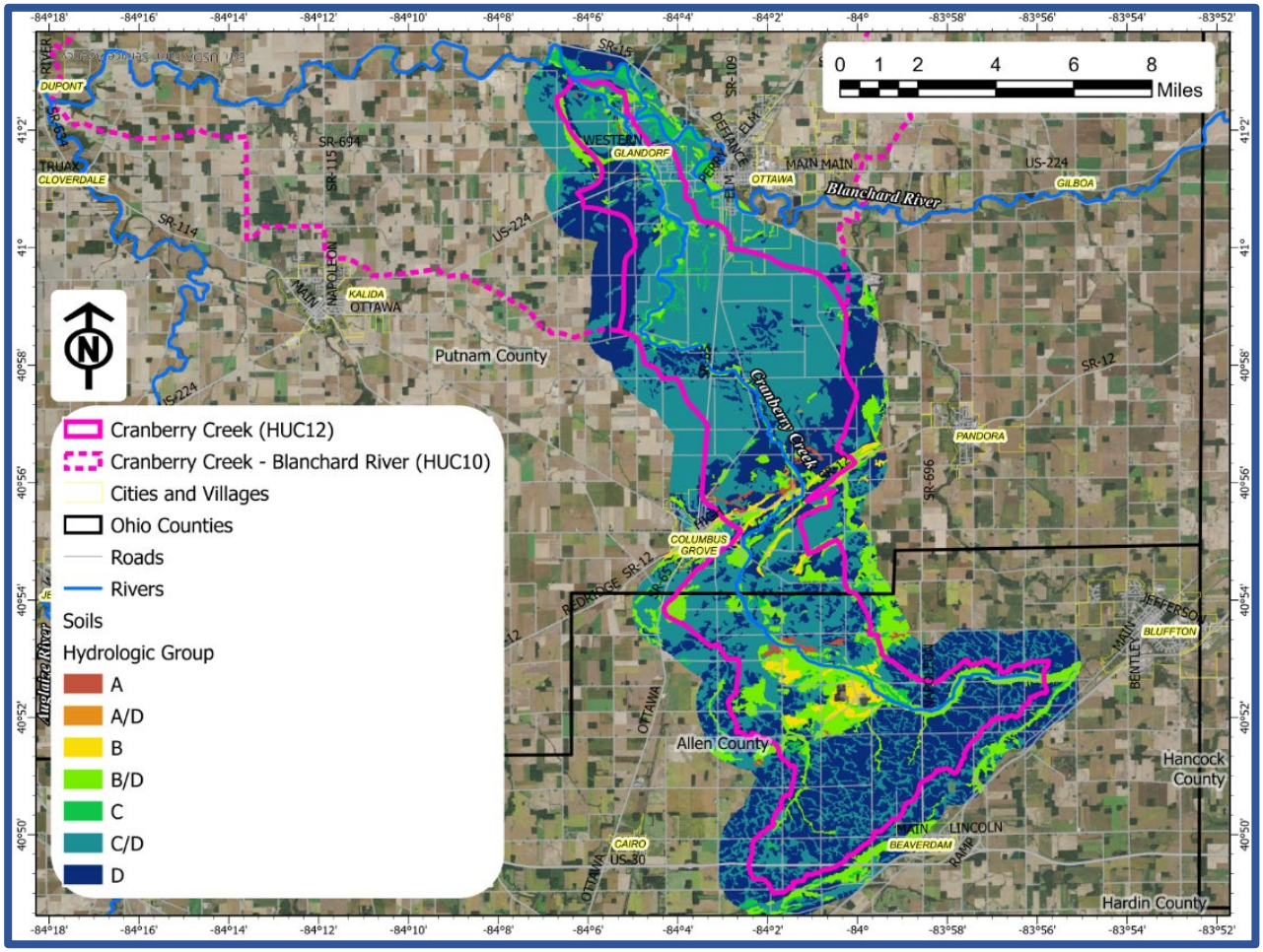


Figure 4: Hydrologic Groups of Soils within Cranberry Creek HUC-12

2.1.2 Land Use and Protection

Land use within the Cranberry 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, much of this is characterized by cultivated crops. According to the 2017 USDA Agricultural Census Allen County harvests over 160,000 acres of cropland. About 41% of this land was harvested for corn (grain) and 54% was harvested for soybeans. Additionally, there were 127 farms throughout the county this includes livestock and poultry. Likewise, Putnam County harvests over 283,000 acres of land. About 28% was harvested for corn (grain) and 58% was harvested for soybeans. Additionally, there are 235 livestock and poultry farms here. 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. It is also important to note that there are no Certified Livestock Feeding Operations (CAFOs) regulated by the ODA within this watershed.

Table 1: 2017 USDA Census Information on Putnam and Allen County

County	Total Cropland Area (ac)	% Grain	% Soybeans	Total Farms
Allen	160,000	41%	54%	127
Putnam	283,000	28%	58%	235

(Source: USDA, 2017)

Table 2: Estimated Animal Headcounts within Cranberry Creek HUC-12

Type	Animal Units
Beef	756
Dairy	308
Swine	15,070
Sheep	74
Horse	33
Chicken	5
Turkey	4
Duck	5

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

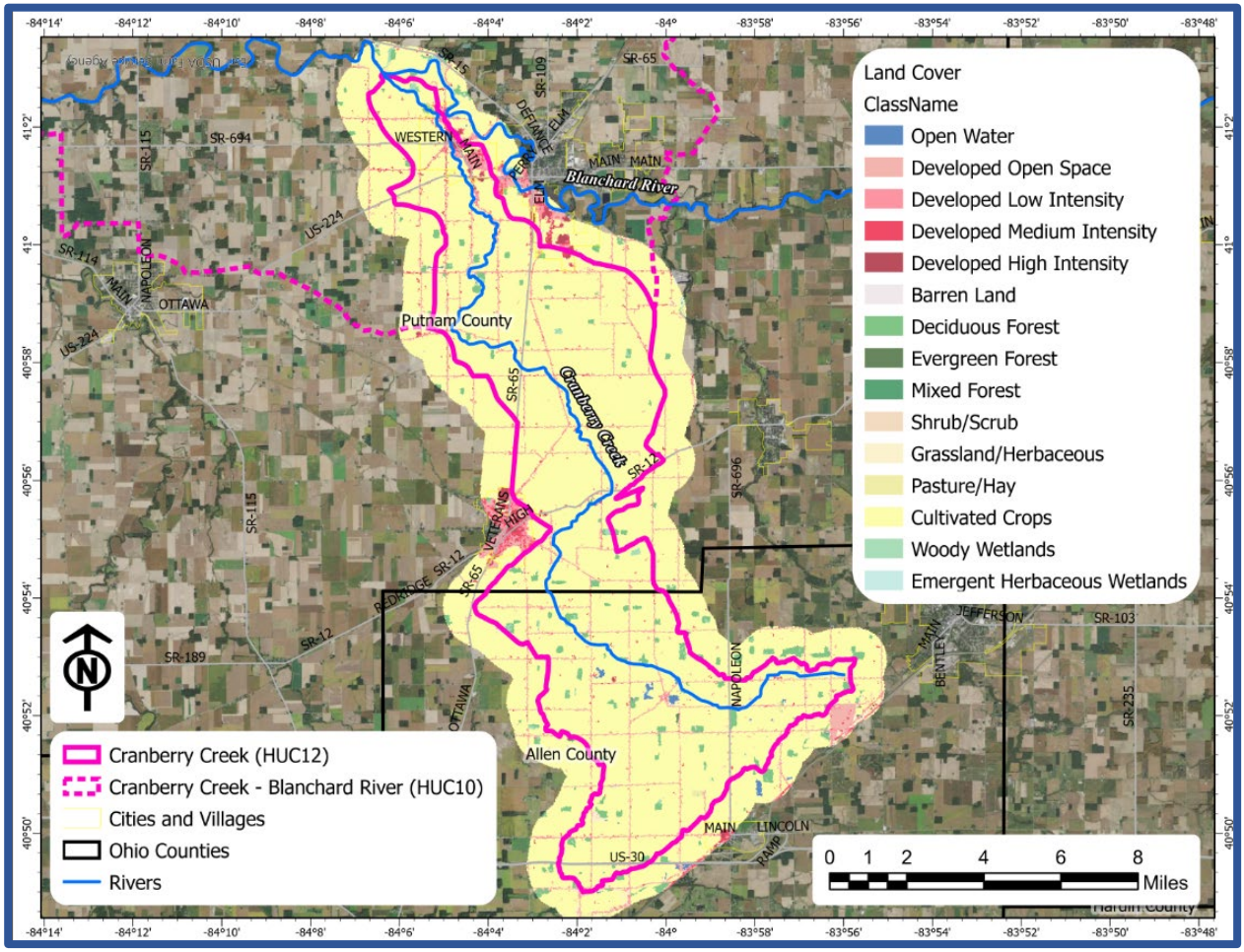


Figure 5: Land Use in Cranberry Creek HUC-12

A breakdown of the overall land use throughout the HUC-12 watershed is show in table 3. As you can the vast majority of the land is consumed by agricultural based practices (cropland, pasture and feedlot). Leaving only 6.7% for urban uses and 2.5% as forest.

Table 3: Land Use Classifications within Cranberry Creek HUC-12

Land Use	Cranberry Creek HUC-12 (04100008 06 01)		
	Area (mi^2)	Area (acres)	% of Watershed Area
Cropland	38.07	25,365.20	87.8%
Urban	3.03	1941.28	6.7%
Pasture	1.35	866.67	3.0%
Forest	1.11	708.55	2.5%
Feedlot	<0.10	5.96	<1%

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

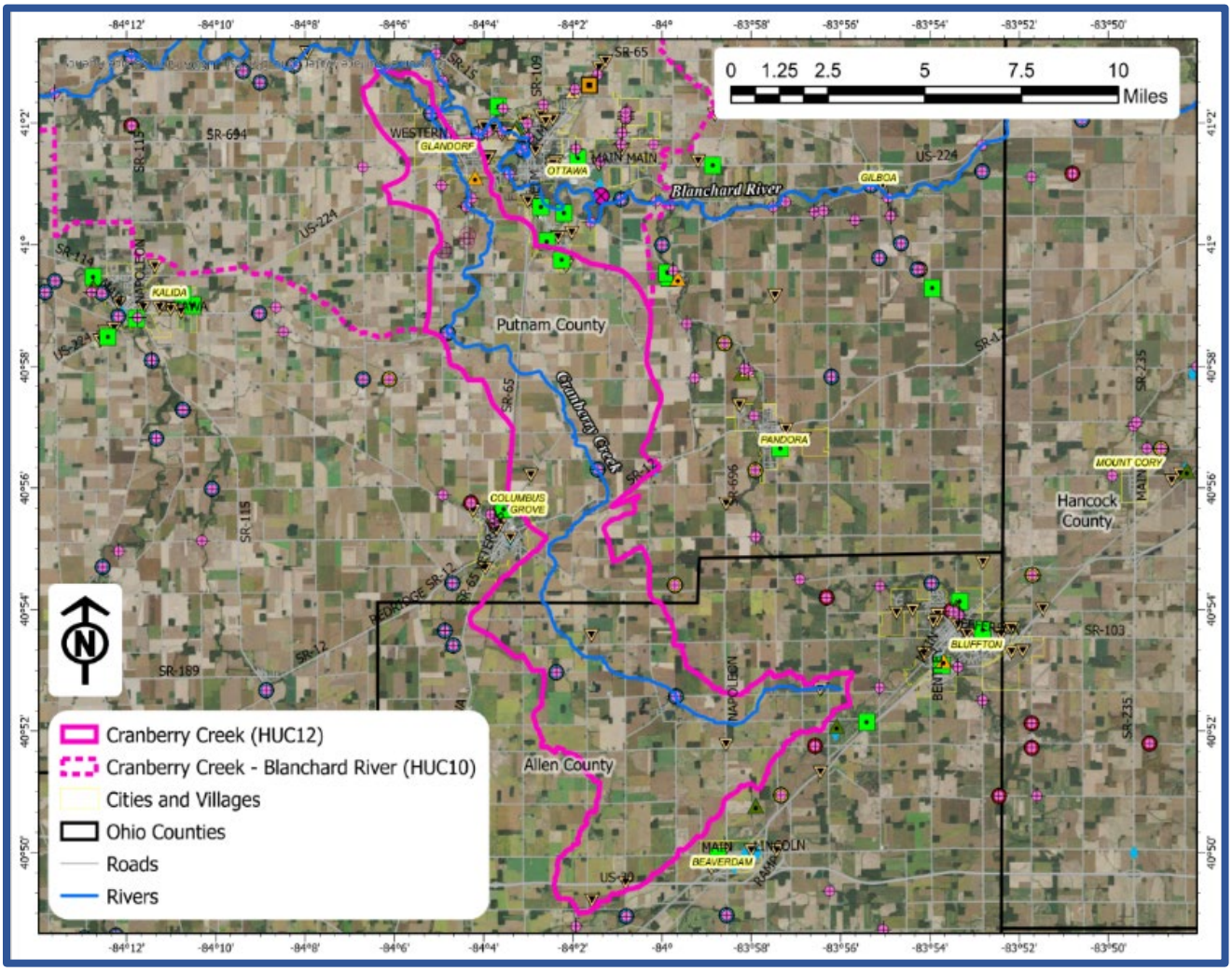
No areas with the watershed have been publically noted has being habitat for endangered or threatened species. Though, privatley owned land within the watershed may be providing ciritcal habitat for wildlife species in Allen and Putnam county. Therefore, it is important to mention the species listed as federally endangered or threatened in the two counties. The results are broken down below in table 4.

