The Outlet/Lye Creek Watershed Action Plan

(HUC #04100008-020)
(HUC #04100008-02)

Prepared and Written by
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In collaboration with:

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The Outlet/Lye Creek Watershed Action Plan Endorsement

The Blanchard River Watershed Partnership would like to thank and recognize the involvement and contributions of the many organizations and individuals who have had a part in the development of this community-based watershed action plan.

We, the undersigned, support and agree to pursue implementation of this Watershed Action Plan and agree to seek the necessary resources to improve over all water quality in The Outlet/Lye Creek subwatershed and the Blanchard River Watershed.

Hancock Co. Commissioners	Hancock Co. Engineer	Hancock Co. OSU Extension
Hancock County Board of Health	ODNR - Division of Soil and Water	Hancock Co. Soil & Water Conservation District
Hancock Regional Planning Commission	City of Findlay	Seneca Co. Soil & Water Conservation District
Amanda Township Board of Township Trustees	Biglick Township Board of Township Trustees	Jackson Township Board of Township Trustees
Marion Township Board of Township Trustees	Environmental Defense Fund - Lake Erie CREP	Wyandot County Health Department

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Preface

The development of The Outlet/Lye Creek Watershed Action Plan (WAP) began in the spring of 2007 with funding from the Environmental Defense Fund. The Blanchard River Watershed Partnership (BRWP) completed an stream observational walk of the area where landowners permission was given. Seventeen Water Quality Monitoring (WQM) sites were set up for the study of the macroinvertebrate population. The release of the "Biological and Water Quality Study of the Blanchard River" by the OEPA provided technical support data from the Total Maximum Daily Load (TMDL) study started in 2005 for the plan. Input from several meetings with OEPA, OSU Extension - Hancock County, Hancock SWCD, Environmental Defense Fund, City of Findlay officials, Hancock County officials, Steering Committee of the Blanchard River Watershed, and other watershed partners helped to provide a framework for the development of the watershed plan. Special thanks to the Sandusky River Coalition and Firelands Coastal Tributaries Coalition for allowing the BRWP to use their watershed action plans as a template for how an endorsed plan should be constructed.

Starting in January of 2009, the actual writing of the draft of The Outlet/Lye Creek started. The writing of the draft continued during 2009. The draft was submitted for review on December 30, 2009. Revision of the WAP was submitted to ODNR/OEPA during December, 2010. Additional funding from NOAA, through a Coastal Management Assistance Grant - Cycle 14 was used to fund the revision of this action plan during 2010-2011.

"This watershed action plan was prepared by the Blanchard River Water Partnership under award NA10NOS4190182 from the National Oceanic and Atmospheric Administration, U.S. Department of Commerce through the Ohio Department of Natural Resources, Office of Coastal Management. The statements, findings, conclusions, and recommendations are those of the author(s) and do not necessarily reflect the views of the National Oceanic and Atmospheric Administration, Department of Commerce, Ohio Department of Natural Resources, or the Office of Coastal Management."

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List of Acronyms Used

ACE(S)	Agriculture Conservation Experienced Services
AWS	Agricultural Water Supply
BMP	Best Management Practice
BOD	Board of Directors
BRWP	Blanchard River Watershed Partnership
CAP	Community-based Approach to Watershed Management
CF	City of Findlay
CMAG	Coastal Management Assistance Grant
CNPCP	Coastal Non-point Pollution Control Program
CREP	Conservation Reserve Enhancement Program
CRP	Conservation Reserve Program
CSW	Construction Storm Water
CWA	Clean Water Act
CZARA	Coastal Zone Act Reauthorization Amendments
CZMA	Coastal Zone Management Act
EDF	Environmental Defense Fund
EQIP	Environmental Quality Incentives Program
EWH	Exceptional Warm-water Habitat
FCE	Findlay City Engineers
FSA	Farm Service Agency
GIS	Geographic Information System
HCBH	Hancock County Board of Health
HCC	Hancock County Commissioners
HCE	Hancock County Engineers
HRPC	Hancock Regional Planning Commission
HSWCD	Hancock Soil Water Conservation District
HSG	Hydrological Soil Group
HSTS	Home Septic Treatment System
HUC	Hydrological Unit Code
IBI	Index of Biological Integrity
ICI	Invertebrate Community Index
ISW	Industrial Storm Water
IWS	Industrial Water Supply
LaMP	Lake-wide Management Plan
LEQI	Lake Erie Quality Index
LRW	Limited Resource Water
MIwb	Modified Index of Well Being
MWH	Modified Warm-water Habitat
NASS	National Agricultural Statistics Service
NCWQR	National Center for Water Quality Research
NOAA	National Oceanic and Atmospheric Administration

NPA	Nonpoint Assessment
NPS	Nonpoint Source
NPDES	National Pollutant Discharge Elimination System
NRCS	National Resource Conservation Service
NWOFMP	Northwest Ohio Flood Mitigation Partnership
OAC	Ohio Administrative Code
ODNR	Ohio Department of Natural Resources
OEPA	Ohio Environmental Protection Agency
ORC	Ohio Revised Code
OSU ext.	Ohio State University Extension
PCR	Primary Contact Recreation
PDWS (PWS)	Public Drinking Water Supply
PHC	Public Health Council
RM	River Mile
SDWA	Safe Drinking Water Act
STS	Sewage Treatment System
SWAC	Storm Water Management Action Committee
SWMP	Storm Water Management Plan
TMDL	Total Maximum Daily Load
TO/LC	The Outlet/Lye Creek
TSD	Technical Support Document (from OEPA to support TMDL studies)
USACE	United States Army Corp of Engineers
USDA	United States Department of Agriculture
USEPA	United States Environmental Protection Agency
USGS	United States Geological Survey
WAP	Watershed Action Plan
WCC	Wyandot County Commissioners
WCE	Wyandot County Engineers
WCHD	Wyandot County Health Department
WQM	Water Quality Monitoring
WQL	Water Quality Laboratory
WRP	Wetlands Reserve Program
WSWCD	Wyandot Soil & Water Conservation District
WWH	Warmwater Habitat
WWH	Warmwater Habitat
WY	Water Year

Acknowledgements

The development of this watershed action plan has not been an easy task. The entire process was new to the BRWP and to most of the stakeholders in the watershed. Money has been scarce and time commitment huge. However, the willingness of the many organizations and agencies to partner with the BRWP to share their expertise and resources to create this action plan has been the catalyst for its formation. Most of these agencies have been active in the conservation effort in the watershed over the past years. By refining these partnerships through mutual goals, the BRWP has developed resources and knowledge, and has continued the enthusiastic effort to enhance and protect the local streams, ditches, and the Blanchard River Watershed. The BRWP has provided a valuable resource to the local area, the Maumee River Basin, and the Lake Erie Basin.

The support from these groups is indicative of the effort needed in any community to protect one of the most valuable resources they have - clean water.

BRWP Partners and Supporters

Hancock Soil and Water Conservation District
Hancock County Engineers
Hancock County Commissioners
City of Findlay
Hancock Park District
Hancock Regional Planning Commission
Hancock Board of Health
Bluffton University
University of Findlay
Owens Community College
ODNR Office of Coastal Management
ODNR Division Of Soil & Water
ODNR Division of Wildlife
OSU Extension
Hancock County NRCS
Seneca County Commissioners
Seneca County SWCD
Northwest Ohio Flood Mitigation Partnership
Village of Bluffton
Village of Ottawa
Environmental Defense Fund
Ohio Environmental Protection Agency
Wyandot County Health Department
Wyandot Soil and Water Conservation District
Wyandot County Commissioners
Sandusky River Coalition
Blanchard River Watershed Partnership
Firelands Coastal Tributaries

Executive Summary

Watershed action plans guide land-use and other implementation strategies that are designed to produce water quality improvements that meet a water quality goal common throughtout Ohio: a statewide average watershed assessment score of 80 by the year 2010. The Blanchard River Watershed Partnership has prepared The Outlet/ Lye Creek Watershed Action Plan (WAP) to mitigate identified causes and sources of water quality impairments through non-regulatory adoption and implementation of best management practices. (BMPs).

The Outlet/Lye Creek WAP is based on the findings and recommendations of the Ohio EPA 2005 TMDL Study of the Blanchard River Watershed. The final TMDL Report was adopted in July 2009. The OEPA released on June 28, 2007 a related report called "Biological and Water Quality Study of the Blanchard River and Selected Tributaries2005." This report on the Blanchard River Basin provided technical support data for the WAP.

The first four chapters of The Outlet/Lye Creek WAP provide introductory and background information on a wide range of fundamental concepts that form the basis of the action plan. Chapter 1 provides information about what is a WAP and the involvement of the Blanchard River Watershed Partnership. Chapter 2 reviews what a watershed is and the ecology of a watershed. Chapter 3 addresses the federal, state, and regional policies that pertain to multiple water resource issues that are relevant to the stakeholders of The Outlet/Lye Creek watershed and the need to implement watershed management. Chapter 4 provides a watershed inventory of the physical and social resources found throughout The Outlet/Lye Creek watershed.

Chapter 5 and 6 discusses several important water resource concepts, such as "Designated Uses" and "Use Attainment." Designated uses that are relevant to The Outlet/Lye Creek watershed include Aquatic Life Use and Public Drinking Water Supply. Parts of The Outlet/Lye Creek watershed are in full aquatic life support use attainment (25%). Other parts of the watershed are either in partial or non-attainment (75%). The final Assessment Unit Score for the watershed was 53 out of a possible 100 points.

Chapter 7 provides an implementation plan for remediation and restoration of the identified problem areas within The Outlet/Lye Creek watershed. Water Quality impairments in The Outlet/Lye Creek watershed described by the Ohio EPA TMDL 2009 report include habitat/flow alteration, sedimentation, pathogens, and ammonia. These impairments encompass several sources that contribute to the pollutant loads or degraded habitat: agricultural runoff, failing home septic systems, loss of riparian buffers and wetlands, streambank and in-stream erosion, and urban runoff.

Chapter 8 provides an overview of how the Ohio Coastal Nonpoint Source Pollution Management Plan applies to The Outlet/Lye Creek watershed. Chapter 9 provides an overview of the budget that will be used by the BRWP during the next six years of the implementation phase of the WAP. Chapter 10

Chapter 10 discusses the evaluation plan the BRWP will use in evaluating the success of the implementation plan in addressing the impairments. The Outlet/ Lye Creek WAP is a living document and revisions are possible during the 6 year implementation phase. A complete revision will be addressed in 2018.

Through the use of The Outlet/Lye Creek WAP, the BRWP expects to bring the watershed into full attainment while empowering the community to take ownership of their water resource. This will ensure a clean and high water quality for future generations.

Special Thanks

No project as big as the writing of a watershed action plan could be accomplished without the help of many people. Below is a summary of people who were very important to the completion of this WAP.

Karen Chapman, Denny Tressel, & Dave Reese - Environmental Defense Fund
Cindy Brookes - Sandusky River Watershed Coordinator
Gary Wilson - Hancock OSU Extension
Katie McKibben - Ohio EPA
Hancock, Wyandot, & Seneca SWCDs
Dr. David Baker - Heidelberg University - NCWQR
Steve Lewis - ODNR Coastal Management - GIS Mapping
Scott Hardin - City of Findlay Auditor's Office - GIS Mapping
Board of Directors - BRWP
Steering Committee - BRWP
Matt Atkins - ODNR Coastal Management
Judy Withrow- Proofreading
Lindsey Summit - Hancock County Board of Health
Jeff Ritchey - Wyandot County Health Department
Jayla Wyatt McGuire - Typing
Steve Wilson - Hancock County Engineer
Brian Hurt & Meghan Clement - City of Findlay Engineer
Ed Crawford - ODNR Soil and Water

Finally, thanks to the numerous residents, farmers, and other stakeholders for their input and support in writing this action plan. Only through their stewardship has and will this WAP be successful.

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CHAPTER 1. Introduction

Purpose
Chapter 1 will introduce the reader to the purpose of The Outlet/Lye Creek watershed action plan. This chapter is designed to be a resource for learning what is involved in watershed planning and the "watershed approach" to solving water quality problems in The Outlet/Lye Creek subwatershed. This chapter also will introduce potential partners to the efforts of the the Blanchard River Watershed Partnership (BRWP) partners.

Chapter Acknowledgements
This chapter was prepared using material from *The Sandusky-Tiffin and Old Women Creek Watershed Action Plan* with permission and by the watershed coordinator and BRWP partners.

Purpose of The Outlet/Lye Creek Watershed Action Plan

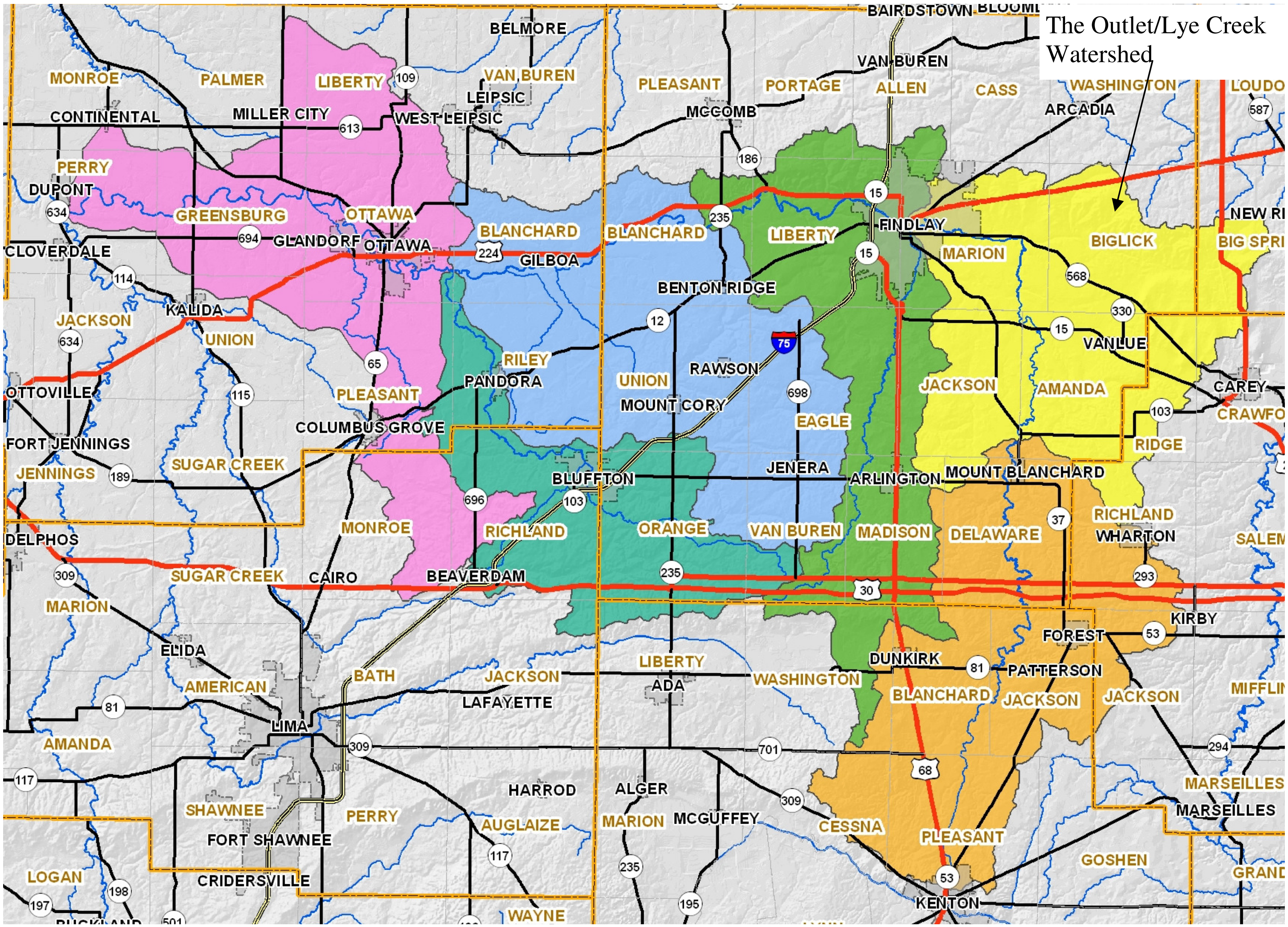
The basic purpose in developing and implementing a Watershed Action Plan (WAP) for The Outlet/Lye Creek subwatershed is to achieve environmental objectives, including public health, regarding Ohio's surface and ground water resources. Watershed action plans guide implementation strategies that are designed to produce water quality improvements in accord with the Ohio's water quality goal of a statewide average watershed assessment score of 80 out of 100 on the Ohio Water Quality Assessment Unit Standards by 2010. Since each subwatershed is unique, a WAP that is specific to an individual watershed is necessary for achieving local goals and objectives. Local participation and approval are necessary in order to fully account for the local nature of issues and for both the planning process and resulting WAP to establish legitimacy among the watershed residents.

The Outlet/Lye Creek WAP is based on the findings and recommendations of the Ohio EPA's Total Maximum Daily Loads (TMDL) study conducted in the Blanchard River Watershed in 2005. The United States Environmental Protection Agency (USEPA), Division of Surface Water approved the Final TMDL Report in July 2009. This TMDL report addresses the results of the 2005 field study of chemical, physical, and biological conditions in order to determine if streams and rivers in The Outlet/Lye Creek watershed study area were attaining their designated uses. Map 1.1 on page 1-2 shows The Outlet/Lye Creek subwatershed's location in the Blanchard River Watershed.

Stakeholders' Participation

The initial planning process for developing The Outlet/Lye Creek WAP was conducted by the Blanchard River Watershed Partnership (BRWP). A two-phase process was developed. In Phase I, a Stream Observational walk was conducted. Landowners along the Blanchard River, Lye Creek, and The Outlet were contacted for permission to walk along the waterway area. Data collected was used, along with the TMDL report and the OEPA, to develop problem statements for the subwatershed that are discussed in Chapter 7. Phase II involved a Water Quality Monitoring (WQM) study using macroinvertebrates. Twelve to seventeen sites were identified based on the TMDL sites. Monitoring has been

Map 1.1 The Outlet/Lye Creek's location in the Blanchard River Watershed



conducted starting in the spring of 2007 and continuing to the present. Monitoring occurs in June and October.

The problem statements listed the identified the problems, cause(s), source(s), remedial action(s), goal(s) for attainment, and best management practices (BMPs) needed to receive the desire attainment goal. These BMPs were selected by professional individuals in the Blanchard River Watershed.

What is a Watershed Action Plan?

A Watershed Action Plan (WAP) is a comprehensive plan that addresses how to protect, restore, and improve a watershed. A WAP includes an inventory of the watershed resources, identifies and evaluates problems within the watershed, and develops problem statements which will lead to a means of restoring and protecting the watershed using best management practices. Figure 1.1 illustrates how to develop a watershed plan.

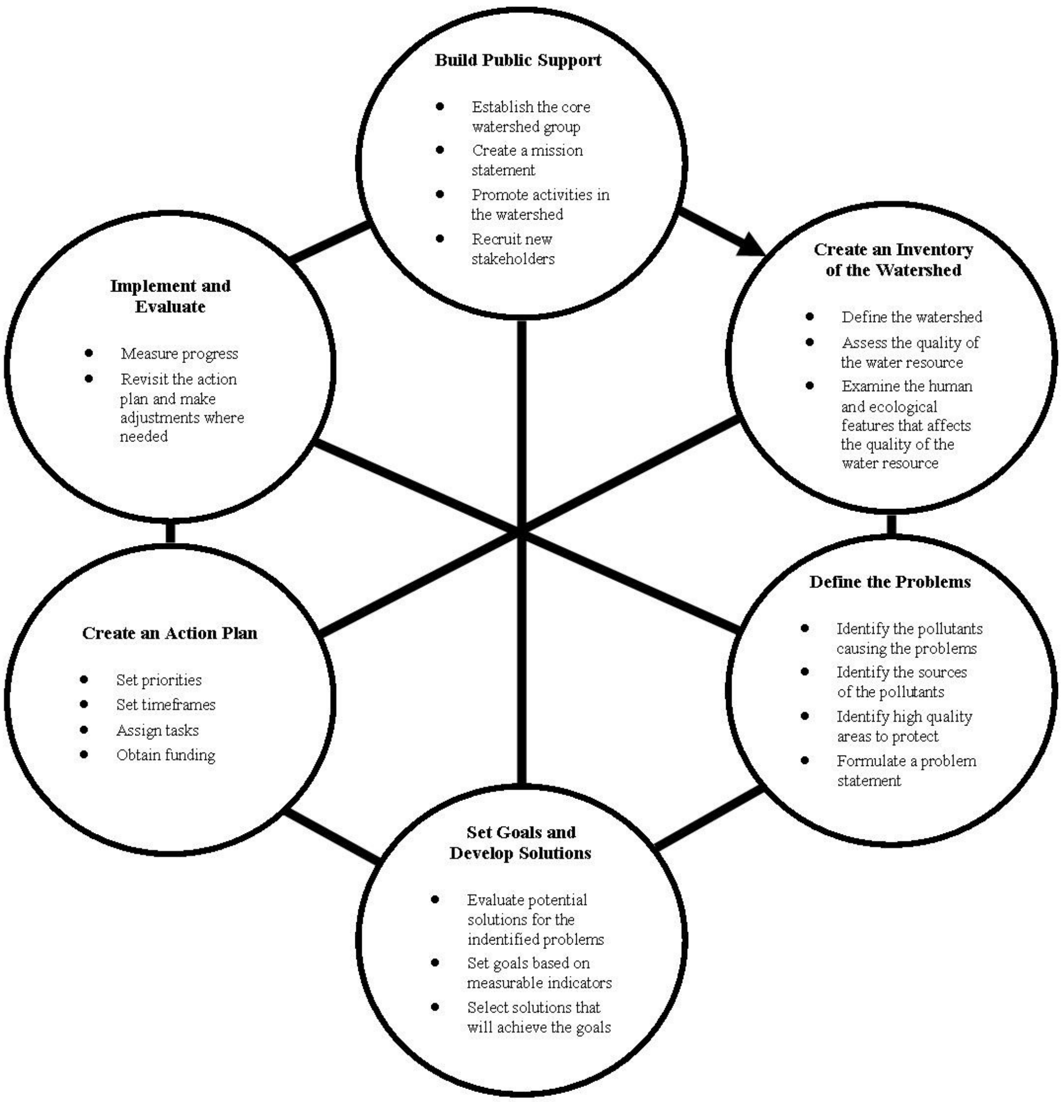


Figure 1.1 Implementing the Watershed Approach (OEPA, 1997)

What is watershed management?

According to The Ohio State University Fact Sheet WS 0001:

> *Watershed management consists of those human activities aimed at controlling, enhancing, and/or restoring watershed functions. In the past, watershed management in Ohio was viewed largely as the responsibility of government agencies and conservancy districts and was focused primarily on controlling the flow of water through the construction of dams and levees to protect human communities from flooding, store water for times of drought, and provide opportunities for water-related recreation.*
>
> *But this emphasis on structural solutions to water storage and flooding has given way to a new approach that recognizes the multitude of functions watershed provide and the need to meet multiple objectives such as flood prevention, erosion control, wildlife habitat, and provision of recreation.*

This new approach is a **Community-Based Approach to Watershed Management (CAP).** In this approach, instead of decisions and actions originating at the top level, (government), all decisions include input from everyone (stakeholders) in the watershed. These stakeholders include federal, state, and local officials, as well as educators, concerned citizens, and private interests. The over-all goal of a CAP is to restore and maintain the biological, chemical, and physical integrity of the water resources in the watershed while causing no adverse effects on the economy of the local communities involved. A CAP includes a comprehensive effort by the social and political communities to address issues associated with water quality, water quantity, and the impact on the health and well being of the watershed. Thus, the result of a CAP is to achieve the environmental objectives as they apply to Ohio's water using a strategic management approach.

Blanchard River Watershed Partnership

The Blanchard River Watershed Partnership is a community-based volunteer organization that seeks to address problems and concerns that affect the health of the Blanchard River Watershed and educate all citizens about the dynamics of the Blanchard River and its tributaries. The BRWP members include interested citizens, local governments' agencies, educators, representatives of industry, conservation groups and agencies, and other stakeholders. They have all come together with one goal in mind: to improve and maintain water quality within the watershed. One of the main ways to achieve improved water quality is through the development of watershed action plans for each of the six subwatersheds located within the Blanchard River Watershed. The BRWP received its 501c3 Public Charity status on July 26, 2006. The Partnership has received several grants that have allowed the group to begin a WQM program. The group is also involved with several outreach and education programs throughout the water-shed. The Partnership hired a part-time coordinator in January of 2009 to facilitate the writing of this WAP and achieve other objectives of the BRWP.

Figure 1.2 BRWP Logo

The Partnership is organized around a membership that includes both individuals and organizations. From the membership, an elected Board of Directors (BOD) and the steering committee comprise the main working groups of the Partnership. The BOD is comprised of nine members that serve three-year terms. There is one member from each of the six subwatersheds and three at-large members. Table 1.1 on page 1-7 shows the membership of the Steering Committee while Figure 1.3 on page 1-6 shows the Organizational Chart for the group. The steering committee includes not only the elected BOD but a representative from each standing committee and strategic issues committee. Ex-officio members of the steering committee consist of government and educational personnel as determined by the steering committee. Ex-officio members do not have a vote but provide valuable leadership to the group. Monthly public meetings are held by the steering committee to guide the Partnership activities. The Partnership is governed by a set of by-laws that are also available for review on the Partnership's web site: http://www.blanchardriver.org. The watershed hired a part-time coordinator, Phil Martin, during 2009. The coordinator can be contacted at 419-422-6487.

Between 2005 and 2008, the Partnership gathered information based on the Appendix 8 Update provided by the OEPA for developing local WAPs. In the summer of 2008, the Partnership decided to develop the WAPs for the Blanchard River Watershed on the HUC 11 digit level. This will allow for more localized WAP and provide a more focused plan for improving and restoring water quality in the entire watershed. The Outlet/Lye Creek subwatershed was the first subwatershed selected. During the summer of 2009, plans were started for doing a WAP in the Riley Creek subwatershed. The completion of each new WAP is dependent on both local acceptance and state endorsement.

Figure 1.3

Organizational Chart for Blanchard River Watershed Partnership

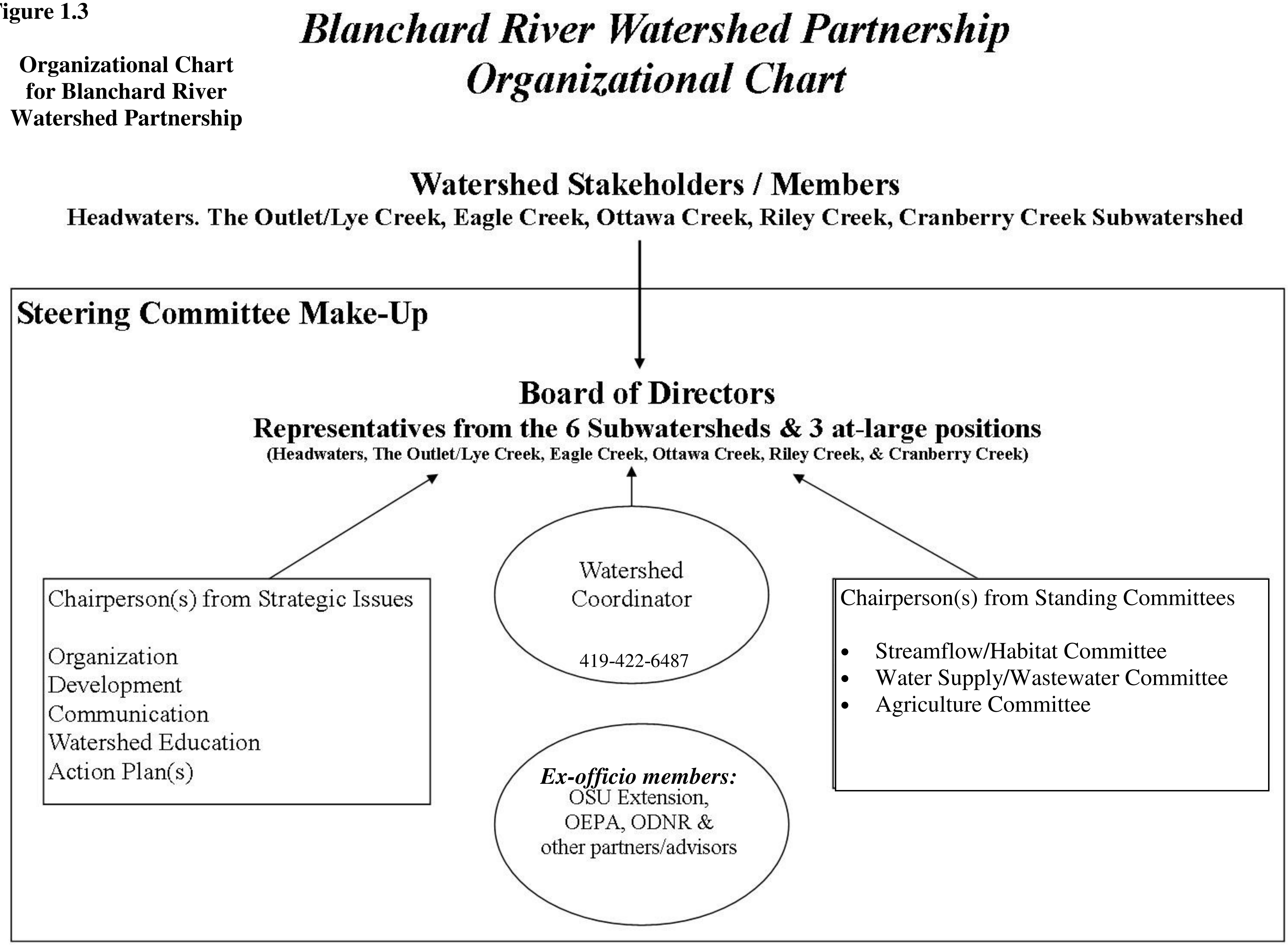


Table 1.1 Steering Committee of Blanchard River Watershed Partnership

Seat	Election Year	Most Recent of Current Representative
Subwatersheds		
Headwaters*	2009	Theresa Allen, Resident Hardin County
The Outlet/Lye Creek*	2011	Richard Koslowski, Resident of Findlay
Eagle Creek*	2010	Bob Connour, Owens Community College
Ottawa Creek*	2009	Leo Schroeder, Businessman and Farmer
Riley Creek*	2010	Nancy Benroth, Village of Bluffton
Cranberry Creek*	2011	Jeff Loehrke, Village of Ottawa
At-Large #1*	2010	Tim Brugeman, Hancock Park District
At Large #2*	2012	Sarah Lehman, Resident of Allen County
At-Large #3*	2011	Anna Creswell, Hardin Northern HS.
Standing Committees		
Streamflow/Habitat	2009	Sarah Betts, Hancock Park District
Water Supply/ Waste Water	2009	Randy Greeno, Findlay Pollution Control Center
Agriculture	N/A	No Representative
Strategic Issues		
Organization	2008	Terry Schwaner, University of Findlay
Development	2008	Richard Kozlowski, Resident of Findlay
Communications	2008	Doug Switzer, Resident of Findlay
Education	2008	Bob Connour, Owens Community College
Action Plan(s)	2008	Phil Martin, Resident of Findlay
Ex-officio		Multiple Individuals

*Members of the Board of Directors

Blanchard River Watershed Partnership

Mission Statement:

To create partnerships that will promote watershed awareness, responsible land use and management decisions, to restore and preserve water quality, and to protect and enhance watershed functions.

Motto:

Action Today, Cleaner Water Tomorrow

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Chapter 2. Watershed Science Overview

Purpose

In this chapter, the reader will find information about the science of watershed, including geographic scale, the water cycle, ecosystem's dynamics, and water pollution from a nonpoint source. This chapter is designed to be an educational resource for understanding how watersheds work and how a watershed is affected by land use.

Chapter Acknowledgements
This chapter was prepared using material from *The Sandusky-Tiffin and Old Women Creek Watershed Action Plan with permission* and by the watershed coordinator and BRWP partners.

What is a Watershed?

A watershed is any area of land where surface water drains into a common body of water, such as a river, lake, or wetland. If water from a certain area drains into a particular body of water, then that certain area shares a common watershed. A watershed can contain one or more of the following features: streams, ditches, ponds, lakes, and/or wetlands. A watershed is also known as a "drainage basin" and/or "hydrological unit."

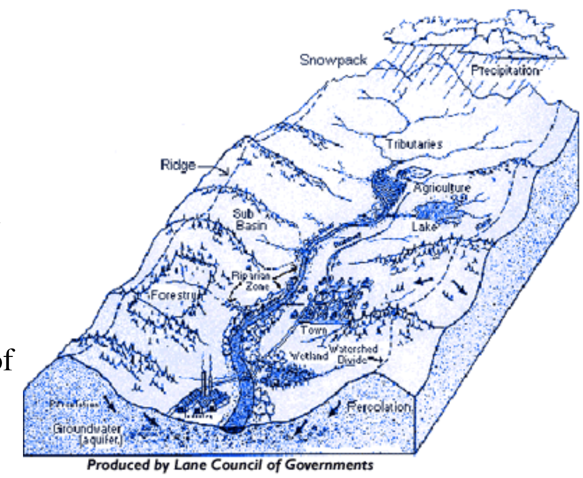


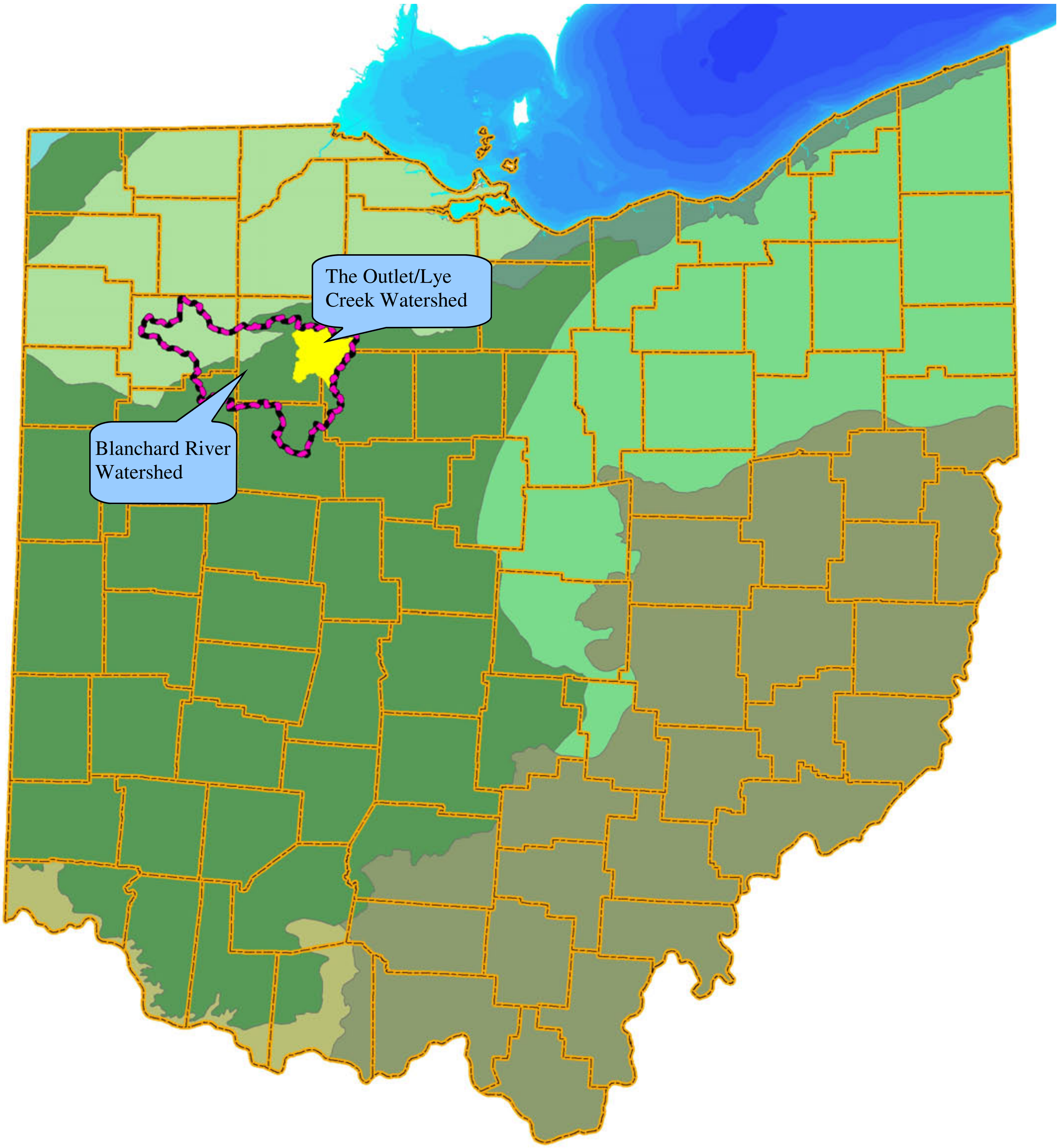
Figure 2.1 Watershed diagram

The Outlet/Lye Creek map (See map 2.1 pg. 2-2) shows the location of the watershed within the larger Blanchard River Watershed. The Blanchard River Watershed includes areas in six counties. The Blanchard River Watershed is located within the larger Maumee River Basin which is located in the Western Lake Erie Basin.

The Blanchard River Watershed is identified using an 8 digit Hydrological Unit Code (HUC), 04100008. There are six subwatersheds located within the Blanchard River Watershed. Each of these subwatersheds is identified using an 11 digit HUC. The Outlet/Lye Creek subwatershed's HUC is 04100008-020. There are 5 smaller 14 digit HUC subwatersheds located in The Outlet/Lye Creek subwatershed. Map 2.2 (see pg. 2-3) shows the 14 digit subwatersheds.