Table 4: Federally Threatened and Endangered Species in Allen and Putnam County

County	Species	Status	Type
Putnam	White Catspaw	Endangered	Mollusk
Allen and Putnam	Clubshell	Endangered	Mollusk
Putnam	Rabbitsfoot	Threatened	Mollusk
Putnam	Rayed Bean	Endangered	Mollusk
Allen	Northern Riffleshell	Endangered	Mollusk
Allen	Northern Long-eared Bat	Threatened	Mammal

(Source: USFWS, 2020)

Moreover, within this HUC-12 watershed there is one NPDES regulated facility. The facility had some non-compliance issues with pH in late 2020. Since then, the only non-compliance issues are related to not reporting or late reporting parameters such as oil and grease sevirty, napthalene, flow rate and phenol. An overview map of the NPDES regulated facilites is shown in Figure 6, the map also includes a legend that explains the symbols used.



Antidegredation Tiers
- Outstanding Waters of the State-Ecological
- Outstanding Waters of the State-Recreational
- Superior High Quality Waters

Surface Water Monitoring Stations (EA3)

Station Type
- Canal Drainage
- Canal Transport
- Channelized Stream
- Sewer: Combined
- Facility: Industrial
- Facility: Other
- Facility: Private
- Facility: Sewage
- Facility: Water Supply
- Landfill
- Great Lake
- Lake
- Mine: General
- Mine: Tailings Pile
- River/Stream
- Riverine Impoundment
- Sewers: Storm
- Superfund Site
- Sewer: Waste
- Wetland: Est-Emergent
- Wetland: General

Individual Permits (NPDES)

Permit Type
- Individual Permit - Industrial
- Individual Permit - Public

General Permits (NPDES)
- General Permits (NPDES)

Industrial Stormwater (NPDES)
- Industrial Stormwater (NPDES)

Construction Permits (NPDES)

Permit Details
- Darby Permit
- Olentangy Permit
- Regular Permit

Construction Permits - inactive (NPDES)

Permit Details
- Darby Permit
- Olentangy Permit
- Regular Permit

Alternate General Permit Areas for Construction Stormwater Discharges

General Permit
- OHCD00002
- OHCO00002

Concentrated Animal Feeding Operations (NPDES Permits)
- Concentrated Animal Feeding Operations (NPDES Permits)

Aquatic Life Use Monitoring
- Full
- Partial
- Non
- Not Applicable
- Not Applicable

FRS_INTERESTS
- FRS_INTERESTS

Figure 6: Location of NPDES Permits in and around Cranberry Creek HUC-12

2.2 Summary of HUC-12 Biological Trends

Biological trends in the larger Blanchard River watershed have been monitored for many years, with an original report published in 1985, "Biological and Water Quality Study of the Blanchard River and Selected Tributaries". This study designated the waterway as Warm Water Habitat, but no biological records were contained in the report. A later Biological Assessment in 2005 "Biological and Water Quality Study of the Blanchard River" included observations leading to a modified warm water habitat designation for the Cranberry Creek mainstem, upstream of the confluence with Little Cranberry Creek, and for the Little Cranberry Creek tributary itself due to extensive habitat alteration (pages 218-219).

The 2020 Integrated Report showed that all sampling sites within the **Cranberry Creek HUC-12** watershed were in attainment for their biological use designations. According to the 2005 Watershed Assessment Unit (WAU) assessment, all five of the sample sites located in the **Cranberry Creek HUC-12** watershed are in full attainment levels, two with Warmwater Habitat (WWH) designations and three with (Modified Warmwater Habitat) MWH as designated by the EPA. Therefore, there were no listed sources for impairments as you can see in Table 5. Additionally, the WQ standards for the ecoregion are shown below for reference in Table 6. However, there were issues listed regarding fecal coliform levels and its effect on the recreational use within the HUC-12. The use designation for areas within Cranberry creek are also listed in Table 7. Additionally, looking at Table 7 you will see that the water is used primarily for agricultural water supply (AWS) and (industrial water supply) IWS, and not public water supply (PWS).

Table 5: Biological Indices Scores for Cranberry Creek HUC-12

River Mile	Type	Drainage Area (mi^2)	IBI	MIwb[a]	ICI[B]	QHEI	Attainment Status	Location
1.64	WWH	43	N/A	N/A	46	N/A	Full	Co. Rd. J
7.76	WWH	30	40	8.541	N/A	44.5	Full	Pleasant Twp Rd. M-10
12.87	WWH	25	32	8.0347	N/A	48	Full	Pleasant Twp. Rd. 8-P
19.94	MWH	6.4	46	N/A	N/A	41	Full	Rockport Rd.
0.83	MWH	7	30	N/A	N/A	25	Full	Eversole Rd.

(Source: Ohio EPA, 2005)

Table 6: 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: Ohio EPA, 2010)

Table 7: Water Use Designations for Cranberry Creek HUC-12

Location	Aquatic Life Habitat	Water Supply	Recreation
Headwaters to upstream Little Cranberry Creek	MWH	AWS, IWS	PCR
Upstream Little Cranberry creek (RM 17.05) to the mouth	WWH	AWS, IWS	PCR
Little Cranberry Creek	MWH	AWS, IWS	PCR

(Source: OEPA 2017 Water Use Designation)

2.3 Summary of HUC-12 Pollution Causes and Associated Sources

The 2022 Integrated Summary Report indicated that the Cranberry Creek sub watershed contained a primary contact recreational use impairment for E. coli. E. coli is a subgroup of fecal coliform, which according to the Ohio EPA is an indicator organism that signals the presence of contaminated water from the feces of warm-blooded animals. This

is consistent with reports of unrestricted cattle in the waterway in the northern portion of the watershed near Glandorf. Additionally, the 2020 DAP also showed Cranberry Creek having higher than average total Phosphorus loads from home sewage treatment systems. Mismanaged or poorly maintained home septic systems may not remove enough N or P before discharging into local waterways. There is also the potential for other contaminants, such as E. coli, from failed, abandoned, or malfunctioning septic systems. A total of 70 fecal bacterial counts were collected throughout the HUC-11, a total of 12 sites. The results were compiled and included in the Blanchard River TMDL (2009); the results are displayed in Table 8. Recreational use of the water is considered impaired when the 75th percentile exceeds 1,000 CFU/mL or the 90th percentile exceeds 2,000 CFU/ml. The results of these samples indicate chronic WQ problems. The likelihood of someone becoming sick from using the water for recreation is significant.

Table 8: Fecal Bacterial Results Collected (CFU/mL) from 12 Survey Sites within the Greater HUC-11 Cranberry Creek and Coordinating Thresholds for Denoting Impaired Recreational Use

Actual 75th Percentile	Threshold for 75th Percentile	Actual 90th Percentile	Threshold for 90th Percentile
2,400	1,000	9,280	2,000

(Source: Blanchard River TMDL,2009)

Moreover, included in the 2009 Blanchard River TDML document there is more specific data included. Table 9 below shows the model-predicted Fecal Coliform existing load results during the recreational season (May through October) for the greater HUC-10, Cranberry Creek. The table also includes the TMDL, required load reduction and percent reduction needed to meet the TMDL.

Table 9: Predicted Fecal Coliform Existing Load for Cranberry Creek, HUC-10 during the Recreational Season and Required Load Reduction and Equivalent Percent

Month	Median 10^9cfu/day	TMDL	Reduction	Percent Reduction
May	8,154	1,597	3,961	78%
June	6,385	1,432	4,113	82%
July	6,436	737	4,628	92%
August	6,220	768	4,719	93%
September	6,500	454	4,727	95%
October	4,970	471	4,603	93%

(Source: Blanchard River TMDL, 2009)

The 2020 Ohio 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 fair field nutrient loading as well. **Cranberry Creek HUC-12** had an estimated loading of 23,000lbs/year which translates to a reduction of 9,200lbs/year for a new goal of 14,000 lbs./year. Table 10, 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 Cranberry Creek HUC-12

	Agricultural Land	Developed/Urban Land	Natural Land	Ohio HSTS Land	NPS Total
Current Estimates	21,000	850	110	570	23,000
Target Estimates	12,600	510	66	342	14,000

(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 **Cranberry Creek HUC-12**. All potential practice locations can be viewed in the Appendix portion of this plan beginning on page 27.

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

Practice	Locations Identified	Average Size/Length/Contributing area/Controlled Area	Max	Total
Nutrient Removal Wetlands	11	238 ac (drainage)	8550 ac	-
Bioreactor	149	-	-	-
Contoured Buffer Strips	19	1132 feet	2546 feet	-
WASCOBS	38	15.5 ac	36.5 ac	588.3 ac
Drainage Water Management	433	20 ac	83 ac	14219 ac
Saturated Buffers	31	-	-	-
Depressions	97	13.3 ha	152.9 ha	1288.8 ha

(Source: OSU Extension WQ Team-ACPF)

CHAPTER 3: CRITICAL AREA CONDITIONS & RESTORATION STRATEGIES

3.1 Overview of All Critical Areas

According to the Blanchard River Watershed TMDL report, the Cranberry Creek HUC 10 Watershed (of which **Cranberry Creek, 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 **Cranberry 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 Cranberry 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. The last critical area, and by far the largest is prioritized agricultural land and high-risk run-off areas. Best management practices that target erosion and run off to keep sediment out of the 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 7. 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. Though, there has been adoption of BMPs throughout **Cranberry Creek, HUC-12**, 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.

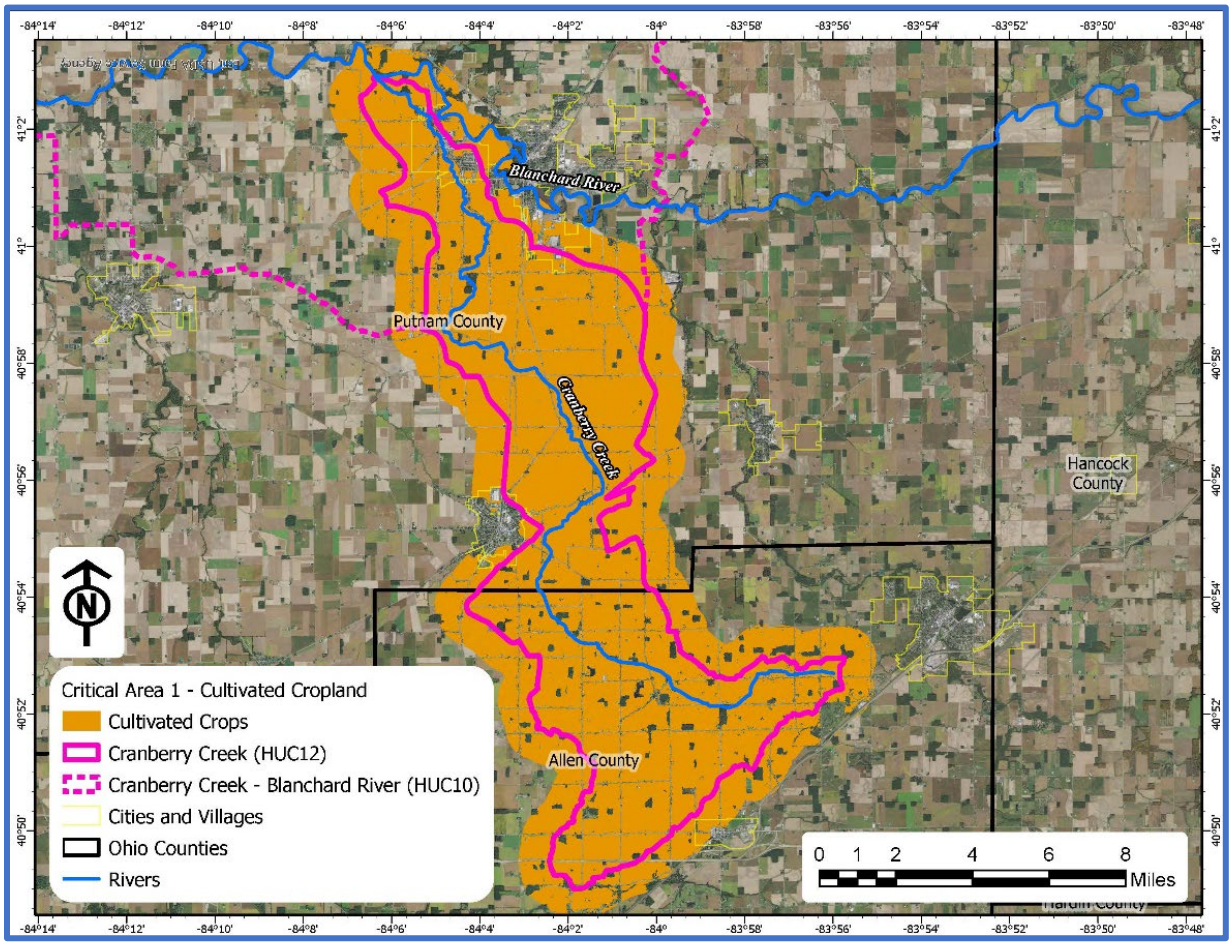


Figure 7: Overview Map of Critical Area #1, Depicting Areas with Cultivated Cropland