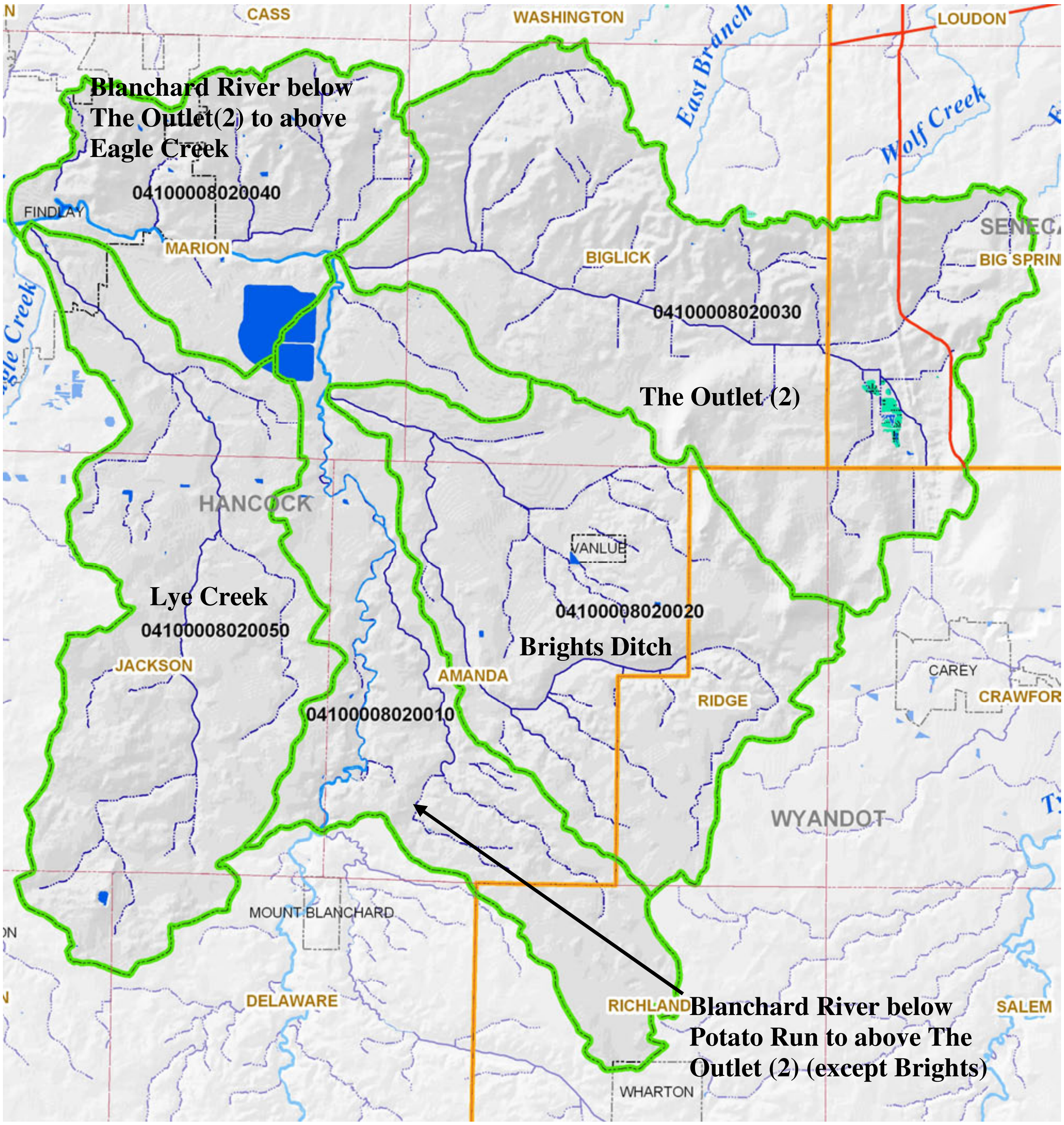
The Blanchard River Watershed is also a part of the Western Lake Erie Basin (WLEB). The Blanchard River flows into the Auglaize River which flows into the Maumee River in Defiance. The Maumee River flows into Lake Erie in Toledo. Thus, the Blanchard River flows into Lake Erie and is subjected to the rules and regulation pertaining to Lake Erie. Chapter 3 will go into more details on what rules and regulations apply to Lake Erie and the Blanchard River. Map 2.3 (see pg. 2-4) shows the location of the Blanchard River Watershed in the WLEB.

Map 2.1 The Outlet/Lye Creek location within the Blanchard River Basin and Ohio



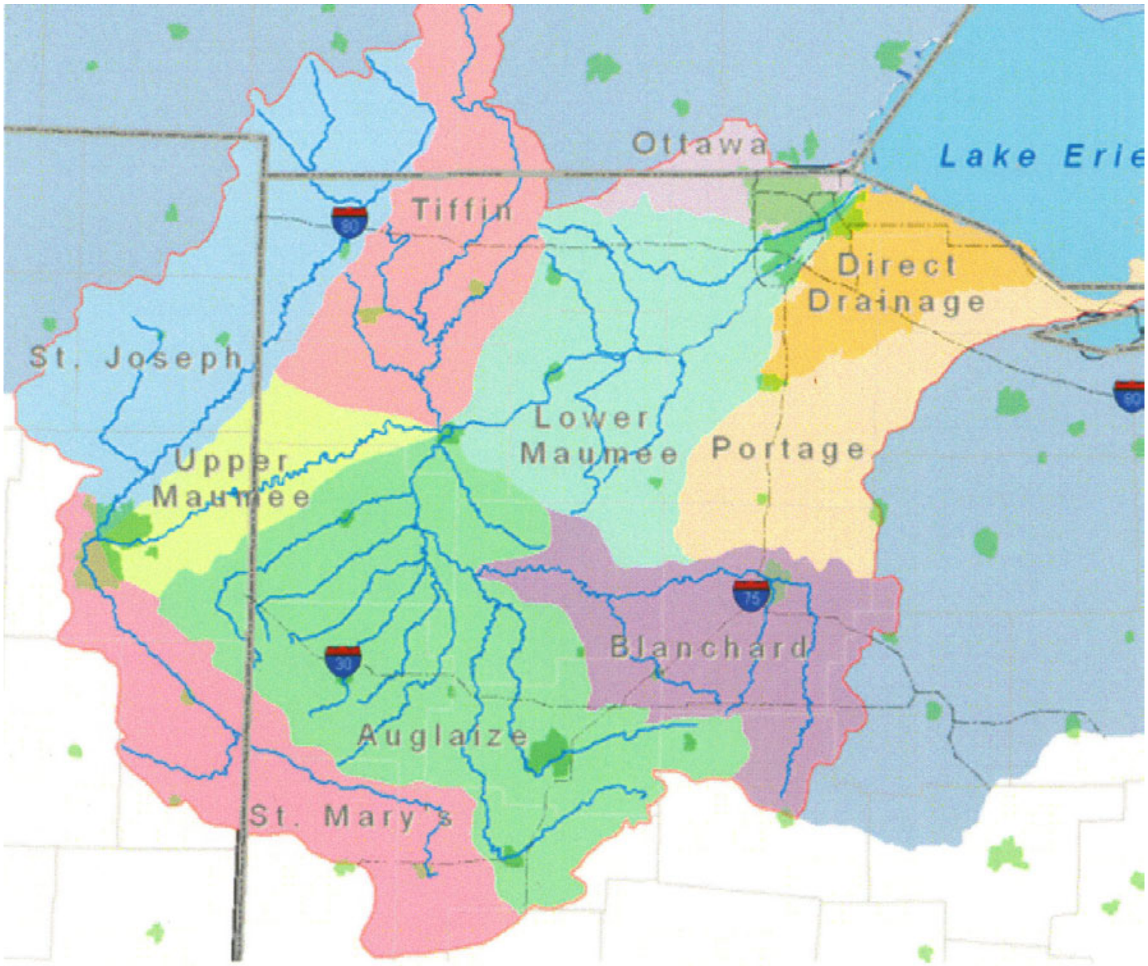
ODNR Coastal Management

Map 2.2 14-Digit Watersheds in The Outlet/Lye Creek Watershed



ODNR Coastal Management

Map 2.3 Location Of Blanchard River Watershed in the Western Lake Erie Basin



Ohio WLEB map

Hydrologic (Water) Cycle

All the water on Earth is stored in three reservoirs: surface water (streams, lakes, oceans, and glaciers), underground (groundwater), and atmosphere (clouds). Basically, water travels through these reservoirs by a process known as the water cycle. Water that falls from the sky may become run-off, infiltrate into the ground, or evaporate/transpire back into the atmosphere depending on the conditions of the area. Once water has returned to the atmosphere, it has completed the process and the cycle starts again. Water is essential to the weather patterns and climate system of the Earth. As water circulates through the process, weather conditions are distributed throughout the Earth creating various landscapes and ecosystems. The Great Lakes naturally maintain their water quantity through the inflows (precipitation and run-off) and outflows (evaporation and discharge to the Atlantic Ocean) as part of the global water cycle. The Great Lakes become the "battle ground" for air masses bringing warm moist air up from the Gulf of Mexico and running into cold dry air masses from the Arctic area. As a result, the phrase "wait a day, the weather will change" applies to the Great Lakes region.

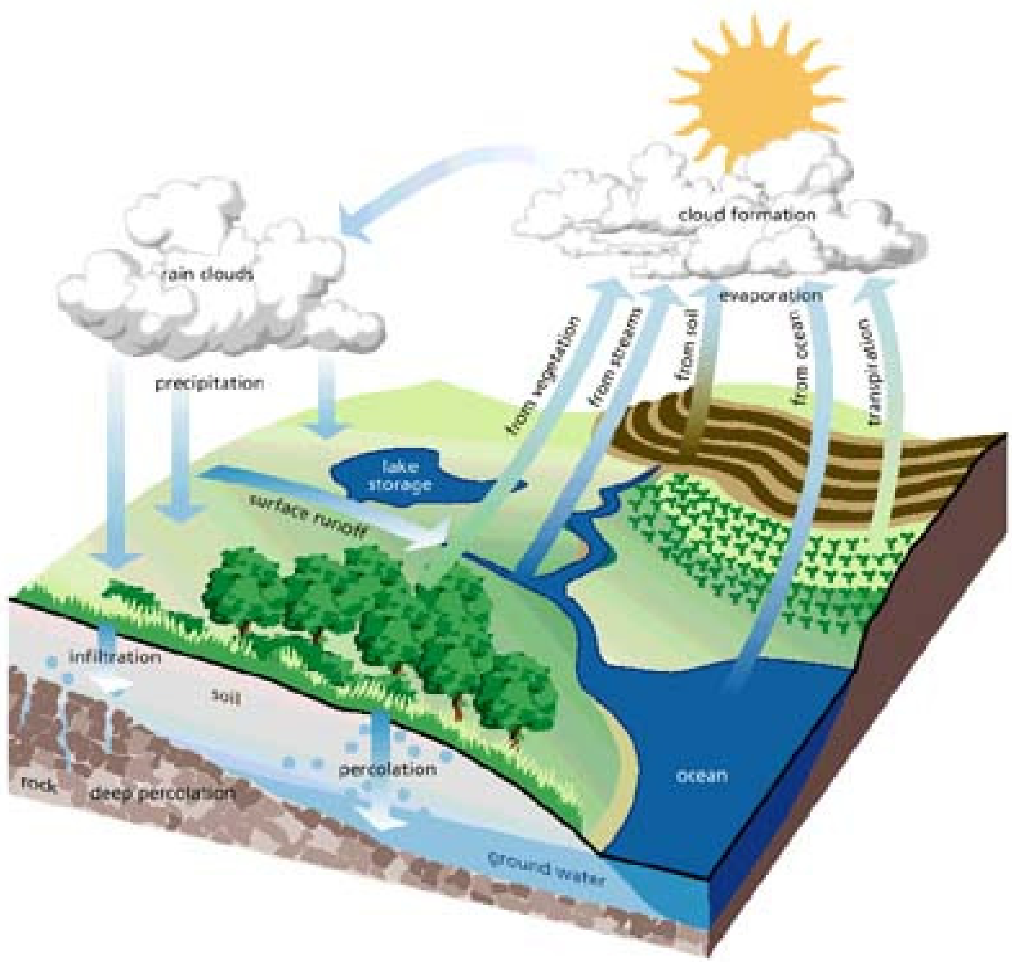


Figure 2.2 Water Cycle http://www.epa.gov/watertrain/ecology/s7.jpg

Watershed Ecology

Understanding the structure and processes of watersheds helps us better recognize the effects of human activities on water quality, habitat, plant and animal communities, and quality of human life. Watershed dynamics can be separated into three categories: chemical budgets, water budgets, and biotic structure. In a healthy watershed all three factors are in balance. Riparian zones have a variety of definitions; however, they generally refer to an area of vegetation, usually woody species, that transitions immediate landscape from the water's edge to the adjacent land. A healthy, natural riparian zone, often referred as a "buffer"' provides essential functions to filter excess nutrients (chemical budget) from entering the stream and flood storage (water budget) that could result in negative impacts on aquatic and terrestrial life native to the watershed. In our local watersheds, losses of riparian buffer and non-point source pollution are the greatest stressors impacting streams. Figure 2.4 on page 2-7 shows the benefits of various vegetation zones for pollution reduction and maintaining stream health.

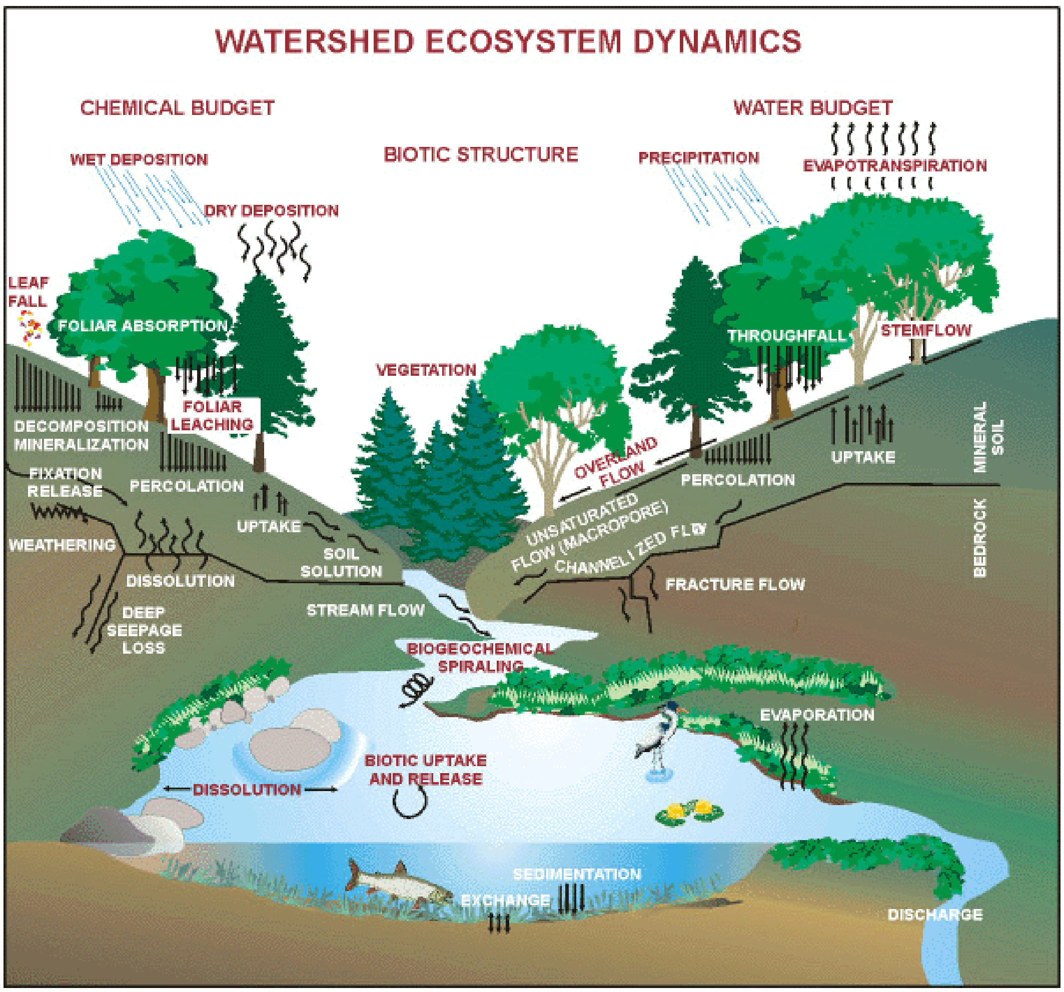


Figure 2.3 Watershed ecology diagram demonstrating modes of movement of water and chemical factors and their relation to the biotic structure.
redrafted from Johnson and Van Hook, 1989. Analysis of biogeochemical cycling processes in Walker Branch Watershed

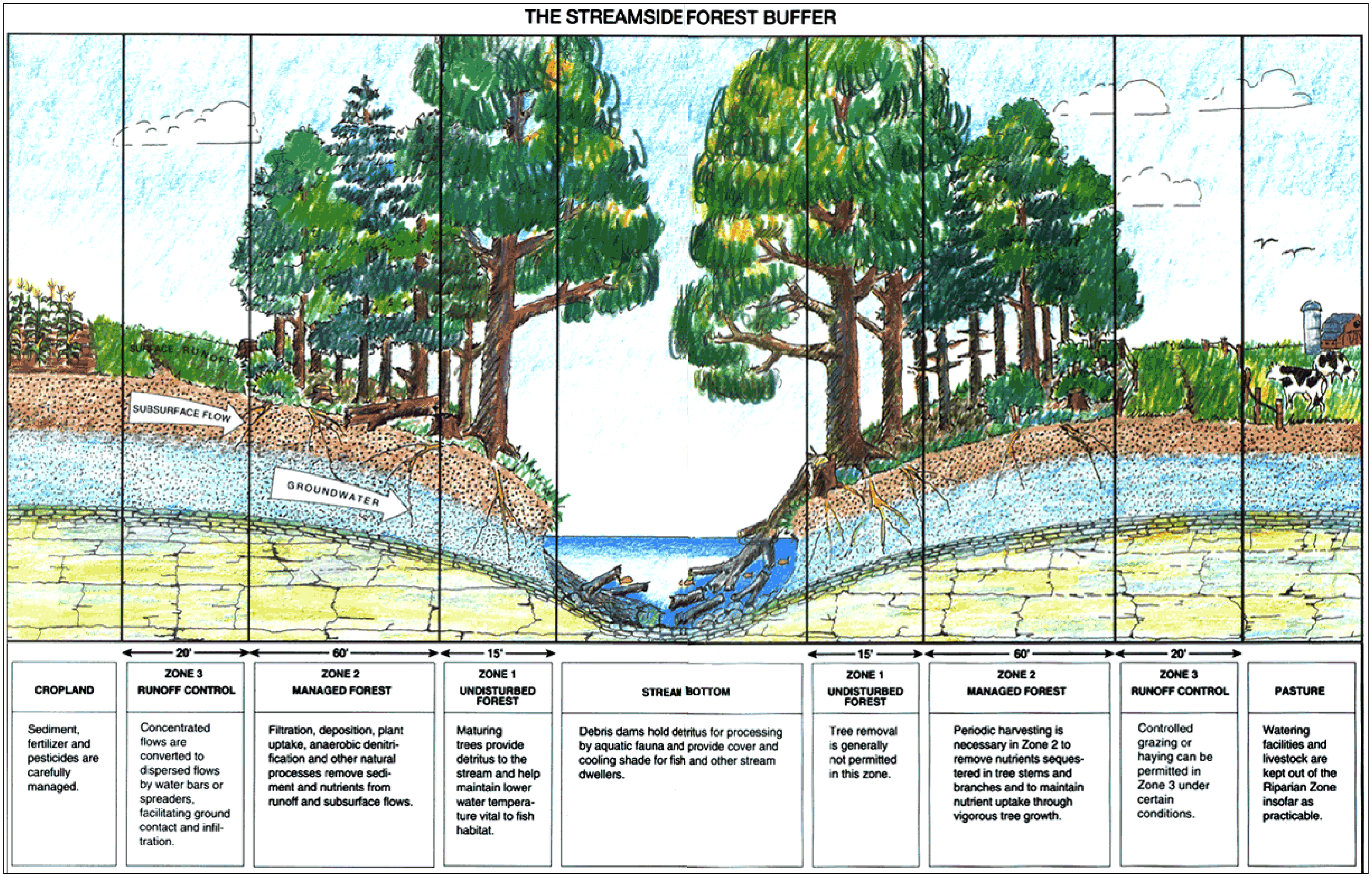


Figure 2.4 Example of a forested riparian buffer and benefit for various vegetation zones for pollution reduction and maintaining stream health.

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Chapter 3 Environmental Policies and Programs

Purpose
This chapter provides an overview of environmental laws and conservation programs that serve as the policy support and development framework for the watershed action plan. This chapter is designed to be a quick resource to help readers understand the framework for watershed management locally and on a broader scale.

Chapter Acknowledgements
This chapter was prepared using material from *The Sandusky-Tiffin and Old Women Creek Watershed Action Plan with permission* and by the watershed coordinator and BRWP partners.

Two significant federal acts of legislation are at the heart of multi-institutional efforts to implement a watershed approach for protecting or improving our nation's waters:

1) the Federal Water Pollution Control Act Amendments of 1972 (aka, the Clean Water Act: Public Law 92-500), and
2) the Safe Drinking Water Act of 1974 (Public Law 93-523).

Additionally, a third piece of legislation is significant for The Outlet/Lye Creek subwatershed, all other assessment units within the Blanchard River Basin, and other watersheds that lie within a coastal zone: the Coastal Zone Management Act, signed into law in 1972. All three federal laws have been amended at least once since their enactment in the 1970s. In communion with federal law, several state laws and programs are also relevant to watershed planning and will be addressed below along with regional and local initiatives that have some bearing on land use activities within The Outlet/Lye Creek subwatershed.

Clean Water Act (CWA)

Programs of importance that are products of the CWA include the Total Maximum Daily Load (TMDL) program, Section 319 nonpoint source management programs, and a permit system called the National Pollutant Discharge Elimination System (NPDES) that includes the Storm Water Program, to name just a few, that have relevance to The Outlet/Lye Creek subwatershed.

The TMDL program, section 303(d) of the CWA, is a regulatory mechanism for reducing both nonpoint source and point source pollution in watersheds throughout the country. A TMDL is essentially a pollutant budget for restoring impaired water bodies (e.g. streams, lakes) in order that they may fully attain their designated use(s). Regulations that the US Environmental Protection Agency (USEPA) set forth in 1985 and amended in 1992 remain in effect for the TMDL program.

The State of Ohio, much like all other states, is compelled by law to assess the quality of state waters relative to their designated use(s), identify waters that are remedial action where appropriate. The “Total Maximum Daily Loads for the Blanchard River Watershed - Final Report” is a product of this program, has been developed by the Ohio Environment Protection Agency (OEPA), and has relevance to residents of The Outlet/Lye Creek subwatershed. The Outlet/Lye Creek subwatershed WAP presented here incorporates that data and presents a strategy for addressing identified impairments. Additional details of the TMDL for The Outlet/Lye Creek subwatershed are presented below.

When the CWA was reauthorized by the Water Quality Act of 1987, new emphasis was placed on the importance of controlling nonpoint sources of pollution. Section 319 of the CWA compels states to identify waters that are threatened by nonpoint sources of pollution and develop programs to reduce and eliminate this type of “poison runoff.” The State of Ohio is updating its nonpoint source pollution program.

Section 319 also serves as a significant source of federal funding, channeled through the states, for programs (e.g. BMP adoptions) that are designed to reduce nonpoint source pollution. It is possible in the near future that a state endorsed WAP will be a requirement for eligibility to this source of funding support. Pollution reduction strategies outlined in Chapter 7 are designed in such a way as to facilitate the application for and approval of future Section 319 grants.

The NPDES Storm Water Program has been implemented in two phases. Phase II, whose Final Rule was published in the Federal Register on 8 December 1999 (64 FR 68722), expands the Phase I program by extending pollution control expectations to smaller municipal separate storm sewer systems (MS4s) and operators of small (i.e. 1-5 acres) construction sites. Findlay has been designated MS4s under Phase II. Ottawa already has separated sanitary and storm sewers.

Expectations for pollution control center on implementation of programs and practices to control polluted storm water runoff through the use of NPDES permits. The Phase II program approach attempts, among other matters, to facilitate and promote watershed planning and to implement the storm water program on a watershed basis (USEPA, 2000). Storm water management, therefore, will play an increasingly important role in both planning and implementating watershed action plans that aim to remediate impaired water bodies. More information can be found at http://www.epa.gov/lawsregs/laws/cwa.html.

Clean Water Restoration Act 2009

Senate Bill 787 was introduced in 2009 as the **Clean Water Restoration Act.** The purpose of the bill was to amend the Federal Water Pollution Control Act (commonly known as the Clean Water Act) to replace the term "navigable waters" that are subject to such Act with the term "waters of the United States," defined to mean all waters subject to the ebb and flow of the tide, including lakes, rivers, streams (including intermittent streams), mudflats, sand flats, wetlands, sloughs, prairie potholes, wet meadows, playa lakes, natural ponds, and all impoundments of the foregoing, to the fullest extent that these waters, or activities affecting them, are subject to the legislative power of Congress under the Constitution. The law declares that nothing in such Act affects the authority of the Secretary of the Army or the Administrator of the Environmental Protection Agency (EPA) under the provisions of the Clean Water Act related to discharges composed:

(1) of return flows from irrigated agriculture;
(2) of stormwater runoff from certain oil, gas, and mining operations composed entirely of flows from precipitation runoff conveyances, which are not contaminated by or in contact with specified materials;
(3) of dredged or fill materials resulting from normal farming, silviculture, and ranching activities, from upland soil and water conservation practices, or from activities with respect to which a state has an approved water quality regulatory program; or
(4) of dredged or fill materials for the maintenance of currently serviceable structures, the construction or maintenance of farm or stock ponds, irrigation ditches and maintenance of drainage ditches, or farm, forest, the territorial seas, and all interstate and intrastate waters and their tributaries, or temporary roads for moving mining equipment in accordance with best management practices, or the construction of temporary sedimentation basins on construction sites for which discharges do not include placement of fill material into the waters of the United States. See http://www.opencongress.org/bill/111-s787/show for additional information.

Safe Drinking Water Act (SDWA)

The SDWA created a federal program to monitor and improve the safety of the nation's drinking water supply. The SDWA authorizes the USEPA to set and implement drinking water standards to protect against both naturally occurring and man-made contaminants in public drinking water. The roots of Ohio's Source Water Protection Plan, a program to assist public water suppliers with protecting their sources of drinking water (streams and aquifers) from contamination, can be traced back to the SDWA. See http://water.epa.gov/lawsregs/rulesregs/sdwa/index.cfm for additional information.

Ohio's Source Water Protection Program addresses public water systems only and features two phases. The first phase is an assessment phase that involves delineating the area in need of protection, identifying the potential contaminant sources in that area, and determining the susceptibility of the source(s) of drinking water. The Ohio EPA reports that this phase was better than 99% complete for Ohio's community public water systems by January 2004. The second phase involves developing and implementing a local drinking water source protection plan. This second phase is to be led by the public water system owner/operator with assistance from others including local watershed groups. It makes sense for these source water protection plans to be integrated into watershed action plans as both strive to protect the vital water resources necessary for human health and a healthy economy.

In The Outlet/Lye Creek subwatershed, both the village of Vanlue and the City of Findlay draw on surface water as a raw source of drinking water. Water quality criteria established in Ohio Administrative Code for public water supply apply within 500 feet of an intake. Both the Village of Vanlue and the City of Findlay have each completed a drinking water source assessment and are now encouraged to develop local protection plans. Partnership efforts at developing The Outlet/Lye Creek WAP will be of great benefit to the protection of drinking water sources and will work with both municipalities as appropriate to protect this critical water resource. See http://www.epa.state.oh.us/ddagw/swap_protplan.aspx for additional information on the Ohio Source Water Plan.

Coastal Zone Management Act (CZMA)

The Coastal Zone Management Act of 1972 (Public Law 92-583) established a voluntary national program within the Department of Commerce to encourage coastal states, including Ohio, to both develop and implement coastal zone management plans. This policy represents a unique federal/state partnership and was devised for purposes of conserving the high-value coastal zone resources for present and future generations.

As part of the Coastal Zone Act Reauthorization Amendments of 1990 (CZARA), Congress created a stand-alone provision to recognize the impacts of nonpoint source pollution on coastal water quality. Named after its placement within these amendments, Section 6217 requires that states and territories with approved coastal management programs develop a Coastal Nonpoint Pollution Control Program (CNPCP). The Ohio CNPCP is administered by the Ohio Department of Natural Resources (ODNR) Division of Soil and Water Resources. The CNPCP must be submitted to USEPA and the National Oceanic and Atmospheric Administration (NOAA) for approval and be implemented through changes to both the existing state coastal management program and the new nonpoint source management program that stems from Section 319 of the CWA. Within these state programs, management measures must be specified for restoring and protecting coastal waters from specific categories of nonpoint source pollution.

Management measures are defined in Section 6217 of the CZARA as “economically achievable measures for the control of the addition of pollutants from existing and new categories and classes of nonpoint sources of pollution, which reflect the greatest degree of pollutant reduction achievable through the application of best available nonpoint pollution control practices. technologies, processes noting criteria, operating methods, or other alternatives.” Watershed action plans developed for the Ohio Lake Erie Basin, such as presented in the The Outlet/Lye Creek subwatershed, must describe how the relevant management measures of the Ohio CNPCP will be implemented within the specific watershed if a watershed inventory or identified water quality impairments indicate applicability. Management measures must also be addressed in order for the State of Ohio to gain approval for its Coastal Nonpoint Source Pollution

Control Program. Details regarding the relevant management measures are offered in Chapter 8 Coastal Management Measures See the following web site for "Guidance for Watershed Projects to Address Ohio's Coastal NPS Pollution Control Program. The following web site provides a pdf. file of the guidance plan. http://www.dnr.state.oh.us/Portals/12/programs/coastalnonpoint/Watershed%20Action%20Plan%20Guidance%20to%20Ohio%20Coastal%20Nonpoint%20Pollution%20Control%20Program%20Plan.pdf

Ohio Nonpoint Source Management Plan

The State of Ohio has completed the Nonpoint Source (NPS) Management Plan 2005 - 2010 for submission to the USEPA. The last comprehensive Ohio NPS Management Plan approved by the USEPA was produced in 1988 and guided by the CWA Amendments of 1987. Updates to this earlier plan were developed and appended in 1993 and 1998.

Over the course of the last several years, many new initiatives have come about to influence state NPS program direction. Thus, this new NPS Management Plan aims to take these initiatives into consideration and serve as the most comprehensive and definitive expression of NPS management goals within the State of Ohio.

Several important changes reflected in the revised plan include:

The plan must be:

- Outcome(s) based using existing targets and new targets
- Integrated items with regional, national, and international water quality goals
- Targets that are not program specific
- The importance of local NPS implementation is emphasized
- Environmental outcomes that place an emphasis on stream integrity
- Comprehensive approaches to addressing Ohio's nonpoint source pollution management are encouraged
- The accessibility to the plan is enhanced

Further information can be found at http://wwwapp.epa.ohio.gov/dsw/nps/NPSMP/index.html. Implementation of watershed action plans will be a key ingredient of state NPS management and in that context should feature three core attributes. Watershed action plans must be science-based, community-led, and sustainable.

Lake Erie Protection & Restoration Plan

While neither a law nor regulatory mechanism, the Lake Erie Protection & Restoration Plan is still the State of Ohio's blueprint for Lake Erie's future and serves as a guidance document for achieving the goals and objectives set forth in a companion piece, the Lake Erie Quality Index (LEQI).
See http://lakeerie.ohio.gov/Portals/0/Reports/2008LEPRplan.pdf . As noted earlier, The Outlet/Lye Creek watershed is situated within the Lake Erie Watershed. Land use activities within The Outlet/Lye Creek subwatershed, therefore, have a direct impact on Lake Erie.

Having released the Second Progress Report in September 2004, the Lake Erie Protection & Restoration Plan proposes the implementation of 84 strategic actions for improving the environment, recreational opportunities, and the economy of the Lake Erie Watershed. These strategies are grouped under ten areas that address water quality, pollution sources, habitat, biology, coastal recreation, boating, fishing, beaches, tourism, and shipping. While many of these areas are not directly relevant to life in The Outlet/Lye Creek subwatershed, some are. Several of the strategies having to do with water quality, pollution sources, habitat, and biology will have an impact on State views and expectations of land use activities within The Outlet/Lye Creek subwatershed and the other subwatersheds of the Blanchard River Basin.

For example, one of the strategies found under the Pollution Sources category states, "Increase from 52% to 80% the percentage of agricultural acreage in the Lake Erie Watershed under conservation tillage practices by 2010." This is one of four strategic actions that are designed to meet the strategic objective of reducing agricultural sediment loading from the Lake Erie Watershed by 67%. Thus, conservation tillage, establishing buffers along 80% of Lake Erie ditches, streams, and tributaries, and other Protection and Restoration Plan actions will be achieved by local and related efforts that seek to reduce sediment and phosphorus loadings to The Outlet/Lye Creek subwatershed.

Another strategic action of the Lake Erie Protection and Restoration Plan calls for reforesting riparian corridors and marginal agricultural acreage, floodplains, and wetlands using a variety of existing programs. This action is compatible with the need to reestablish and reconnect riparian corridors in The Outlet/Lye Creek subwatershed. There are other examples where goals of The Outlet/Lye Creek WAP and the Protection and Restoration Plan are complementary.

Recommendations in this WAP that address the requirements of improving water quality in The Outlet/Lye Creek subwatershed will, therefore, satisfy other State initiatives such as the Lake Erie Protection & Restoration Plan. To learn more about the Lake Erie Protection & Restoration Plan, please visit their website: http://www.epa.state.oh.us/oleo/reports/lepr2/secondreport.html.

Lake Erie Lakewide Management Plan (LaMP)

The Lake Erie Lakewide Management Plan (LaMP) provides a structure for the people of the United States and Canada to address environmental and natural resource concerns, coordinate research activities, pool resources, and make joint commitments to improving the environmental quality of our shared resource: Lake Erie (Lake Erie LaMP Work Group, 2004). An excerpt from this binational effort clarifies why the Lake Erie LaMP, updated yearly, is important to the residents of The Outlet/Lye Creek subwatershed:

> *The environmental integrity of Lake Erie is dependent not only on various characteristics and stressors within the lake itself, but also on actions implemented throughout the Lake Erie watershed and beyond. Urban sprawl, shoreline development, climate change, the introduction of exotic species, the exploitation and destruction of natural lands and resources, the dominant agricultural and industrial practices within the lake basin, and long-range transport of contaminants from outside the basin all impact the health of Lake Erie.*

The Lake Erie LaMP identified land use practices as the dominant management category affecting the Lake Erie ecosystem. For agricultural land use, the Lake Erie LaMP calls for continuing reductions in the use of conventional tillage, agricultural chemicals and fertilizers. Specific watershed targets are to be established for securing, protecting, and restoring natural lands. Phosphorus exports from non-point sources, including agricultural land use, is to be strongly reduced for purposes of favoring recovery and maintenance of healthy aquatic communities in the immediate receiving waters such as Maumee Bay. Sewage treatment plants may be expected to improve upon their previously achieved phosphorus load reductions. The Blanchard River Watershed's TMDL Report calls for the sewage and wastewater treatment plant in Findlay to reduce phosphorus concentrations that are currently elevated and identified as one cause of aquatic life impairment within the Blanchard River Watershed. Thus pollutant reductions from both point and nonpoint sources will simultaneously achieve local and regional initiatives that are complementary to one and another.

To learn more about the Lake Erie LaMP, readers are encouraged to visit this website: http://www.epa.gov/ginpo/lakeerie/2004update/index.html.

Balanced Growth Task Force

The Balanced Growth Task Force of the Ohio Lake Erie Commission has produced a strategy to protect and restore Lake Erie and its watersheds for purposes of achieving long-term competitiveness, ecological health, and quality of life. The planning framework produced by the Task Force recommends a voluntary, incentive-based program for balanced growth in the Ohio Lake Erie basin. This framework reflects the ten guiding principles that are outlined in the Lake Erie Protection and Restoration Plan discussed earlier.

Throughout the Balanced Growth planning framework, a watershed approach is promoted for planning and decision making. Furthermore, this framework includes active roles for both local and state governments in supporting local watershed planning partnerships. The essence of the Balanced Growth framework is fully compatible with watershed action plans developed at the scale of The Outlet/Lye Creek subwatershed. The Balanced Growth framework offers reason to believe that new incentives for implementing locally-produced watershed action plans could be enjoyed by those groups with such plans.

This new strategy gives residents of The Outlet/Lye Creek subwatershed more reason to "go with the flow" and produce a meaningful action plan that will lead to greater conservation and improve quality of life. To learn more about Balanced Growth Plan in the Ohio Lake Erie Watershed, please visit the following website: http://www.lakeerie.ohio.gov/BalancedGrowth.aspx.

Great Lakes Ecosystem Protection Act 2010

HB 4755 was introduced in the House of Representatives in March 2010. A summary of this bill follows:

- *Authorizes the Great Lakes Restoration Initiative at $475 million per year. This is the level of funding initially proposed by the President for FY2010.*
- *Authorizes a new advisory group to the EPA. The two-tiered group is loosely modeled on the Great Lakes Regional Collaboration (GLRC).*
- *Authorizes the Federal Interagency Task Force which was established in 2004 by Executive Order which means that it could be dissolved by Executive Order.*
- *Reauthorizes the Great Lakes Legacy Act which expires in 2010. The authority is for $150 million per year, the level recommended by the GLRC Strategy Report.*
- *Reauthorizes EPA's Great Lakes National Program Office (GLNPO) at level funding ($25 million).*

Further information can be found at http://www.opencongress.org/bill/111-h4755/show.

Ohio Household Sewage Treatment Regulations

Effective May 6, 2005, Substitute House Bill 231 (125th General Assembly) Chapter 3718 of the Ohio Revised Code required the Public Health Council to adopt new rules governing household sewage treatment systems and small flow on-site sewage treatment systems (not more than 1,000 gallons of sewage per day).

Amended Substitute House Bill 119 (Am. sub. HB 119), passed by the 127th Ohio General Assembly, contains substantial amendments to the Ohio Revised Code (ORC) and the Ohio Administrative Code (OAC) regarding the regulation of household and small flow on-site sewage systems in Ohio. The sewage treatment system rules adopted by the Public Health Council (PHC) that became effective on Jan. 1, 2007, has been rescinded as required by the bill. The bill also enacts several uncodified provisions into state law that took effect July 1, 2007. These uncodified provisions are effective until July 1, 2009 and have substantial impact on the sewage programs implemented by the Ohio Department of Health (ODH) and local health districts.

In compliance with Am. Sub. HB 119, the director of Health adopted statewide interim sewage rules (OAC 3701-29) effective July 2, 2007. The PHC, at its July 25, 2007, meeting, adopted these rules as minimum standards through July 1, 2009. In mid July 2009 HB 1 issued a 6 month extension continuing the previous ruling established on July 25, 2007. Local health districts are responsible for code enforcement and were permitted to adopt more stringent rules during the same time period.

The Am. Sub. HB 119 requires compliance with National Pollutant Discharge Elimination System (NPDES) permit requirements for new and replacement discharging Home Septic Treatment Systems (HSTS). An installation permit for a new or replacement discharging HSTS cannot be issued by a local health district until a homeowner obtains NPDES permit coverage. (information from Mills ODH) Further information can be found at http://www.odh.ohio.gov/odhPrograms/eh/sewage/sewrules.aspx.

Western Lake Erie Basin Partnership (WLEB)

The Western Lake Erie Basin Partnership includes 14 Federal, State, and regional partners. These 14 groups include US Army Corps of Engineers; US Department of Agriculture - Natural Resources Conservation Service; US Fish & Wildlife Service; US Geological Survey; Ohio Water Science Center; US EPA; Governor of Ohio; Governor of Indiana; Governor of Michigan; Ohio State Technical Committee; Indiana State Technical Committee; Michigan State Technical Committee; Ohio Department of Natural Resources, Division of Soil & Water Conservation; National Association of Conservation Districts; and Maumee River Basin Partnership of Local Governments. The WLEB completed a Blanchard River Assessment in August 2009. The report can be found at: http://www.wleb.org/documents/assessments/Blanchard%20Watershed%20Final%20Assessment%20091509.pdf. For more information about the WLEB visit their web site at: http://www.wleb.org.

Northwest Ohio Flood Mitigation Partnership (NWOFMP)

The Northwest Ohio Flood Mitigation Partnership, Inc is a private/non-profit organization whose purpose is to expedite the design and development of a flood mitigation plan to be implemented in coordination with responsible public authorities in the Blanchard River Watershed.

This will be accomplished by:

- Working with the Army Corps of Engineers (USACE) to develop a feasibility study for the project. This step is in the process and could take 24-31 months.
- Advocating for local governments with the Federal Legislators, Congress must first authorize the Army Corps of Engineers to create the project and then annually the project must remain a priority. Each year, Congress must appropriate the Federal share of the project funds.
- Determining a funding plan for construction. This organization will try to develop any possible funding sources such as CDBGs, private foundations, private sector funds, federal, state and local funds. Once the feasibility study is complete, we will have a more Federal firm dollar figure for necessary construction.
- Creating a "community-based" committee to design a "living river" concept of flood control. The plans and specifications may include structural controls such as floodwalls or levees and impediment removal. Non-structural options may include diversion of water through non-developed areas, acquisition and demolition of properties where feasible and wetlands restoration.

To be successful the NWOFMP will need the cooperation of the City of Findlay, the Village of Ottawa, the Hancock and Putnam County Commissioners and all other political subdivisions within the watershed. They will need the help and support of the Ohio Department of Natural Resources, the Ohio EPA, the Blanchard River Watershed Partnership, the Natural Resource Conservation Service, the U S Department of Agriculture, our state legislators and most importantly our federal legislators. The NWOFMP's intent is that once they have accomplished stated goals and construction is turned over to a public entity, the NWOFMP organization will cease to exist in its present form. Their strategy would be to exit after three years. There will be a need for an organization to continue through construction and take over maintenance and operations of the projects. A task force of watershed elected officials started meeting in January 2010 to decide how to proceed with the flood mitigation plan. The USACE requires a local watershed entity to enter into the cost-sharing portion of the flood plan and on short-term basis by June 1, 2010. The group decided that the Hancock County Commissioners would act as the public entity for the short term. On September 13, 2010, a petition was filed with the Hancock County Clerks of Court to create a separate Conservancy District. The six judges held a public meeting on November 22, 2010 in Findlay concerning the Conservancy. In early December, the six judges voted 4-2 against a separate Conservancy

District. The Hancock County Commissioners filed a letter with the Maumee Conservancy District in January 2011 asking the Maumee Conservancy District to take over responsibility for the flood efforts in the Blanchard River Watershed.

The Northwest Ohio Flood Mitigation Partnership officially went out of business on December 31, 2010, as planned.

Hancock Regional Planning Commission

The Hancock Regional Planning Commission (HRPC) provides professional planning services for the City of Findlay and Hancock County. HRPC is responsible for enforcement of the Hancock County Subdivision Regulations, Lot Splits, Assistance to the Villages and Townships Zoning Codes, Zoning Advisory and City Planning Reviews.

Also provided are professional grant writing services for the cities of Findlay, Fostoria and for Hancock County. This includes administration of the Community Development Block Grant (CDBG) program, Economic Development Grants, Revolving loan fund dollars, review and reporting of the Enterprise Zones and TIF. For further information go their web site at: http://www.hancockrpc.org/.

City of Findlay's MS4 Phase II Program

The USEPA has mandated that small municipal "urbanized" communities develop a separate storm sewer system (MS4s). The Phase II Rule defines a small MS4 storm water management program as comprised of six minimum control measures that, when administered in concert, are expected to result in reduction of the discharge of pollutants into receiving water bodies. Operators of regulated small MS4s are required to design their programs to do the following: reduce the discharge of pollutants to the "maximum extent practicable" (MEP), protect water quality and satisfy the appropriate water quality requirements of the Clean Water Act. Implementation of the MEP standard will require the development and implementation of best management practices and the achievement of measurable goals to satisfy each of the following six minimum control measures:

1. *Public Education and Outreach*
   Distributing educational materials and performing outreach to inform citizens about the impacts polluted storm water runoff discharges can have onwater quality.
2. *Public Participation/Involvement*
   Providing opportunities for citizens to participate in program development and implementation, including effectively publicizing public hearings and/or encouraging citizen representatives on a storm water management panel.
3. *Illicit Discharge Detection and Elimination*
   Developing and implementing apian to detect and eliminate illicit discharges to the storm sewer system (includes developing a system map and informing the community about hazards associated with illegal discharges and improper disposal of waste).
4. *Construction Site Runoff Control*
   Developing, implementing and enforcing an erosion and sediment control program for construction activities that disturb one or more acres of land (controls could include silt fences and temporary storm water detention ponds).
5. *Post-Construction Runoff Control*
   Developing, implementing and enforcing a program to address discharges of post-construction storm water runoff from new development and redevelopment areas. Applicable controls could include preventive actions such as protecting sensitive areas (e.g., wetlands) or the use of structural BMPs such as grassed swales or porous pavement.
6. *Pollution Prevention/Good Housekeeping*
   Developing and implementing a program with the goal of preventing or reducing pollutant runoff from municipal operations. The program must include municipal staff training on pollution prevention measures and techniques (e.g., regular street sweeping, reduction in the use of pesticides or street salt, or frequent catch-basin cleaning).

The City of Findlay is in the second year of the 5 year cycle. The City submitted to the OEPA the Stormwater Management Plan for approval in December 2009. They are awaiting the decision. The City of Findlay has formed a Stormwater Management Action Committee (SWAC) to pursue improvements.

Chapter 4 The Outlet/Lye Creek Watershed Inventory

Purpose

The focus of this chapter is to provide an extensive inventory of the resources within The Outlet/Lye Creek watershed. This inventory will provide very useful information in making decisions on how to improve and maintain water quality and habitat within the watershed.

Chapter Acknowledgements
This chapter was prepared using material from *The Sandusky-Tiffin Watershed Action Plan with permission* and by the watershed coordinator and BRWP partners.

Land Use

The Land Use is illustrated in Map 4-1, Land Use Map and was obtained from ONDR Office of Coastal Management. Table 4.1 summarizes land use for the entire 11-digit watershed. The watershed covers 85,384 acres. Table 4.2 shows the Land Use for the 14-digit subwatersheds located in The Outlet/Lye Creek watershed. Like most of the Blanchard River Watershed, agriculture is the predominant land use (82.7%) for the watershed. The main crops grown are corn, soybeans, and wheat. The agriculture area is heavily tiled with most ditches being channelized to aid in drainage. Wooded areas, composed mainly of deciduous species, account for (2.74%) of the land use. These areas are scattered in a fragmented pattern in small woodlots that are separated from other woodlots by the agricultural fields. Continuous woody vegetation is found along the riparian corridor of The Outlet. Most of the riparian corridor of the Blanchard River that is found in the watershed is covered with mature trees. Lye Creek has little woody vegetation due to the maintenance program.

Table 4.1 The Outlet/Lye Creek Land Use*

Cover Type	Acres	Percent
Pasture Hay	1276	1.5
Cultivated Crops	69,302	81.2
Grassland	2378	2.8
Open Water	968	1.1
Barren	6.6	.01
Developed Open Space	1361	1.6
Developed Low Intensity	3506	4.1
Developed Medium Intensity	953	1.1
Developed High Intensity	378	.44
Deciduous Forest	2314	2.71
Evergreen Forest	24.2	0.03
Scrub/Shrub	4.4	0.01
Palustrine Forested Wetland	2760	3.23
Palustrine Scrub/Shrub Wetland	51.08	0.07
Palustrine Emergent Wetland	54.89	0.06

*Source: Coastal Management

Map 4.1 Land Use The Outlet/Lye Creek Subwatershed

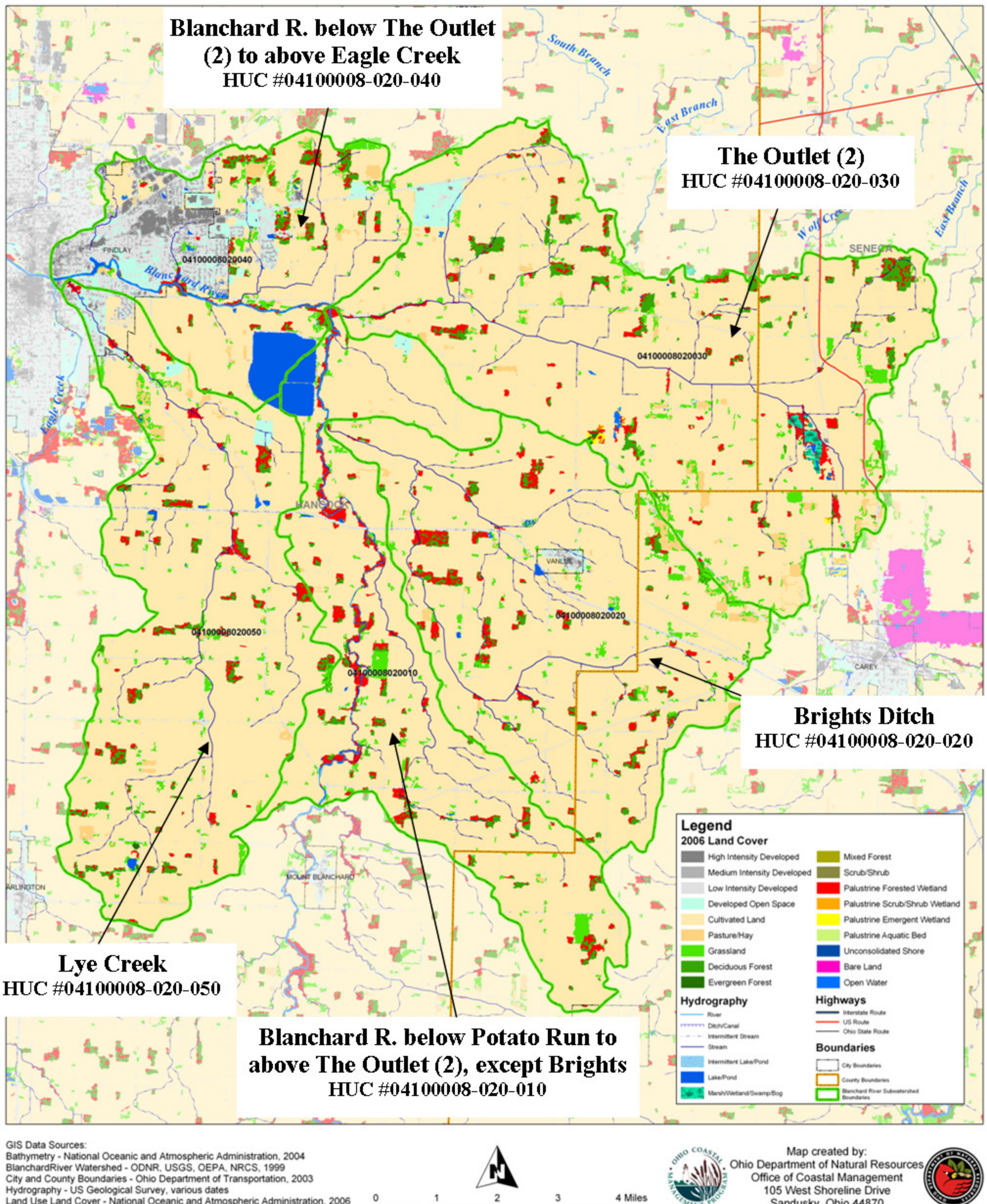


Table 4.2 **Land Use:** **The Outlet/Lye Creek Watershed** **HUC0410008-020**	**14 Digit Watersheds located in The Outlet/Lye Creek**					**Overall Total**	
	04100008020**010**	04100008020**020**	04100008020**030**	04100008020**040**	04100008020**050**	04100008**020**	Percent of Coverage
High Intensity Developed	0.00	8.78	6.59	357.86	4.39	377.62	0.44
Medium Intensity Developed	6.59	63.67	32.93	775.00	74.65	952.83	1.12
Low Intensity Developed	219.55	509.35	564.24	1,569.76	643.27	3,506.16	4.11
Developed Open Space	54.89	43.91	327.12	687.18	248.09	1,361.19	1.59
Cultivated Land	12,410.98	15,833.72	20,773.52	5,025.43	15,258.50	69,302.15	81.20
Pasture Hay	59.28	259.07	480.81	223.94	252.48	1,275.57	1.49
Grassland	436.90	450.07	764.02	338.10	388.60	2377.69	2.79
Deciduous Forest	320.54	436.90	768.41	324.93	436.24	2,314.02	2.71
Evergreen Forest	0.00	2.20	8.78	4.39	8.78	24.15	0.03
Scrub/Shrub	4.39	0.00	0.00	0.00	0.00	4.39	0.01
Palustrine Forested Wetland	750.85	544.48	665.23	298.58	500.57	2,759.70	3.23
Palustrine Scrub/Shrub Wetland	21.95	6.59	19.76	4.39	4.39	51.08	0.07
Palustrine Emergent Wetland	13.17	4.39	24.15	298.58	0.00	54.89	0.06
Bare Land	0.00	0.00	0.00	4.39	2.20	6.59	0.01
Water	311.76	21.95	30.74	546.67	57.08	968.20	1.13
Total Acres	14,610.84	18,185.06	24,466.30	10,173.80	17,906.24	85,342.24	100.0

Table 4.2 Key - Name of the 14-digit subwatersheds

04100008-020-010 Blanchard River below Potato Run to above The Outlet (2), (except Brights)
04100008-020-020 Brights Ditch
04100008-020-030 The Outlet (2)
04100008-020-040 Blanchard River below The Outlet (2) to above Eagle Creek
04100008-020-050 Lye Creek

Watershed Hydrology

Stream Drainage Network. Fig. 4.1, on the next page, is a schematic drawing from the Technical Support Data (TDS) Report based on the 2005 TMDL study conducted by the OEPA on the Blanchard River. Some of the names of the tributaries have been added using information from the Hancock County Engineer's office. Map 4.2 (see pg. 4-6) shows the tributaries for The Outlet/Lye Creek watershed.

Fig. 4.1 shows the stream order for The Outlet/Lye Creek watershed. The figure is based on the Strahler-Horton stream classification system used by the NRCS. In this system first order streams have no tributaries. Where two first order tributaries join, a second order stream is formed. Where two second order tributaries join, a third order stream is formed, and so on and so forth.

In this watershed, the highest stream order is the Blanchard River at order 5. The stream order system can provide information about the watershed in five ways; 1. stream length, 2. stream gradient, 3. area of watershed, 4. stream continuum, and 5. number of streams of the order. In most watersheds, there are many more miles of low order streams than of high order streams. For the Lye Creek/The Outlet, watershed there 117.23 miles of streams. See Table 4.3. below.

Table 4.3 Stream length by stream order in The Outlet/Lye Creek watershed

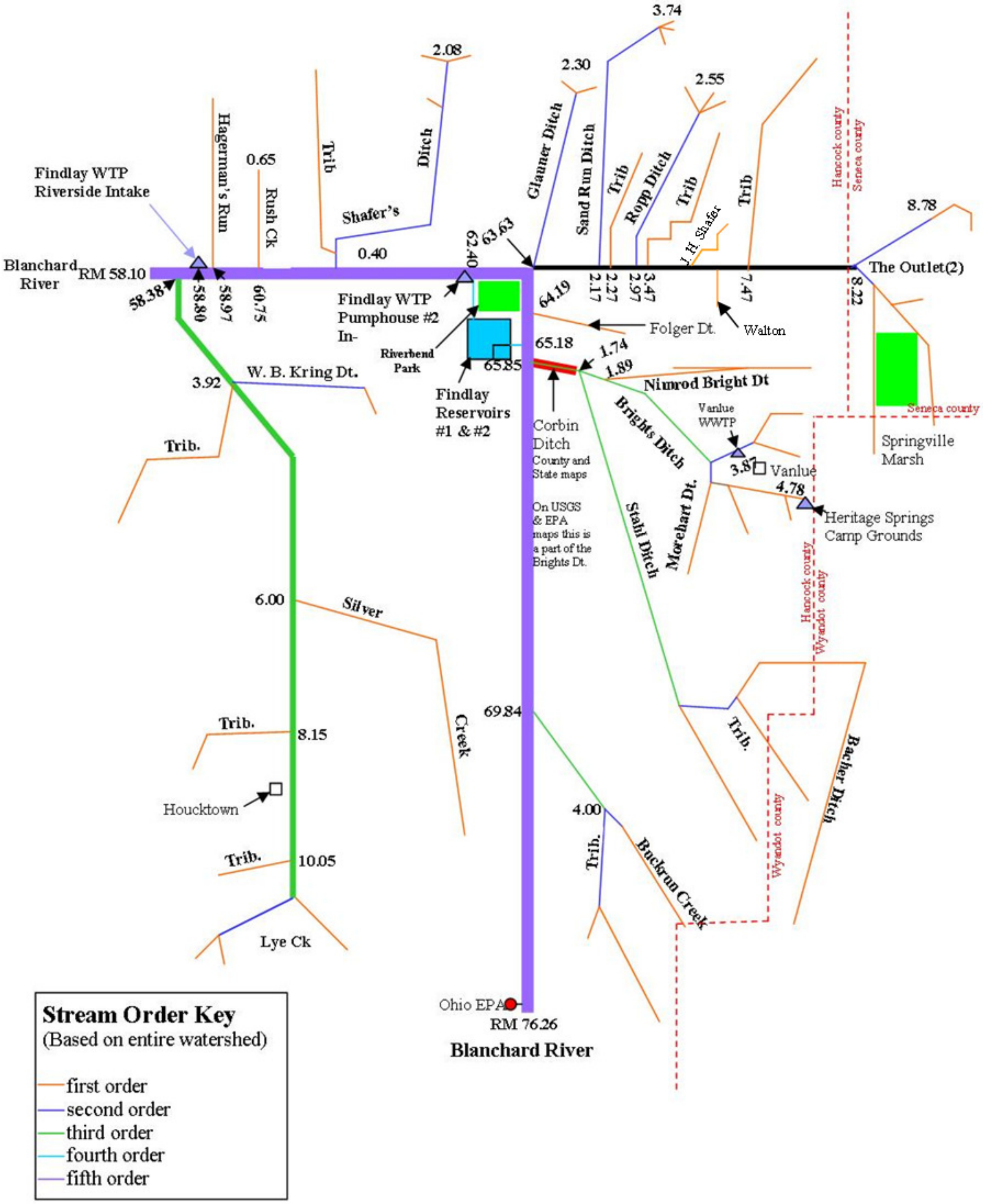
Stream Order	Length (miles)	Percent of Miles
1st Order	50.42	43.01
2nd Order	19.45	16.59
3rd Order	29.20	24.91
4th Order	none	none
5th Order	18.16	15.49
Total	117.23	100.00

Source: Hancock SWCD, County Auditor, and NRCS Rapid Assessment

Information on the main streams, ditches, and tributaries located in The Outlet/ Lye Creek watershed are shown in Table 4.4 on page 4-7. Table 4.5 on page 4-8 breaks the waterways down into the 14-digit subwatersheds and shows stream order for each. This data was obtained from the ODNR's Gazetteer of Ohio Streams (ODNR, 2001), the Hancock County Engineer's office, and Hancock County Soil Water Conservation District.

Map 4.3 on page 4-7 shows the ditches and streams that are under county maintenance contract in The Outlet/Lye Creek watershed.

Figure 4.1 Schematic Drawing of The Outlet/Lye Creek subwatershed streams showing stream order HUC# 04100008-020



Map 4.2
Tributaries

*This stretch is known as Corbin's Ditch on Ohio and Hancock County maps. USGS and EPA considers this stretch to be a part of Brights Ditch

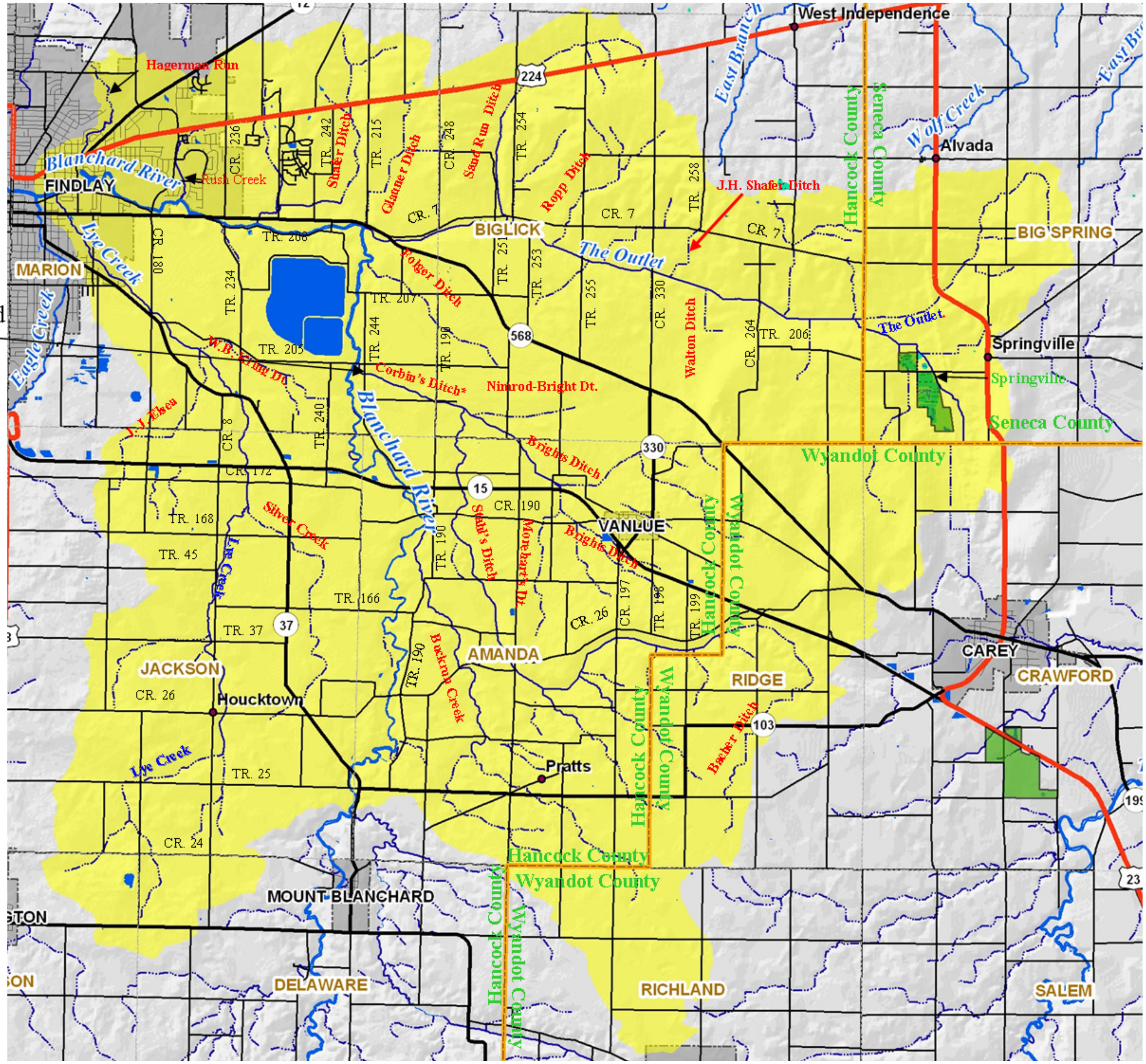
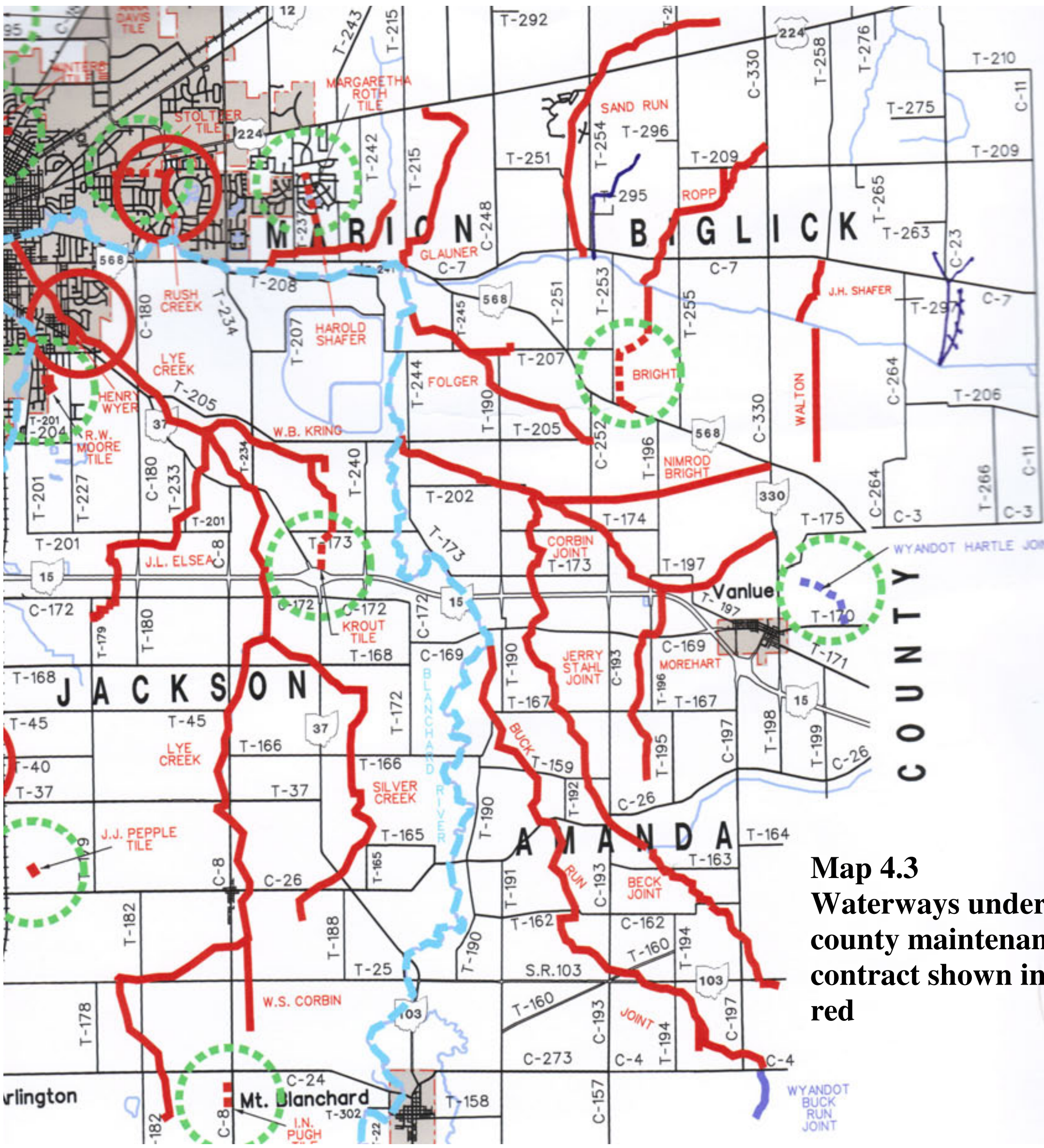


Table 4.4 Main Tributaries in The Outlet/Lye Creek Watershed

Stream Name	Flows Into	Length (mi.)	Elevation at (Source-ft)	Elevation at (mouth-ft)	Average Fall (ft/mile)	Area Drainage (sq. miles)
Stahl Ditch	Brights Ditch	9.1	837	788	5.4	14.8
Brights Ditch	Blanchard River	2.2	790	783	3.2	28.4
The Outlet (2)	Blanchard River	9.2	809	775	3.7	38.2
Lye Creek	Blanchard River	8.5	803	759	5.2	28
Silver Creek*	Lye Creek	4.3	829	759	5.2	4.67
Walter's Ditch**	Stahl Ditch	1	846	837	9	2.3

*Intermittent Stream Source: Gazetteer of Ohio Streams (ODNR 2001)
**Name changed from Bacher ditch



Map 4.3 Waterways under county maintenance contract shown in red

Table 4.5 Streams and Ditches with Stream Order
The Outlet/Lye Creek Watershed at 14 digit subwatersheds
(Stream/Ditch in red under county maintenance contract)

Stream/Ditch	first order (ft)	second order (ft)	third order (ft)	fourth order (ft)	fifth order (ft)
Blanchard River below Potato Run to above The Outlet (2), except for Brights (HUC 0410008-020-010)					
Blanchard River					66,686
Folger Ditch	14,893				
Buckrun Creek	19,946	6046	21,657		
Brights Ditch (HUC 04100008-020-020)					
Corbin's ditch*			9353		
Brights ditch	32,104	5163	9402		
Nimrod-Bright	13,566				
Stahl's ditch		3181	25,582		
Walters (Bacher)ditch	5280				
The Outlet (HUC 04100008-020-030)					
The Outlet			43,402		
Sand Run Ditch	326	19,750			
Tributary	7835				
Ropp Ditch	4691	8775			
Tributary	9268				
Tributary	4895				
J. H. Shafer	4745				
Walton	7900				
Tributary	3308	5498			
Tributary (Seneca)	7263	17,198			
Tributary (Seneca/Wy)	25,868	2864			
Blanchard River below The Outlet (2) to above Eagle Creek (HUC 04100008-020-040)					
Blanchard River					29,198
Hagerman's Run	9874**				
Rush Creek	5274				
Shaffer's Ditch	4704	18,481			
Tributary	9046				
Glauner Ditch	12,165				
Lye Creek (HUC 04100008-020-050)					
Lye Creek	12,895	8088	44,800		
W.B. Kring	9269	7667			
J.L. Elsea	17,089				
Silver Creek	22,704				
Tributary	1294				
Total	266,202	102,711	154,196	0.00	95,884 = 618,993 ft 117.23 mi.

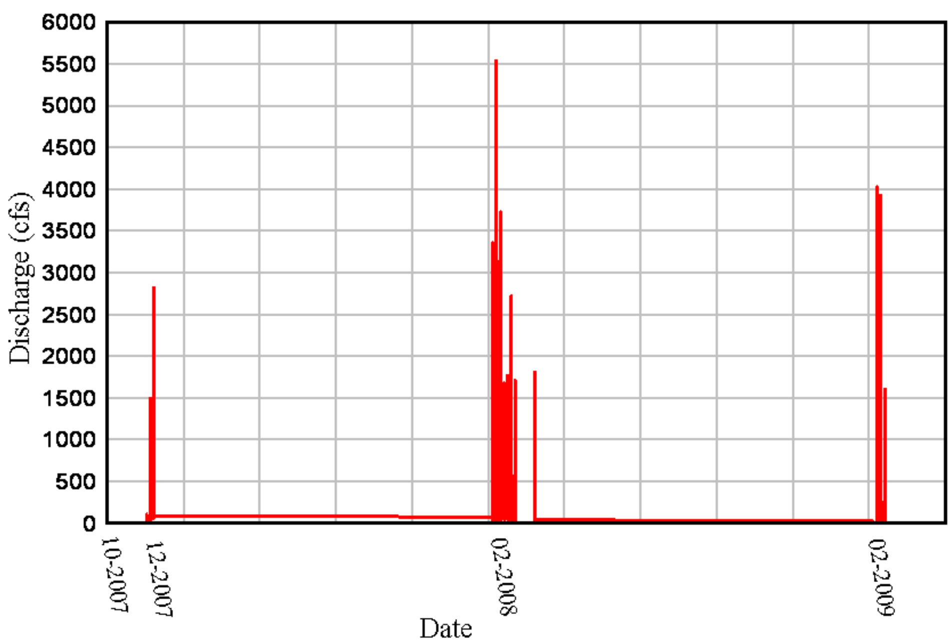
* Corbin's ditch extends from river to the point where Stahl's ditch branches on county map
** approximately 941 feet is covered

Streamflow Characteristics

The streamflow within The Outlet/Lye Creek watershed is documented by three USGS stream gages located on the Blanchard River below Mt. Blanchard (station # 0418837); on the Blanchard River above Findlay (station # 04122400); and on Lye Creek near Findlay (station #04188433).

The gage on the Blanchard River below Mt. Blanchard is located just north of where SR 37 crosses the river, with a drainage area of 141 mi^2. The gage has collected data continuously since October 2007. The discharge rates for the Blanchard River below Mt. Blanchard from October 2007- March 2009 are shown in Figure 4.2. The summary of the statistics for this period are shown in Table 4.6 on the next page. The Average Monthly Discharge data for the Blanchard River below Mt. Blanchard station are shown in Figure 4.3 on page 4-11.

Figure 4.2 Stream Flow Blanchard River below Mt. Blanchard 2007-2009



Picture 4.1

Blanchard River at SR. 37 facing downstream from the bridge deck. USGS Gage station # 0418837 is located on this bridge.
(Martin)

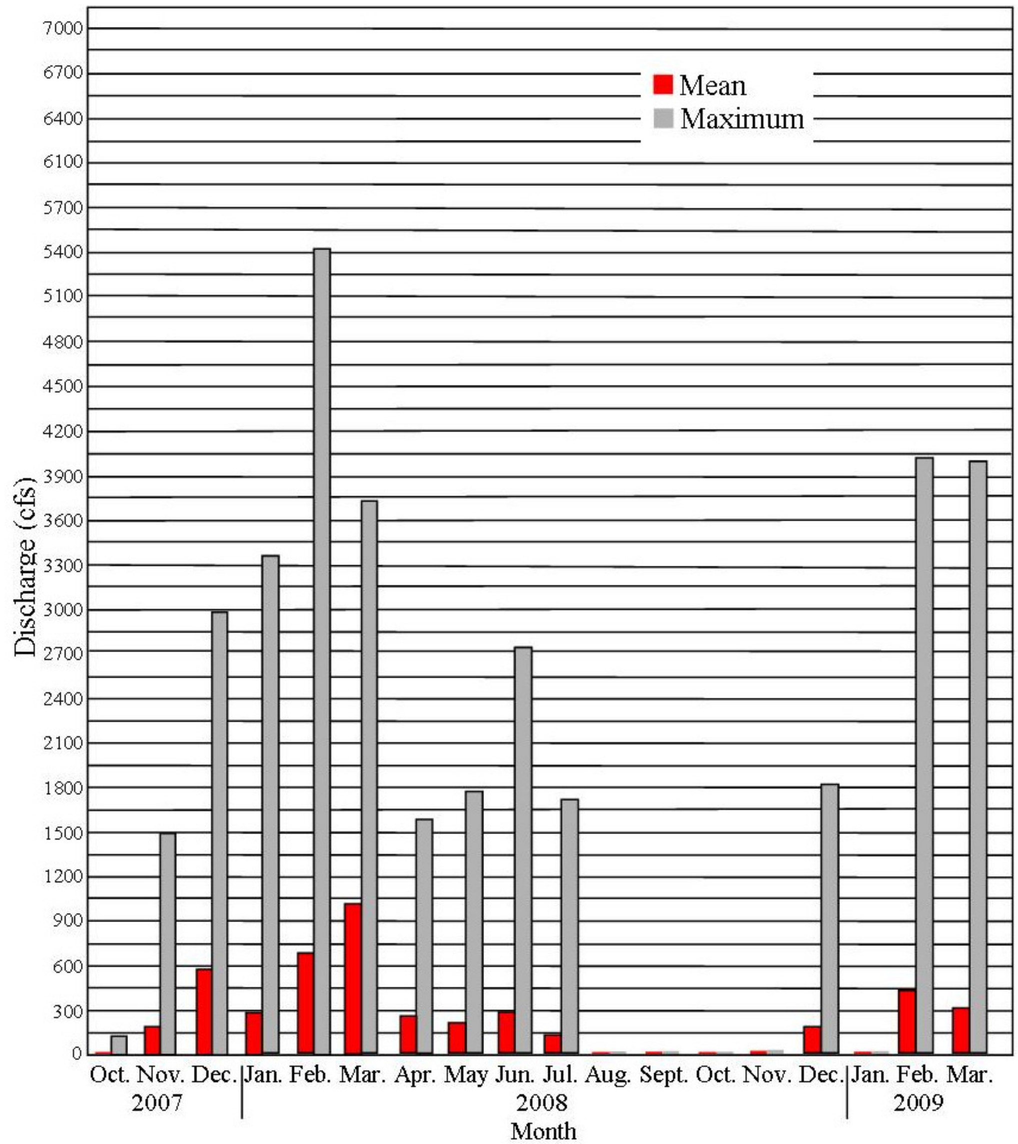
Table 4.6 Summary of Statistics for USGS Stream Gage 04188337 (Blanchard River below Mt. Blanchard) from October 2007 - March 2009. Location HUC 04100008-020-010.