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 Cranberry Creek identified 74 locations (1144 acres) as very high risk, 154 locations (3651 acres) as high risk, and 256 locations (7575 acres) as moderate risk. The results are listed in Table 12 below. Additionally, the actual output of the RRA tool is shown in Figure 8 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*.

Table 12: Runoff Risk Assessment throughout Cranberry Creek HUC-12

Runoff Risk Assessment	Unique Locations Identified	Total Area (ac)
Very High Risk	74	1144
High Risk	154	3651
Moderate Risk	2256	7575

(Source: OSU Extension WQ Team-ACPF)

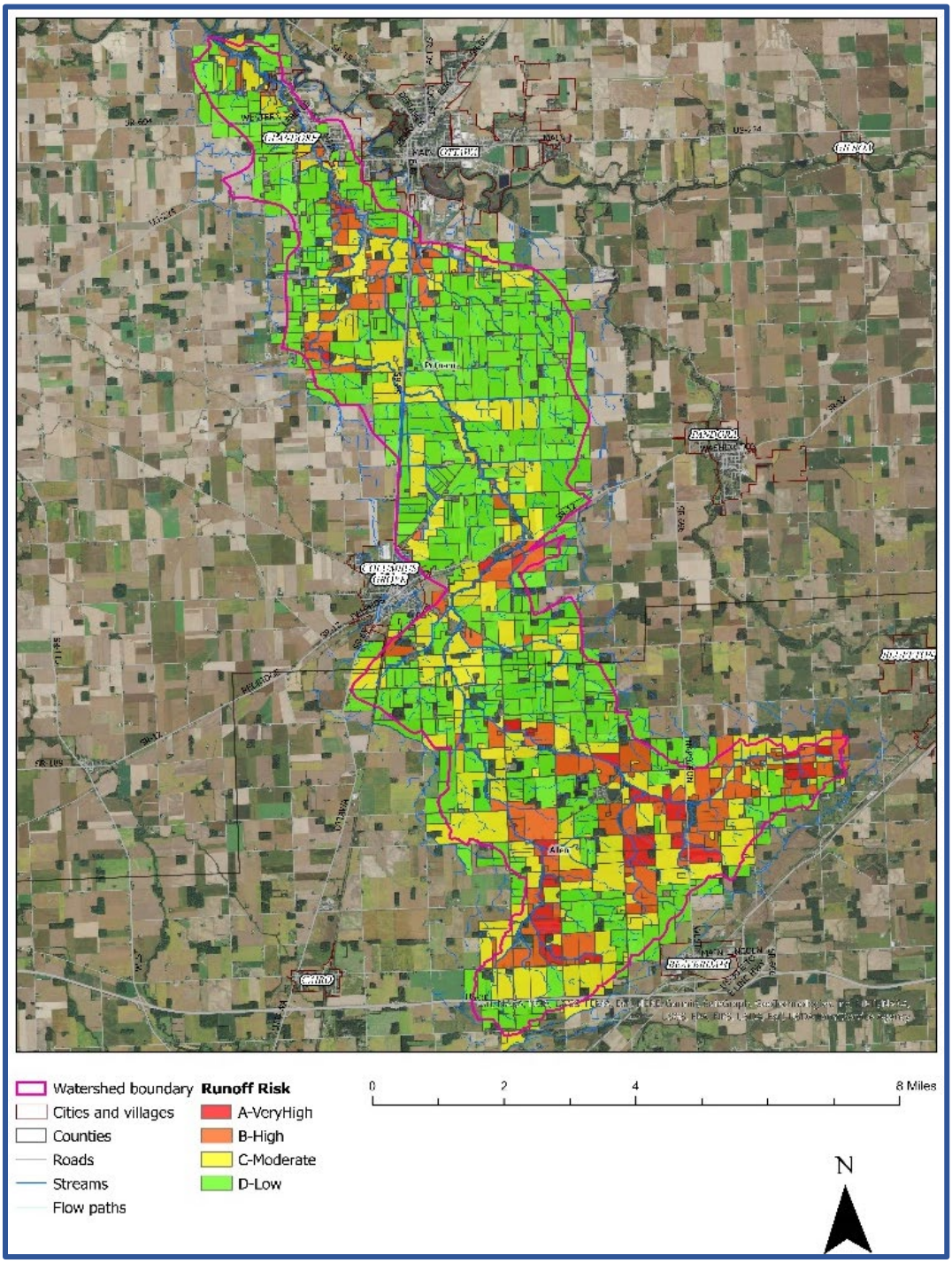


Figure 8: Run-Off Risk Assessment Output for Cranberry Creek

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

All in full attainment. Invert only Fair, Qualitative Habitat Evaluation Index (QHEI) below 60. Maintain levels and potentially raise Invert 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 12, each of the three sampling locations are either fair or marginally good, which means there is opportunity for improvement but also, the scores do not denote critical need for intervention.

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

Cranberry Creek HUC-12 (04100008 06 01)							
River Mile	**Drainage Area** *(mi^2)*	**Total Species**	**QHEI**	**IBI**	**MIwb[a]**	**Predominant Species** *(% of Catch)*	**Narrative Evaluation**
7.80	30	22	44.5	40	8.541	Bluntnose Minnow (19.47%), Striped Shine (17.89%)	Marginally Good
12.90	25	20	48	32	8.0347	Central Stoneroller (37.95%), Bluntnose Minnow (22.48%)	Marginally Good
19.90	6.4	17	41	46	n/a	Central Stoneroller (34.44%), Blackstripe Topminnow (18.66%)	Fair

(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. Other HUC-12 watersheds in the greater HUC-10, such as Pike Run- Blanchard River and Miller City Cutoff are considered impaired. The overall report card for HUC-10, Cranberry Creek in 2018 graded the watershed a C+. However, the HUC-12, Cranberry Creek was given an A rating.

We know agricultural activities within the WLEB contribute to nutrient loading in Lake Erie which causes eutrophication and the creation of Harmful Algal Blooms (HABs). Implementation of various Best Management Practices (BMPs) will help reduce the overall nutrient loading number. Many of the BMPs advocated for 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*, encompass 23,175 acres of agricultural land, are consistent with the overarching goals of any NPS-IS, which is to improve overall water quality and meet the nutrient reduction goals. More specifically, those prioritized agricultural lands with higher risks for run-off, which accounts for about 21% of the total agricultural land within the watershed. It is evident that the agricultural activities within **Cranberry Creek HUC-12**, *Critical Area #1* add to far-field impairment via excessive nutrient loss, specifically phosphorus, into waterways that lead to 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 **Cranberry Creek 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 table 14, you will see the sum of acres participating in H2Ohio programs in 2021 and 2022 in Allen and Putnam County.

Table 14: H2Ohio Data for Allen and Putnam County

County	Allen		County	Allen
Crop Year	2021		Crop Year	2022
Row Labels	Sum of Actual Acres		Row Labels	Sum of Actual Acres
H2Ohio-1- VNMP Development	57728		H2Ohio-1- VNMP Development	2240
H2Ohio-1- VNMP Implementation	48134		H2Ohio-1- VNMP Implementation	26120
H2Ohio-2- VRT Phosphorus Application	13295		H2Ohio-2- VRT Phosphorus Application	10520
H2Ohio-3- Subsurface Phosphorus Place	5707		H2Ohio-3- Subsurface Phosphorus Place	4147
H2Ohio-4- Manure Incorp. - All Other	504		H2Ohio-4- Manure Incorp. - All Other	250
H2Ohio-4- Manure Incorp. - Poultry Dry	473		H2Ohio-4- Manure Incorp. - Poultry Dry	73
H2Ohio-5a- Cons. Crop Rota. - S. Grain	2361		H2Ohio-5a- Cons. Crop Rota. - S. Grain	1331
H2Ohio-5b- Cons. Crop Rota. - Forage	196		H2Ohio-5b- Cons. Crop Rota. - Forage	99
H2Ohio-6- Overwintering Cover Crop	3270		H2Ohio-6- Overwintering Cover Crop	2470
H2Ohio-7- DWM Structure	0		H2Ohio-7- DWM Structure	0

County	Putnam		County	Putnam
Crop Year	2021		Crop Year	2022
Row Labels	Sum of Actual Acres		Row Labels	Sum of Actual Acres
H2Ohio-1- VNMP Development	121265		H2Ohio-1- VNMP Development	11225
H2Ohio-1- VNMP Implementation	119180		H2Ohio-1- VNMP Implementation	122401
H2Ohio-2- VRT Phosphorus Application	30593		H2Ohio-2- VRT Phosphorus Application	20007
H2Ohio-3- Subsurface Phosphorus Place	14952		H2Ohio-3- Subsurface Phosphorus Place	10730
H2Ohio-4- Manure Incorp. - All Other	5162		H2Ohio-4- Manure Incorp. - All Other	5682
H2Ohio-4- Manure Incorp. - Poultry Dry	2636		H2Ohio-4- Manure Incorp. - Poultry Dry	2875
H2Ohio-5a- Cons. Crop Rota. - S. Grain	10193		H2Ohio-5a- Cons. Crop Rota. - S. Grain	7726
H2Ohio-5b- Cons. Crop Rota. - Forage	1372		H2Ohio-5b- Cons. Crop Rota. - Forage	1610
H2Ohio-6- Overwintering Cover Crop	24959		H2Ohio-6- Overwintering Cover Crop	29999
H2Ohio-7- DWM Structure	18		H2Ohio-7- DWM Structure	4

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 **Cranberry 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. EQIP connects farmers not only with the information to apply practices on their land but also matches them with payments for practice implementation.

It is important to note that some of the funding sources listed above have programs that cannot be used in conjunction with each other. Yet, the majority of the most successful conservation practice implementation

includes multiple partners to achieve the highest level of success, return and functionality. 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.

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 **Cranberry Creek HUC-12**, the following goals have been recognized:

Goal 1. Achieve the 40% phosphorus reduction in springtime load. In Critical Area 1# this means decreasing the springtime phosphorus load to at least 12,600 lbs./year.
X NOT ACHIEVED: Current baseline contribution is estimated to be 21,000 lbs./year.

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 2. Maintain an IBI score at or above 28 at Eversole Road, RM 0.83.
✓ACHIEVED: IBI is currently 30 here.

Goal 3. Maintain a QHEI score at or above 43.5 at Eversole Road, RM 0.83.
X NOT ACHIEVED: Currently the site is at 25.

Goal 4. Maintain an ICI score at or above 34 at County Road J., RM 1.64.
✓ACHIEVED: ICI score is currently 46 here.

Goal 5. Maintain an IBI score at or above 28 at Pleasant Township Road M-10, RM 7.76.
✓ACHIEVED: IBI score is currently 40 here.

Goal 6. Maintain an QHEI score at or above 55 at Pleasant Township Road M-10, RM 7.76.
X NOT ACHIEVED: Currently the site is at 44.5.