Summary Statistics (cfs)	2007			2008												2009		
	Oct.*	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.*	Nov.	Dec.	Jan.	Feb.	Mar.
Total Flow	342.8	5162.4	14,445	9185.5	20,075	31,365	7917	1797	8874	4095.2	15.06	18.95	1.61	39.53	5749.4	93.7	16,703.9	9643.8
Mean	17.1	172	577.8	296	692	1012	264	232	296	141.2	0.49	0.65	0.81	1.32	198.3	3.02	597	311
Maximum	110.0	1500	2820	3360	5540	3730	1680	1770	2720	1710	0.80	1.5	0.81	6.4	1810	24	4030	3930
Minimum	2.4	8.2	48	8.8	18	10	40	16	15	0.62	0.34	0.27	0.80	0.77	1.1	1.2	1.2	3.0

Table 4.7 Summary of Statistics for USGS Stream Gage 04188400 (Blanchard River above Findlay) from October 2007 - March 2009. Location HUC 04100008-020-040

Summary Statistics (cfs)	2007			2008												2009		
	Oct.*	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.*	Nov.	Dec.	Jan.	Feb.	Mar.
Total Flow	345.7	596	11,327	13,615	27,653	44,237	12,140	10,837	9584	7028	317.3	482.8	131.8	469.3	9791.6	1279.7	20,924.9	17,310
Mean	181.9	37.25	666.3	439	954	1427	405	350	319	227	10.2	16.1	4.25	16.18	316	42.66	747	558
Maximum	103	191	2150	3300	6670	4050	1790	1450	1660	1470	39	148	6.1	146	2190	201	4080	5460
Minimum	4.7	13	226	60	42	75	90	45	33	18	3.9	2.1	3.0	2.9	4.4	6.5	6.6	6.4

Figure 4.3 Average monthly discharge from the Blanchard River below Mt. Blanchard, Ohio USGS Gage 04188337 from October 2007 - March 2009



The gage on the Blanchard River above Findlay (station # 04122400) is located on the river at the City of Findlay water intake station located on TR 208. The gage has provided continuous data since October 2007. The discharge rates for the station from October 2007 - March 2009 are shown in Figure 4.4 on the next page. The summary of the statistics for this period are shown in Table 4.7 on the previous page. The Average Monthly Discharge data for the Blanchard River above Findlay station are shown in Figure 4.5 on the next page.

Figure 4.4 Stream Flow Blanchard River above Findlay Ohio 2007-2009

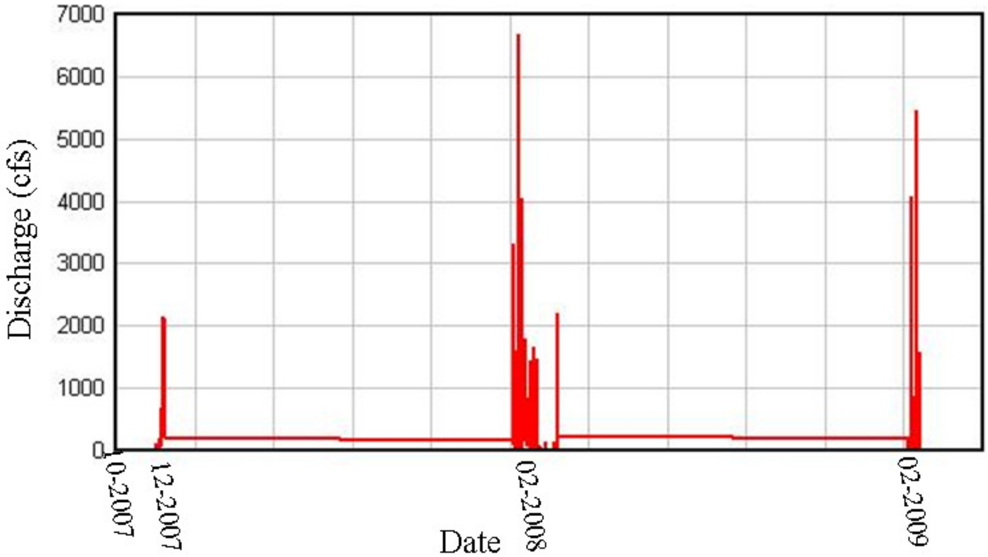
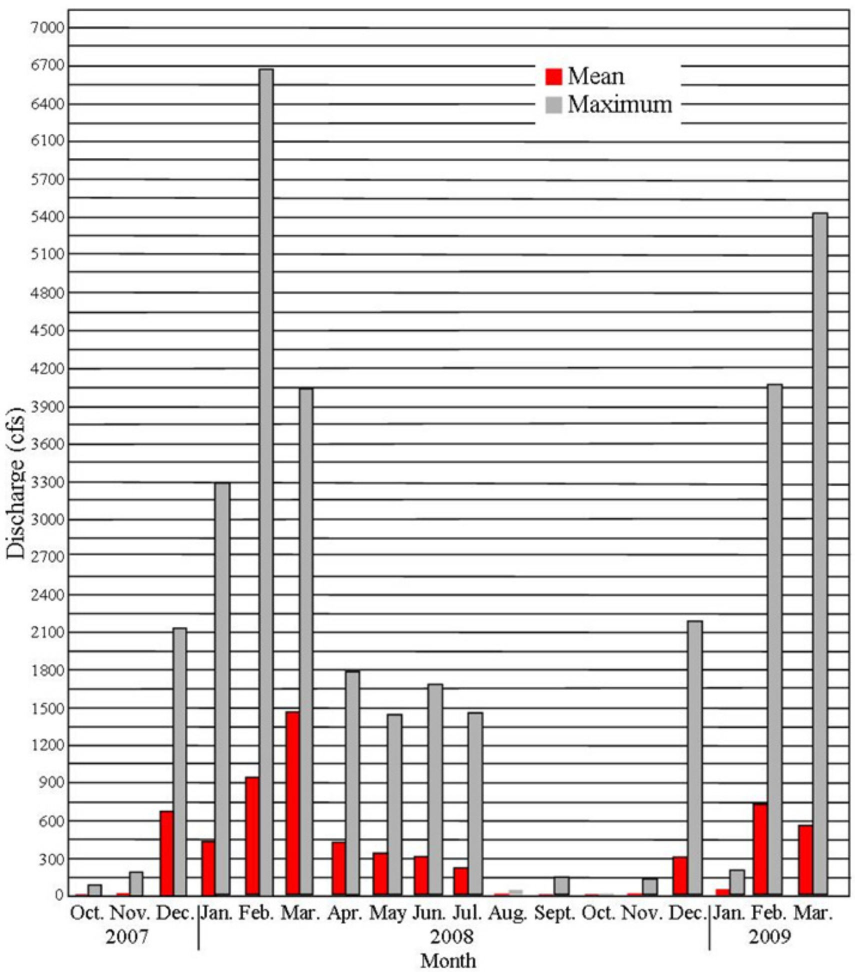


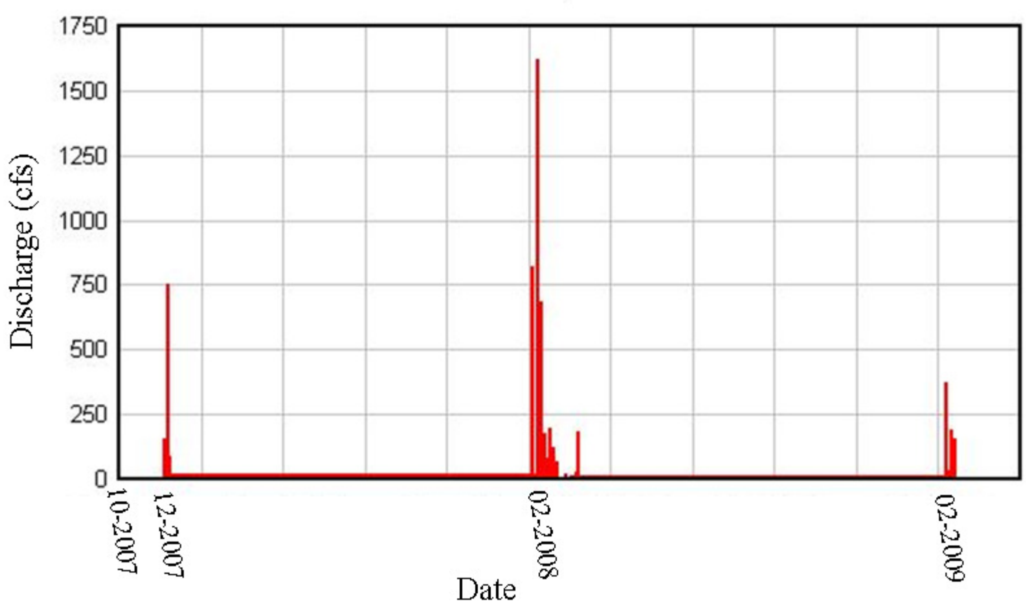
Figure 4.5 Average monthly discharge from the Blanchard River above Findlay, Ohio USGS Gage 04188400 from October 2007-March 2009



The gage on Lye Creek above Findlay (station # 04188433) is located on Lye Creek where the creek crosses TR 172 south of Findlay. The gage has provided continuous data since October 2007. The discharge rates for the station from October 2007 - March 2009 are shown in Figure 4.6 below. The summary of the statistics for this period are shown in Table 4.8 on the next page. The Average Monthly Discharge data for the Blanchard River above Findlay station are shown in Figure 4.7 on page 4-15.

In analyzing the stream flow data shown in the previous pages, it is easy to conclude from the data that there are short periods of high discharge. Most of these times of heavy discharge have occurred between January - March. In fact, six of the ten highest historical crest in the Blanchard River watershed have occurred during this same time period. (National Weather Service).

Figure 4.6 Stream Flow Lye Creek above Findlay Ohio 2007-2009



Picture 4.2 Blanchard River at the water intake dam and USGS Gage station # 04122400 on TR. 208
(Martin)

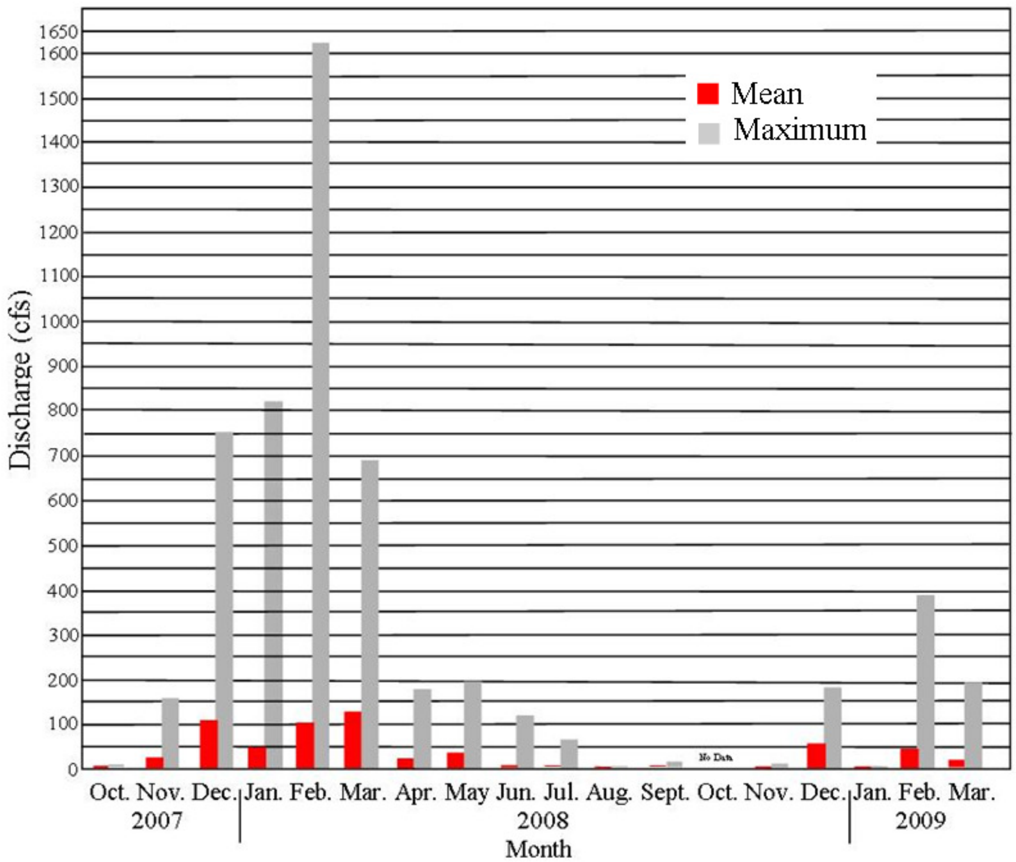
Picture 4.3 Lye Creek facing downstream from USGS Gage station # 04188433 on TR. 172
(Martin)

Table 4.8 Summary of Statistics for USGS Stream Gage 04188433 (Lye Creek above Findlay, OH) from October 2007 - March 2009.

Summary Statistics (cfs)	2007			2008												2009		
	Oct.*	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.**	Nov. ***	Dec. ****	Jan.#	Feb.	Mar.
Total Flow	11.85	440.01	2189.5	1484.6	2613.8	3488.6	599.3	1024	286.7	73.57	0.34	30.87	No Data	14.61	912.09	30.49	1004.27	551.69
Mean	0.66	16.3	104.3	49.49	100.5	124.6	20.7	34.1	9.89	2.54	0.01	1.1		7.3	57	1.27	41.84	19.02
Maximum	4.8	155	750	819	1620	685	173	196	119	67	0.08	17		14	184	4.1	374	189
Minimum	.07	0.52	6.5	2.4	3.2	5.1	3.4	0.05	0.01	0.01	0.00	0.00		0.61	0.15	0.10	0.19	0.76

*Gage measurements started October 12, 2007.
**No data for October 2008.
***Only two days data for November 2008
****Only sixteen days for December 2008
#Only twenty four days for January 2009

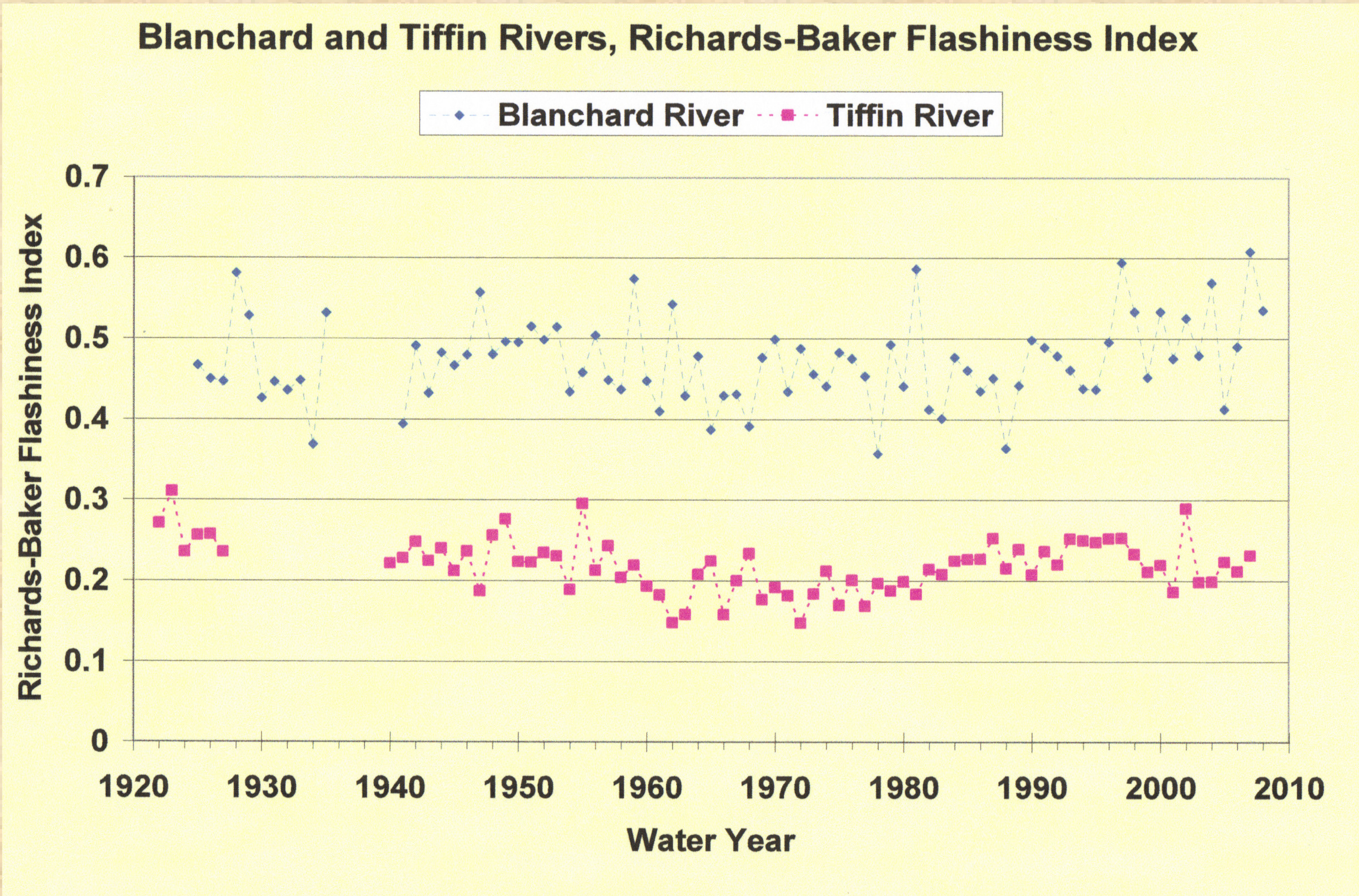
Figure 4.7 Average monthly discharge from Lye Creek above Findlay, Ohio USGS Gage 04188433 from October 2007-March 2009



Stream Flashiness

Stream flashiness is a measure of how quickly stream flows change during runoff events, relative to the total discharge of the stream. Flashy streams are those that, relative to other streams in their size range, have high peak flows during runoff events and low base flows. Low base flows for The Outlet/Lye Creek subwatershed, as well as, the entire Blanchard River Watershed were identified by the Ohio EPA as a problem. Dr. David Baker, from the National Center for Water Quality Reasearch (NCWQR) located at Heidelberg University, has calculated the Richards-Baker Flashiness Index for the Blanchard River from 1920-2008. The data is shown in figure 4.8 on the next page. From the data, one can see that the Blanchard River has a higher degree of flashiness than the Tiffin River. The high stream flashiness is a problem that was probably created by the channelization of most of the waterways in the watershed for agricultural drainage and use. Best Management Practices (BMPs) will need to address this stream flashiness. Chapter 7 discusses the problem areas and offers BMPs to solve many of the problems identified in the Ohio EPA TMDL report.

Figure 4.8



Information from Dr. David Baker from NCWQR at Heidelberg University 2009

Other Stream and Floodplain Attributes

Currently, the Northwest Ohio Flood Mitigation, Hancock County Engineer, City of Findlay Engineer, US Army Corps of Engineers, and other agencies are conducting several studies within the Blanchard River Watershed related to flooding and water quality. When the results of this study are released this WAP will need to be updated to include information on the following attributes:

*Channel and floodplain condition, streambank condition, extent and location of levees and diversion channels, detention/retention basins, riparian habitat, and oxbow cutoffs.
*Extent and location of streams bordering conservation easements.
*Inventory of wetlands and opportunities for wetland restoration.

Ecoregional Location

The Outlet/Lye Creek watershed is situated exclusively within the Eastern Corn Belt Plains (Level III), Clavey High Lime Till Plains (Level IV) Ecoregion of the United States. The Ohio EPA uses water quality criteria for the Eastern Corn Belt Plains Ecoregion to evaluate biological conditions for the entire The Outlet/Lye Creek watershed. See Table 4.9 below.

Table 4.9 - Ecoregion Biocriteria: Eastern Corn Belt Region (ECBP) (2009 Blanchard River Watershed TMDL report).

INDEX - Site Type	WWH	EWH	MWH
IBI Headwaters-Wading/Boat	40/42	50/48	24
Mlwb Wading/ Boat	8.3/8.5	9.4/9.6	4.0
ICI Headwaters-Wading/Boat	36	46	22

Table 4.10 - Ecoregion Location, Use Designation, and Aquatic Life Use Attainment of The Outlet/Lye Creek watershed. (2009 Blanchard River Watershed TMDL report).

River Mile	Location	Use Designation	IBI	Mlwb[a]	ICI[b]	QHEI	Attainment Status
HUC #04100008-020-040							
75.8/75.6	Blanchard River	WWH	38[ns]	7.2*	VG	57.5	Partial
71.9/71.9	Blanchard River	WWH	40	8.7	VG	51.0	Full
HUC #04100008-020-010							
61.7/61.9	Blanchard River	WWH	36[ns]	7.2*	48	62.5	Partial
3.6/___	Buckrun Creek	MWH rec.		NA	HF*		
HUC #04100008-020-020							
3.8/___	Brights Ditch	MWH rec.		NA	P*		
2.4/___	Brights Ditch	MWH rec.		NA	P*		
0.3/___	Brights Ditch	MWH rec.		NA	G		
HUC #04100008-020-030							
7.7/7.7	The Outlet	MWH rec.	44	NA	G	41.5	Full
6.1/6.1	The Outlet	MWH rec.	36	NA	HF	17.5	Full
4.5/4.5	The Outlet	MWH rec.	42	5.7*	38	39	NON
0.5/___	The Outlet	MWH rec.		NA	44		
HUC #04100008-020-050							
9.4/___	Lye Creek	MWH rec.		NA	P*		
6.7/___	Lye Creek	MWH rec.		NA	LF*		
2.6/2.6	Lye Creek	MWH rec.	32	6.4	20*	39.5	Partial

a - Mlwb is not applicable to headwater streams with drainage areas ≤ 20 mi^2

b - A narrative evaluation of the qualitative sample based on attributes such as community composition, EPT taxa richness, and number of sensitive taxa was used when quantitative data were not available or considered unreliable due to current velocities less than 0.3 fps flowing over the artificial substrates.

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

* - Indicates significant departure from applicable biocriteria (>4 IBI or ICI units, or >0.5 Mlwb units). Underlined scores are in the Poor or Very Poor range.

G - good
HF - high fair
LF - low fair
P - poor
VG - very good

Non-Agricultural Conservation/Conservation Easements
(See Map 4.4 the next page)

There are no conservation easements located within the Seneca County and Wyandot County portions of The Outlet/Lye Creek watershed. The land located within the Hancock County portion of the watershed that would be considered to have conservation easements are the areas along the river under the control of the Hancock Park District. These properties are shown below by the 14-digit subwatershed location.

Blanchard River below The Outlet (2) to above Eagle Creek.
HUC #04100008-020-040

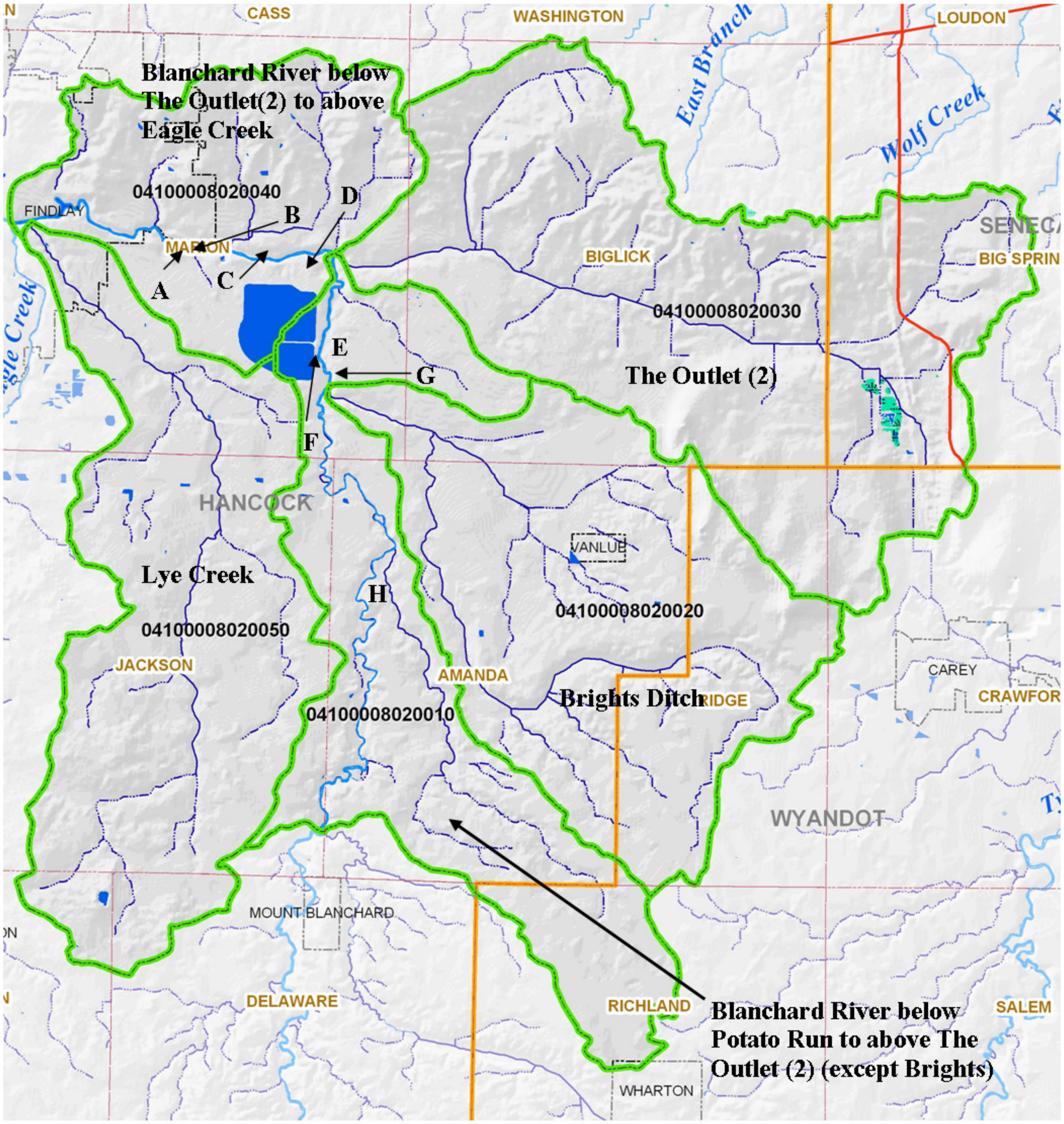
A. Vogelsong Farm (22 acres) - located on the south side of the river north of SR 568 and east of Bright Road.
B. Lawrence Farm (12.5 acres) - located on the north side of the river south of SR 568 and the intersection of CR 236.
C. Lehman (6 acres) located on the south side of the river along TR 208 just west of TR 241.
D. Riverbend Park (87 acres) - located along TR 208 just east of TR 241.

Blanchard River below Potato Run to above The Outlet (2), (except Brights)
HUC #04100008-020-040

E Younger Farm (20 acres) - located on the east side of the river north of TR 207 and east of the reservoirs.
F. Findlay Reservoir Park (451 acres) - runs along the east side of the City of Findlay Reservoirs north of TR 207.
G. Bright Farm (11.5 acres) - located west of TR 244 and north of TR 207.
H. Rieck Center University of Findlay (54 acres) located at 17311 TR 166.

Picture 4.4 Younger Conservation Farm located just east of the Blanchard River and the along TR 207 See Letter E on Map 4.4. (Martin)

Map 4.4 Non-Agricultural Conservation/Conservation Easement Locations



ODNR Coastal Management

Key: Identified by letter on above map

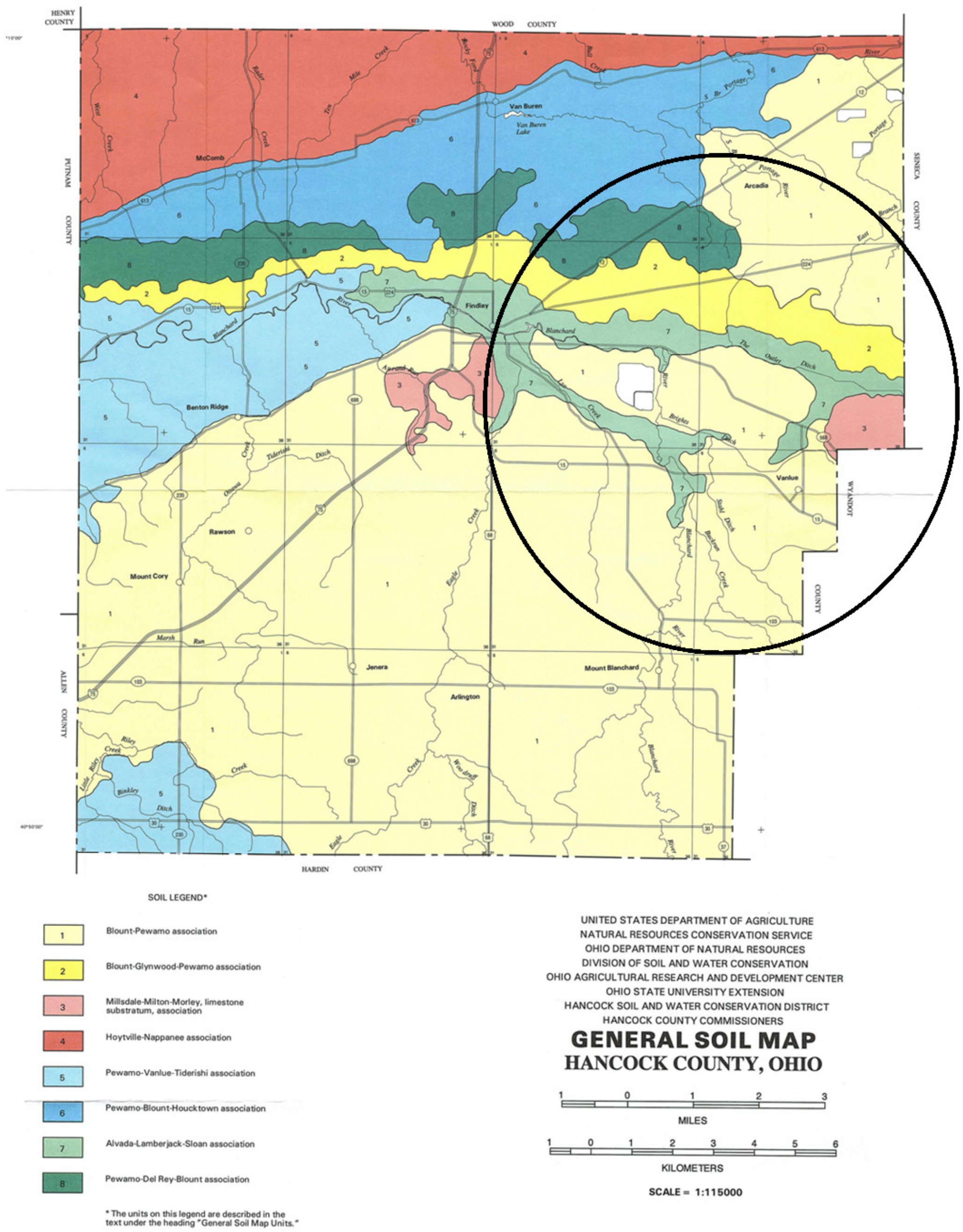
A. Vogelsong Farm
B. Lawrence Farm
C. Lehman
D. Riverbend Park
E. Younger Farm
F. Findlay Reservoir Park
G. Bright Farm
H. Rieck Center University of Findlay

Soils

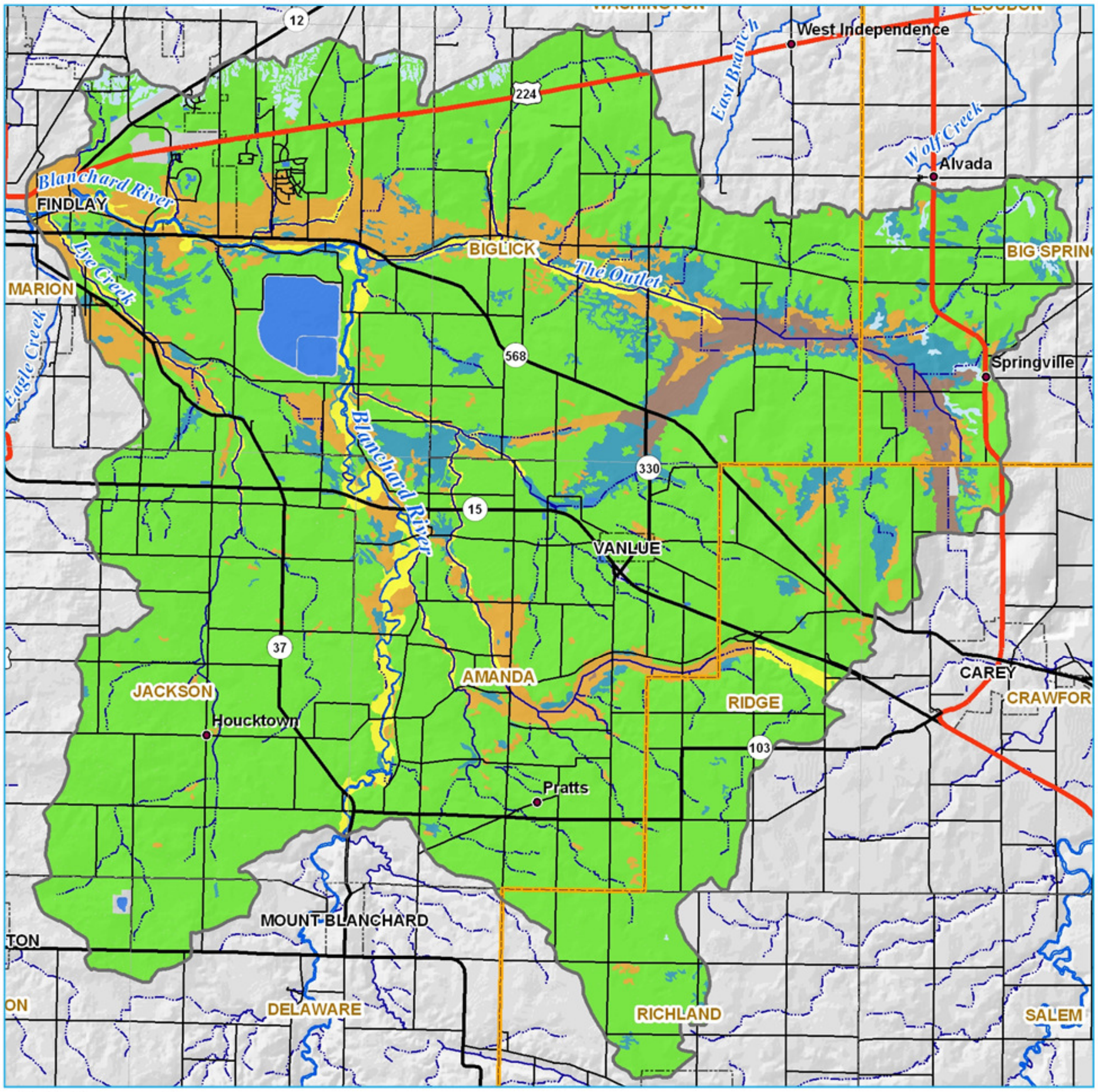
Soils in The Outlet/Lye Creek watershed are derived from glacial drift of Wisconsin age. Most of the subwatershed is covered by Blount-Pewamo association soils found between Lye Creek and The Outlet Ditch and all the area south of Lye Creek. See Map 4.5 on the next page General Soils of Hancock County. Blount-Pewamo association soils are very deep, level to gently sloping, somewhat poorly drained and very poorly drained soils that formed in till. The landforms associated with these soils include rises, knolls, flats, depressions, and drainageways on ground moraines and end moraines. The slope range for these soils are 0 to 4 percent. The area surrounding The Outlet ditch is composed of Alvada-Lamberjack-Sloan association soils. These Alvada-Lamberjack-Sloan association soils are also found along Lye Creek from its mouth to the point where Lye Creek turns south near Elm Grove cemetery at the intersection of SR 37 and TR 234. An area of this association extends eastward from this point for about 1 mile. See Map 4.5 on the next page. Alvada-Lamberjack-Sloan association soils are very deep, level and nearly level, very poorly drained and somewhat poorly drained soils that formed in loamy, sandy, or gravelly deposits overlying till: in alluvium; or in alluvium overlying limestone or dolostone. The landforms associated with these soils include depressions, drainageways, and rises on outwash plains and on flats and backswamps on flood plains. The slope for this association is 0 to 2 percent. The only other soil type found in the watershed is Millsdale-Milton-Morley, limestone stratum, association. An area of this soil type is found in the corner formed by the boundary of Seneca and Wyandot County northeast of Vanlue. See Map 4.5 on the next page. Millsdale-Milton-Morley, limestone stratum, association soils are moderately deep and very deep, level to gently sloping, very poorly drained, well drained, and moderately well drained soils that formed in till overlying limestone or dolostone or in till and the underlying residuum derived from limestone or dolostone. The landforms associated with these soils include flats, depressions, drainageways, rises, and knolls on ground moraines and on monadocks on ground moraines. The slope range for these soils are 0 to 6 percent. (soil survey of Hancock County, Ohio 2006) Map 4.6 on page 4-23 shows the Parent Material Soils found in the watershed.

A more detailed map of the soils at the phase level is shown in Appendix B. Appendix B also contains a summary of the soils showing muname, museries, count, area in acres, and percent.

Map 4.5 General Soils of Hancock County



Map 4.6 Parent Materials Soils - The Outlet/Lye Creek Watershed



Soil Legend:

- Glacial Till Soils
- Glacial Stream Sediment Soils
- Alluvial
- Offshore Lake Sediment
- Organic Soils
- Lakebed Sediment Soils

Hydric Soils

According to the NRCS Hydric Soils Technical Note 1, a hydric soil is a soil that formed under conditions of saturation, flooding, or ponding long enough during the growing season to develop anaerobic conditions in the upper part. The scope of this action plan does not require a complete understanding of hydric soils. Map 4.7, on the next page, shows the hydric soils for The Outlet/Lye Creek watershed. As the map shows, there are wide areas of hydric soil in The Outlet/Lye Creek watershed. GIS calculation show that 33,476.71 acres out of a total area of 85,391.44 acres, or 39.20%, are covered by hydric soils. Table 4.11 below summarizes the Hydric Soils for the entire The Outlet/Lye Creek watershed.

Table 4.11 Hydric Soils - The Outlet/Lye Creek Watershed

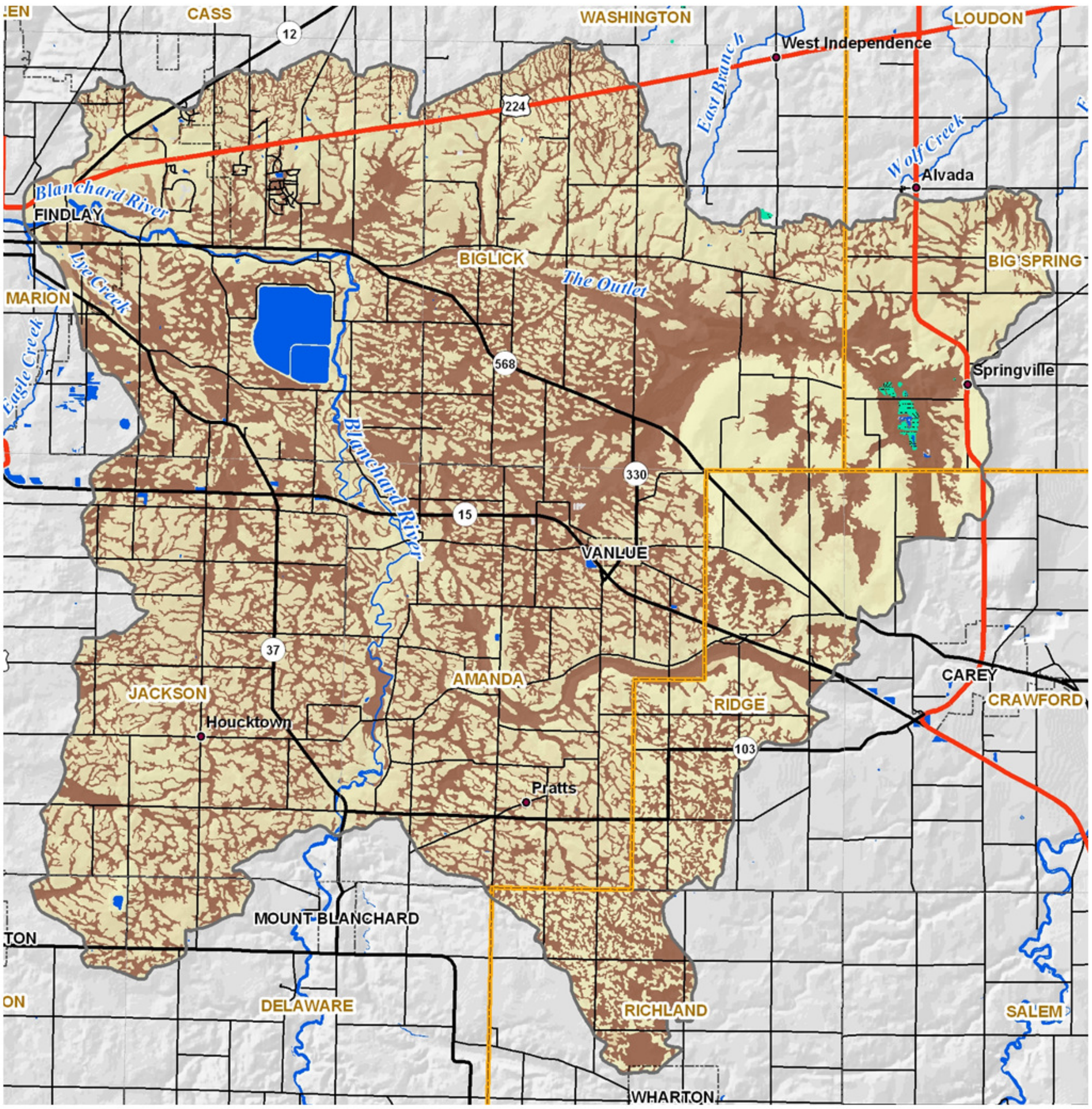
Hydric Soil	Area (acres)	Percent
Yes	33,476.71	39.20
No	50,599.25	59.26
Unranked	1,315.48	1.54
Total	85,391.44	100.00

Hydric soils are normally located along wide, flat drain ways or depressional areas of the landscape. The darker areas on Map 4.7 show best potential sites for wetland or floodplain restoration. Map 4.8, on page 4-26, shows Hydric Soils with TMDL sites showing nitrogen and phosphorus levels. Map 4.8 also shows the Hydric Soils for each of the five 14-digit subwatersheds. Table 4.12 below summarizes the Hydric Soils for The Outlet/Lye Creek 14-digit subwatersheds.

Table 4.12 Hydric Soils The Outlet/Lye Creek Watershed - 14 digit level

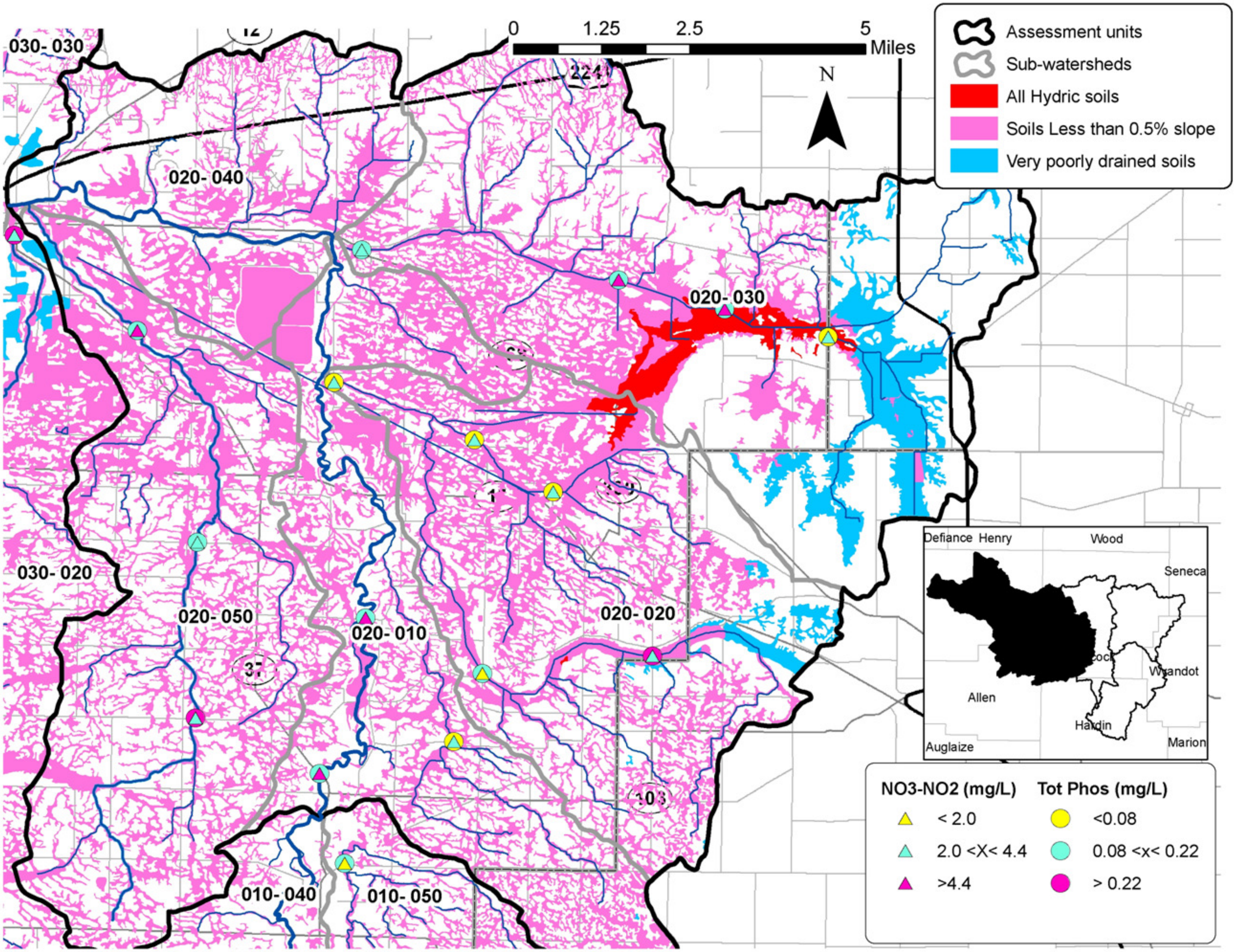
HUC 14-digit subwatershed	Yes	Hydric Soil No	Unranked	Grand Total
04100008-020-010	3,346.06	3442.74	0	6,788.79
04100008-020-020	235.14	446.90	2.07	684.12
04100008-020-030	28,941.43	44,409.90	1047.88	74,399.22
04100008-020-040	932.23	2,227.51	265.52	3,425.27
04100008-020-050	21.85	72.20	0	94.05
Grand Total	33,476.71	50,599.25	1315.48	85,391.44

Map 4.7 Hydric Soils



The darker the area, the higher the percentage of hydric components. They range from 100% (very dark brown) down to 0% (very light tan).

Map 4.8 Hydric Soils with TMDL sites for N and P



Hydrologic Soil Groups

Table 4.13, below shows the percentages of the watershed area that fall within each hydrologic group along with a numeric measure of transmission rates by grouping. Map 4.9, on the next page, shows the Hydrologic soil groups in the watershed.

Hydrologic soil groups can be useful in estimating surface runoff from precipitation.

Table 4.13 Distribution of Hydrologic Soil Groups in The Outlet/Lye Creek Watershed

Hydrological Soil Group	Transmission Rate	Acres	% of Classified Soils
A	>0.30 in/hr	1,173.14	1.37
B	0.15 to 0.30 in/hr	12,030.09	14.09
C	0.05 to 0.15 in/hr	64,784.74	75.87
D	0.00 to 0.05 in/hr	2,467.21	2.89
A/D		660.59	0.77
B/D		2,178.30	2.55
C/D		554.12	0.65
Not Classified		1,543.36	1.81
Total		85,391.44	100.00

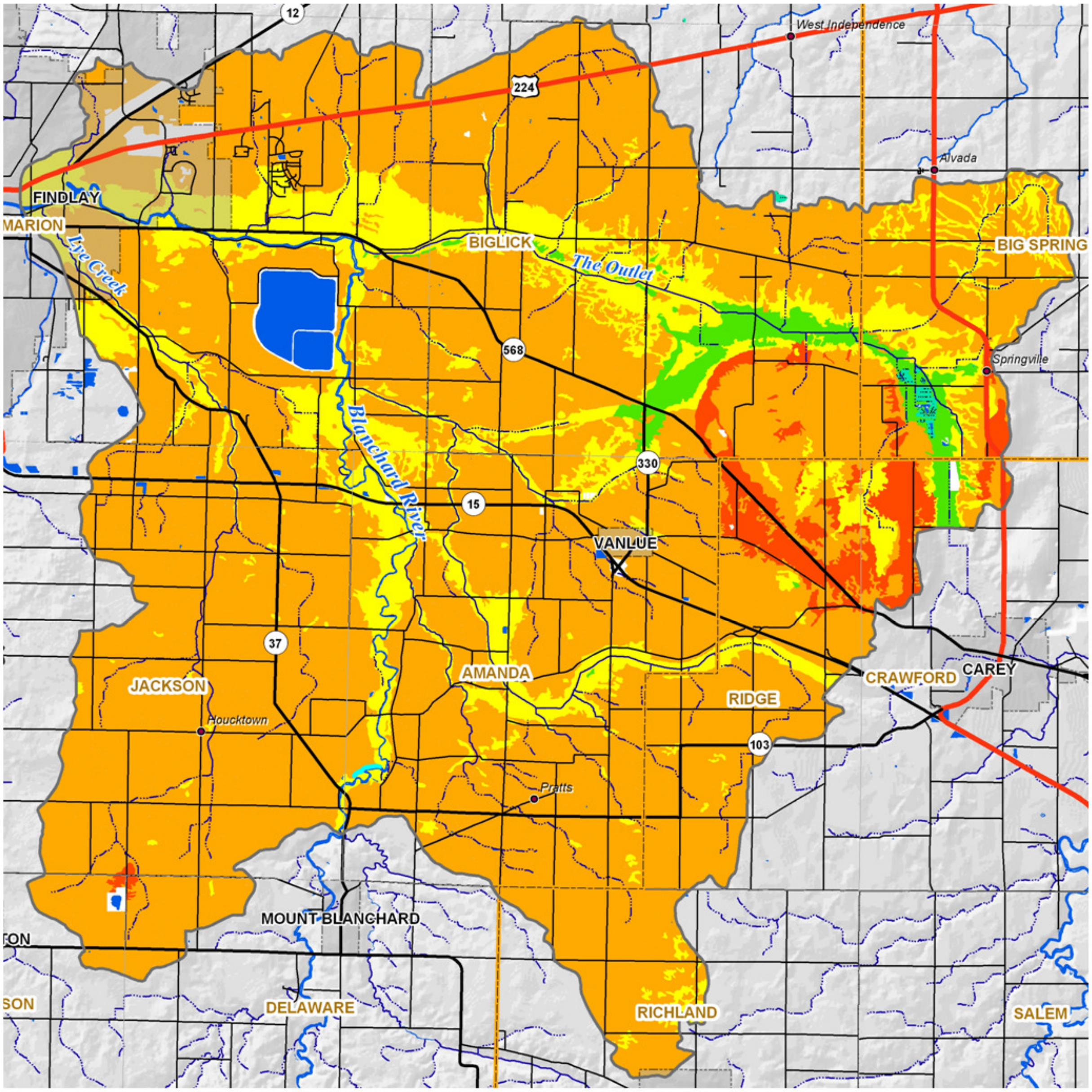
The Natural Resource Conservation Service (NRCS) has classified soils into four Hydrologic Soil Groups (HSGs) based on the soil's runoff potential. Soils that do not have year-round vegetative cover, such as tilled agricultural fields, are assigned to one of four groups. The four HSGs are A, B, C, and D. Soils in Group A generally have the smallest runoff potential and Group D soils the greatest runoff potential. HSGs are very useful in helping to estimate surface runoff amounts after storm events of varying frequency.

The NRCS and USDA discuss the classification of HSGs in "Urban Hydrology for Small Watersheds" in Technical Release-55. They have classified HSGs into four groups.

Group A is sand, loamy sand or sandy loam types of soils. Group A has low runoff potential and high infiltration rates even when thoroughly wetted. They consist chiefly of deep, well to excessively drained sands or gravels and have a high rate of water transmission. Only 1.37% of the watershed soils are in Group A.

Group B is silt loam or loam. Group B has a moderate infiltration rate when thoroughly wetted and consists chiefly or moderately deep to deep, moderately well to well drained soils with moderately fine to moderately coarse textures. Group B makes up the second largest group of Hydrologic soil in the watershed at 14.09%.

Map 4.9 Hydrologic Soil Groups - The Outlet/Lye Creek Watershed



Hydrologic Soil Groups

- **Group A**
- **Group B**
- **Group C**
- **Group D**

Group C soils are sandy clay loam. They have low infiltration rates when thoroughly wetted and consist chiefly of soils with a layer that impedes downward movement of water and soils with moderately fine to fine structure. This group makes up 75.87% of the watershed.

Group D soils are clay loam, silty clay loam, sand clay, silty clay or clay. This HSG has the highest runoff potential. They have very low infiltration rates when thoroughly wetted and consist chiefly of clay soils with a high swelling potential, soils with a permanent high water table, soils with a claypan or clay layer at or near the surface and shallow soils over nearly impervious material. Only 2.89 % of the watershed is in this group.

Identifying the location of soils that are most prone to surface runoff will assist with efforts to target adoption of BMPs. In Chapter 7, each identified problem statement contains a GIS soil map of that area. This knowledge, along with the local knowledge of the stakeholders in the area, will play a key role in identifying and implementing the BMPs to solve the problem(s) in that area. However, additional funding will be required to fulfill the needed materials and analyses to complete each project.

Climate

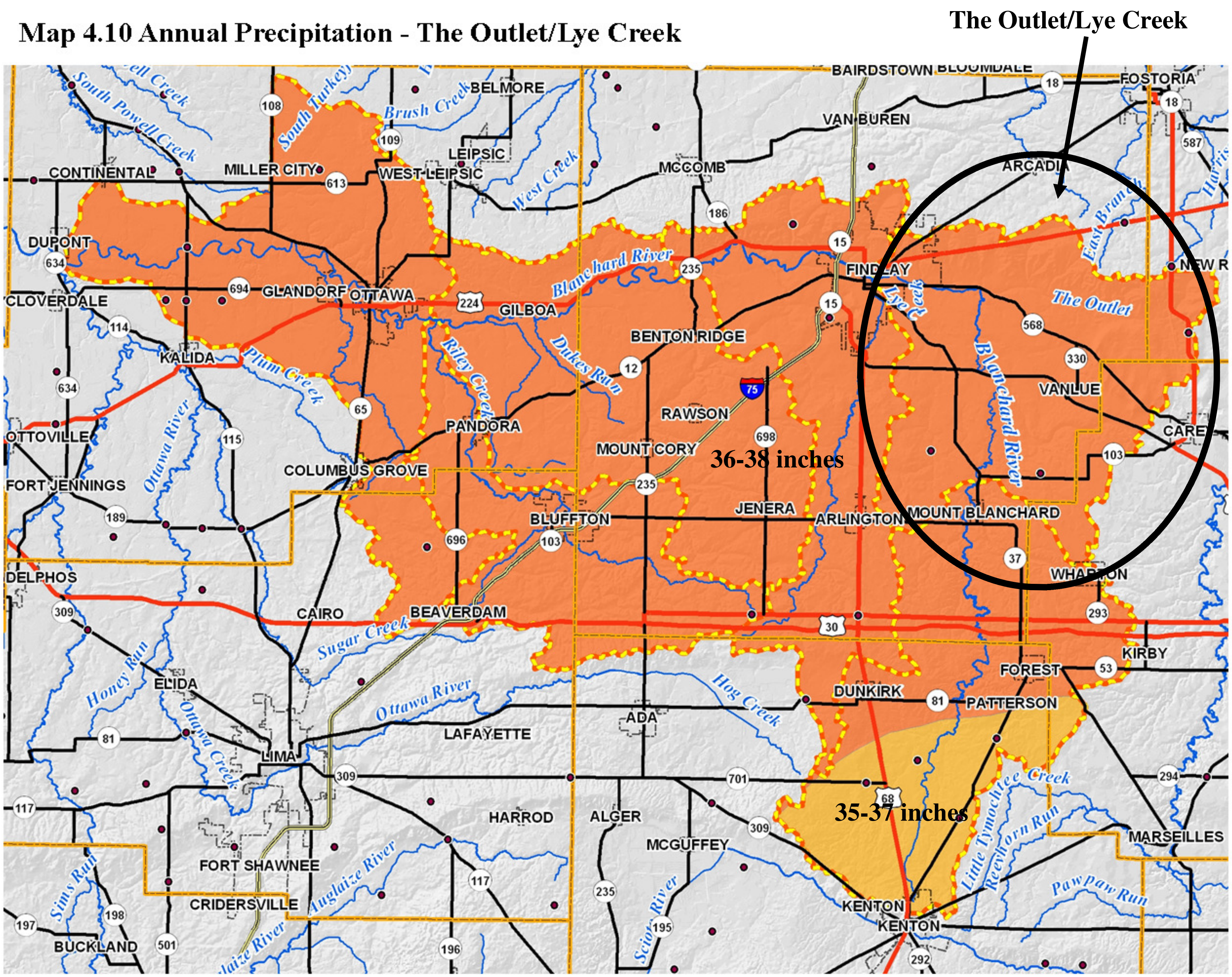
The Outlet/Lye Creek watershed, like all the subwatersheds in the Blanchard River Watershed, is cold in winter and hot in summer. Winter precipitation, frequently in the form of snow, results in a good accumulation of soil moisture by spring and minimizes drought during the summer. Normal annual precipitation patterns are adequate for all of the crops that are adapted to the temperature and the growing season in the survey area.

In winter, the average temperature is 26.0 ^{o}F and the average daily minimum temperature is 18.7 ^{o}F. The lowest temperature on record, which occurred at Findlay on January 19, 1994, is -20 ^{o}F. In summer, the average temperature is 70.9 ^{o}F and the average daily maximum temperature is 81.4 ^{o}F. The highest recorded temperature, which occurred on June 25, 1988, is 104 ^{o}F.

The average annual precipitation is 36.29 inches. Of this, 20.7 inches, or 57 percent, usually falls in May through October. The heaviest one day rainfall on record was 6.25 inches on September 1, 1959. Thunderstorms occur on about 37 days each year, and most occur during the period May through August. (See Map 4.10 on the next page).

The average seasonal snowfall is about 29 inches. The heaviest 1-day snowfall on record was 15.2 inches on January 31, 1982. The greatest snow depth at any one time during the period of record was 23 inches. On the average, 45 days of the year have at least 1 inch of snow on the ground. The number of such days varies greatly from year to year (Soil Survey of Hancock County, Ohio 2006).

Map 4.10 Annual Precipitation - The Outlet/Lye Creek



Geology

The Outlet/Lye Creek watershed is located in the eastern part of the Central Lowland Province. Proceeding from west to east in Hancock County, the underlying bedrock dips and becomes progressively younger. The bedrock within the watershed is of sedimentary origin, primarily Silurian limestone and dolostone (Ohio Department of Natural Resources 1947).

The Tymochtee Group underlies an area ranging from the central part to the southeastern part of the county, especially in Delaware, Jackson, Madison, and Eagle Townships. The Tymochtee Group lies east of the Bowling Green fault, which parallels Interstate 75 before turning southeast near Findlay. East of the fault, the bedrock is dominated by the Greenfield and Lockport Groups. These groups underlie Biglick, Cass, Marion, and Amanda Townships (Ohio Department of Natural Resources 1999).

The Defiance Moraine crosses the northern part of The Outlet/Lye Creek watershed, separating the Blanchard River Watershed from the Portage River Watershed (Soil Survey of Hancock County, Ohio 2006).

Political Geography and Demographics

A portion of The Outlet/Lye Creek watershed is situated in three counties: Hancock (79.5%), Wyandot (13.7%) and Seneca (6.8%).

The Outlet/Lye Creek watershed is located within a mainly rural landscape in northwest Ohio. There are ten townships located in the watershed in the three-county area. The area and estimated populations of each township can be found in table 4.14 on the next page. To estimate the population of the watershed, each township's population was considered to be evenly distributed throughout the township. The percentage of the land within each township that is located within the watershed was used as a means of extrapolating the estimated population of the township within the watershed and the total population of the watershed. The basis for the data in determining the population was found at http://www.city-data.com.

The Outlet/ Lye Creek watershed is located in a predominately rural area (77%) in northwest Ohio. The majority of the population is white non-Hispanic (97%); black (0.3%), American Indian and Alaska Native (0.03%), Asian (1.0%) and other (0.6%). The median age of the males is 37.6, while the median age of the females is 37.2.

The largest concentration of population is located in the slice of Findlay that is located in the watershed. This area is located in the 14-digit subwatershed known as the Blanchard River below The Outlet (2) to above Eagle Creek (HUC 04100008-020-040. The population of this slice is estimated to be 12,721. The village of Vanlue had a population of 371, based on the 2000 census. The village of Vanlue is located in the Brights Ditch (HUC 0410008-020-020) subwatersheds.

Table 4.14 Township Data for The Outlet/Lye Creek Watershed

Townships	Area of Twp. (ac.)	% of Twp. in Watershed	Area of Twp. in Watershed (ac.)	% of Watershed in Twp.	Population of Twp. in Watershed*		Residents per mi.^{2}
Hancock Co.					2000	2009***	
Amanda	17,750.8	96.1	17,059.2	19.98	1004	922	35
Biglick	23,146.0	78.9	18,254.8	21.38	753	785#	28
Delaware	19,969.1	5.3	1064.9	1.25	65	61	37
Jackson	19,022.9	72.4	13,765.6	16.12	767	740	34
Madison	15,247.6	5.4	801.7	0.94	116	44	35
Marion	23,037.8	73.4	16,900.1**	19.79	1617	1752	66
Seneca Co.							
Big Spring	23,357.2	24.9	5818.4	6.81	446	429#	47
Wyandot Co.							
Crawford	23,129.8	7.8	1806.6	2.11	95	92	33
Richland	19,434.3	14.3	2772.2	3.25	136	133#	31
Ridge	9546.9	74.8	7140.9	8.36	383	374#	33
	Total Area in Watershed		85,384.4	Total Population	5382	5332	

*Township population extrapolated from Census data and percent of township in watershed.
**Includes 832 acres of water, mainly in the two above ground reservoirs for the City of Findlay
***Population data from Sperling's Best Place at www.bestplaces.net
#Population determined by using percent change from 2000 based on Ohio Census.

Table 4.15 below shows the Political Units and Other Entities located within The Outlet/Lye Creek Watershed.

Table 4.15 Political Units and Other Entities within The Outlet/Lye Creek Watershed

County	Township	Locality	School District	Other Planning Organizations
Hancock				Hancock Regional Planning Commission
	Amanda	Vanlue	Vanlue LSD Findlay CSD Riverdale LSD	
	Biglick		Vanlue LSD Arcadia LSD	
	Delaware		Arlington LSD Riverdale LSD	
	Jackson	Houcktown	Arlington LSD	
	Madison		Arlington LSD	
	Marion		Van Buren LSD Vanlue LSD Findlay CSD Arcadia LSD	
Seneca				Seneca Regional Planning Commission
	Big Spring		New Riegel LSD	
Wyandot				Wyandot Regional Planning Commission
	Crawford Richland Ridge		Carey ESD Riverdale LSD Carey ESD Riverdale LSD	

http://www.findlayhancockchamber.com/Assets/Welcome/GFI%20Economic%20Development%20Efforts%202008.pdf

Greater Findlay Inc, an economic development arm of the Chamber of Commerce reports that "*Findlay•Hancock County region embodies the true concept of a micropolitan community offering nearly all the advantages of a true metropolitan area without the disadvantages of a big city. In March 2010, Findlay ranked as the tenth best micropolitan community in the U.S. for new and expanding facilities for 2009 by Site Selection magazine, the official publication of the Industrial Asset Management Council. The magazine ranked 674 of the nation's micropolitan areas, cities of 10,000 to 50,000 people which cover at least one county. The Greater Findlay region has ranked in Site Selection's Top 20 for 11 consecutive years.*

Findlay/Hancock County is well positioned for future development and growth. The community's strong business climate will continue to attract a diverse blend of retail, office, manufacturing and distribution centers. A regional employment hub with direct access to the I-75 corridor, low-cost utilities, quality workforce, and close proximity to both air and rail transportation will provide great resources for future economic growth." For more information visit Greater Findlay Inc web site at http://www.findlayhancockchamber.com/

Agricultural Resources

As with the population data, the agricultural data was extrapolated from data for each county and the percent of the watershed in that county. The agricultural land within a county was considered to be evenly distributed throughout the county. County specific data for each county can be found at the web site www.agcensus.usda.gov. and in the 2007 Annual Report published by the Ohio Department of Agriculture. Table 4.16 summarizes the agricultural statistics for The Outlet/Lye Creek Watershed.

Table 4.16 Agricultural Statistics for The Outlet/Lye Creek Watershed

	Hancock Co.	Seneca Co.	Wyandot Co.	Total
Farm Land in Watershed (acres)	52,691.45(-5)*	4445.71(-4)*	8992.19(+9)*	66,256.55
Number of Farms	190(-6)*	19(-3)*	24(+4)*	233
Average Farm Size	278(+0)	235(-1)*	377(+5)*	297
Average Production per Farm	$ 109,639(+132)*	$ 93,644(+100)*	$ 213,516(+80)*	
Government Payments	$ 1,201,750(+40)*	$ 1,001,795(+32)*	$ 231,552(+35)*	$ 2,435097
Government Payments/Farm	$ 6,325(+0)	$ 5245(-2)	$ 8,576(-5)	

*Percent of change from 2002-2007

The following can be extrapolated from the 2007 Annual Report data:

1. The number of farms in Hancock county and Seneca County have decreased, while the average farm size has shown little change.
2. The number of and average size of farms in Wyandot County have both increased.
3. Soybeans are the dominant crop in the watershed (Hancock 42.2%, Seneca 39.2%, and Wyandot 44.8%).
4. The majority of the farms had sales under $100,000 (Hancock 73.8%, Seneca 78.6%, and Wyandot 69.9%). Data is based on the entire county.
5. The average age of the principal owner for farms is 52.3 years. Data is based on all three counties.
6. Over 92% of the principal operators are male; over 99% are white.

Picture 4.5

Soybean field along CR 205 near reservoir #1 east of Findlay. Beans were sowed using Conservation Tillage practice.
(Martin)

Table 4.17 quantifies land uses by area within each county in The Outlet/Lye Creek watershed.

Table 4.17 Agricultural Land Use by Area & County
The Outlet/Lye Creek Watershed

	Hancock Co.	Seneca Co.	Wyandot Co.	Total	Percent of Total Land Area
Total area in Watershed, acres	67,846.7	5818.4	11,719.7	85,384.4	-
Number of Farms	190	19	24	233	-
Farm Land in Watershed, acres	52,691.45	4445.26	8992.19	66,128.9	77.40
Soybean, acres	22,234.44	1740.75	4031.84	28,007.03	32.80
Corn, acres	17,205.52	1470.15	3340.28	22,015.95	25.80
Wheat, acres	6546.88	653.4	1116.44	8316.72	9.70
Oats, acres	-----	33.0	-----	33.0	0.04
Hay, acres	898.2	75.9	158.2	1132.3	1.30
Produce, acres	380*	0.0	0.0	300	.44
CRP/CREP, acres	212.6	0.0	73.2	285.8	0.33
Non-farmland, acres	15,155.25	1373.14	2727.51	19,255.5	22.55

*Information obtained from the farmers that grow produce

Table 4.18 Summarizes the data for livestock in The Outlet/Lye Creek watershed.

Table 4.18 Estimate of Livestock by County in The Outlet/Lye Creek Watershed

Type of Livestock	Estimated Population by County*			
	Hancock	Seneca	Wyandot	Total
Cattle and Calves	872	167	136	1175
Sheep and Lambs	234	46	125	405
Hogs and Pigs	6663	709	1499	8871
Layers	D	62	D	62D

*based on USDA 2007 Census for Agriculture.
D - cannot be disclosed

Table 4.19 Agricultural Land Use - 14-digit HUC level

Agriculture Land Use \ 14-Digit Subwatershed	04100008-020-010	04100008-020-020	04100008-020-030	04100008-020-040	04100008-020-050
Total Acres	14,581	18178	24,418	10,173.80	17,843
Total Acres Cultivated Crops	10,637	13,731	17,585	5025.43	13,144
Total Acres Pasture/Hay	59.28	259.07	480.81	223.94	252.48
% of Landuse in Farmland	85.35	88.49	86.87	51.60	86.62
Total Acres Corn	3202.03	4085.11	5359.57	2624.84	4619.81
Total Acres Soybean	4070.80	5193.46	6813.71	1648.34	5004.79
Total Acres Wheat	1203.87	587.70	2015.03	487.47	1480.07
Total Acres Oats	----	----	33.00	----	----
Total Acres Produce			110.00*	120.00*	150.00*

Information extrapolated from USDA 2007 Census for Agriculture
*Estimates from local producers
14-digit Subwatershed Key
04100008-020-010 Blanchard River below Potato Run to above The Outlet (2), (except Brights Ditch)
04100008-020-020 Brights Ditch
04100008-020-030 The Outlet (2)
04100008-020-040 Blanchard River below The Outlet (2) to above Eagle Creek
04100008-020-050 Lye Creek

Table 4.19 above shows extrapolated data for Agricultural Land Use in The Outlet/Lye Creek watershed at the 14-digit subwatershed level. Data for livestock at the 14-digit level was not able to be extrapolated.

Conservation Tillage Practices

The Hancock Soil and Water Conservation District (HSWCD) does a conservation tillage survey each year and reports the information to the National Resource Conservation Service (NRCS). Unfortunately, the NRCS does not report the information back to the HSWCD. The HSWCD and the Ohio State Extension Service both agree that 85% of the soybeans in the watershed are planted using No Till; 10% of the corn; and 90% of the wheat. This would extrapolate to 21,005.25 acres for wheat; 2201.6 acres for corn; and 7485 acres for wheat.

Cultural Resources

(See Table 4.20 on page 4-41)

The cultural resources of The Outlet/Lye Creek watershed are more varied than many of the other Blanchard River subwatersheds. The location of Riverbend Park near the two reservoirs and the City of Findlay's Riverside Park located within the watershed are the primary reasons for this diversity. Table 4.20 on page 4-41 contains information on cultural resources within the watershed broken down at the 14-digit watershed level.

There are four major roads that transect the watershed: US Route 224, runs east-west along the northern boundary of the watershed; State Route 15 runs east -west through the middle part of the watershed; State Route 37 runs northwest-southeast though the watershed; and State Route 103 runs along the southern boundary of the watershed.

The Hancock Park District has developed several parks within the watershed with the main park being the Riverbend Recreation Area east of Findlay near the two City of Findlay reservoirs. This 234 acre area provides year-round recreation and conservation activities that include picnicking, hiking, disc golf, playgrounds, fishing, primitive camping, volleyball courts, off-leash dog park, cross country snow skiing, and a great habitat for local wildlife species. The Brugeman Lodge provides a 240 seat banquet hall for meetings and receptions. The Findlay Reservoirs, located south of the park area, provide some of the best fishing in northwest Ohio for all anglers. The Old Millstream Parkway meanders for 18 miles between Riverbend Recreation area upstream to Blanchard landings downstream, west of Findlay. The Parkway provides sportsman access areas and hiking, biking and canoe trails.

Picture 4.6

Covered bridge at the entrance to Riverbend Park on TR. 241 just off SR. 568 east of Findlay. (BRWP)

Picture 4.7

Boat Launch for City of Findlay reservoir #2 on TR 207 east of Findlay. This reservoir allows gas motors under 10 hp. Reservoir #1, located just to the south of reservoir #2 on CR 205, allows only electric motors.
(Martin)

Riverside Park Waterfront and Waterfalls is located in Findlay at 231 Mc Manness Ave. Riverside Park, originally opened in 1906, has the notoriety of being Hancock County's oldest park and is located at the site of the old Water Works Park. Recent renovations are a cooperative effort between the City of Findlay and Hancock Park District. The City of Findlay owns and manages Riverside Park with the Waterfront Area managed and maintained by the HPD. Swimming, fishing, canoeing, picnicking, hiking, volleyball, and a band shell are available.

Riverside Landings at Riverside Park offers boat launching and canoe/ paddle boat rentals. *This area is impaired by sedimentation behind the dam to the point that the aquatic habitat has been destroyed, and the ability to navigate canoes and others boats is being severely compromised. This problem will be addressed in Chapter 7.*

Picture 4.8

Riverside Dam located on the Blanchard River near Riverside Park. (Martin)

Picture 4.9

Kayaking on the Blanchard River just east of the boat rental at Riverside Park in Findlay. (Hancock Park District)

Picture 4.10

Sign at the entrance to Riverside Park showing all the activities available. (Martin)

The Riverside Park area has been declared an historical area by the Ohio Historical Society. The picture of the historical marker located just south of the swimming pool area in Riverside Park is shown on the next page. (see picture 4.11)
This area has many historical events associated with Findlay and Hancock County.

Picture 4.11

This Ohio Historical Marker is located south of the swimming pool at Riverside Park in Findlay, Ohio. The marker describes the events that have occurred around Riverside Park. (Martin)

Picture 4.12

Hull's Army historical marker is located at the entrance to the parking lot on the south end of the swimming pool at Riverside Park in Findlay. (Martin)

Picture 4.13

Tell Taylor Memorial is located just south of the softball diamond at Riverside Park near the intersection of Mc Manness and Country Club Drive.
Tell Taylor was born in Findlay and spent a lot of time on the Blanchard River in this area. He is best known for writing the song "Down By the Old Millstream". (Martin)

Five golf courses are located within the watershed. The courses range from the par-3 Shady Grove course to the championship lay-out of Red Hawk Golf Course. See Table 4.20 on page 4-41 for a list and contact information for these courses.

Picture 4.14

Ohio Historical Marker for the Indian Trails Caverns located 4 miles west of Carey, Ohio on SR 568.

Indian Trails Caverns, located 4 miles west of Carey on SR 568 contains the Sheriden cave site. This site has been presented with a historical marker by the State of Ohio. The Caverns have yielded over ten thousand different specimens and artifacts which include over sixty-five species of life that lived in Ohio prior to the last glacial coverage of the region.

For additional information on local and recreational resources, contact the Findlay-Hancock County Convention and Visitors Bureau, http://www.visitfindlay.com/default.aspx.