Goal 7. Maintain a IBI score at or above 22 at Pleasant Township Road 8-P, RM 12.87.
✓ACHIEVED: IBI score is currently 32 here.

Goal 8. Maintain an QHEI score at or above 55 at Pleasant Township Road 8-P, RM 12.87.
X NOT ACHIEVED: Currently the site is at 48.

Goal 9. Maintain a IBI score at or above 22 at Rockport Road, RM 19.94.
✓ACHIEVED: IBI score is currently 46 here.

Goal 8. Maintain an QHEI score at or above 43.5 at Rockport Road, RM 19.94.
X NOT ACHIEVED: Currently the site is at 41.

Overall Objective

To achieve progress toward reducing the springtime load (reduction of 8,400 lbs./year) in the watershed efforts must focus on widespread implementation of BMPs throughout the HUC-12 watershed. Descriptions and estimations of each BMP is broken down below:

Objective 1: Plant cover crops on at least 5,000 acres annually throughout the HUC-12 watershed.

Objective 2: Implement conservation tillage practices (30-60% residue) on at least 8,000 acres.

Objective 3: Reduce erosion and there for sediment and nutrient loss by installing grassed waterways that receive water from at least 200 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 2,000 acres.

Objective 5: Create and implement nutrient management plans for producers, covering at least 8,000 acres.

Objective 6: Create or improve at least 10 acres of wetlands and/or water retention basins that treat agricultural runoff from at least 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 1,000 acres.

Objective 9: Implement streambank stabilization and/or two stage ditches on at least 20,000 linear feet (3.79 miles) to reduce erosion from agricultural lands and drainage areas.

Table 15: Estimated Nutrient Loading Reductions from Each Proposed Objective

Objective Number	Best Management Practice	Total Acreage Treated	Estimated Annual P Load Reduction *(lbs.)*	Estimated Spring P Load Reduction *(lbs.)*
1	Cover Crops	5,000	350	227
2	Conservation Tillage (30-60% Residue)	8,000	2,848	1,843
3	Grassed Waterways [a]	200	100	65
4	Buffer Strips/Saturated Buffers (34'<) [b]	2,000	118	76
5	Nutrient Management Planning [c]	8,000	3,600	2,329
6	Wetlands and/or Water Retention [d]	10	125	81
7	Blind Inlets [e]	100	500	324
8	Drainage Water Management	1000	350	226
9	Stream Stabilization/Two-Stage Ditches	2000	560	362
	TOTAL	**21,510***	**8,551**	**5,533**
			Overall Total P Reduction Required by DAP	**8,400**

(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.*

[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 10 wetland acres, using a 25:1 ratio we can in theory, treat 250 total acres.*

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

* *Acres treated will likely have overlapping conservation practices*

Collectively these objectives will work towards the goal of reaching the phosphorus reduction from prioritized agricultural lands in **Cranberry Creek HUC-12**. Any additional conservation practices implemented 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 toward the phosphorus 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 & Objectives for Riparian Corridors

3.3.1 Critical Area #2 Detailed Characterization for Riparian Corridors

As previously mentioned in the 2007 Biological and Water Quality Study of the Blanchard River, the condition of Cranberry Creek tributaries and streams is a considerable source of sediment transport and nutrient loading into the watershed. This issue has triggered a sediment TMDL for the watershed. The TMDL for the Blanchard River Watershed provided multiple approaches for reducing the sediment load and improving habitat in 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 10 below shows the riparian corridor within the watershed, focus of this critical area.

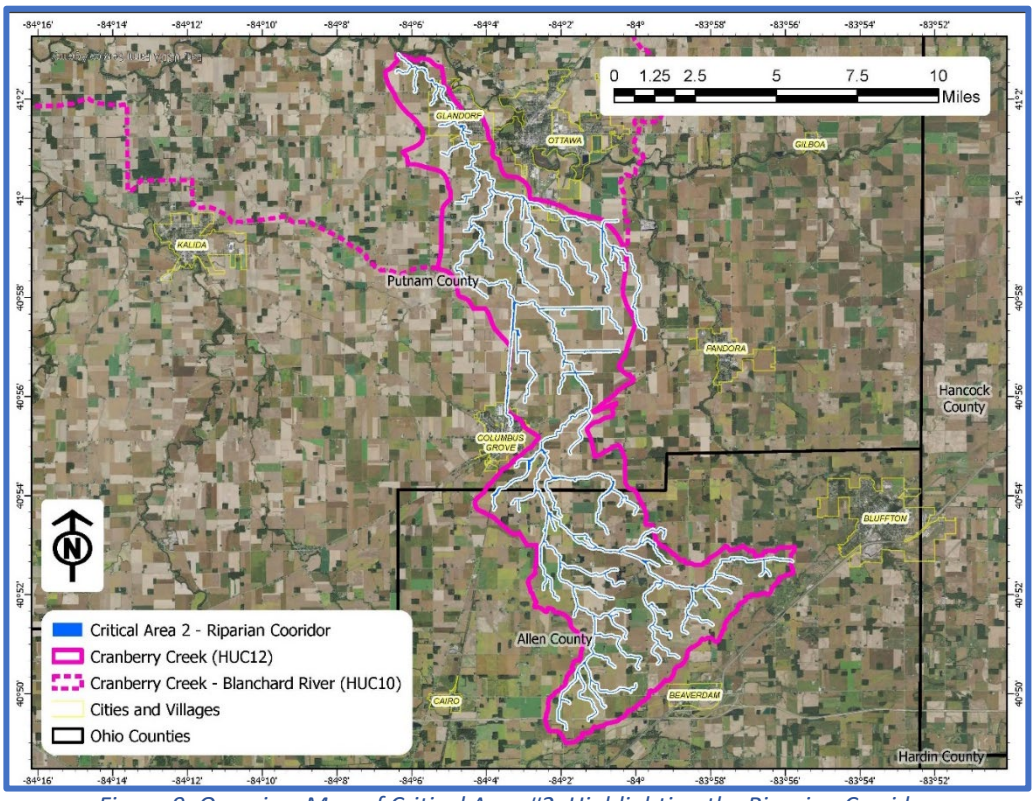


Figure 9: Overview Map of Critical Area #2, Highlighting the Riparian Corridor

This is consistent with reports from local conservation and engineering offices within Cranberry 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 14 below. 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 34 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 618 acres within this *Critical Area #2.*

Table 15 : Riparian Function Assessment ACPF Outputs for Cranberry Creek HUC-1214

Classification	Locations identified	Contributing Acres
Critical zone	2.37 mi	3124 ac
Deep rooted vet	47 mi	2772 ac
Multi-species buffer	12 mi	6397 ac
Stiff stemmed grasses	6.6 mi	6405 ac
Stream bank stabilization	34 mi	1501 ac

(Source: OSU Extension WQ Team-ACPF)

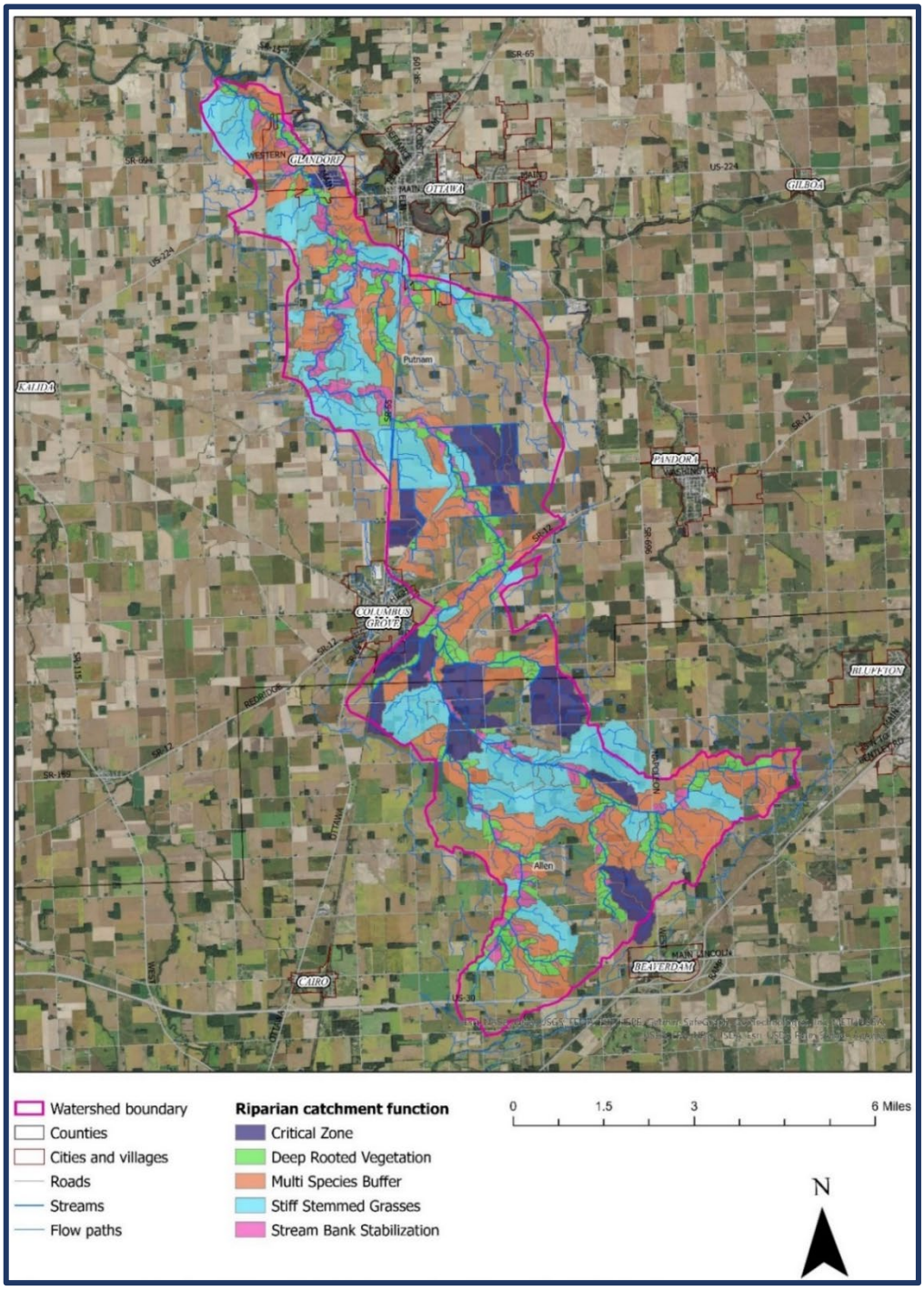


Figure 10: Riparian Catchment Function Output for Cranberry Creek HUC-12

3.3.2 Critical Area #2 Detailed Biological Conditions for Riparian Corridors

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

3.3.3 Critical Area #2 Detailed Causes and Associated Sources for Riparian Corridors

The overall run-off risk assessment for **Cranberry Creek HUC-12** is shown in Figure 8 of this document. Areas of high erosion emphasized by Allen County Engineers, include 8 miles of streambanks. The ACPF assessment in Figure 10 highlighted adjacent approximate 300 acres in (blue) have high and very high runoff risk. Additionally, there are at least three streams with eroded banks: Rockport to east of Phillips, Eversole to Hook Waltz, and Begg to SR12. The critical zones identified are shown in Figure 8, shaded purple.

3.3.4 Critical Area #2 Outline Goals and Objectives for the Critical Area for Riparian Corridors

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*.

Goal 1. Maintain an IBI score at or above 28 at Eversole Road, RM 0.83.
✓ACHIEVED: IBI is currently 30 here.

Goal 2. Maintain a QHEI score at or above 43.5 at Eversole Road, RM 0.83.
X NOT ACHIEVED: Currently the site is at 25.

Goal 3. Maintain an ICI score at or above 34 at County Road J., RM 1.64.
✓ACHIEVED: ICI score is currently 46 here.

Goal 4. Maintain an IBI score at or above 28 at Pleasant Township Road M-10, RM 7.76.
✓ACHIEVED: IBI score is currently 40 here.

Goal 5. Maintain an QHEI score at or above 55 at Pleasant Township Road M-10, RM 7.76.
X NOT ACHIEVED: Currently the site is at 44.5.

Goal 6. Maintain a IBI score at or above 22 at Pleasant Township Road 8-P, RM 12.87.
✓ACHIEVED: IBI score is currently 32 here.

Goal 7. Maintain an QHEI score at or above 55 at Pleasant Township Road 8-P, RM 12.87.
X NOT ACHIEVED: Currently the site is at 48.