Table 4.20 Cultural Resources in The Outlet/Lye Creek Watershed (14-digit level)

HUC 04100008-020-010 Blanchard River below Potato Run to above The Outlet (2) (except Brights)				
Resource	***Location***	***County***	***Type***	***Contact Information***
Rieck's Nature Center - U of Findlay	TR 166 off of SR 37	Hancock	Nature Center	419-422-8313
HUC 04100008-020-020 Brights Ditch				
Resource	***Location***	***County***	***Type***	***Contact Information***
Vanlue Village Park	Vanlue, Ohio	Hancock	Village Park	419-387-7413
Heritage Springs Campground	13891 TR 199 Vanlue, Ohio	Hancock	Campground	419-387-7738
Indian Trails Caverns	SR 568 4 miles west of Carey, Ohio	Wyandot	Historical Caverns	419-387-7773
HUC 04100008-020-030 The Outlet				
Resource	***Location***	***County***	***Type***	***Contact Information***
Wayside Golf Course	18125 SR 568	Hancock	Golf Course	419-423-5089
Springville Marsh State Nature Preserve	TR 24 off US 23/SR199 3.5 miles north ofCarey	Seneca	Nature Preserve	614-265-6453
Red Hawk Golf Course	18441 US 224 east	Hancock	Golf Course	419-894-4653
HUC 04100008-020-040 Blanchard River below The Outlet (2) to above Eagle Creek				
Resource	***Location***	***County***	***Type***	***Contact Information***
Riverside Park	231 McManess Ave., Findlay	Hancock	City Park	419-424-7176
Riverbend Recreation Area	TR 208 off of SR568 to 241	Hancock	County Park	419-425-7275
Riverside Landings Boat Launch	Riverside Park	Hancock	Scenic River Boat Launch	419-425-7275
Forest G Hall Minipark	Hancock County Fairgrounds	Hancock	County Park	419-425-7275
Eastpoint	East Main Cross St. at Bright Rd.	Hancock	Scenic site	419-425-7275
Centennial Park	Blanchard St. @ Cross Ave.	Hancock	City Park	419-424-7176
Civitan Park	Blanchard St	Hancock	City Park	419-424-7176
Old Millstream Parkway	Riverbend Recreation	Hancock	County/City	419-242-7176
Findlay Country Club	1500 Country Club Dr.	Hancock	Private Golf	419-422-9263
Shady Grover Golf Course	15733 US 224 east	Hancock	Golf Course	419-422-7494
Hancock County Agricultural Society	1017 E. Sandusky St. Findlay, Ohio	Hancock	Fairgrounds	419-429-7344
HUC 04100008-020-050 Lye Creek				
Oak Mallet Golf Course	15925 CR 205	Hancock	Golf Course	419-422-5035

Biological Resources

The Biological Resources in The Outlet/Lye Creek watershed are probably the most abundant and varied in the entire Blanchard River Watershed. Three unique areas contribute to this varied range of habitat. The first unique habitat is ODNR's Springville Marsh. The marsh is located in Seneca County 3 1/2 miles north of Carey Springville Marsh is described by ODNR as an unequaled nature preserve in north-western Ohio. It is the largest inland wetland in this part of the state. The preserve is noted for several Canadian and Atlantic coastal plain species. See Table 4.21 on page 4-43 for additional information on rare, threatened and endangered plants. The second habitat includes the two large City of Findlay above-ground reservoirs located east of Findlay. The reservoirs cover 775 acres and have a capacity of 6.4 billion gallons of water. The reservoirs provide an excellent resource for fishing. (See Appendix C). The fishing aspect of the reservoirs is under the control of the ODNR Division of Wildlife. The reservoirs also provide a great habitat for many waterfowl that use the water bodies for a source of food and a migratory stopover. A nest of Bald Eagles use the reservoirs for their food source. The third habitat includes several conservation properties along the river and Riverbend Park. Both of these areas are under supervision of the Hancock Park District. A complete list of both animal and plants species can be found in Appendix C. A study of the fresh water mussels in the river was conducted by the URS Corporation for the Army Corp of Engineers and the Northwest Ohio Flood Mitigation Partnership, Inc. A copy of the report can be found in Appendix C. On page 3 of the report, the summary states, "*no living or freshly dead specimens of Ohio endangered or US endangered (or candidate species) were found during the study.*"

Picture 4.15
The boardwalk at Springville Marsh State Nature Preserve ODNR

According to the U.S. Fish and Wildlife study, the only endangered animals species found in Hancock are the Indiana Bat (*Myotis sodalist)* and the Clubshell (*Pleuroberna clava*). The Rayed bean (*Villosa fabalis*) is listed as a candidate.

Table 4.21, on the next page, list the Rare, Endangered, and Threatened Plants that are found in the watershed. Invasive species of plants and animals are also listed in Appendix C. Zebra mussels started to show up in the Blanchard River in 2008. The zebra mussel have entered the two City of Findlay reservoirs where they have created problems for the City of Findlay in getting water from reservoir 1 to the water treatment plant on Blanchard Street. (See Chapter 5 on pages 5-9 for more details).

Table 4.21 Rare, Endangered and Threatened Plants
The Outlet/Lye Creek Watershed

Rare Plant List for Hancock County (As of 06/04/2008)

Vascular Plants	Year on list	Status
Anemone cylindrica Prairie Thimbleweed	1977	T
Arabis hirsuta var. adpressipilis Southern Hairy Rock Cress	1978	P
Carex alopecoidea Northern Fox Sedge	1960	E
Ulmus thomasii Rock Elm	2008	T

Number of rare plant species for this county: 4

Rare Plant List for Seneca County (As of 06/05/2008)

Lichens:

Collema crispum Crinkled Jelly Lichen	1962	X

Vascular Plants:

Betula pumila Swamp Birch	1994	T
Carex alata Broad-winged Sedge	2004	P
Carex bebbii Bebb's Sedge	1999	P
Carex cryptolepis Little Yellow Sedge	2007	P
Carex lasiocarpa Slender Sedge	1993	P
Carex pseudocyperus Northern Bearded Sedge	2004	E
Carex viridula Little Green Sedge	1990	P
Cypripedium candidum White Lady's-slipper	1994	E
Eleocharis engelmannii Engelmann's Spike-rush	1969	E
Eleocharis quinqueflora Few-flowered Spike-rush	2004	T
Phragmites australis ssp. americanus American Reed Grass	2006	T
Potamogeton gramineus Grass-like Pondweed	1986	E
Rhynchospora alba White Beak-rush	2007	P
Spiranthes lucida Shining Ladies'-tresses	1980	P
Woodwardia areolata Netted Chain Fern	2006	P

Number of rare plant species for this county: 16

Rare Plant List for Wyandot County (As of 06/05/2008)

Vascular Plants:

Baptisia lactea Prairie False Indigo	1996	P
Betula pumila Swamp Birch	1976	T
Carex atherodes Wheat Sedge	1996	P
Carex cryptolepis Little Yellow Sedge	1969	P
Cuscuta glomerata Glomerate Dodder	1999	T
Helianthus mollis Ashy Sunflower	1981	T
Platanthera flava Tubercled Rein Orchid	1960	P
Sagittaria montevidensis Southern Wapato	1968	P
Vernonia fasciculata Prairie Ironweed	1990	P

Number of rare plant species for this county: 9

E - State Endangered T - State Threatened P - Potentially Threatened
X - Presumed Exptirpated A - Added

Source: ODNR Web site: http://www.ohiodnr.com/RarePlantSpeciesbyCount/tabid/20404/Default.aspx

National Pollutant Discharge Elimination System Permits

Point Source Pollution is not addressed in this plan. The jurisdiction for point source is the duty of the Ohio EPA. The EPA has developed a National Pollutant Discharge Elimination System (NPDES) Permit set of regulations. These permits regulate the amount of discharged waste water while maintaining water quality standards of the water course it is entering. By reducing the permitted discharge levels from the total pollutant found in the waterway, a more accurate nonpoint source contribution of a particular pollutant can be obtained.

NPDES permits can be divided into two groups: General and Individual Permits. The General Permits are summarized in Table 4.22 on the next 3 pages, 4-45 through 4-47. General permits fall into one of several categories. The two categories that are found in The Outlet/Lye Creek watershed are Industrial Storm Water (ISW) and Construction Storm Water (CSW).

There are two individual NPDES permits in The Outlet/Lye Creek watershed. Both of these permits are in the 14-digit Brights Ditch subwatershed. The first is Vanlue STP site located on TR 197. The discharge enters Brights Ditch at RM 3.87. The NPDES permit ID is 2PA00016*ID. The station number is 2PA00016001. The Vanlue site is a controlled discharge with an existing annual load of 73.1 kg/yr. The allowable annual load varies based on stream flow. Potential for upstream dilution allows discharge concentration above the TMDL target when discharge occurs at a stream flow of 2.22 cfs or greater. There is no need for a reduction at the Vanlue STP site. The second individual permit site is the National Lime & Stone - Vanlue Plant located on SR 568 just east of CR 330. The NPDES permit ID is 2IJ00093*AD. The station number is 2IJ00093001. Effluent loadings based on average design flow is 0.554 MGD. The discharge, if any, would flow into a ditch that flows into Brights Ditch near the Vanlue STP site.

There is one *point source* facilities not currently regulated by a NPDES permit. This site is the Heritage Springs Camp Grounds (2PR00182) located at 13891 TR 199 east of Vanlue. The camp grounds has a Design Flow of 0.0125 MGD. This site also falls in the 14-digit Brights Ditch subwatershed.

There are no Household Sewage General Permits in The Outlet/Lye Creek watershed.

Table 4.22 Summary of General Permits for The Outlet/Lye Creek Watershed

HUC # 04100008-020-010 Blanchard River below Potato Run to above The Outlet (2), except Brights Ditch						
OH EPA Permit No.	**Applicant Name**	**Facility Name**	**Facility Address**	**Issue Date**	**Receiving Stream**	**Type**
2GC00255*AG	ODOT District 1	HAN-37-11.62 PID-21625	SR 37 Mt. Blanchard, OH.	11/19/2003	Blanchard River	CSW
HUC # 04100008-020-020 Brights Ditch						
OH EPA Permit No.	**Applicant Name**	**Facility Name**	**Facility Address**	**Issue Date**	**Receiving Stream**	**Type**
2 GR00095*DG	Hilltop Energy Inc.	Vanlue Site	11630 SR 330 Vanlue, OH.	7/14/2006	Brights Ditch	ISW
HUC # 0410008-020-030 The Outlet (2)						
OH EPA Permit No.	**Applicant Name**	**Facility Name**	**Facility Address**	**Issue Date**	**Receiving Stream**	**Type**
HUC # 04100008-020-040 Blanchard River below The Outlet (2) to above Eagle Creek						
OH EPA Permit No.	**Applicant Name**	**Facility Name**	**Facility Address**	**Issue Date**	**Receiving Stream**	**Type**
2GC00404*AG	Arcadia Point Development	Point at Brookstone Phase 2	Brookstone Dr. Findlay, OH.	4/12/2004	Regional Retention Pond for Brookstone	CSW
2GC00638*AG	Birchhaven Estates Eastern Woods Ltd	Birchhaven Estates	Eastern Woods Pwky at US 224 Findlay, OH	10/26/2004	Blanchard River by Tributary/Retention	CSW
2GC01242*AG	Brookview Homes Inc	Somerset Park	CR 95 Findlay, OH.	4/11/2006	Blanchard River by Tributary	CSW
2GC00337*AG	Build Covington Greens LLC	Covington Greens Apts.	CR 236 & US 224 NE Findlay, OH.	2/9/2004	City of Findlay MS4 to Blanchard River	CSW
2GC00911*AG	CCA Inc	Winter Woods Estate	Replat Lots 42 & 43 Findlay, OH.	7/5/2005	Blanchard River	CSW
2GC00111*AG	C-International	C-International Findlay Distr. Ctr	14601 TR 212 Findlay, OH. 45840	7/10/2003	Blanchard River by Tributary	CSW
2GR00546*DG	Createc Corp.	Createc Corp.	1900 Industrial Dr. Findlay, OH.	6/19/2006	City of Findlay MS4 to Blanchard River	ISW
2GR00576*AG	Cummins Filtration (formerly Kuss Filtration)	Cummins Filtration	2150 Industrial Dr. Findlay, OH.	1/13/2004	City of Findlay MS4 to Blanchard River	ISW

Table 4.22 Summary of General Permits for The Outlet/Lye Creek Watershed cont. 2

OH EPA Permit No.	Applicant Name	Facility Name	Facility Address	Issue Date	Receiving Stream	Type
2GR00503*DG	Filtech Inc	Filtech Inc	2001 Industrial Dr. Findlay, OH.	8/14/2006	City of Findlay MS4 to Blanchard River	ISW
2GC00592*AG	Findlay One LLC	Hunter's Crossing	Omaha Dr. CR 236 Findlay, OH.	9/15/2004	Lye Creek	CSW
2GC000418AG	First Federal	First Federal Findlay East Branch	7591 Patriot Dr. Findlay, OH.	5/28/2003	City of Findlay MS4 to Blanchard River	CSW
2GC00087*AG	FMT Inc	Riverside Executive	1100 E. Main Cross St. Findlay, OH.	6/23/2003	Blanchard River	CSW
2GC02646*AG	Hancock County Enginners Office	Hancock CR. 95	CR 95 Btwn the CSX RR & CR 18 Findlay, OH.	5/5/2010		CSW
2GC00417*AG	Kohl's Dept. Stores Inc	Kohl's Dept. Store	2310 Tiffin Ave. Findlay, OH.	4/19/2004	Blanchard River Tributray	CSW
2GC01595*AG	LVP Development	Lakeview Park Estates 13th Add.	CR. 237 Findlay, OH.	1/17/2007	Blanchard River Tributary	CSW
2GR01554*DG	Midway Products Group Inc.	Findlay Products Corp.	2045 Industrial Dr. Findlay, OH.	6/24/2008	City of Findlay MS4 to Blanchard River	ISW
2GR01586*DG	Motlen (North America) Corp.	Molten (North America) Corp.	1835 Industrial Dr. Findlay, OH.	2/11/2009	City of Findlay MS4 to Blanchard River	ISW
2GR00165*DG	Nissan Brake Ohio Inc	Nissan Brake Ohio Inc	1901 Industrial DR. Findlay, OH.	8/10/2006	City of Findlay MS4 to Blanchard River	ISW
2GC01335*AG	ODOT District 1	HAN-568-4.51 PID-76625	SR 568/TR 242 & TR 241 Findlay, OH.	7/11/2006	Blanchard River by Tributary	CSW
2GC01137*AG	ODOT District 1	HAN-75-14.39 PID-80710	CR 313 to CR 95 Findlay, OH.	1/10/2006	Blanchard River by	CSW
2GC02314*AG	ODOT District 1	HAN-568-3.00 PID-80412	Intersection of SR 568 & CR 236 Findlay, OH.	3/4/2009	Blanchard River by Tributray	CSW
2GC02200*AG	Ohio Orthopedic & Sports Medicine	Ohio Orthopedic & Sports Medicine	1950 Fostoria Ave. Findlay, OH.	9/12/2008	Blanchard River by Tributary	CSW

Table 4.22 Summary of General Permits for The Outlet/Lye Creek Watershed cont. **3**

OH EPA Permit No.	Applicant Name	Facility Name	Facility Address	Issue Date	Receiving Stream	Type
2GC00245*AG	Owens Community College	Owens Community College - Findlay	3200 Bright Rd. Findlay, OH.	11/5/2003	County Storm Sewer	CSW
2GC00535*AG	Patriot Ctr. LLC Co Rudolph Libbe Prop	Patriot Center	7519, 7527, & 7535 Patriot Dr. Findlay, OH.	8/4/2004	City of Findlay	CSW
2GC01086*AG	Paul Ballinger	Ballinger Commer-cial Subdivision	Bright Rd & Fostoria Ave. Findlay, OH.	11/15/2005	Blanchard River	CSW
2GR00599*DG	Pieco Inc dba Superior Trim	Pieco Inc Superior Trim	2151 Industrial Dr. Findlay, OH.	9/14/2006	Blanchard River MS4 to Blanchard River	ISW
2GC00544*AG	Petti Construction	Villas at Burberry	CR 236 & SR 12 Findlay, OH.	8/17/2004	Blanchard River	CSW
2GC01400*AG	Primrose Retirement Housing	PrimroseRetirement Housing	TR 237/SR 568/US224 Findlay, OH.	8/1/2006	Blanchard River by Tributary	CSW
2GR01523*DG	Rowmark LLC	Rowmark LLC	2040 Industrial Dr. Findlay, OH.		City of Findlay MS4 to Blanchard River	ISW
2GR015234	Rowmark LLC	Rowmark LLC	2040 Industrial Dr. Findlay, OH.	2/11/2008	City of Findlay MS4 to Blanchard River	ISW
2GR00197*DG	Sanoh America Inc (Former Hisan Inc)	Sanoh America Inc (former Hisan Inc)	1849 Industrial Dr. Findlay, OH.	3/31/2009	City of Findlay MS4	ISW
2GC00323*AG	Timberstone Constr. Inc	Covington Greens Subdivision	CR 236 NE Edge Findlay Findlay, OH.	1/26/2004	Blanchard River Tributary	CSW
2GC00392*AG	Timberstone Constr. Inc	Covington Greens Subdivision Plat 2	CR 236 Findlay, OH.	1/26/2004	Blanchard River Tributary	CSW
2GC00883*AG	Weinko Inc	Forest Lake 5th Addition	Part of NE 1/4 of Sect. 14 Findlay, OH.	6/13/2005	Blanchard River Tributary	CSW
2GC00882*AG	Weinko Inc	Forest Lake 6th Addition	Part of SW 1/4 of Sect. 14 Findlay, OH.	6/13/2005	Blanchard River Tributary	CSW
2GR01542*DG	Werk-Brau Co Inc	Wek-Brau Co Inc	2800 Fostoria Rd. Findlay, OH.	4/23/2008		ISW
2GC00260*AG	Winkoe	Winkoe Storage & Office Condos	SR 12 E. Findlay, OH.	11/24/2003	Ditch to Blanchard River	CSW

Chapter 5 The Outlet/Lye Creek - Water Resources

Purpose

The focus of this chapter is to review the criteria for determining the water quality of a waterbody. This chapter will also provide an inventory of the water resources in The Outlet/Lye Creek watershed.

Chapter Acknowledgements
This chapter was prepared by the watershed coordinator and BRWP partners using materials from the *Sandusky-Tiffin Watershed Action Plan* with permission.

Introduction

Watershed Action Plans (WAP) are designed to look at water resources from a Nonpoint Point Assessment (NPA). In order to better understand what is involved in studying and understanding the general approaches to water resource protection in Ohio, familiarity with the following terms and ideas is essential:

- **Use Designations**
- **Use Attainment/Use Impairment**
- **Water Quality Data (Chemical, Physical, Biological)**
- **Water Quality Standards/Criteria**
- **Causes and Sources of Impairments**
- **Remedial Measures/Watershed Action Plan**

Use Designation: Each of Ohio's streams have been assigned designated uses related to their present and future use: as a source for drinking water, for recreation activities involving contact with water; for agricultural uses (livestock, irrigation); for industrial uses; and as aquatic habitat for fish, insects and other aquatic organisms. (OSU Extension Bulletin 873-98)

Use Attainment: Use attainment is another way of describing whether or not a stream is meeting Ohio's water quality standards. Ohio EPA has assigned a use designation, or a specific set of water quality standards, to most major streams and rivers throughout the state by dividing each stream into segments and assigning each segment a specific use designation. Ohio EPA assesses use attainment based on aquatic life habitat use designations because they provide the most accurate and comprehensive evaluation of water quality standards associated with the designation. The degrees of use attainment include: full attainment; full attainment but threatened; partial attainment; and non-attainment. (osu extension bulletin 873-98)

Use Impairment: Used when a stream does not meet the full attainment criteria for water quality as determined by the Ohio EPA.

Water Quality Data: The quantitative or qualitative measurements of the chemical, physical or biological characteristics of a stream segment that are used to determine whether or not a particular use is impaired.

One of the measurements to determine whether a stream segment meets the warmwater habitat use designation is a fish community index called the Index of Biological Integrity (IBI).

Water Quality Standards: Under the Clean Water Act, every state must adapt water quality standards to protect, maintain, and improve the quality of the nation's surface waters. These standards represent a level of water quality that will support the goal of "swimmable/fishable" waters. Water quality standards are ambient standards as opposed to discharge-type standards. Ohio's water quality standards include these major components: 1) beneficial use designations; 2) narrative criteria; 3) numeric criteria; and 4) antidegradation policy. (OSU Extension Bulletin 873-98) The term "**criteria"** is often used interchangeably with water quality standard. For a warmwater use designation stream in this subwatershed to be in full attainment for the Index of Biological Integrity (IBI), the criteria requires a score of 40 or higher.

Causes and Sources of Impairments: Anytime a stream does not meet full attainment, there are several possible reasons for the failure. These "reasons" are the **causes and sources of the impairment**. For example, habitat alteration due to stream channel modification may be a cause and source of impairment to the fish community, resulting in IBI values that fall below the standard.

Remedial Measures: Actions to repair or correct a cause and/or source of impairment that is designed to improve the water quality.

Watershed Action Plan (WAP): A WAP identifies the appropriate remedial measures for a watershed and sets forth a comprehensive plan to achieve their implementation.

Use Designations in Ohio: An Overview

The Ohio EPA describes their water use designations as follows…

> *"Beneficial use designations describe existing or potential uses of water bodies. They take into consideration the use and value of water for public water supplies, protection and propagation of aquatic life, recreation in and on the water, agricultural, industrial and other purposes. Ohio EPA assigns beneficial use designations to water bodies in the state. There may be more than one use designation assigned to a water body. Examples of beneficial use designations include: public water supply, primary contact recreation, and aquatic life uses (warmwater habitat, exceptional warmwater habitat, etc.).*

Sidebar 5.1 (see page 5-4) provides a review of the Designated Uses for Water Resources in Ohio. Attainment of aquatic life uses is determined by directly measuring fish and aquatic insect populations to see if they are comparable to those seen in least impacted areas of the same ecological region and aquatic life use. Sidebar 5.2 on page 5-5 provides a review of the Aquatic Life Use Designations as they apply to The Outlet/Lye Creek watershed.

Table 5.1 Waterbody Use Designations for The Outlet/Lye Creek (Based on Table 2 of the OEPA 2007 Blanchard River TSD) See Sidebar 5.1 for abbreviations of use designations.

Water Body Segment	Use Designations												
		Aquatic Life Habitat						Water Supply			Recreation		
	SRW	WWH	EWH	MWH	SSH	CWH	LRW	PWS	AWS	IWS	BW	PCR	SCR
Blanchard River - at RMs 58.72, 62.43, & 65.20		+						+	+	+		+	
Lye Creek		*		Δ					*	*		*	
Silver Creek		*							*	*		*	
The Outlet		*		Δ					*	*		*	
Brights Ditch		*		Δ					*	*		*	
Stahl's Ditch		*		Δ					*	*		*	
Walter's Ditch		*							*	*		*	

+ Designation based on Ohio EPA biological field assessments
* Designation based on the 1978 and 1985 water quality standards
Δ A new recommendation based on the findings of the Ohio EPA - 2005 TMDL study

14 digit subwatershed sites in the above table

Blanchard River @ RM. 65.20 - HUC #04100008-020-010 Blanchard River below Potato Run to above The Outlet (2) (except Brights Ditch)

Brights Ditch, Stahl's Ditch, and Walters Ditch - HUC #04100008-020-020 Brights Ditch

The Outlet - HUC #04100008-020-030 The Outlet (2)

Blanchard River @ RM. 58.72 and 62.43 - HUC #04100008-020-040 Blanchard River below The Outlet (2) to above Eagle Creek

Lye Creek and Silver Creek - HUC #04100008-020-050 Lye Creek

Post TMDL Use Designation in the Blanchard River Watershed

The 2007 Blanchard River TSD document provides a listing of current and proposed use designations of stream segments in the Blanchard River TMDL area (OEPA, 2007, Table 2). The Outlet/Lye Creek portion of that table is shown in Table 5.1 above.

Sidebar 5.1 Designated Uses for Water Resources in Ohio

There are two broad use designations for streams and rivers in Ohio - aquatic and non-aquatic.

Aquatic Life Habitat Use Designations*

- *Warmwater (WWH)* - This use designation defines the "typical" warmwater assemblage of aquatic organisms for Ohio rivers and streams; *this use represents the principal restoration target for the majority of water resource management efforts in Ohio.*
- *Exceptional Warmwater Habitat (EWH)* - This use designation is reserved for waters which support "unusual and exceptional" assemblages of aquatic organisms which are characterized by a high diversity of species, particularly those which are highly intolerant and/or rare, threatened, endangered, or special status.
- *Coldwater Habitat (CWH)* - This use is intended for waters which support assemblages of cold water organisms and/or those which are stocked with salmonids with the intent of providing a put-and-take fishery on a year-round basis which is further sanctioned by the ODNR, Division of Wildlife.
- *Modified Warmwater Habitat (MWH)* - This use applies to streams and rivers which have been subjected to extensive, maintained, and essentially permanent hydromodifications such that the biocriteria for the WWH use are not attainable *and where the activities have been sanctioned by state or federal law;* the representative aquatic assemblages are generally composed of species which are tolerant to low dissolved oxygen, silt, nutrient enrichment, and poor quality habitat.
- *Limited Resource Water (LRW)* - this use applies to small streams (usually <3 mi^2 drainage area) and other water courses which have been irretrievably altered to the extent that no appreciable assemblage of aquatic life can be supported; such waterways generally include small streams in extensively urbanized areas, those which lie in watersheds with extensive drainage modifications, those which completely lack water on a recurring annual basis, or other irretrievably altered waterways.

The vast majority of streams and rivers in Ohio are designed as Warmwater Habitat.

Non-Aquatic Habitat Use Designations*

There are two divisions on non-aquatic habitat uses designation; water supply use and recreation use.

Water Supply Use Designations

- *Public Water Supplies (PWS)* - Refers to those waters which are simply defined as segments within 500 yards of a portable water supply or food processing industry intake.
- *Agricultural Water Supply (AWS)* - Generally this applies to all waters, unless it can clearly be shown that it its not applicable. Normally used for livestock watering and irrigation with no treatment.
- *Industrial Water Supply (IWS)* - General this applies to all waters.

Recreation Use Designations

- *Primary Contact Recreation (PCR)* - These waters have a water depth of at least one meter over an area of at least 100 square feet or, lacking this, where frequent human contact is a reasonable expectation.
- *Secondary Contact Recreation* - These waters include those that do not meet the criteria for PCR.

*Information gathered from the 2005 OEPA Blanchard River Basin TSD

Sidebar 5.2 Aquatic Life Use Designations
(applicable to The Outlet/Lye Creek Watershed)

Exceptional Warmwater Habitat is the most biologically productive environment. These waters support unusual and exceptional assemblages of aquatic organism, which are characterized by a high diversity of species, particularly those that are highly intolerant and/or rare, threatened endangered or special status. This use represents a protection goal for water resource management efforts dealing with Ohio's best water resources. The standards for ammonia and dissolved oxygen are more stringent than in the other use designations.

Warmwater Habitat defines the typical warmwater assemblages of aquatic organisms for Ohio rivers and streams. It is the principal restoration target for the majority of water resource management efforts in Ohio. Criteria vary by ecoregion and site type.

Modified Warmwater Habitat applies to streams with extensive and irretrievable physical habitat modifications. The biological criteria for warmwater habitat are not attainable. The activities contributing to the modified warmwater habitat designation have been sanctioned and permitted by state or federal law. The representative aquatic assemblages are generally composed of species that are tolerant to low dissolved oxygen, silt, nutrient enrichment and poor habitat quality. The ammonia and dissolved oxygen standards are less stringent than warmwater habitat. There are three subcategories:

Modified Warmwater Habitat - A for those streams affected by acidic mine runoff.
Modified Warmwater Habitat - C for those streams heavily channelized; and
Modified Warmwater Habitat - I for those streams extensively impounded.

The biocriteria are set separately.

Limited Resource Water applies to streams that have drainage areas of less than three square miles and either may lack water on a recurring annual basis, or have been irretrievably altered to the extent that no appreciable assemblage of aquatic life can be supported; no formal biological criteria are established for this designation. (EPA Guide to Developing Local Watershed Plans in Ohio)

Agricultural Drainage Uses:

As in any of the subwatersheds in the Blanchard River watershed, the reality of the stream networks is that they serve as pathways for agricultural drainage that are essential for the agriculture production within that subwatershed. The natural use of the streams for aquatic life habitat is not viewed as a top priority by many of the farmers. Many of the streams (ditches) are the result of drainage networks that were placed in the farmland to increase the rate of drainage during rain periods. The ditches were dug to drain the wetlands of the Black Swamp. Those streams that did exist have been modified either as part of drainage practices or as a consequence of agricultural land use in general.

A major concern of the agriculture stakeholders in the watershed is that efforts to achieve designated aquatic life uses in the watershed will interfere with their ability to drain their croplands. If any of these streams are designated as headwaters streams, there are concerns about how OEPA's Headwater Initiative may affect agriculture landscape. While the MWH and LRW use designation do provide some relief to agriculture drainage, even these designations could be a source of problems relative to agricultural drainage provided by headwater stream.

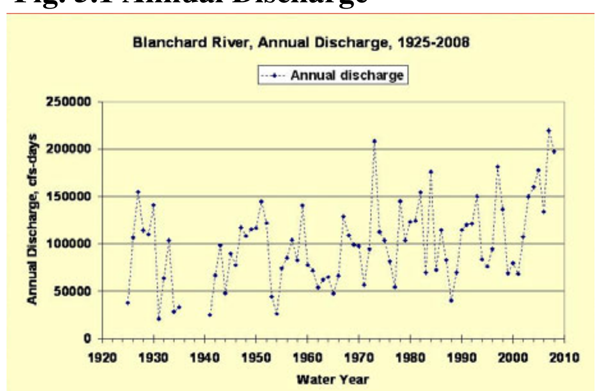
As expanding urban areas encroach upon productive agricultural lands, agricultural demands result in drainage of millions of wetland acres and channelization of thousands of miles of stream courses. The impact of such alterations on aquatic biota can be disastrous. Yet natural stream reaches within these intensively developed agricultural watersheds can serve as oases for aquatic life, and possibly hold the key to restoration of damaged systems and preservation of threatened ones. (Marsh and Luey, 1982)

Pollutant Export Issues

Pollutant export from the Blanchard River has been monitored by the National Center for Water Quality Research located at Heidelberg University in Tiffin Ohio since July 2007. The collection site is located at the USGS site located at CR 140 about .25 miles south of US 224 and just west of the City of Findlay. This site receives water flow from three of the 11 digit watersheds in the Blanchard River Watershed. The three subwatersheds are: Headwaters, The Outlet/Lye Creek, and Eagle Creek. Even though the site covers more than just The Outlet/Lye Creek watershed, the Headwaters' water flows through The Outlet/Lye Creek watershed, and the Eagle Creek watershed have about the same land use. So, the pollutant export data should be indicative of The Outlet/ Lye Creek watershed. The 2008 Water Year (WY) includes data from October 1, 2007 - September 30, 2008.

The annual discharge (flow) for the Blanchard River for 2008 was the third highest for the period of discharge measurements which dates back to 1923 (see Fig. 5.1). The highest annual discharge was in 2007. In general, annual discharges seem to be increasing for the Blanchard River.

Fig. 5.1 Annual Discharge



As shown in Figure 5.2, the export rate of suspended solids is about average for the Maumee Basin, but is less than average for the Sandusky Watershed.

Table 5.2 shows the total pollutant loads exported from each watershed study during the 2008 Water Year.

Table 5.3 shows the unit area discharge and pollutant loads. Unit area loads allow comparison of export rates from watersheds of differing sizes.

Fig. 5.2

2008 Water Year – Export Rate of Suspended Sediments

River	Suspended solids	
	Kilograms / hectare	pounds/ acre
Maumee	848	758
Tiffin	251	225
Blanchard	812	725
Lost Creek	499	446
Sandusky	1099	981
Honey Creek	684	611
Rock Creek	1607	1435
Cuyahoga	1628	1453
Muskingum	381	341
Scioto	429	383
Great Miami	1223	1092

Relatively low sediment export rate.

Export about average for Maumee watershed.

Relatively low export. May reflect adoption of erosion control measures in this watershed.

Source: Dr David Baker, Heidelberg University

Table 5.2 Total pollutant loads exported from each study watershed during the 2008 WY

2008 WY	Pollutant Loads						
River	Discharge	Suspended solids	Total phosphorus	Dissolved reactive phosphorus	Nitrate	Total Kjeldahl nitrogen	Chloride
	million cubic meters	metric tons	metric tons	metric tons	metric tons	metric tons	metric tons
Maumee	8,026.0	1,391,000	3,570.0	829.0	30,600.0	12,400.0	184,000
Tiffin	526.0	26,700	99.6	34.3	1,470.0	544.0	12,800
Blanchard	509.0	72,800	255.0	68.3	1,880.0	777.0	13,800
Lost Creek	5.4	549	2.2	0.9	13.3	7.0	64
Sandusky	1,906.0	356,000	877.0	187.0	7,250.0	2,870.0	38,400
Honey Creek	242.0	26,400	96.7	28.1	838.0	307.0	4,180
Rock Creek	53.0	14,400	26.9	4.3	118.0	87.8	962
Cuyahoga	1,174.0	298,000	301.0	44.8	1,700.0	1,160.0	185,000
Muskingum	10,011.0	733,000	1,800.0	400.0	14,300.0	7,040.0	349,000
Scioto	5,345.0	428,000	1,800.0	761.0	14,900.0	5,220.0	229,000
Great Miami	4,301.0	860,000	1,950.0	619.0	15,200.0	5,860.0	178,000
Raisin	1,098.0	20,900	83.6	39.8	334.0	920.0	57,300

Table 5.3 Unit area discharge and pollutants loads

2008 WY	Unit Area Loads						
River	Discharge	Suspended solids	Total phosphorus	Dissolved reactive phosphorus	Nitrate	Total Kjeldahl nitrogen	Chloride
	centimeters	kilograms/ hectare	kilograms/ hectare	kilograms/ hectare	kilograms/ hectare	kilograms/ hectare	kilograms/ hectare
Maumee	49.0	848.4	2.177	0.506	18.66	7.56	112
Tiffin	49.5	251.4	0.938	0.323	13.84	5.12	121
Blanchard	56.8	812.4	2.846	0.762	20.98	8.67	154
Lost Creek	49.2	499.3	2.037	0.855	12.10	6.40	58
Sandusky	58.8	1098.8	2.707	0.577	22.38	8.86	119
Honey Creek	62.7	683.9	2.505	0.728	21.71	7.95	108
Rock Creek	59.2	1607.1	3.002	0.484	13.17	9.80	107
Cuyahoga	64.1	1627.5	1.644	0.245	9.28	6.34	1010
Muskingum	52.1	381.4	0.937	0.208	7.44	3.66	182
Scioto	53.6	429.3	1.805	0.763	14.94	5.24	230
Great Miami	61.2	1223.0	2.773	0.880	21.62	8.33	253
Raisin							

Unit area export rates involve dividing the total export by the total watershed area, resulting in units of tons per square mile. Conversion factors are then used to produce more commonly used units, such as pounds/acre.

Table 5.3 shows that the export rates of total phosphorus for the Blanchard River are higher than those of the Maumee Watershed as a whole and similar to those of the Sandusky Watershed. These export rates are high relative to comparably sized watersheds in the agricultural Midwest. Table 5.3 also shows that the export rates of dissolved reactive phosphorus for the Blanchard River are higher than for the Maumee watershed as a whole and for the Sandusky Watershed. The high dissolved phosphorus export is associated with both the agricultural lands uses in the watershed as well as the effluents from the Findlay

Pollution Control Center. Dissolved phosphorus export is a major problem for Lake Erie because of its high bioavailability to algae (Baker, 2009).

Nitrate and Total Kjeldahl nitrogen export rates for the Blanchard River are comparable to those of the Maumee and Sandusky Watershed (See Table 5.3 on page 5.7). Nitrogen export represents the greatest financial loss of nutrients from cropland in Northwestern Ohio, $14.70 per acre for the entire Maumee Watershed). (Baker, 2009).

Drinking Water Resources

Ohio has abundant surface and ground water resources. The Outlet/Lye Creek watershed is located in the Carbonate Aquifers area of Ohio. (See Map 5.1 on the next page) Carbonate aquifers generally provide sufficient production for water wells.(OEPA)

As in most watersheds, The Outlet/Lye Creek watershed rural stakeholders obtain their water from private wells. There are roughly 550 wells located within the watershed. Vanlue, the only village located in the watershed, is in the final stages of installing a community water system. The source for the water will still be supplied by wells.

The major water resource for the City of Findlay is located within the watershed in the form of two above ground reservoirs. Reservoir 1 was built in 1950 and has a capacity of 1.4 billion gallons. Reservoir 1 covers 187 acres. Reservoir 2 was built in 1969 and has a capacity of 5.0 billion gallons. Reservoir 2 is the largest above ground reservoir in Ohio and covers 640 acres. The City of Findlay pumps water from the Blanchard River into Reservoir 2, which acts as a settling area before the water is released into Reservoir 1. Findlay pipes the water from Reservoir 1 to the Water Treatment Plant.

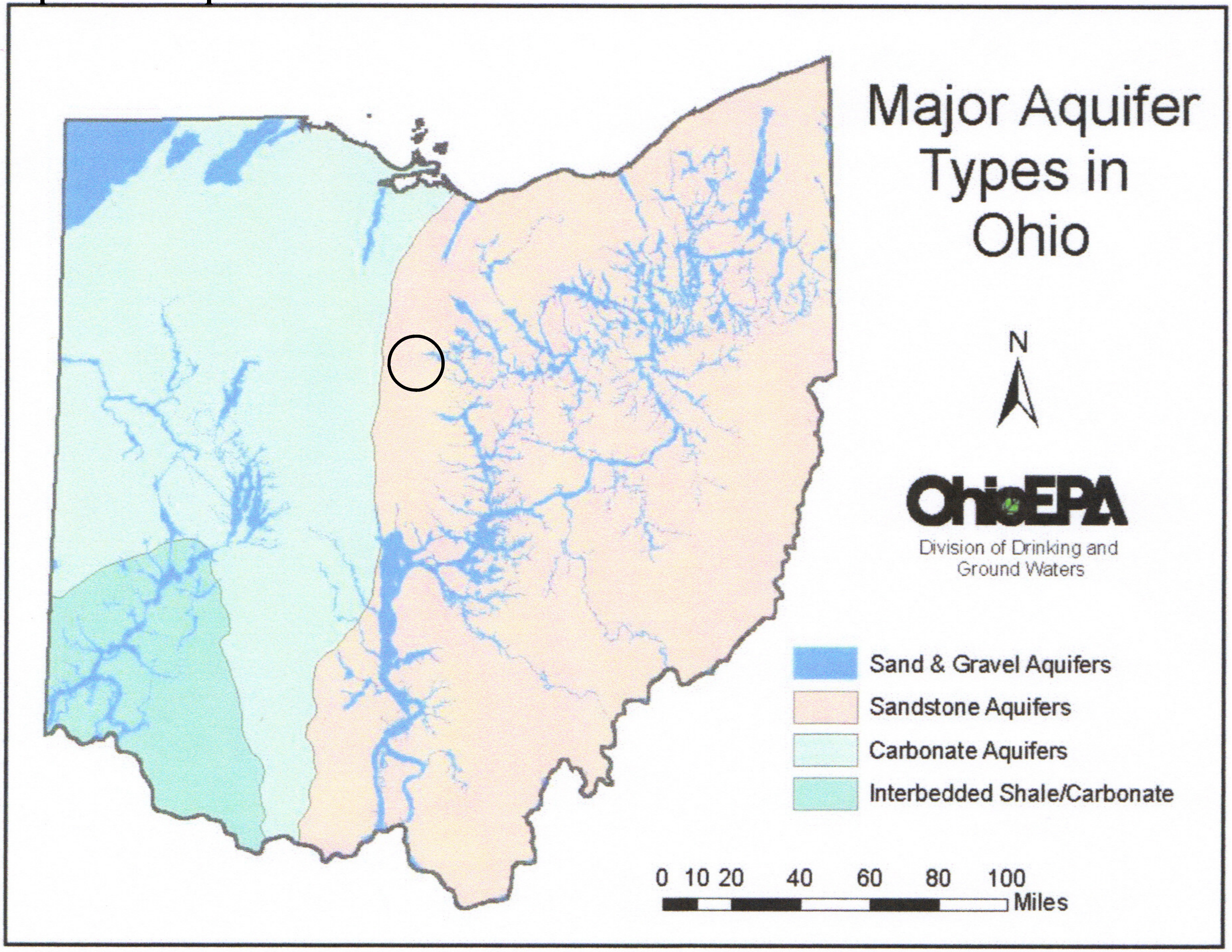
The City of Findlay maintains two back-up sources for water: the Riverside dam in Findlay and the dam located just east of where the two reservoirs share a common wall. (See the arrow in Picture 5.1 to the left.) This location would require a huge capital investment to be serviceable again.