Goal 8. Maintain a IBI score at or above 22 at Rockport Road, RM 19.94.
✓ACHIEVED: IBI score is currently 46 here.

Goal 9. Maintain an QHEI score at or above 43.5 at Rockport Road, RM 19.94.
X NOT ACHIEVED: Currently the site is at 41.

Objectives

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 **Cranberry Creek HUC-12**. Moreover, there will be progress in reducing both far-field and near-field impairments. Though **Cranberry 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*.

Objective 1: Stabilize at least 3 miles (15,840 linear feet) of degraded streambanks by implementing two-stage ditches specifically within floodplain areas.

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

Monitoring WQ 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 **Cranberry 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 raw sewage 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 in Figure 6. Currently HSTS land has a springtime load of approximately 570 lbs. of phosphorus. The DAP recommends a target reduction of 228 lbs. Cities and villages partially or fully within the HUC-12 watershed are Glandorf, Columbus Grove, and Ottawa. Aside from contributing to the phosphorus loading in the WLEB, the effects of these pollutants have contributed to the recreational use impairment for Cranberry Creek.

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

Recreational water use impairment is determined using bacteria counts from water quality samples within watersheds. The recreational use for much of the Blanchard River watershed, **Cranberry Creek HUC-12** included, is primary contact (PCR). This use designation indicates that the water is likely being used for swimming. To assess bacteria counts fecal coliform bacteria is used as the indicator organism. If present in the water, the water has been contaminated with feces from a warm-blooded animal. The samples are reported in colony forming units or CFU per 100mL. When present at elevated levels, the risk for illness when in contact with the water increases. Criteria for sampling includes a minimum for 5 samples collected within a 30-day period (within the recreational season). The results are then computed into a geometric mean per site. Sites with a mean that exceed 1,000 CFU/100ml or 10% of the samples exceed 2,000 CFU/100mL are in violation. As shown earlier in Table 8 and 9, the greater Cranberry Creek HUC-10 greatly exceeds the limitations for fecal coliform counts.

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

Organic enrichment throughout the greater HUC was noted as priority impairment in the *Blanchard River Watershed TMDL,* 2009. According to USDA Census data, within **Cranberry Creek HUC-12** there are 392 septic systems with 3 people using each system on average. The septic system failure rate in this watershed is estimated to be 2.18%. The map to the right (TMACOG,2018), Figure 12 shows the total P load for HSTS within each HUC-12 in the WLEB. As you can see, Cranberry Creek HUC-12 has a marginal P load, within the range of 0.50-0.99 metric Ton/annum.

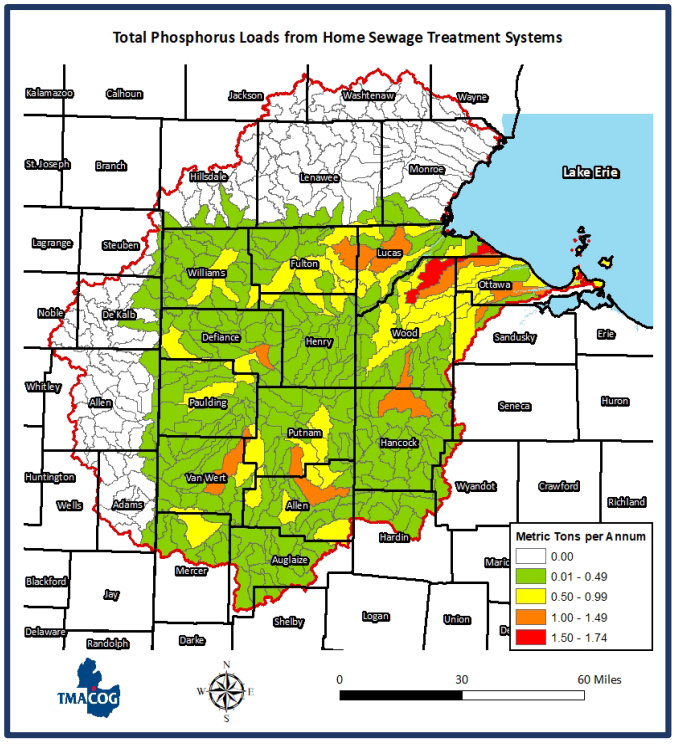


Figure 11: TMACOG, 2018 Map of P loading from HSTS within the WLEB

Data given by Allen County Health Department found that 130 systems have tile fields that are less than 45 years old. These systems utilize soil absorption and therefore do not discharge to Waters of the State. Another 46 systems had sand filters and were less than 35 years old. These systems are sending treated discharge into Waters of the State. Each of these systems are inspected annually to ensure they maintain compliance. The other systems are inspected every 10 years under the Operation and Maintenance Program unless a public nuisance is present. There are another 180 homes that are declared unknown. Which means one of two things, either the system was installed prior to 1974 and likely is failing or they only have a septic tank/tanks that directly discharge into an agricultural field or conduit. The 180 homes that have been declared

as unknown will be those of focus for the objective below.

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

Contributions from home sewage treatment systems should be addressed as significant nutrient contributions to meet the 40% reduction overall nutrient goals in the Ohio DAP. Estimates suggest the baseline load from HSTS at 570lbs, with a necessary reduction of 228lbs to meet the target goal of 242lbs.

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 HSTS in **Cranberry Creek HUC-12,** the following goals have been recognized:

Goal 1. Achieve the 40% phosphorus reduction in springtime load. In Critical Area #3 this means decreasing the springtime phosphorus load to at least 342 lbs./year.
X NOT ACHIEVED: Current estimated load contribution is 570 lbs./year.

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 P loading in the watershed.

Goal 2. Achieve Geometric Mean of recreation data for E. Coli of 126 colonies per 100ml.
X NOT ACHIEVED: Current estimated mean exceedances are 2,400 colonies per 100ml.

Overall Objective

To achieve progress toward reducing the springtime load (reduction of 228 lbs./year) within the realm of sewage loading in the watershed efforts must focus on widespread implementation of the below objectives within the critical area. In addition to this, any progress made here will provide further reduction of springtime load as well as the e. Coli concentration within **Cranberry Creek, HUC-12** watershed.

Objective 1: 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 **Cranberry 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 **Cranberry 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 (The 40% P reduction) to protect and restore the use attainment within Lake Erie. The Nutrient load reduction efforts align with the Lake Erie Collaborative Agreement and Ohio's DAP (OLEC, 2018).

For **Cranberry 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 **Cranberry 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 Cranberry 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: Cranberry Creek (HUC-12) (41000070601) —Critical Area #1							
Goal	**Objective**	**Project #**	**Project Title** (EPA Criteria g)	**Lead Organization** (EPA Criteria d)	**Time Frame** (EPA Criteria f)	**Estimated Cost** (EPA Criteria d)	**Potential/Actual Funding Source** (EPA Criteria d)
Urban Sediment and Nutrient Reduction Strategies							
Altered Stream and Habitat Restoration Strategies							
Agricultural Nonpoint Source Reduction Strategies							
High Quality Waters Protection Strategies							
Other NPS Causes and Associated Sources of Impairment							
Other NPS Causes and Associated Sources of Impairment							

Table 18: Critical Area #1- Project #		
Nine Element Criteria	**Information needed**	**Explanation**
n/a	**Title**	
criteria d	**Project Lead Organization & Partners**	
criteria c	**HUC-12 and Critical Area**	
criteria c	**Location of Project**	
n/a	**Which strategy is being addressed by this project?**	
criteria f	**Time Frame**	
criteria g	**Short Description**	
criteria g	**Project Narrative**	
criteria d	**Estimated Total cost**	
criteria d	**Possible Funding Source**	
criteria a	**Identified Causes and Sources**	
criteria b & h	**Part 1: How much improvement is needed to remove the NPS impairment for the whole Critical Area?**	
	Part 2: How much of the needed improvement for the whole Critical Area is *estimated* to be accomplished by this project?	
	Part 3: Load Reduced?	
criteria i	**How will the effectiveness of this project in addressing the NPS impairment be measured?**	
criteria e	**Information and Education**	

CHAPTER 5: WORK CITED

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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.

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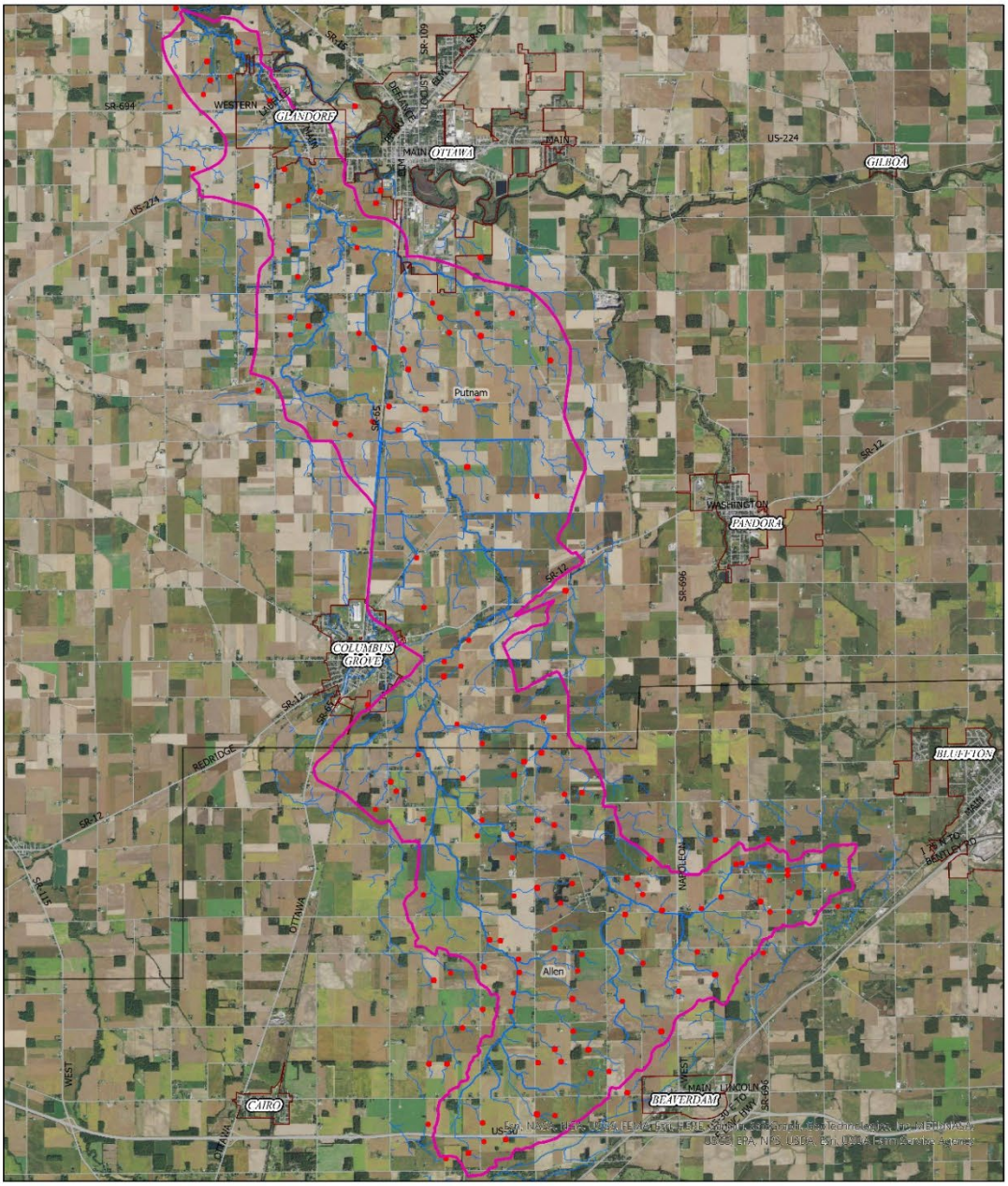
Agricultural Conservation
PLANNING FRAMEWORK

Cranberry Creek - ACPF: Bioreactors



Bioreactors
Watershed boundary
Counties
Cities and villages
Roads
Streams
Flow paths

0 2 4 8 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 2022 using the Agricultural Conservation Planning Framework tool developed by the USDA ARS (https://acpf4watersheds.org).