Zebra mussels were discovered in the two reservoirs in 2008. The City of Findlay has built a treatment building just south of reservoir 1 to killed the zebra mussels before they can enter the aqueduct that carries the water to the City of Findlay Water Treatment Plant. Sodium Permanganate is being used to treat the water in the treatment building.

Picture 5.1

Aerial photograph of the two City of Findlay Reservoirs.
(Hancock Co. Auditor)

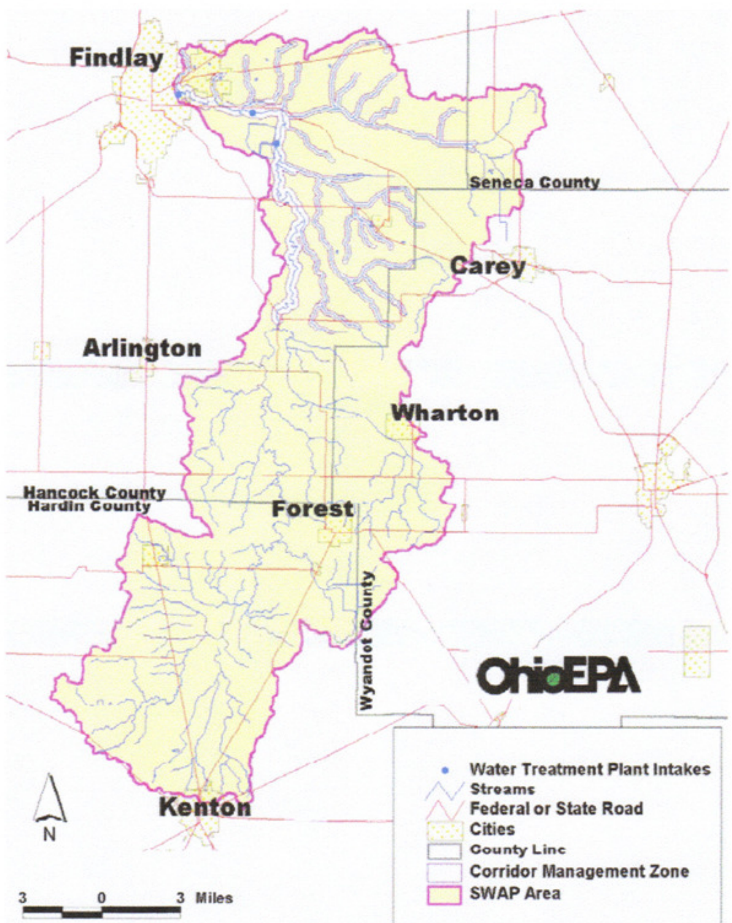
Map 5.1 Ohio Aquifers



Source Water Assessment and Protection Plans for City of Findlay (SWAPP)

The water that surrounds us - the Blanchard River, streams, ditches, and aquifers - makes up our drinking water sources. The Safe Water Drinking Act (SDWA) was passed by Congress in 1974 to help protect public health by regulating the nation's water supply. Figure 5.3 shows a map of the area of the Blanchard River Watershed that is included in the SWAPP for Findlay. Every year the City of Findlay prepares a Consumer Confidence Report on Drinking Water for the consumers. Included within this report is general health information, water quality test results, how to participate in decisions concerning drinking water and water systems contacts.

Figure 5.3 Source Water Protection Area for the City of Findlay



Source: NRCS Rapid Assessment for the Blanchard River

As you can observe in the Figure 5.3 the source water protection area for the City of Findlay includes the 11-digit Headwaters watershed (04100008-010), the 14-digit subwatershed Blanchard River below Potato Run to above The Outlet (2) [except Brights] (04100008-020-010), the 14-digit subwatershed Brights Ditch (04100008-020-020), and The Outlet (2) (04100008-020-030).

The Ohio EPA in 2004 released a Drinking Water Source Assessment Report for the City of Findlay. The report provided a map of protection areas, the potential contaminant sources within it, and an evaluation of how susceptible the City of Findlay's drinking water is to contamination. A copy of this report can be obtained from the City of Findlay Drinking Water Department. (See pgs. 5-12 & 5-13 for the City of Findlay Drinking Water Consumer Confidence Report for 2009.)

The City of Findlay has a unique water supply in the sense that the two reservoirs hold a supply that could meet the drinking water requirements for almost three years. In the event of a contamination in the river, the city stops any pumping from the Blanchard River into the reservoirs. The capacity of the reservoirs allows the City of Findlay to have an adequate supply of water while the contamination in the river is addressed.

Ohio 2010 Intregrated Water Quality and Assessment Report

In February 2011, the Ohio EPA released their 2010 Integrated Water Quality and Assessment Report - Blanchard River. A copy of this report that deals with The Outlet/Lye Creek Watershed can be found in Appendix F. The report is broken down into the 14-digit watersheds.

Previous and Present Water Quality Studies of the Blanchard River

A. Biological and Water Quality Report of the Blanchard River adapted in 2009. Report can be viewed at http://www.epa.ohio.gov/dsw/tmdl/BlanchardRiverTMDL.aspx

B. NRCS Rapid Assessment of the Blanchard River Watershed Report can be viewed at ftp://ftp-fc.sc.egov.usda.gov/OH/pub/Rapid_Assessments/Blanchard_1-17-08.pdf

C. National Center for Water Quality Research, Heidelberg University. http://www.heidelberg.edu/WQL

D. Western Lake Erie Basin, "Historical Assessment of Streamflow and Water Quality Activities 2009" This report can be viewed at: http://www.wleb.org/watersheds/documents/MOPS_04100008_Blanchard.pdf

E. Western Lake Erie Basin Study Blanchard Watershed Assessment - August 2009. This report can be viewed at: http://www.wleb.org/documents/assessments/Blanchard%20Watershed%20Final%20Assessment%20091509.pdf

F. Ohio 2010 Integrated Water Quality and Assessment Report - Blanchard River. This report can be viewed at: http://wwwapp.epa.ohio.gov/dsw/ir2010/basin.php

G. Blanchard River Watershed Partnership, "Water Quality Study using Macroinvertebrates", The results can be viewed at: http://www.blanchardriver.org.

City of Findlay Water Department
Drinking Water Consumer Confidence Report For 2009

Superintendent	Mayor	Service Director
Scott Shellhammer	Pete Sehnert	Bruce Hardy

Introduction
The following report has been prepared to provide information to you, the consumer, on the quality of our drinking water. Included within this report is general health information, water quality test results, how to participate in decisions concerning your drinking water and water system contacts.

Source water information and assessment
Our water source is surface water pumped from the Blanchard River into the Findlay Reservoir, which is located three miles southeast of the water treatment plant. For the purpose of source water assessments, in Ohio all surface waters are considered susceptible to contamination. By their nature, surface waters are readily accessible and can be contaminated by chemicals and pathogens, which may rapidly arrive at the public drinking water intake with little warning or time to prepare. The City of Findlay's drinking water source protection area contains potential contaminant sources such as agricultural runoff, industrial storm water, gas station runoff, home construction, animal feed lot runoff, gas lines and gas and oil wells, wastewater treatment discharges, cemeteries, airports, silage, farm machinery repair, pesticide/fertilizer/petroleum storage areas, pasture, closed and inactive landfills, roadways and railways, and one site being investigated by Ohio EPA's Division of Emergency and Remedial Response (Hobbs Dump) just outside the protection area in Seneca County.

We treat your water using lime/soda softening, coagulation, sedimentation, stabilization, fluoridation, disinfection, and filtration to remove or reduce harmful contaminants in the source water; however, no single treatment technique can address all potential contaminants. The potential for water quality impacts can be further decreased by implementing measures to protect the Blanchard River. Information that is more detailed is in the City of Findlay's Drinking Water Source Assessment Report, which can be obtained by calling the Findlay Water Department at 419-424-7193.

Sources of contamination to drinking water
The sources of drinking water (both tap water and bottled water) include rivers, lakes, streams, ponds, reservoirs, springs, and wells. As water travels over the surface of the land or through the ground, it dissolves naturally occurring minerals and, in some cases, radioactive material, and can pick up substances resulting from the presence of animals or from human activity.

Contaminants that may be present in source water include: (A) Microbial contaminants, such as viruses and bacteria, which may come from sewage treatment plants, septic systems, agricultural livestock operations and wildlife; (B) Inorganic contaminants, such as salts and metals, which can be naturally-occurring or result from urban storm water runoff, industrial or domestic wastewater discharges, oil and gas production, mining, or farming; (C) Pesticides and herbicides, which may come from a variety of sources such as agriculture, urban storm water runoff, and residential uses; (D) Organic chemical contaminants, including synthetic and volatile organic chemicals, which are by-products of industrial processes and petroleum production, and can also come from gas stations, urban storm water runoff, and septic systems; (E) Radioactive contaminants, which can be naturally-occurring or be the result of oil and gas production and mining activities.

In order to ensure that tap water is safe to drink, USEPA prescribes regulations which limit the amount of certain contaminants in water provided by public water systems. FDA regulations establish limits for contaminants in bottled water which must provide the same protection for public health.

Drinking water, including bottled water, may reasonably be expected to contain at least small amounts of some contaminants. The presence of contaminants does not necessarily indicate that water poses a health risk. More information about contaminants and potential health effects can be obtained by calling the Environmental Protection Agency's Safe Drinking Water Hotline (1-800-426-4791).

Who needs to take special precautions?
Some people may be more vulnerable to contaminants in drinking water than the general population. Immuno-compromised persons such as persons with cancer undergoing chemotherapy, persons who have undergone organ transplants, people with HIV/AIDS or other immune system disorders, some elderly, and infants can be particularly at risk from infection. These people should seek advice about drinking water from their health care providers. EPA/CDC guidelines on appropriate means to lessen the risk of infection by Cryptosporidium and other microbial contaminants are available from the Safe Drinking Water Hotline (1-800-426-4791).

About your drinking water
The EPA requires regular sampling to ensure drinking water safety. Our water department conducted sampling for bacteria, inorganic, synthetic organic, and volatile organic contaminants during 2009. Samples were collected for 63 different contaminants, most of which were not detected in the City of Findlay water supply. The Ohio EPA requires us to monitor for some contaminants less than once per year because the concentrations of these contaminants do not change frequently. The Ohio EPA also requires us to monitor for unregulated contaminants that have no current MCLs, treatment techniques or action levels. Some of our data, though accurate, are more than one year old.

Listed below is information on those contaminants that were found in the City of Findlay drinking water.

Contaminants (Units)	MCLG	MCL	Level Found	Range of Detections	Violation	Sample Year	Typical Source of Contaminants
Bacteriological							
Total Organic Carbon (ppm)	NA	TT	2.3	1.7 – 3.3	NO	2009	Naturally present in the environment.
The value reported under "Level Found" for Total Organic Carbon (TOC) is the lowest ratio between percentage of TOC actually removed to the percentage of TOC required to be removed. A value of greater than one (1) indicates that the water system is in compliance with TOC removal requirements. A value of less than one (1) indicates a violation of the TOC removal requirements.							
Turbidity (NTU)	NA	TT	0.28	0.05 – 0.28	NO	2009	Soil runoff.
Turbidity (% meeting standard)	NA	TT	100%	100% – 100%	NO	2009	
Turbidity is a measure of the cloudiness of water and is an indication of the effectiveness of our filtration system. The turbidity limit set by the EPA is 0.3 NTU in 95% of the daily samples and shall not exceed 1 NTU at any time. As reported above the Findlay Water Department's highest recorded turbidity result for 2009 was 0.28 NTU and lowest monthly percentage of samples meeting the turbidity limits was 100%.							

Contaminants (Units)	MCLG	MCL	Level Found	Range of Detections	Violation	Sample Year	Typical Source of Contaminants
Radioactive Contaminants							
Gross Alpha (pCi/L)	0	15	0.584	NA	NO	2006	Erosion of natural deposits.
Gross Beta (pCi/L)	0	AL=50	6.8	NA	NO	2003	Decay of natural and man-made deposits.
EPA considers 50pCi/L to be the level of concern for beta particles.							
Inorganic Contaminants							
Copper (ppm)	1.3	AL=1.3	0.110	NA	NO	2007	Corrosion of household plumbing systems; Erosion of natural deposits.
	Zero out of 30 samples was found to have copper levels in excess of the Action Level of 1.3 ppm.						
Fluoride (ppm)	4	4	1.01	0.77 – 1.18	NO	2009	Erosion of natural deposits; Water additive which promotes strong teeth; Discharge from fertilizer and aluminum factories.
Lead (ppb)	0	AL=15	<2.0	NA	NO	2007	Corrosion of household plumbing systems; Erosion of natural deposits.
	Zero out of 30 samples was found to have lead levels in excess of the Action Level of 15 ppb.						
Nitrate (ppm)	10	10	0.90	0.20 – 0.90	NO	2009	Runoff from fertilizer use; Leaching from septic tanks, sewage; Erosion of natural deposits.
Volatile Organic Contaminants							
Bromodichloromethane (ppb)	NA	NA	7.5	NA	NO	2009	By-product of drinking water chlorination.
Chloroform (ppb)	NA	NA	12.0	NA	NO	2009	By-product of drinking water chlorination.
Dibromochloromethane (ppb)	NA	NA	2.7	NA	NO	2009	By-product of drinking water chlorination.
Haloacetic Acids (HAA5) (ppb)	NA	60	21.2	10.7 – 32.5	NO	2009	By-product of drinking water chlorination.
Total Trihalomethane (TTHM) (ppb)	NA	80	49.6	27.8 – 67.4	NO	2009	By-product of drinking water chlorination.
IDSE HAA5 (ppb)	NA	NA	NA	11.2 – 30.8	NO	2009	By-product of drinking water chlorination.
IDSE TTHM (ppb)	NA	NA	NA	19.1 – 68.6	NO	2009	By-product of drinking water chlorination.
Residual Disinfectants							
Total Chlorine (ppm)	MRDLG = 4	MRDL = 4	1.39	1.17 – 1.57	NO	2009	Water additive used to control microbes.

IDSE Monitoring Results
Under the Stage 2 Disinfectants/Disinfection Byproducts Rule (D/DBPR), our public water system was required by USEPA to conduct an evaluation of our distribution system. This is known as an Initial Distribution System Evaluation (IDSE), and is intended to identify locations in our distribution system with elevated disinfection byproduct concentrations. The locations selected for the IDSE may be used for compliance monitoring under Stage 2 DBPR, beginning in 2013. Disinfection byproducts are the result of providing continuous disinfection of your drinking water and from when disinfectants combine with organic matter naturally occurring in the source water. Disinfection byproducts are grouped into two categories, Total Trihalomethanes (TTHM) and Haloaetic Acids (HAA5). USEPA sets standards for controlling the levels of disinfectants and disinfectant byproducts in drinking water, including both TTHMs and HAA5s.

Lead Educational Information
If present, elevated levels of lead can cause serious health problems, especially for pregnant women and young children. Lead in drinking water is primarily from materials and components associated with service lines and home plumbing. The City of Findlay Water Department is responsible for providing high quality drinking water, but cannot control the variety of materials used in plumbing components. When your water has been sitting for several hours, you can minimize the potential for lead exposure by flushing your tap for 30 seconds to 2 minutes before using water for drinking or cooking. If you are concerned about lead in your water, you may wish to have your water tested. Information on lead in drinking water, testing methods and steps you can take to minimize exposure is available from the Safe Drinking Water Hotline at 800-426-4791 or at http://www.epa.gov/safewater/lead.

License to Operate (LTO) Information
We have a current, unconditioned license to operate our water system.

How do I participate in decisions concerning my drinking water?
If you have any questions about this report or concerning your water utility, please contact Scott Shellhammer by calling (419) 424-7193 or by writing to 110 North Blanchard Street, Findlay, OH 45840. We want our valued customers to be informed about their water utility. You can attend regular public meetings on the first and third Tuesday of each month, at 7:30 p.m., in Council Chambers in the Municipal Building, at 318 Dorney Plaza.

Definitions of some terms contained within this report

- Maximum Contaminant Level Goal (MCLG): The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs allow for a margin of safety.
- Maximum Contaminant level (MCL): The highest level of contaminant that is allowed in drinking water. MCLs are set as close to the MCLGs as feasible using the best available treatment technology.
- Parts per Million (ppm) or Milligrams per Liter (mg/L) are units of measure for concentration of a contaminant. A part per million corresponds to one second in a little over 11.5 days.
- Parts per Billion (ppb) or Micrograms per Liter (µg/L) are units of measure for concentration of a contaminant. A part per billion corresponds to one second in 31.7 years.
- Picocuries per Liter (pCi/L): A measure of radioactivity.
- Nephelometric Turbidity Unit (NTU): A measure of water cloudiness.
- Not Applicable (NA)
- Action Level (AL): The concentration of a contaminant which, if exceeded, triggers treatment or other requirements which a water system must follow.
- Treatment Technique (TT): A required process intended to reduce the level of a contaminant in drinking water.
- Maximum Residual Disinfectant Level Goal (MRDLG): The level of drinking water disinfectant below which there is no known or expected risk to health. MRDLGs do not reflect the benefits of the use of disinfectants to control microbial contaminants.
- Maximum Residual Disinfectant Level (MRDL): The highest level of a disinfectant allowed in drinking water. There is convincing evidence that addition of a disinfectant is necessary for control of microbial contaminants.
- The "<" symbol: A symbol which means less than. A result of <5 means that the lowest level that could be detected was 5 and the contaminant in that sample was not detected.

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Chapter 6 The Outlet/Lye Creek - Aquatic Life Use Attainment

Purpose

The focus of this chapter is to provide a review of the aquatic life use attainment criteria used by the OEPA and ODNR during the TMDL study. Criteria standards as they apply to The Outlet/Lye Creek watershed are presented.

Chapter Acknowledgements
This chapter was prepared using material from *The Sandusky-Tiffin Watershed Action Plan with permission* and by the watershed coordinator and BRWP partners.

Use Attainment

Use Attainment can be divided into sections describing the use attainment for each of the following three use designations assigned to segments of The Outlet/ Lye Creek Watershed in the TMDL report:

I. Aquatic life use
II. Recreation use
III. Public water supply use

I. Aquatic Life Use Attainment

To understand the basis for biological use attainment analyses by the OEPA, additional background information is needed beyond the general concepts introduced in the previous chapters. Much of the information presented below is taken from the OEPA Guide to Developing Local Watershed Action plans in Ohio (OEPA, 1997), the Blanchard River TSD (OEPA 2005), and the Blanchard River TMDL report (OEPA, 2009).

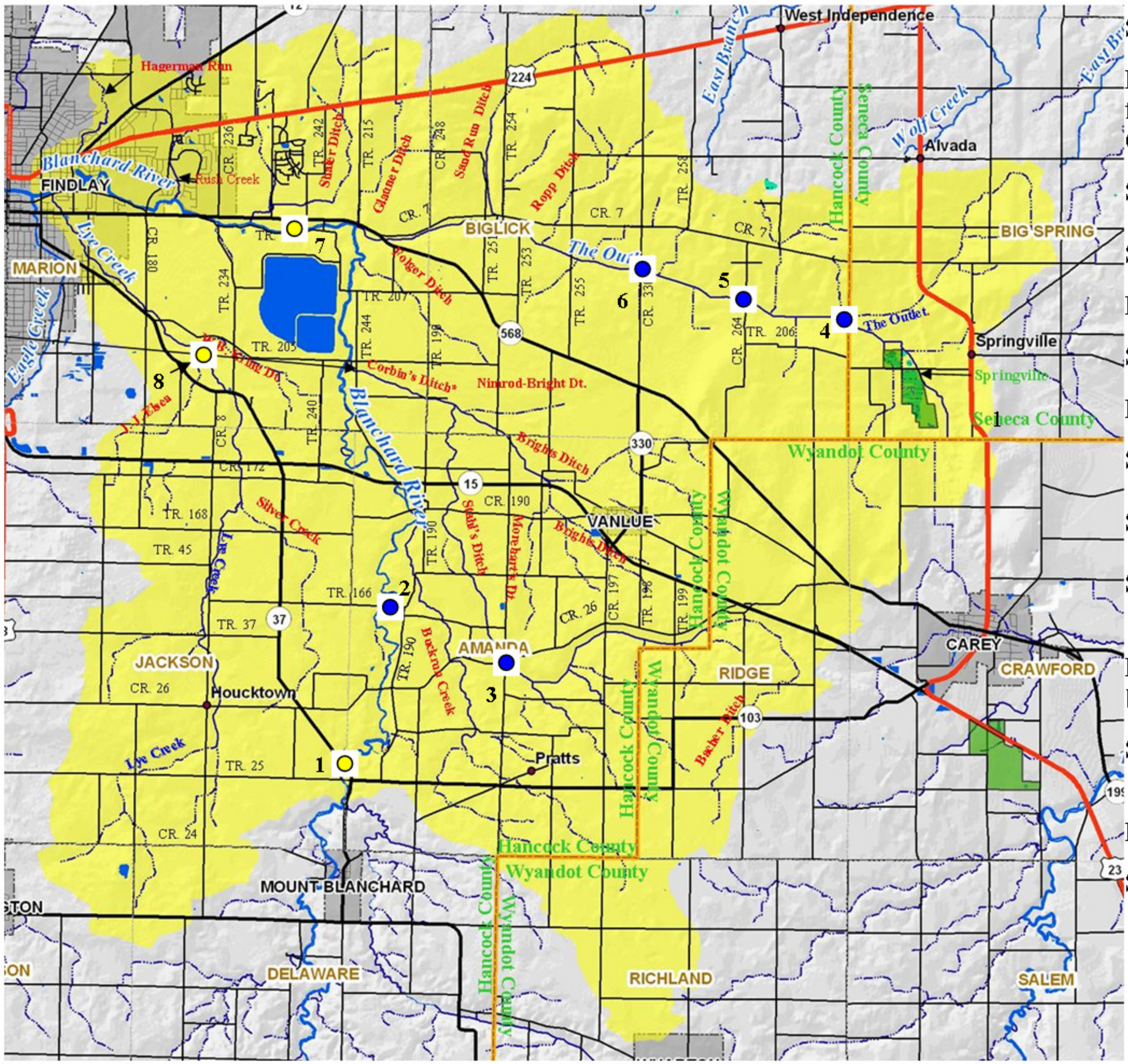
Biological Community Measurements: As a part of the Blanchard River TMDL study, the Ohio EPA conducted detailed studies of the biological communities within the drainage area of the Blanchard River Watershed, which included The Outlet/Lye Creek subwatershed. The location of the sampling stations are shown on Map 6.1 on page 6-2.

The TMDL study plan called for fish and/or macroinvertebrate sampling at 16 sites in The Outlet/Lye Creek Watershed. Fish and macroinvertebrate sampling was planned at each site; however, due to the limitations of resources, timing, and site suitability, a number of locations were sampled for only a single organism group. This resulted in only 8 sites being used for attainment status.

The OEPA utilizes standardized electro fishing techniques to study fish communities. These techniques are described in the OEPA User's Manual for Biological Field Assessment (OEPA, 1987). Quantitative macroinvertebrate studies involve the placement of artificial substrates in riffle environments of streams. Following a colonization period, the artificial substrates are collected

Map 6.1 TMDL Sampling Sites and Attainment

Attainment Status ● Full ○ Partial



Site Location:

HUC 04100008-020-010 Blanchard R from below Potato Run to above The Outlet (2), except Brights Ditch

Site 1: Blanchard River @ SR 37 N of Mt. Blanchard

Site 2: Blanchard River @ TR 166

HUC 04100008-020-020 Brights Dt.

Site 3: Stahl Ditch @ Hancock CR 193

HUC 04100008-020-030 The Outlet

Site 4: The Outlet (Lower) @ Hancock/ Seneca Co. Line Rd.

Site 5: The Outlet (Lower) @ Hancock CR 264

Site 6: The Outlet (Lower) @ Hancock CR 330

HUC 04100008-020-040 Blanchard R. below The Outlet (2) to above Eagle Ck.

Site 7: Blanchard River adj. TR 208 upstream of Findlay

HUC 04100008-020-050 Lye Creek

Site 8: Lye Creek @ Hancock CR 205

and the macroinvertebrate communities evaluated relative to species composition and frequency. The qualitative macroinvertebrate studies involve the use of nets to collect representative species present in the stream. The macroinvertebrate methods are also described in the OEPA User's Manual for Biological Field Assessment (OEPA 1987).

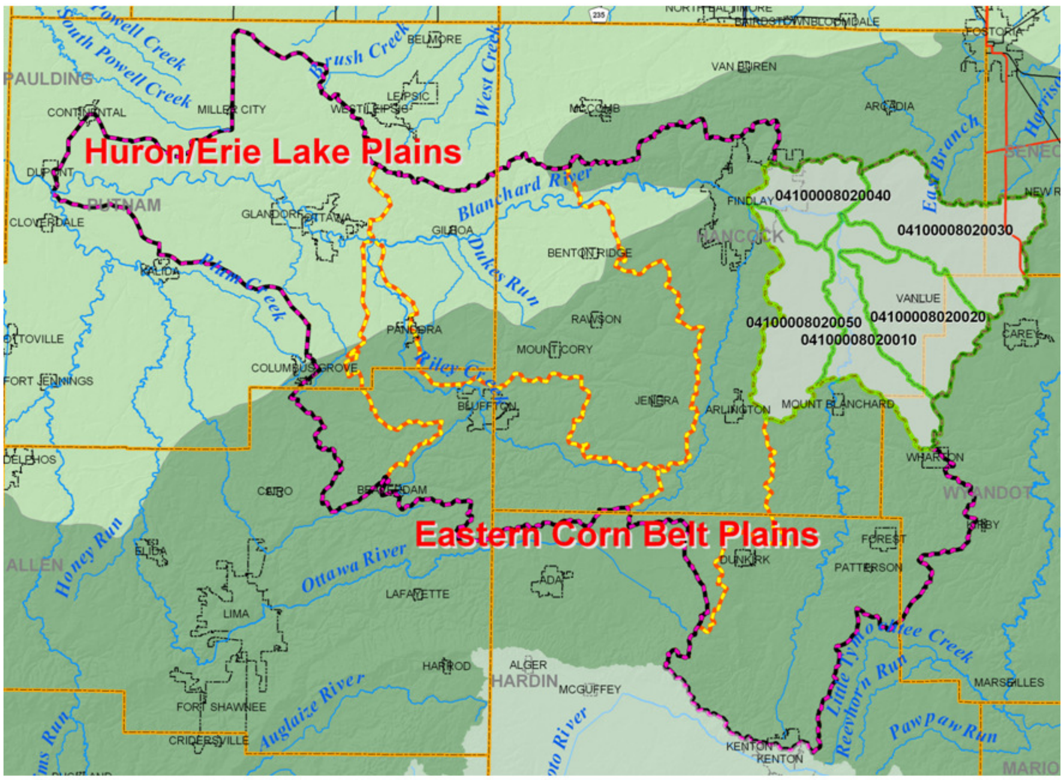
Biological Indices: The fish and macroinvertebrate data from the previously mentioned studies are used to calculate the following three indices, as described in the OEPA Guide and presented below:

- **Index of Biological Integrity (IBI)** - The index of biological integrity is a measure of fish species diversity and species populations. The index is a number that reflects total native species composition, indicator species composition, pollutant intolerant and tolerant species composition, and fish condition. Combined, the higher the calculation, the healthier the aquatic ecosystem; conversely, the lower the index, the poorer the health of the aquatic ecosystem. The highest score is 60.

- **Modified Index of Well Being (Mlwb)** - The modified index of well being factors out 13 pollutant tolerant species of fish and includes fish mass in the final analysis. Thus, if the IBI and the Mlwb are examined together, an even clearer picture of the health of the biological community emerges. For example, if a high IBI is coupled with a low Mlwb, it could tell us that while there is a variety of species and a good number of individuals of each species (high IBI) individual members of these species are smaller than what is expected. This might indicate that while fish are numerous , they are not maturing fully. In turn, this information could be useful in determining which pollution source is impacting the biological community. The high value of the Mlwb is 12. The Mlwb is not applied to stream segments with drainage areas less than 20 square miles.

- **Invertebrate Community Index (ICI) -** The invertebrate community index is based on measurements of the macroinvertebrate communities living in a stream or river. It is particularly useful in evaluating stream health because: (1) there are a wide variety of macroinvertebrate taxa, which are known to be pollutant intolerant; and (2) there are a number of macroinvertebrate taxa, which are known to be pollutant tolerant. Like the IBI, the ICI scale is 0-60 with the higher scores representing healthier macroinvertebrate communities and therefore more biologically diverse communities.

Biological Standards: In Ohio, numerical standards for the above indices have been incorporated into the state's pollution control laws. The minimum standards vary depending on the use designation and location (ecoregion) in the state. All of The Outlet/Lye Creek watershed is located in the Eastern Corn Belt Ecoregion (see Map 6.2 below for location and description) For streams in this ecoregion the standards for the three indices of the aquatic life use designations in the watershed shown in tabular fashion in Table 6.1 on the next page.



Map 6.2 Ecoregions of Ohio in the Blanchard River Watershed

The Blanchard River Watershed is outlined by the magenta-black dotted line. The Outlet/Lye Creek subwatershed is shown by the light gray area. The remaining subwatersheds are outlined by the orange-yellow lines. The 14-digit subwatersheds are shown within the green boundaries.

The Eastern Corn Belt Plains is primarily a rolling till plain with local end moraines; it had more natural tree cover and has lighter colored soils than the Central Corn Belt Plains. The region has loamier and better drained soils than the Erie Drift Plain. Glacial deposits of Wisconsinan age are extensive. They are not as dissected nor leached as the pre-Wisconsinan till which is restricted to the southern part of the region. Originally, beech forests and elm-ash swamp forests dominated the wetter pre-Wisconsinan soils. Today, extensive corn, soybeans, and livestock production occurs and has affected stream chemistry and turbidity. (Native Seed Network)

Table 6.1 Narrative ranges and WWH biocriteria (bold) for Ohio Eastern Corn Belt Plains ecoregion.

IBI			MIwb		ICI	Narrative Evaluation
Headwater	Wading	Boat	Wading	Boat	All	
40-45	40-45	42-43	8.3-8.8	8.5-9.0	36-40	Good
36-39	36-39	38-41	7.8-8.2	8.0-8.4	32-34	Marginally Good
28-35	28-35	26-37	5.9-7.7	6.4-7.9	14-30	Fair
18-27	18-27	16-25	4.5-5.8	5.0-6.3	2-12	Poor
12-17	12-17	12-15	0-4.4	0-4.9	<2	Very Poor

Ohio EPA

Reference Sites: The particular values of the standards shown in table 6.1 are based on biological measurements of reference streams in each ecoregion of the state. The reference stream segments are selected such that they have minimal pollutant impacts and optimal habitat characteristics for the ecoregion. The standards used for WWH general represent the 25th percentile of all of the index values for the reference sites. Thus, if the scores at all of the reference sites for a particular ecoregion were ranked from the highest to the lowest, the score 25% up from the lowest score is selected as the standard. Separate sets of reference sites are selected for MWH designations. By using ecoregional reference sites, OEPA assures that local streams are evaluated relative to similar streams in terms of soils, geology, and native vegetation.

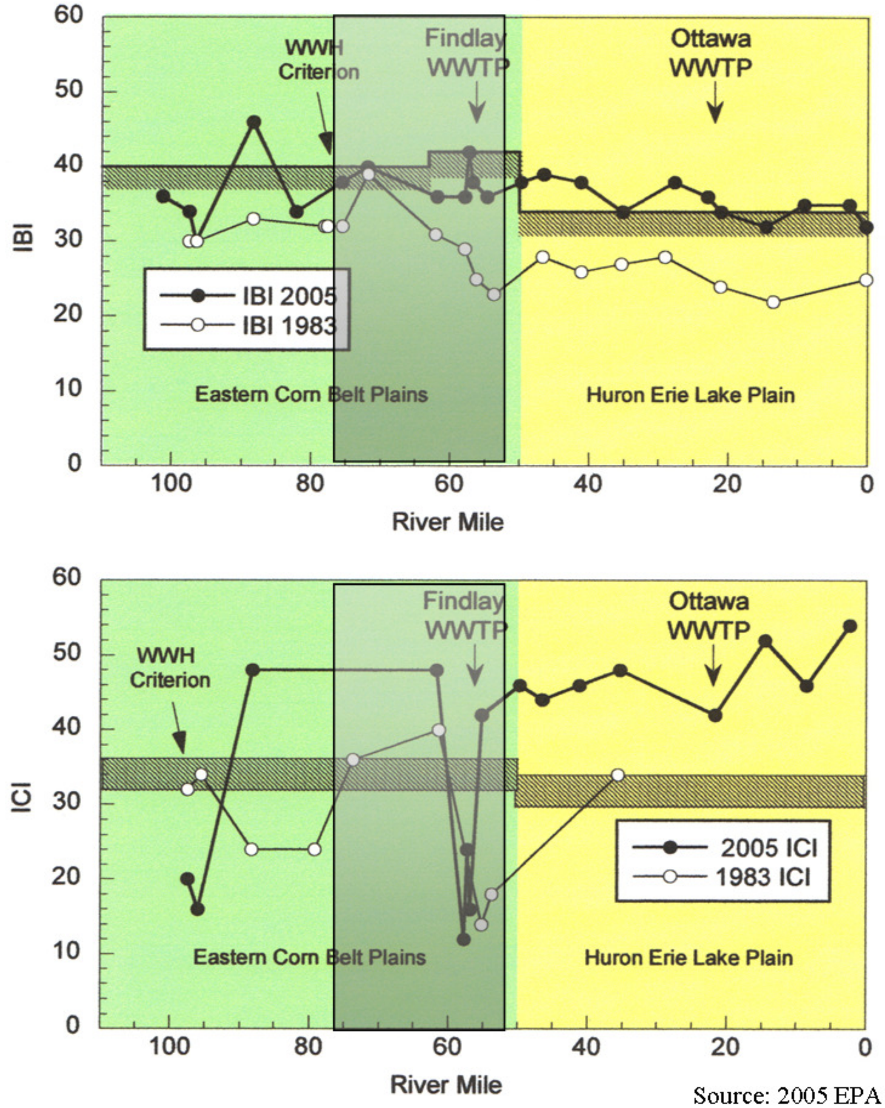
Degrees of Use Attainment for Ohio Streams and Rivers: The OEPA has developed a standard set of terms to describe the degree to which biological use attainment is being met. These are as follow:

- **FULL Attainment -** A use is considered to be fully attained when all of the biological indices meet the biocriteria value for the applicable use designation, ecoregion, and site type.

- **PARTIAL Attainment -** A use is considered to be partially attained if one or two biological indices indicate attainment, but others do not; for the EWH and WWH use designations, the biological indices that fail to meet the applicable biocriteria must at least within the fair range of performance.

- **NON-Attainment** - A use is not attained if all of the biological indices fail to meet the biocriteria, or if either organism group reflects poor or very poor performance, even if the other organism group meets the biocriteria.

Figure 6.1 Longitudinal trend of the Index of Biotic Integrity (IBI) and Invertebrate Community Index (ICI) in the Blanchard River in 1983 and 2005.



Source: 2005 EPA TSD report

Summary of Biological Studies

Figure 6.1 shows the longitudinal trend of the Index of Biotic Integrity (IBI) and Invertebrate Community Index (ICI) in the Blanchard River in 1983 and 2005. The shaded area represents the area located within The Outlet/Lye Creek Watershed. Over-all, both the IBI and ICI have shown improvement between 1983 and 2005.

A summary of the Blanchard River assessment unit scoring for The Outlet/ Lye Creek Watershed is shown in Table 6.2. A summary of the data for the eight 2005 TMDL EPA Water Quality Monitoring sites is shown in Table 6.3. on page 6-8.

Table 6.2 Summary of Blanchard River assessment unit scoring. The assessment unit score is an average grade of aquatic life use status. A maximum unit score of 100 is possible if all monitored sites meet designated aquatic life uses.

The Outlet/Lye Creek WAU (04100008-020)	Aquatic Life Attainment Staus							Assessment Unit Score
	Total	Full		Partial		NON		
		#	%	#	%	#	%	
Sites ≤ 50 mi.^{2} drainage area	5	3	60.0	1	20.0	1	20.0	52.8
Miles of assessed streams with > 50 mi.^{2} and < 500 mi.^{2} drainage area.	3	1	33.3	2	66.7	-	-	

Comments:
An additional eight sites of less than 50 mi.^{2} were sampled but did not meet data requirements to completely evaluate aquatic life status *(i.e. no fish data and only qualitative macroinvertebrate data)*. Three sites supported macroinvertebrate assemblages reflecting good community quality. Five other sites had macroinvertebrate assemblages that failed to meet ecoregional aquatic life expectations.

EPA 2005 TMDL Report

The recommended Aquatic Life Use status for all the sites before the 2005 TMDL study was Warmwater Habitat. The results of the 2005 TMDL study has recommended that all the sites, not in the mainstem of the Blanchard River, have their Aquatic Life Use designation changed to Modified Warmwater Habitat.

The causes of impairment identified by the EPA at the monitored sites were habitat alteration, nutrient enrichment, organic enrichment, nitrate/nitrite, phosphorus, and temperature. The sources of the impairment were crop production and agricultural related channelization.