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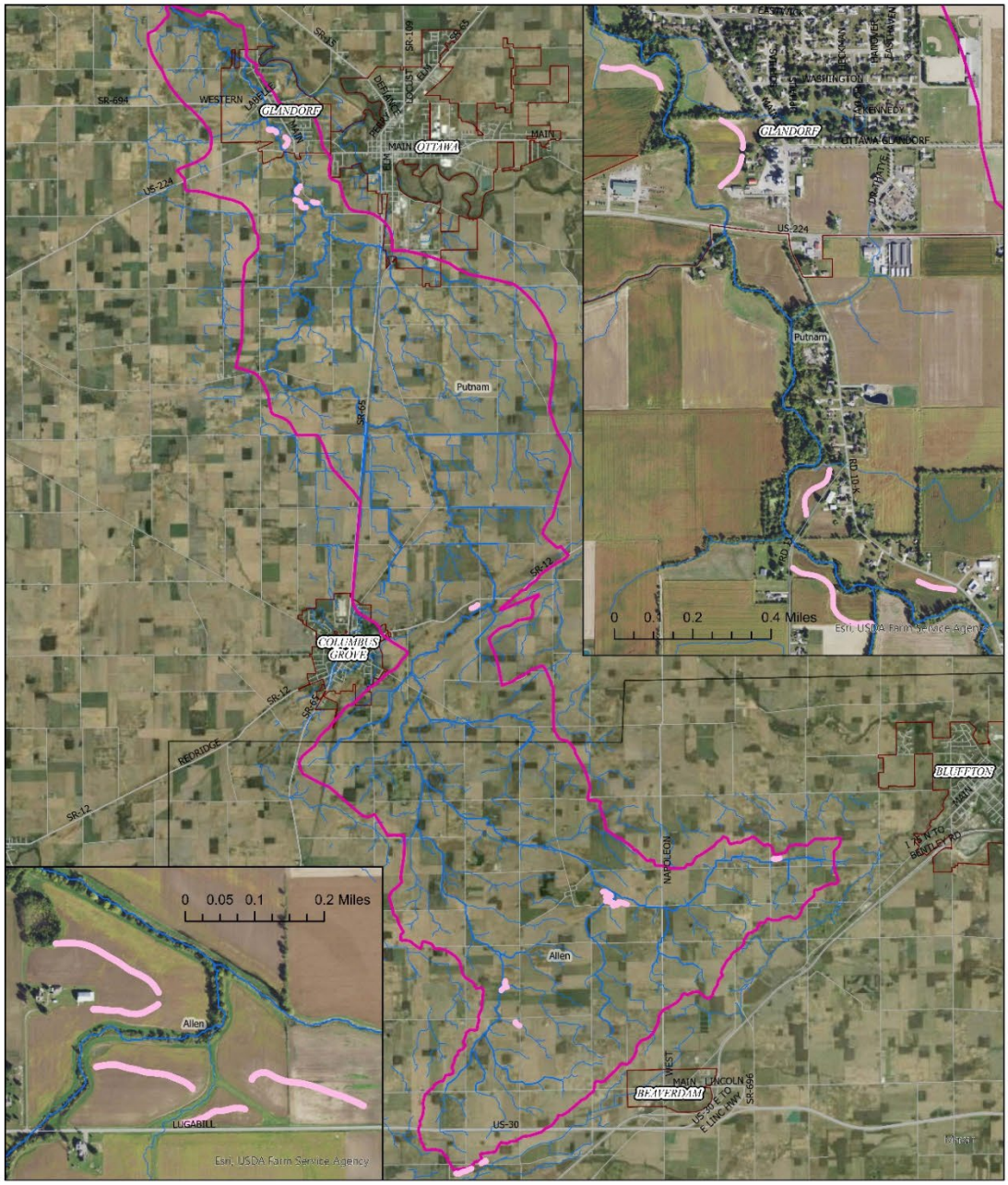
Agricultural Conservation PLANNING FRAMEWORK

Cranberry Creek - ACPF: Contoured Buffer Strips



Contoured buffer strips
Watershed boundary
Counties
Cities and villages
Roads
Streams
Flow paths

0 2 4 8 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 2022 using the Agricultural Conservation Planning Framework tool developed by the USDA ARS (https://acpf4watersheds.org).

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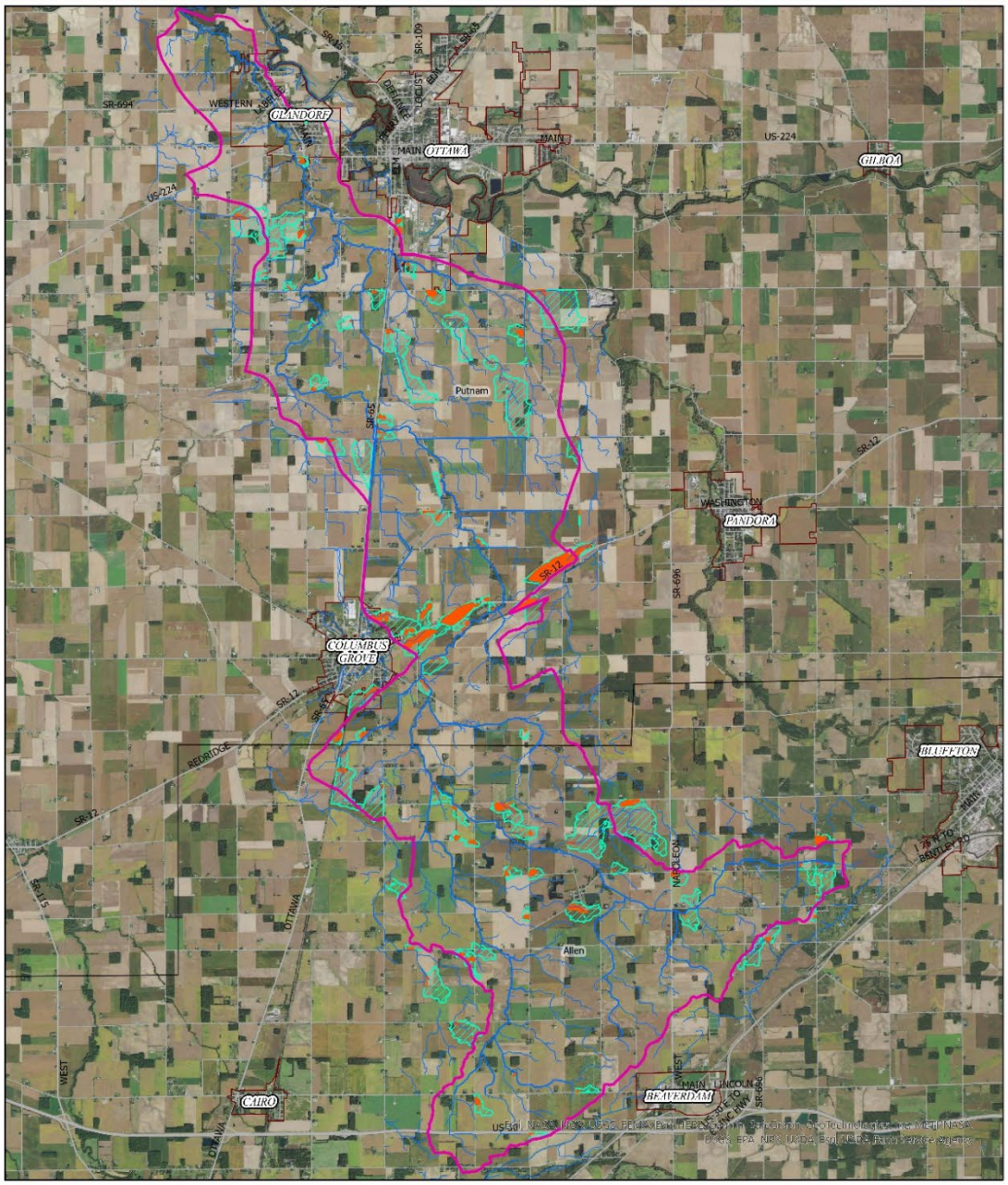
Agricultural Conservation PLANNING FRAMEWORK

Cranberry Creek - ACPF: Depressions



Depressions
Depression watersheds
Watershed boundary
Cities and villages
Counties
Roads
Streams
Flow paths

0 2 4 8 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 2022 using the Agricultural Conservation Planning Framework tool developed by the USDA ARS (https://acpf4watersheds.org).

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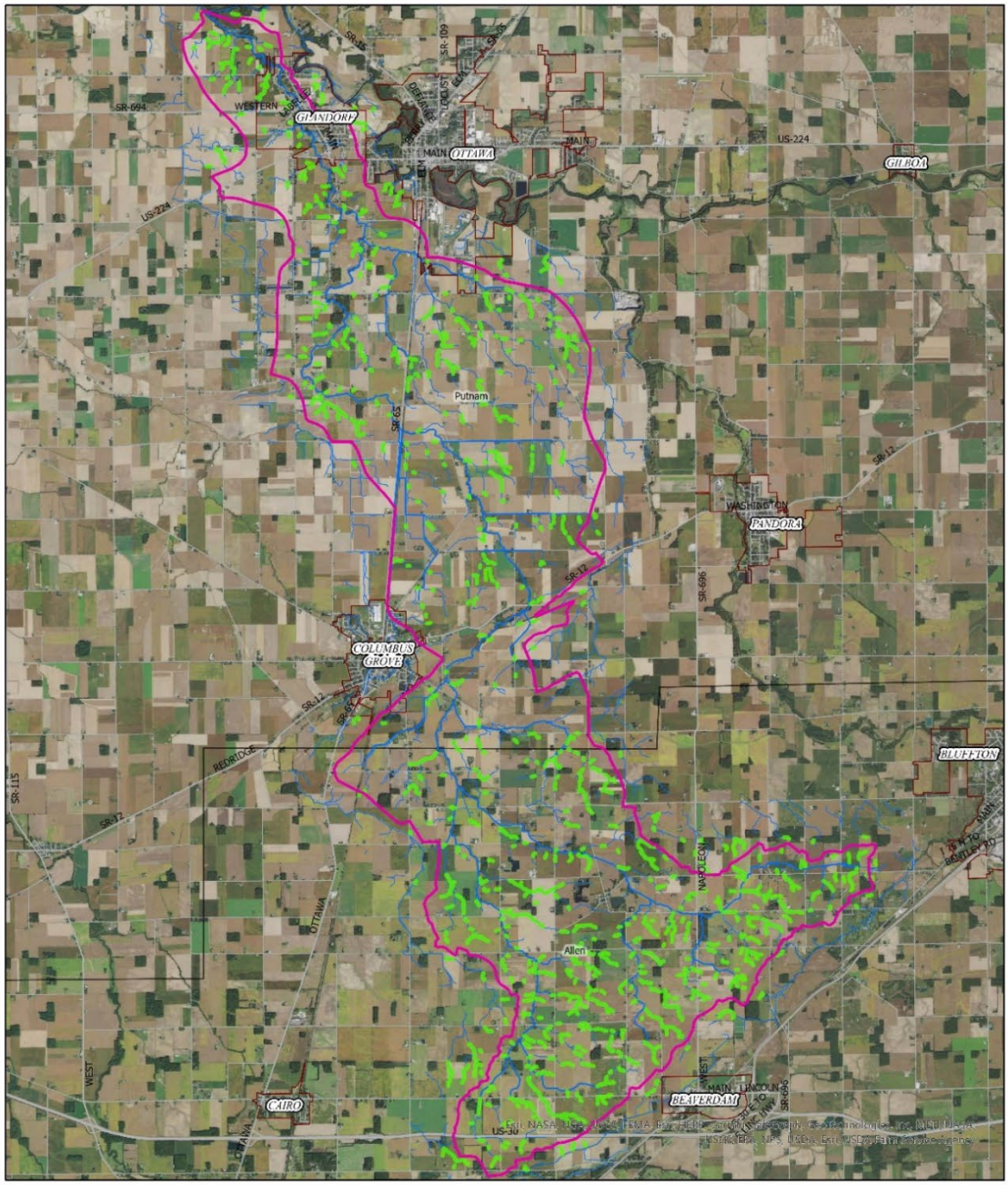
Agricultural Conservation PLANNING FRAMEWORK

Cranberry Creek - ACPF: Grass Waterways



Grass waterways (3sd)
Watershed boundary
Counties
Cities and villages
Roads
Streams
Flow paths

0 2 4 8 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 2022 using the Agricultural Conservation Planning Framework tool developed by the USDA ARS (https://acpf4watersheds.org).

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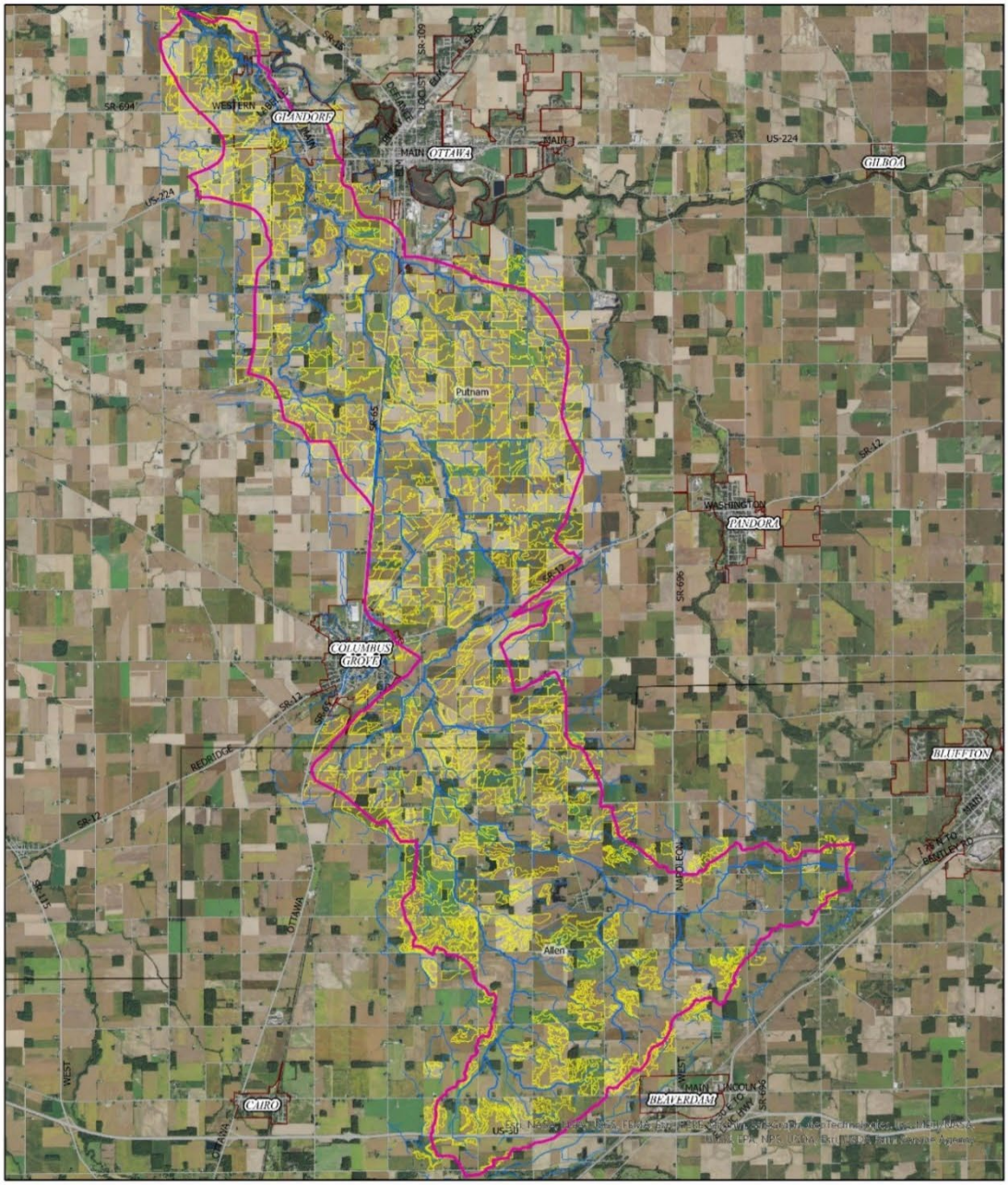
Agricultural Conservation
PLANNING FRAMEWORK

Cranberry Creek - ACPF: Drainage Management



Drainage management (0.5m contour > 10ac)
Watershed boundary
Counties
Cities and villages
Roads
Streams
Flow paths

0 2 4 8 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 2022 using the Agricultural Conservation Planning Framework tool developed by the USDA ARS (https://acpf4watersheds.org).

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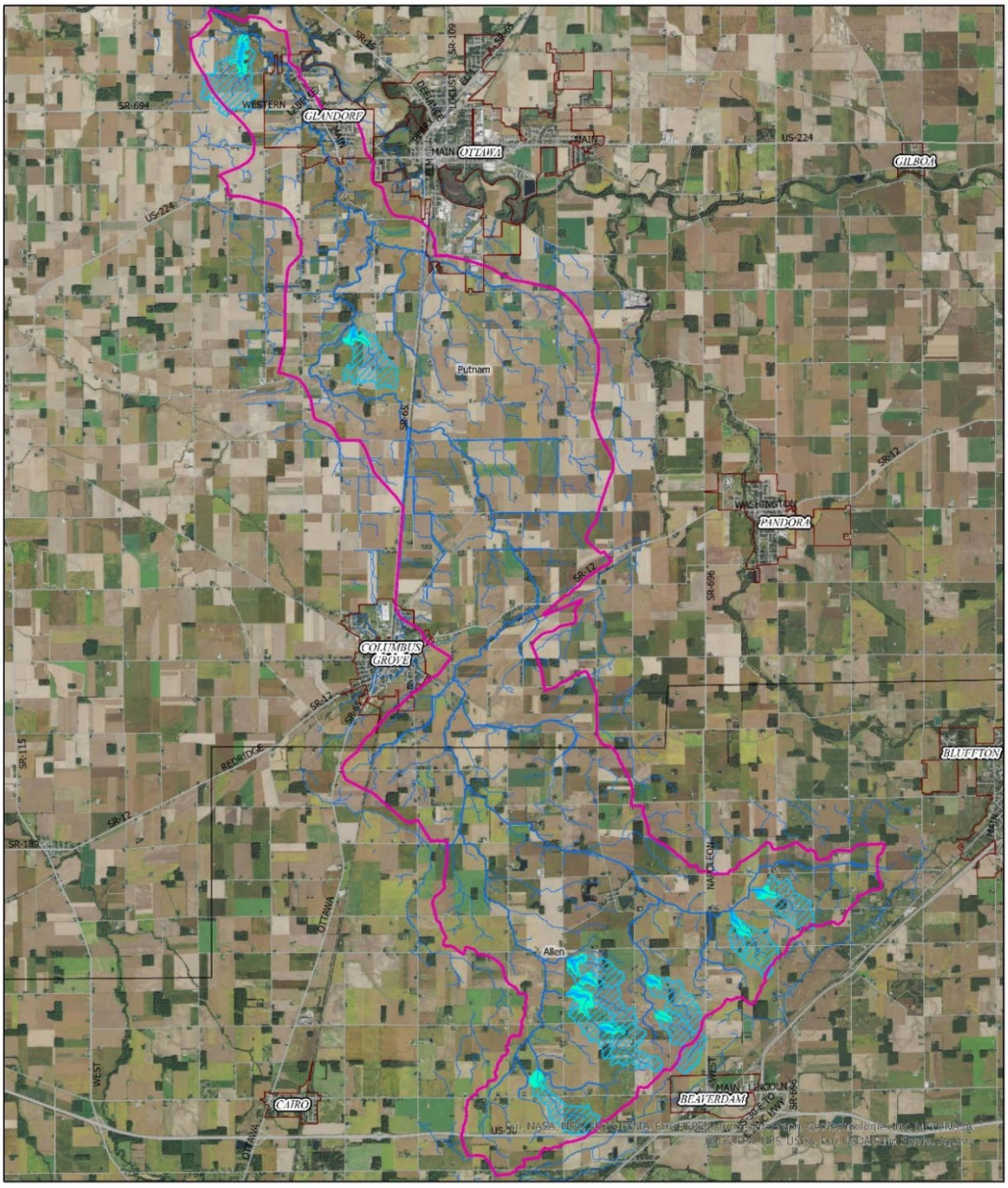
Agricultural Conservation PLANNING FRAMEWORK

Cranberry Creek - ACPF: Nutrient Removal Wetlands



Nutrient removal wetlands

- Buffer
- Wetland
- **NRW drainage areas**
- Watershed boundary
- Counties
- Cities and villages
- Roads
- Streams
- Flow paths

0 2 4 8 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 2022 using the Agricultural Conservation Planning Framework tool developed by the USDA ARS (https://acpf4watersheds.org).

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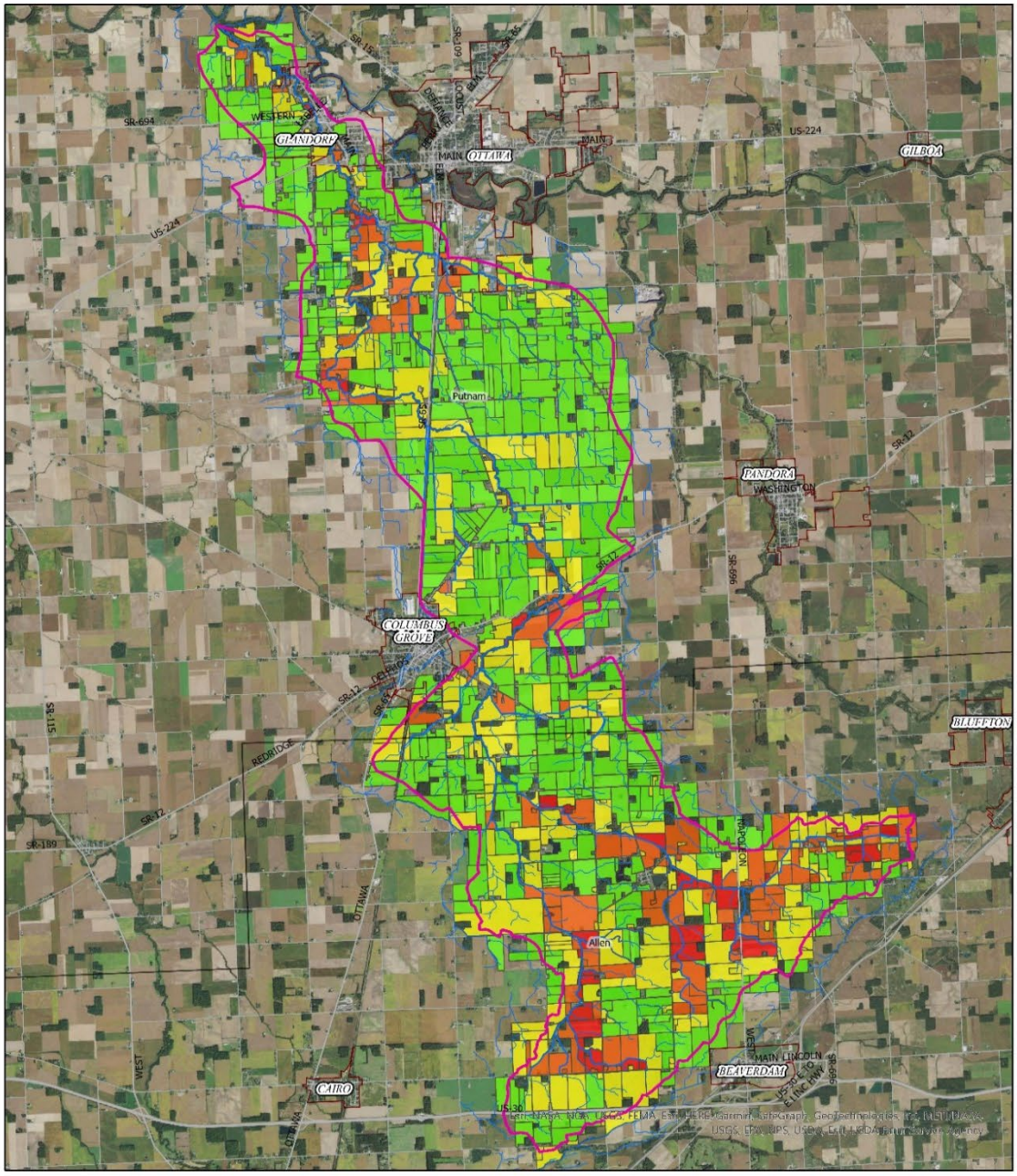
Agricultural Conservation PLANNING FRAMEWORK

Cranberry Creek - ACPF: Runoff Risk Assessment



Watershed boundary
Cities and villages
Counties
Roads
Streams
Flow paths

Runoff Risk
A-VeryHigh
B-High
C-Moderate
D-Low

0 2 4 8 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 2022 using the Agricultural Conservation Planning Framework tool developed by the USDA ARS (https://acpf4watersheds.org).

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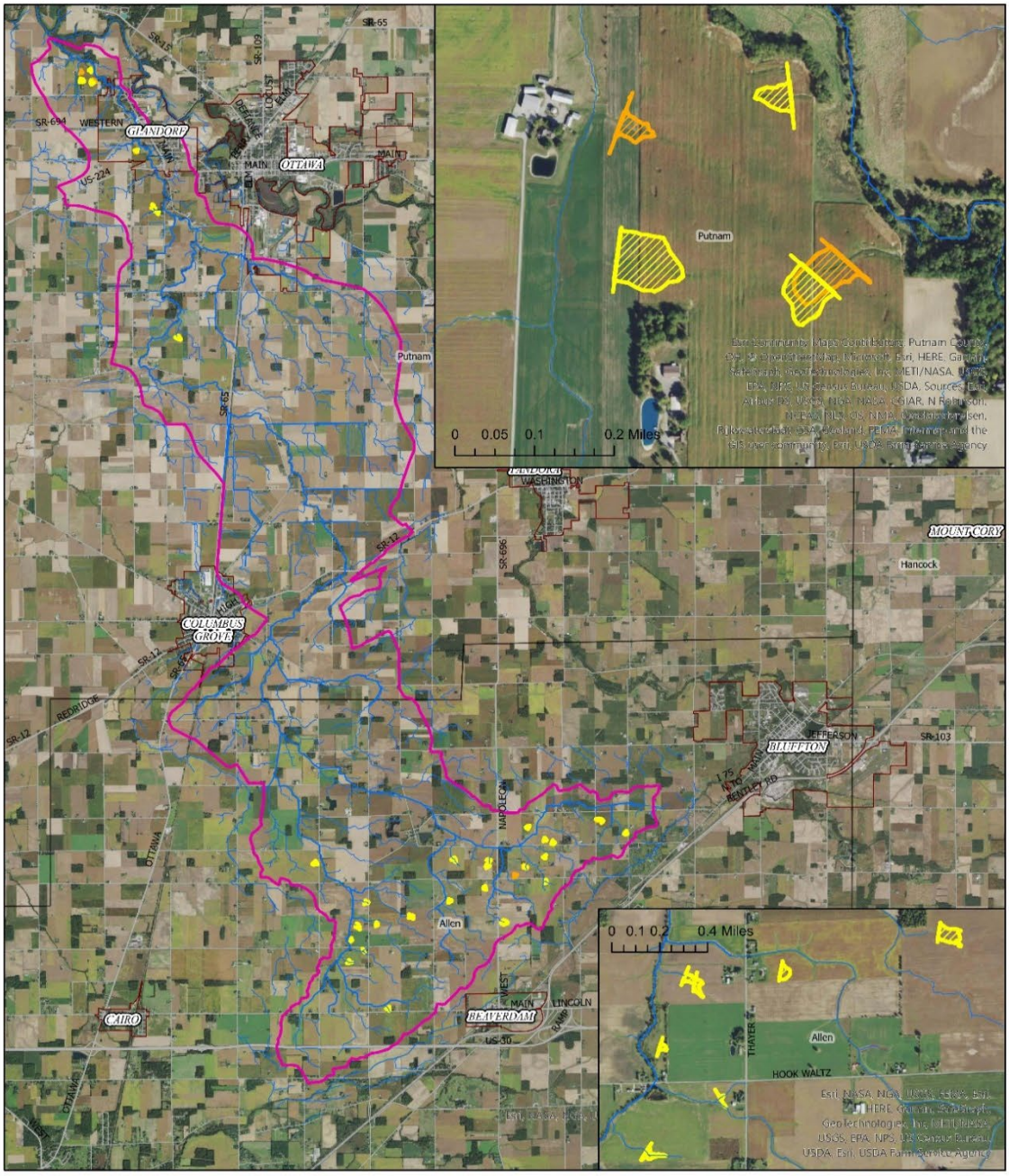
Agricultural Conservation PLANNING FRAMEWORK

Cranberry Creek - ACPF: Water and Sediment Control Basins (WASCOBs)



- WASCOBs (1m)
- WASCOB basins (1m)
- WASCOBs (1.5m)
- WASCOB basins (1.5m)
- Watershed boundary
- Counties
- Cities and villages
- Roads
- Streams
- Flow paths

0 2.25 4.5 9 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 2022 using the Agricultural Conservation Planning Framework tool developed by the USDA ARS (https://acpf4watersheds.org).

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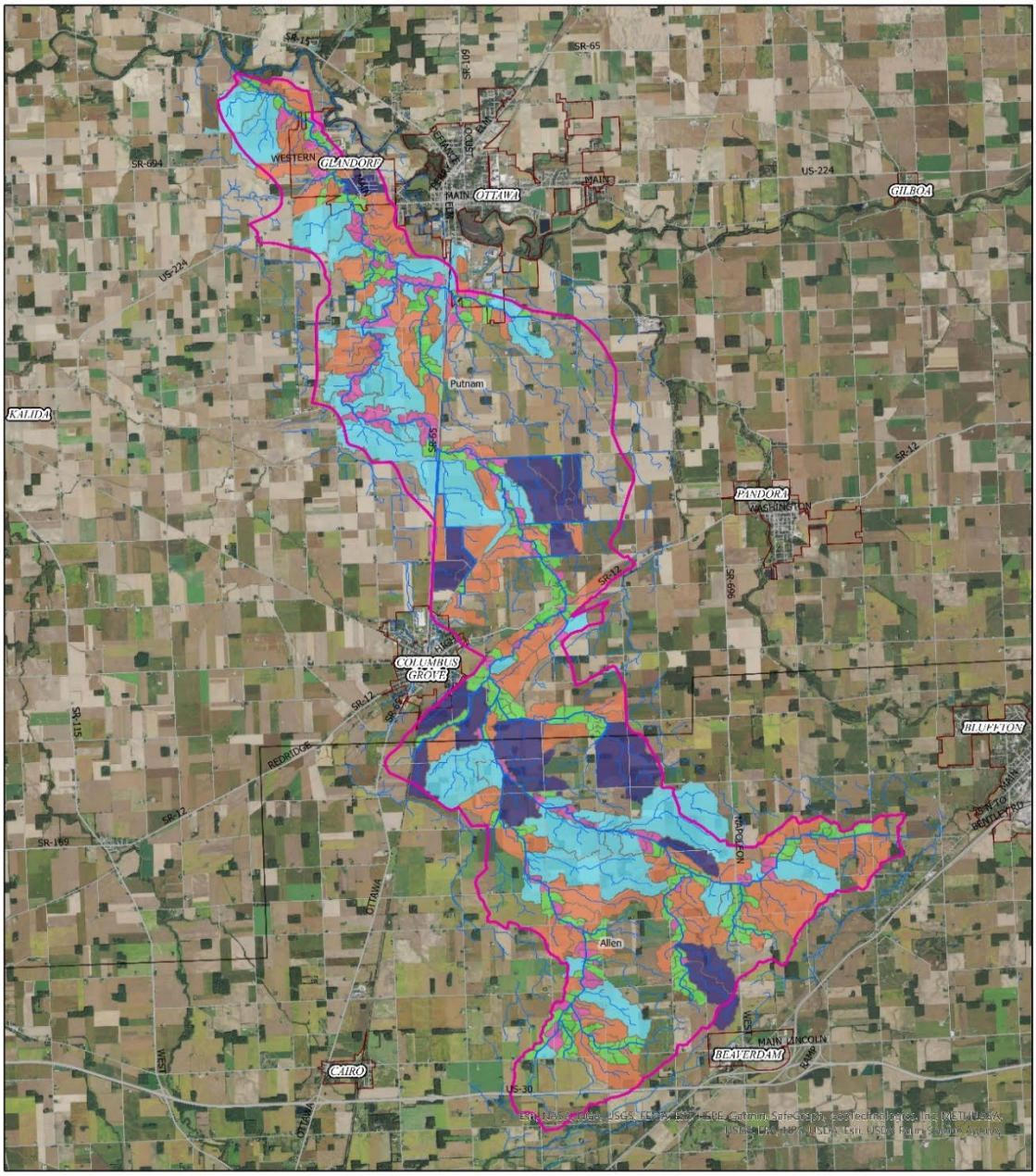
Agricultural Conservation PLANNING FRAMEWORK

Cranberry Creek - ACPF: Riparian Function Assessment



- 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

0 1.5 3 6 Miles

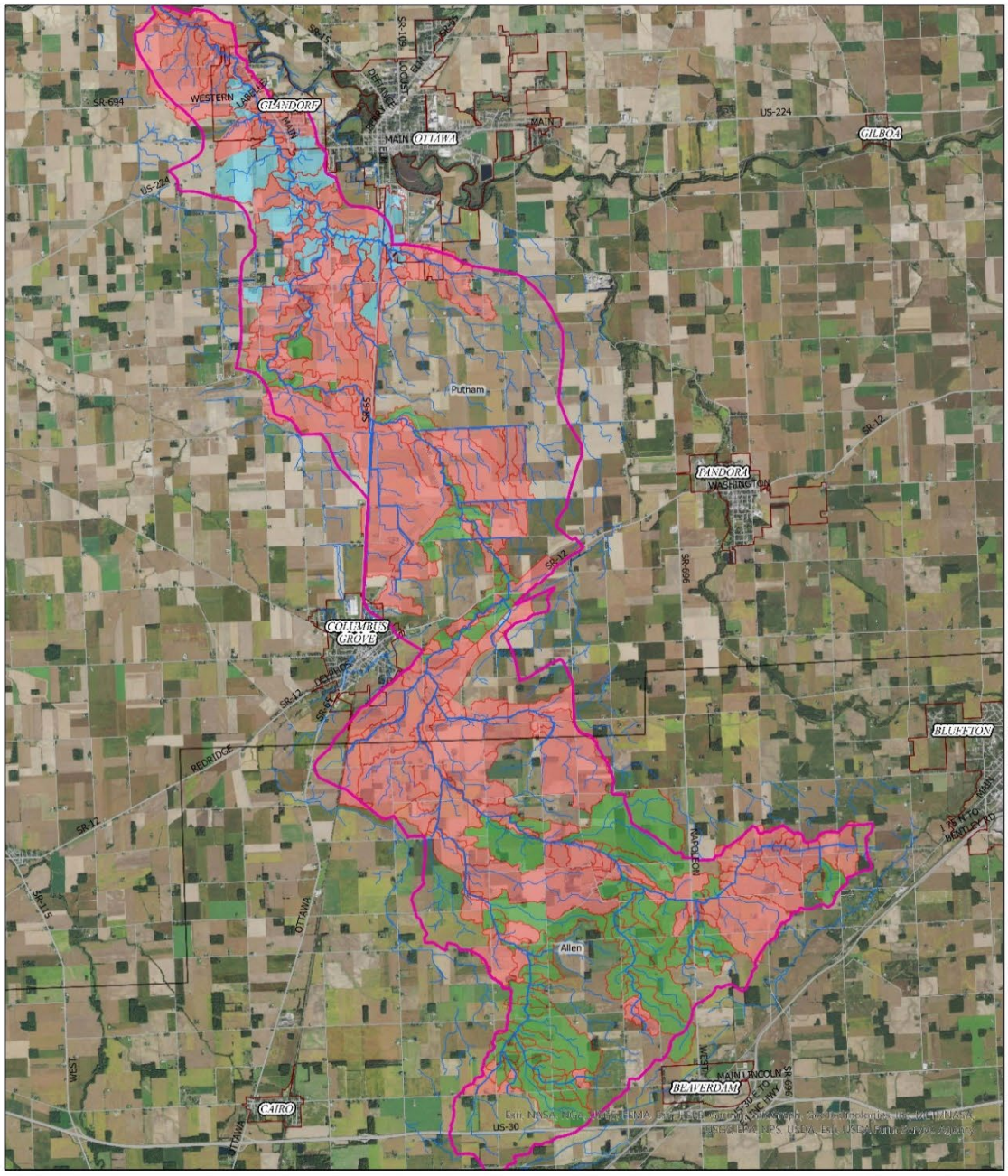
N

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 2022 using the Agricultural Conservation Planning Framework tool developed by the USDA ARS (https://acpf4watersheds.org).

THE OHIO STATE UNIVERSITY
EXTENSION

Agricultural Conservation PLANNING FRAMEWORK

Cranberry Creek - ACPF: Saturated Buffers



Saturated Buffers
- NO
- YES
- YES - Requires carbon enhancement
- Watershed boundary
- Cities and villages
- Counties
- Roads
- Streams
- Flow paths

0 2 4 8 Miles

N

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