The eight sites that were studied for attainment status represented approximately 33 assessed stream miles in The Outlet/Lye Creek Watershed. The biological communities were impacted primarily by factors related to agricultural practices in the watershed. Elevated nutrients, and impacts associated with dissolved oxygen/organic enrichment were identified in the TMDL report as causative factors in 100% of the impaired miles of the eight sites. Hydromodification, principally channelization, affected 47 percent of the impaired stream miles. This modification resulted in instream habitat and natural flow regimes being altered. Riparian vegetation was limited to grasses and low growing brush in many areas. The combination of exposure to sunlight and elevated nutrients promoted excessive primary productivity.
(2009 TMDL Report)

Table 6.3 EPA Water Quality Monitoring Sites - 2005 TMDL Study - The Outlet/Lye Creek Watershed

Map 6.1 Site #	Stream Name	Location	Drainage Area ($Mi.^2$)	River Mile	IBI	ICI	MIwb	QHEI	Attainment
1	Blanchard R.	SR 37 North of Mt. Blanchard	142.0	75.8	38^{ns}	VG	7.2**	57.5	Partial
2	Blanchard R.	TR 166	145.0	71.9	40	VG	8.7	51.0	Full
3	Stahl Ditch	Hancock CR 193	12.4	4.4	34	MG^{ns}	*	39.5	Full
4	The Outlet	Hancock/Seneca Co Line Rd.	7.0	7.7	44	G	*	41.5	Full
5	The Outlet	Hancock CR 264	16.4	6.1	36	HF	*	17.5	Full
6	The Outlet	Hancock CR 330	24.0	4.5	42	38	<u>5.7</u>**	39.0	Non
7	Blanchard R.	Adjacent to TR 208 Upstr. Findlay	238.0	61.7	36^{ns}	48	7.2**	62.5	Partial
8	Lye Creek	Hancock CR 205	26	2.6	32	20**	6.4	39.5	Partial

* - Not enough credible to calculate MIwb.
** - Indicates significant departure from applicable biocriteria (>IBI or ICI units or >0.5 MIwb units). Underlined scores are in the Poor or Very Poor range .
ns - Nonsignificant departure from biocriteria (≤ IBI or ICI units, or ≤ MIwb units).

EPA DSW Biological Monitoring & Assessment Map site & TSD Report

II. Recreational Use Attainment

In determining the safety of waters in The Outlet/Lye Creek watershed for recreational activities, fecal coliform bacteria was used as the indicator organism. The presence of these organisms indicates that water has been contaminated by feces from warm blooded animals. Elevated bacteria counts, reported in colony forming units (CFU)/100 ml, increase the risk of illness for people who come in contact with the water (TMDL report).

The overall determination of recreation use was made for the entire WAU. The TMDL report showed that impairment occurs when either the 75th percentile exceeds 1,000 or the 90th percentile exceeds 2,000. The Ohio EPA 2008 Integrated Water Quality report shows the 75th percentile to be 600 while the 90th percentile was 4150. Based on the 90th percentile score of 4150, the watershed would be considered impaired. (TMDL report)

Site specific evaluation of The Outlet/Lye Creek Watershed was only done on the Blanchard River portion of the watershed. None of the sites violated the geometric mean and there was only one violation of the site specific maximum.

The Outlet and Lye Creek were not evaluated due to their size and lack of fishing, hunting, and boating use.

III. Public Water Supply Use Attainment

The Ohio EPA 2010 Integrated Water Quality and Assessment report studied the Public Water Supply at RMs 58.72, 62.43, and 65.20. There were no conclusions drawn due to insufficient data. To find more information about the Ohio EPA 2010 Integrated Water Quality and Assessment report go to this web site: http://wwwapp.epa.ohio.gov/dsw/ir2010/basin.php

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Chapter 7 Implementation Plan for The Outlet/Lye Creek Watershed Restoration

Purpose

This chapter will address the Problem Areas and present Problem Statements in The Outlet/Lye Creek as identified from the 2005 TMDL Study of the Blanchard River Watershed and local stakeholders.Development of goals, action items, and BMPs for each problem statement will be discussed. An Implementation Plan for restoration will be the result.

Chapter Acknowledgements
This chapter was prepared using material from the *Sandusky-Tiffin Watershed Action Plan with permission* and by the watershed coordinator and BRWP partners.

Agricultural Programs to Reduce Water Resource Impairments: An Overview

As in most of the subwatersheds in Blanchard River Watershed, agriculture dominates the land use in The Outlet/Lye Creek (81.2%). As a result, many, but not all, of the causes and sources of water quality problems are associated with agricultural land uses.

Before discussing the specific problem statements, a discussion of Best Management Practices (BMPs) as they apply to Agricultural Non-point Source Pollution (AGNSP) is needed.

According to the National Water Program…

> " *Best Management Practices (BMPs) are effective, practical, structural, nonstructural methods which prevent or reduce the movement of sediment, nutrients, pesticides, and other pollutants from the land to surface or groundwater, or which otherwise protect water quality from potential adverse effects of agricultural activities. These practices are developed to achieve a balance between water quality protection and agricultural production within natural and economic limitations."*

Sidebars 7.1 and 7.2, on the next two pages, review recommendations for agricultural BMPs as approved by the watershed SWCDs.

Picture 7.1 Erosion

Field erosion from a 2.2 inch rain on February 28, 2011.

Martin

Sidebar 7.1 Blanchard River Watershed Coalition
Agricultural Subcommittee
Recommendations for watershed BMPs 2009

(These recommendations are based on input from Allen, Hancock, Hardin, Putnam, Seneca, and Wyandot SWCDs)

1. Repair broken tile mains in connection with the development of water retention areas and/or controlled drainage. Broken tile mains are often sites of serious erosion and sediment delivery to streams.
2. Increase participation in filter strip programs by increased marketing of existing programs (CRP, CREP) and/or by increasing rental rate payments (from private sources) so that payments would exceed the value of the average crop on nonflooding soils.
3. Use selective logjam removal to alleviate local flooding problems, focusing on large, complete blockage logjams. Allow smaller logjams to remain for stream habitat enhancement.
4. Use rotation incentive payments so that farmers can incorporate small grains, hay or cover crops into their rotations. Target fields next to water courses; extend the rotation to at least three years; crops must be green (i.e. growing) during the winter. Cost share must cover seed costs, labor and chemical burn down in the spring. Cover crops can be used in this category or as stand alone measures.
5. Innovative equipment - variable rate equipment, manure equipment, yield monitors, etc. Aid to producers for conservation equipment purchase often opens doors for participation in additional conservation programs.

Some Specific BMPs to Promote

1. Filter strips, target all ditches
2. Tillage/planting equipment (non inversion)
3. Continuous No Till
4. Promote 3-4 year rotations (not just a corn/soybean rotation)
5. Tile blow-out repairs
6. Manure storage
7. Manure spreading equipment
8. Composters
9. Nutrient and pest management
10. Cover crops
11. Waterways and structures
12. Repair old tile mains
13. Natural channel design (demo)
14. Incentive for continuous No Till (tier levels?)
15. Reduce use of triazine products (Altrazine)
16. Windbreaks
17. Reduce nitrate delivery via tile: drainage management system, nutrient management plan, nutrient application timing, and other BMPs.
18. Filter strip payments/incentives to tenant farmers
19. Buy downs - GPS, yield monitors, mapping systems, geo-referencing equipment
20. Recording keeping software - GIS info software
21. Conservation tillage equipment for corn
22. Log jam removal
23. Field buffers (around whole fields, not just next to streams)

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Sidebar 7.2 Guiding Principles for Watershed Action Plan Development Relative to Agricultural Nonpoint Pollution.

1. Plan components must hold promise for meeting water quality objectives:
   - Reduce aquatic life impairments within the rivers and streams of the watershed.
   - Reduce the export of pollutants that impair downstream water uses, drinking water supplies, and downstream flooding.

2. Plan components must be deemed appropriate to watershed farmers and landowners:
   - Must be economically viable to individual farmers.
   - Must recognize the importance of drainage to profitable crop production in this region.
   - Must recognize the diversity of crop and livestock production settings within the watersheds (large versus small operation; owner-operators versus renters, site specificity of BMPs).
   - Should hold promise for providing long-term solutions to problems.

3. Where appropriate, the plan components should be targeted to site specific sources and causes of site specific impairments.

4. Solving drainage problems, such as removal of problem causing logjams or repair of broken tile mains, must be an integral part of improving aquatic habitats in streams.

5. Priority for restoration of woody riparian corridors and/or in-stream habitat will be given to larger streams over smaller streams. We do not expect high quality aquatic communities in man-made drainage ditches where prior land clearing and natural streams were absent.

6. Many water quality problems represent the cumulative impact of multiple upstream sources. For these problems, remedial measures may require widespread adoption throughout the watershed. For example, grass buffer strips on many miles of small streams and ditches may be needed to help reduce sediment and nutrient inputs to streams and subsequent export.

7. Plans will address non-agricultural sources of impairments (point sources, septic tanks, urban nonpoint sources) as well as agricultural sources.

8. Where either the agricultural or environmental desired plan of practices is uncertain, the plan will suggest demonstration projects for evaluation of those practices. Farmers/landowners willing to participate in the demonstrations will be essential for evaluation of these innovative practices. Farmers/landowners participating in demonstration projects will receive extra incentives or protections related to any added risks they encounter.

9. Educational materials and programs will play an integral part in the Watershed Action Plans including their development and

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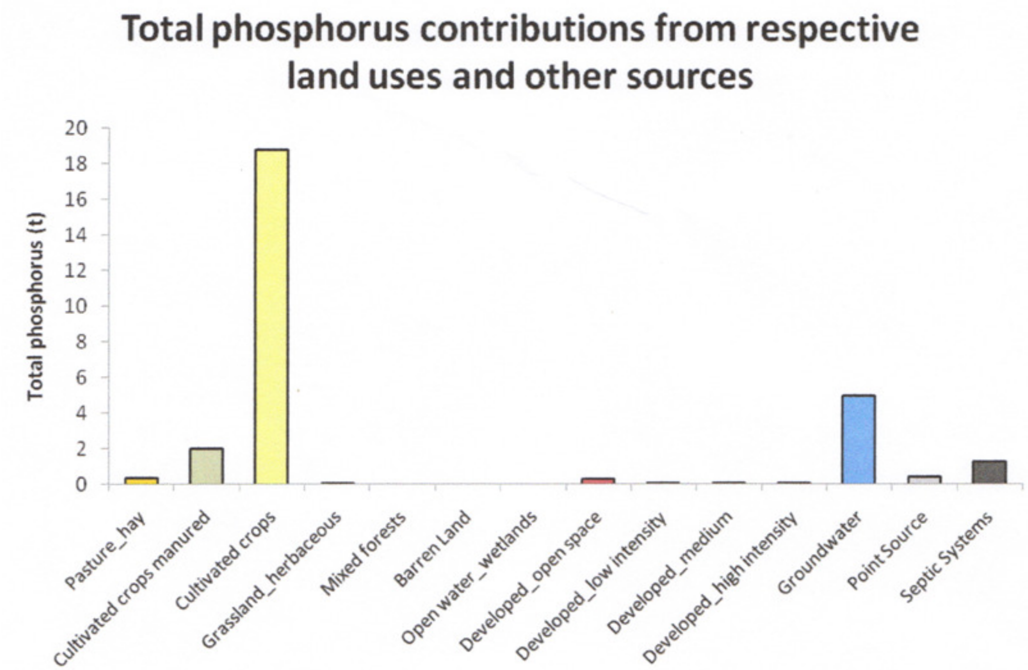
The 2005 EPA Total Maximum Daily Load study identified phosphorus and nitrogen as two of the nutrients that are a source of pollution in The Outlet/Lye Creek Watershed. The problems occur when nutrients from animal waste and fertilizers are applied to farm land in amounts that exceed the amount needed by the crop or can be held by the soil. Phosphorus and nitrogen can move through runoff and subsurface drainage systems into the neighboring streams and waterways. Figure 7.1 shows the total phosphorus contributions from respective land use and other sources. Figure 7.2, on the next page, shows the total phosphorus contributions from respective land uses and other sources for The Outlet and Brights Ditch 14 digit watersheds.

Figure 7.1 Total Phosphorus - The Outlet/Lye Creek Watershed

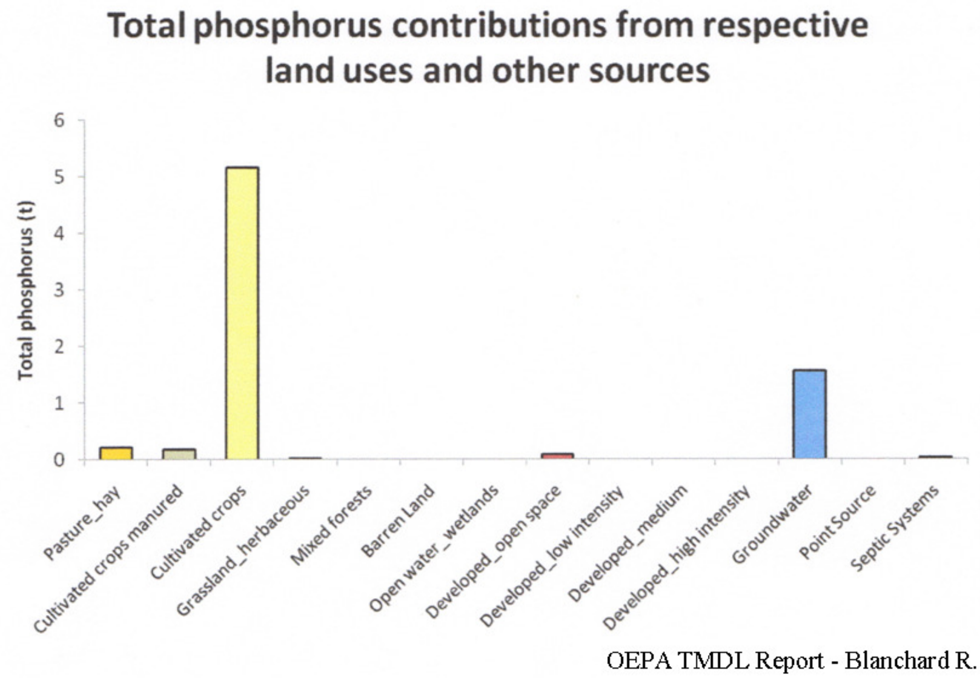


OEPA TMDL Report - Blanchard R.

As can be observed in Figure 7.1 and Figure 7.2, on the next page, most of the total phosphorus entering the waterways in The Outlet/Lye Creek Watershed is coming from agricultural practices. The OEPA TMDL Report shows a total of 28.19 tons of total phosphorous being added to the waterways. Of this amount, 66.6% or 18.76 tons/yr. of the total phosphorus is from cultivated crops and 75% overall from agriculture sources (See Table 7.1). Developing BMPs to reduce the runoff of these nutrients is mandatory to restore and maintain water quality in the watershed.

Table 7.1, on page 7-5, of the TMDL Report calls for a 52.6% reduction of total phosphorus in wasteload reductions and a 90% reduction from household sewage treatment systems for the Blanchard River with The Outlet.

Figure 7.2 Total Phosphorus - The Outlet and Brights Ditch 14 digit Watershed



OEPA TMDL Report - Blanchard R.

Table 7.1 Sources of Phosphorus in The Outlet/Lye Creek HUC 04100008-020

Phosphorus Source	tons/yr.	Percent
Pasture Hay	0.3642	1.292
Cultivated crops manured	1.9968	7.084
Cultivated crops	18.7605	66.556
Grassland-herbaceous	0.0356	0.126
Mixed forests	0.003	0.011
Developed-open space	0.3152	1.118
Developed-low intensity	0.0552	0.196
Developed-medium intensity	0.0575	0.204
Developed-high intensity	0.0401	0.142
Groundwater	4.9503	17.562
Point Source	0.3782	1.342
Septic Systems	1.2308	4.366
	Total 28.1874	100.000

OEPA TMDL Report - Blanchard R.

Problem Area 1 Blanchard River below Potato Run to above The Outlet (2): except for Brights Ditch (HUC 04100008-020-010)

Background: This subwatershed begins at the mouth of Potato Run (RM 76.76) which is the end point for the Headwaters Watershed (HUC 04100008-010). The subwatershed ends at the mouth of The Outlet (2) (RM 63.63). As a result, the subwatershed receives any impairments from the Headwaters subwatershed and from the Brights Ditch subwatershed that enters at RM 65.85. The subwatershed covers 14,581 acres of land. Of this 10,637 acres or 73% is cultivated cropland. There are two significant tributaries that flow into this subwatershed. Buckrun Creek enters at RM 69.84 and Folger Ditch enters at RM 64.39. Both of these tributaries are under county maintenance. Since the river is draining less than 200 mi^2 in this watershed, the river is considered to be a wadeable stream by the EPA for assessment purposes.

> ***NOTE OF CONCERN - The subwatershed ends about 1.23 miles above the water intake for the City of Findlay located along TR 208. Any loadings from this subwatershed, becomes a potential problem for the City of Findlay's water supply. TMDL Study showed nitrate-nitrites level to be above the target of 1.5 mg/L in 5 out of 6 grabs averaging 3.33 mg/L per grab.***

There are several sources of impairments in this subwatershed:

Picture 7.2 Rapid erosion after a 2.2 inch rain in February

1. Like most waterways in the Blanchard River Watershed, this watershed shows a high degree of flashiness. Erosion, mainly from agricultural runoff, during high flow periods is the main cause of sediment loading and siltation. (See Picture 7.2)
2. This subwatershed shows a high level of nitrate-nitrite loading in the Blanchard River portion. During the 2005 EPA TMDL study, 12 out of 23 grabs were above the EPA target goal of 1.5 mg/L. The range of those grabs above the target goal were from 1.46 to 15.3. All of these grab sites are located above the water intake point for Findlay. Three of the 23 grabs were 1.46-1.48 mg/L. These three are so close to being above the target that the BRWP still considers them relevant, since the river at these points is above the water intake for the City of Findlay.

The BRWP asked Mr. Ralph Heimlich, an ACE, to analyze this subwatershed to determine the estimated sediment, phosphorus, and nitrogen loadings from agricultural runoff. Table 7.2 below shows the calculated load reductions needed to meet the target goal from the TMDL Report. The complete analysis can be found in Appendix D on pages D-2 through D-18.

Table 7.2 Loading Reductions Blanchard River above Potato Run to below The Outlet (2), except Brights Dt.

Crop	Acres to	P Reduction	Sediment Load	N Reduction
Acres	Treat (51.2%)	(.455 lbs/ac/yr)	(tons/yr)	.875 lbs/ac/yr
10637	5542	2522	1174	4849

Problem Statement 1.1 Sediment Loadings: Blanchard River below Potato Run to above The Outlet (2), except for Brights Ditch (HUC # 04100008-020-010)

The Blanchard River is impaired by sediment loading equal to approximately 1200 tons of excess sediment eroding from agricultural fields per year.

Goal 1 - Reduce field erosion from agriculture cropland by 1200 tons per year.

Objective 1 Establish riparian buffers/filter strips that treat 2,900 acres of cropland.

Action 1: Local governmental agencies, such as Hancock SWCD, ODNR, NRCS, and EDF will work with farmers to install the practices using CRP, CREP, EQIP and other programs.

Action 2: Seek funding to provide Cost Sharing Funding and financial incentives to farmers.

Action 3: Conduct a Conservation Practice Day in the watershed for the farmers.

Objective 2 Increase Conservation Tillage/residual management by 100 acres/yr.

Action 1: Conduct annual no-till day.

Action 2: Seek funding to provide $ 25/acre no-till.

Objective 3 Increase Cover Crop usage by 50 acres/yr.

Action 1: Local governmental agencies, such as Hancock SWCD, ODNR, NRCS, and EDF will work with farmers to install the practice using CRP, CREP, EQIP and other programs.

Action 2: Seek funding to provide $ 10/acre for cover crops.

Objective 4 Install 500 linear feet of grass waterways.

Action 1: Local governmental agencies, such as Hancock SWCD, ODNR, NRCS, and EDF will work with farmers to install the practice using CRP, CREP, EQIP and other programs.

Action 2: Seek funding to provide Cost Sharing Funding and financial incentives to farmers.

See Table 7.10 on page 7-45 for a summary of these strategies.

Problem Statement 1.2 Nitrate-nitrite Loadings: Blanchard River below Potato Run to above The Outlet (2), except for Brights Ditch (HUC# 04100008-020-010)

> ***Excess nitrate-nitrate loading, equal to an average concentration of 3.85 mg/L compared to the target of 1.5 mg/L, is impairing the Blanchard River which eventually enters the river above the water intake for the City of Findlay.***

Goal 1: Reduce nitrogen associated with sediment erosion from agriculture cropland by 4800 lbs. per year.

Objective 1 Establish riparian buffers/filter strips that treat 2,900 acres of cropland.

Action 1: Local governmental agencies, such as Hancock SWCD, ODNR, NRCS, and EDF will work with farmers to install the practices using CRP, CREP, EQIP and other programs.

Action 2: Seek funding to provide Cost Sharing Funding and financial incentives to farmers.

Action 3: Conduct a Conservation Practice Day in the watershed for the farmers.

Objective 2 Increase Conservation Tillage/residual management by 100 acres/yr.

Action 1: Conduct annual no-till day.

Action 2: Seek funding to provide $ 25/acre no-till.

Objective 3 Increase Cover Crop usage by 50 acres/yr.

Action 1: Local governmental agencies, such as Hancock SWCD, ODNR, NRCS, and EDF will work with farmers to install the practice using CRP, CREP, EQIP and other programs.

Action 2: Seek funding to provide $ 10/acre for cover crops.

Objective 4 Install 500 linear feet of grass waterways.

Action 1: Local governmental agencies, such as Hancock SWCD, ODNR, NRCS, and EDF will work with farmers to install the practice using CRP, CREP, EQIP and other programs.

Action 2: Seek funding to provide Cost Sharing Funding and financial incentives to farmers.

See Table 7.10 on page 7-46 for a summary of these strategies.

Goal 2: To reduce the nitrate-nitrites loadings from leaching into the Blanchard River to reach the TMDL target of 1.5 mg/L.

<u>Objective 1</u> Install bioreactors on 2 drainage systems to remove nitrate-nitrite from the draining water.

Action 1: Grant money will be sought to cover the cost of the bioreactors.

Action 2: A bioreactor contractor will be hired to do the installation.

Action 3: State agencies/universities will be contacted to see if there is interest in over-seeing the project.

<u>Objective 2</u> Install 2 drainage management systems to control the flow of water from the tile, thus limiting the nitrate-nitrite loading.

Action 1: Local governmental agencies, such as Hancock SWCD, ODNR, NRCS, and EDF will work with farmers to install the practices using EQIP and other programs.

<u>Objective 3</u> Install floating wetlands in the channel of the waterway to help remove nitrate-nitrites that have entered. (See Appendix E pages E-1 through E-13 for information on floating wetlands).

Action 1: Grant money will be sought to cover the cost of the floating wetlands.

Action 2: A floating wetlands contractor will be hired to do the installation.

Action 3: State agencies/universities will be contacted to see if there is interest in over-seeing the project.

<u>Objective 5</u> Soil testing and a nutrient management plan will be developed to prevent excess nitrogen from being added to the Adrian Muck Soil.

Action 1: Local governmental agencies, such as Hancock SWCD, ODNR, NRCS, OSU Extension, and EDF will work with farmers to develop the plan.

Action 2: Seek funding to help cover the cost of soil testing.

See Table 7.10 on page 7-47 for a summary of these strategies.

Phosphorus Loading: Even though phosphorus was not identified as an impairment in this subwatershed during the TMDL Report, there were grabs that were high at times. The reduction of sediment loading described under Problem Statement 1.1 on page 7-7 would result in a estimated phosphorus reduction of 1320 lbs./yr.

Problem Area 2 Brights Ditch subwatershed (HUC 04100008-020-020)

Background: Brights Ditch subwatershed covers 18,185 acres of land. Of this, 15,258 acres or 81.2% is cultivated cropland. Brights Ditch enters the Blanchard River at RM 65.85. The first 1.74 miles is known as Corbin's Ditch on state and county maps. At mile 1.74 the ditch splits with Stahls Ditch flowing south and than east into Wyandot County south of the Village of Vanlue. The main branch of Brights Ditch flows eastward from the split before ending north of Vanlue. Most of Brights Ditch is under a county maintenance contract.

> ***NOTE OF CONCERN - Brights Ditch enters the Blanchard River at RM3.45 above the City of Findlay's water intake located along TR 208. Any loadings, especially nitrate-nitrites from Brights Ditch that enters the river, becomes a potential problem for the City of Findlay's water supply. The TMDL Study showed nitrate-nitrites level to be above the target of 1.5 mg/L in 5 out of 6 grabs averaging 3.33 mg/L per grab.***

There are several sources of impairments in Brights Ditch:

1. Like most waterways in the Blanchard River Watershed, Brights Ditch and Stahls Ditch shows a high degree of flashiness. Erosion, mainly from agricultural runoff, during high flow periods is the main cause of sediment loading and siltation.
2. Stahls Ditch shows high phosphorus upstream from TR. 199. The two probable causes of the phosphorus is agricultural runoff and failed HSTS.
3. Brights Ditch shows a high level of nitrate-nitrite at each TMDL site (RM 0.24 - TR 244; RM 2.41 - TR 252; and RM 3.85 - TR 197). The two probable sources of this nitrogen is the Adrian Muck soil that flows into Brights Ditch at TR. 197 and agriculture run-off from excess fertilizer. Nitrate-nitrite loading is a major concern since this watershed is in the water supply area for the City Of Findlay.

The BRWP asked Mr. Ralph Heimlich, an ACE, to analyze the Brights Ditch watershed to determine the estimated sediment, phosphorus, and nitrogen loadings from agricultural runoff. Table 7.3 below shows the calculated load reductions needed to meet the target goal from the TMDL Report. The complete analysis can be found in Appendix D on pages D-2 through D-18.

Table 7.3 Load Reductions - Brights Ditch (HUC # 04100008-020-020)				
Brights Ditch except for Stahls Ditch upstream of TR 199				
Crop Acres	Acres to Treat (51.2%)	P Reduction (.455 lbs/ac/yr)	Sediment Load (tons/yr)	N Reduction (.875 lbs/ac/yr)
9322	4773	2172	1946	4176
Stahls Ditch upstream of TR 199				
Crop Acres	Acres to Treat (51.2%)	P Reduction (.455 lbs/ac/yr)	Sediment Load (tons/yr)	N Reduction (.875 lbs/ac/yr)
4409	2257	1027	920	1975

Problem Statement 2.1 Sediment Loadings: Brights Ditch except for Stahls Ditch upstream of TR 199

Brights Ditch is impaired by sediment loading equal to approximately 1950 tons of excess sediment eroding from agricultural fields per year.

Goal 1 - Reduce field erosion from agriculture cropland by 1900 tons per year.

Objective 1 Establish riparian buffers/filter strips that treat 4,800 acres of cropland.

Action 1: Local governmental agencies, such as Hancock SWCD, ODNR, NRCS, and EDF will work with farmers to install the practices using CRP, CREP, EQIP and other programs.

Action 2: Seek funding to provide Cost Sharing Funding and financial incentives to farmers.

Action 3: Conduct a Conservation Practice Day in the watershed for the farmers.

Objective 2 Increase Conservation Tillage/residual management by 200 acres/yr.

Action 1: Conduct annual no-till day.

Action 2: Seek funding to provide $ 25/acre no-till.

Objective 3 Increase Cover Crop usage by 100 acres/yr.

Action 1: Local governmental agencies, such as Hancock SWCD, ODNR, NRCS, and EDF will work with farmers to install the practice using CRP, CREP, EQIP and other programs.

Action 2: Seek funding to provide $ 10/acre for cover crops.

Objective 4 Install 1000 linear feet of grass waterways.

Action 1: Local governmental agencies, such as Hancock SWCD, ODNR, NRCS, and EDF will work with farmers to install the practice using CRP, CREP, EQIP and other programs.

Action 2: Seek funding to provide Cost Sharing Funding and financial incentives to farmers.

See Table 7.10 on page 7-48 for a summary of these strategies.

Problem Statement 2.2 Phosphorus Loadings: Brights Ditch except for Stahls Ditch upstream of TR 199

Brights Ditch is impaired by sediment-associated phosphorus loading equal to approximately 2200 lbs/yr of phosphorus from agricultural fields per year.

Goal 1 - Reduce phosphorus loading from agriculture cropland by 2100 lbs per year.

Objective 1 Establish riparian buffers/filter strips that treat 4,800 acres of cropland.

Action 1: Local governmental agencies, such as Hancock SWCD, ODNR, NRCS, and EDF will work with farmers to install the practices using CRP, CREP, EQIP and other programs.

Action 2: Seek funding to provide Cost Sharing Funding and financial incentives to farmers.

Action 3: Conduct a Conservation Practice Day in the watershed for the farmers.

Objective 2 Increase Conservation Tillage/residual management by 200 acres/yr.

Action 1: Conduct annual no-till day.

Action 2: Seek funding to provide $ 25/acre no-till.

Objective 3 Increase Cover Crop usage by 100 acres/yr.

Action 1: Local governmental agencies, such as Hancock SWCD, ODNR, NRCS, and EDF will work with farmers to install the practice using CRP, CREP, EQIP and other programs.

Action 2: Seek funding to provide $ 10/acre for cover crops.

Objective 4 Install 1000 linear feet of grass waterways.

Action 1: Local governmental agencies, such as Hancock SWCD, ODNR, NRCS, and EDF will work with farmers to install the practice using CRP, CREP, EQIP and other programs.

Action 2: Seek funding to provide Cost Sharing Funding and financial incentives to farmers.

See Table 7.10 on page 7-49 for a summary of these strategies.

Problem Statement 2.3 Nitrate-nitrite Loading: Brights Ditch except for Stahls Ditch upstream of TR 199

Brights Ditch is impaired by sediment-associated nitrate-nitrite loading equal to approximately 4200 lbs/yr of nitrate-nitrite from agricultural fields per year.

Goal 1 - Reduce nitrate-nitrite loading from agriculture cropland by 4100 lbs per year.

Objective 1 Establish riparian buffers/filter strips that treat 4,800 acres of cropland.

Action 1: Local governmental agencies, such as Hancock SWCD, ODNR, NRCS, and EDF will work with farmers to install the practices using CRP, CREP, EQIP and other programs.

Action 2: Seek funding to provide Cost Sharing Funding and financial incentives to farmers.

Action 3: Conduct a Conservation Practice Day in the watershed for the farmers.

Objective 2 Increase Conservation Tillage/residual management by 200 acres/yr.

Action 1: Conduct annual no-till day.

Action 2: Seek funding to provide $ 25/acre no-till.

Objective 3 Increase Cover Crop usage by 100 acres/yr.

Action 1: Local governmental agencies, such as Hancock SWCD, ODNR, NRCS, and EDF will work with farmers to install the practice using CRP, CREP, EQIP and other programs.

Action 2: Seek funding to provide $ 10/acre for cover crops.

Objective 4 Install 1000 linear feet of grass waterways.

Action 1: Local governmental agencies, such as Hancock SWCD, ODNR, NRCS, and EDF will work with farmers to install the practice using CRP, CREP, EQIP and other programs.

Action 2: Seek funding to provide Cost Sharing Funding and financial incentives to farmers.

See Table 7.10 on page 7-50 for a summary of these strategies.

Problem Statement 2.4 Sediment Loading: Stahls Ditch

Background: Approximately 2 miles of Stahl ditch, starting at TR 199 in Hancock County and continuing as Walter's ditch in Wyandot county, is impaired by high levels of Phosphorus due to run-off from agricultural fields as sediment associated phosphorus and possibly from failing HSTS in the area. Wyandot Health Department (WHD) reports that there are 81 septic systems in this area. The WHD estimates that 68 of the 81 units have off-lot discharge which could be added nutrients to the ditch. Based on estimated failure rate of 50% and a phosphorus loading estimate of 16.4 lbs/yr/system, the estimated loading of phosphorus from failing HSTS would be 558 lbs/yr. Finally, part of this section of Stahl/Walters ditch is under a joint maintenance contract with the SWCD district of Hancock and Wyandot counties. (See Appendix D for additional photos, soils maps, and pictures of this problem area.)

Stahls Ditch upstream of TR 199 is impaired by sediment loading equal to approximately 920 tons per year of excess sediment eroding from agricultural fields per year.

Goal 1 - Reduce field erosion from agriculture cropland by 900 tons per year.

Objective 1 Establish riparian buffers/filter strips that treat 2,250 acres of cropland.

Action 1: Local governmental agencies, such as Hancock SWCD, ODNR, NRCS, and EDF will work with farmers to install the practices using CRP, CREP, EQIP and other programs.

Action 2: Seek funding to provide Cost Sharing Funding and financial incentives to farmers.

Action 3: Conduct a Conservation Practice Day in the watershed for the farmers.

Objective 2 Increase Conservation Tillage/residual management by 100 acres/yr.

Action 1: Conduct annual no-till day.

Action 2: Seek funding to provide $ 25/acre no-till.

Objective 3 Increase Cover Crop usage by 50 acres/yr.

Action 1: Local governmental agencies, such as Hancock SWCD, ODNR, NRCS, and EDF will work with farmers to install the practice using CRP, CREP, EQIP and other programs.

Action 2: Seek funding to provide $10/acre for cover crops.

Objective 4 Install 1000 linear feet of grass waterways.

Action 1: Local governmental agencies, such as Hancock SWCD, ODNR, NRCS, and EDF will work with farmers to install the practice using CRP, CREP, EQIP and other programs.

Action 2: Seek funding to provide Cost Sharing Funding and financial incentives to farmers.

See Table 7.10 on page 7-51 for a summary of these strategies.

Problem Statement 2.5 Phosphorus loadings: Stahls Ditch upstream of TR 199

> ***The area of Stahls Ditch upstream of TR 199 is impaired by phosphorus loading from agricultural run-off from crop production and failed home septic systems equal to about 1050 lbs. per year.***

Goal 1 - Reduce sediment-associated phosphorus by 550 lbs. per year.

Objective 1 Establish riparian buffers/filter strips that treat 2250 acres of cropland.

Action 1: Local governmental agencies, such as Hancock SWCD, ODNR, NRCS, and EDF will work with farmers to install the practices using CRP, CREP, EQIP and other programs.

Action 2: Seek funding to provide Cost Sharing Funding and financial incentives to farmers.

Action 3: Conduct a Conservation Practice Day in the watershed for the farmers.

Objective 2 Increase Conservation Tillage/residual management by 100 acres/yr.

Action 1: Conduct annual no-till day.

Action 2: Seek funding to provide $25/acre no-till.

Objective 3 Increase Cover Crop usage by 200 acres/yr.

Action 1: Local governmental agencies, such as Hancock SWCD, ODNR, NRCS, and EDF will work with farmers to install the practice using CRP, CREP, EQIP and other programs.

Action 2: Seek funding to provide $10/acre for cover crops.

Objective 4 Install 5000 linear feet of grass waterways.

Action 1: Local governmental agencies, such as Hancock SWCD, ODNR, NRCS, and EDF will work with farmers to install the practice using CRP, CREP, EQIP and other programs.

Action 2: Seek funding to provide Cost Sharing Funding and financial incentives to farmers.

Objective 4 Increase Nutrient Management practices by 2 practices/ year.

Action 1: Local governmental agencies, such as Hancock SWCD, ODNR, NRCS, and EDF will work with farmers to install the practice using CRP, CREP, EQIP and other programs.

Action 2: Seek funding to provide Cost Sharing Funding and financial incentives to farmers.

See Table 7.10 on page 7-52 for a summary of these strategies.

Background: Wyandot County Health Department (WHD) reports that there are 81 septic systems in this area. The WHD estimates that 68 of the 81 units have off-lot discharge which could be added nutrients to the ditch. Based on estimated failure rate of 50% and a phosphorus loading estimate of 16.4 lbs/yr/ system, the estimated loading of phosphorus from failing HSTS would be 558 lbs/yr.

Goal 2 - Reduce phosphorus from failing HSTS by 500 lbs. per year

Objective 1 Utilize the existing septic permits to identify the type, location, and age of existing septic systems in the problem area.

Action 1: Wyandot County Health Department will conduct the review of their existing permits.

Action 2: Grants will be pursued to cover the cost of the inspection.

Action 3: A centralized database will be developed to better keep track of HSTS.

Objective 2 Collect and document additional missing septic systems data during the course of the Health District's day-to-day activities.

Action 1: Wyandot County Health Department will attempt to obtain missing septic system information for homes in the target area while conducting day-to-day activities in the subwatershed.

Action 2: Grants will be pursued to cover the cost of the inspection.

Action 3: The data will be added to the centralized database.

Objective 3 Repair/replace all individual HSTS that are failing.

Action 1: Wyandot County Health Department will develop a plan to replace/repair all failing HSTS.

Action 2: Grants will be pursued to help with the cost of the replacement/repair.

Objective 4 The Wyandot County Health Department will develop educational materials to pass out to homeowners.

Action 1: Letters, brochures, educational displays, newspaper articles, and other media sources will be utilized.

Action 2: Grants will be pursued to cover the cost of the materials.

See Table 7.10 on page 7-53 for a summary of these strategies.

Problem Statement 2.6 Nitrate-nitrite Loading: Brights Ditch upstream from TR 197 (RM. 3.8)

Background: Brights Ditch flows from the east to the west through this rural area northwest of Vanlue. This TMDL site is located at the southeast corner of the lagoon treatment system for the village of Vanlue. Much of the upstream flow originates from 115 acres of Adrian muck (Ad) (organic) soil located to the northeast. The village of Vanlue's lagoon system empties into Brights Ditch at the point. See Appendix E for pictures, aerial photo map, and soils of this area.

The probable sources of the nitrate-nitrite are leaching by water through the Adrian muck soil into the drainage tile; groundwater from the ridge has shown high levels of nitrate-nitrites (BAKER); or nitrate-nitrites from fertilizer that are easily carried into the drainage tile during rain events. In trying to solve the problem, many of the BMPs are still experimental and will be installed as demonstrative projects. The EPA has called for a target value of 1.0 mg/L. The grabs taken at TR 197 during the EPA TMDL study showed an average concentration of 4.73 mg/L. These grabs occurred during June and July in 2005 when there was high rain water infiltration. The loading during this period was 2.73 mg/L higher than the EPA target goal of 1.0 mg/L. There are no sources and/or agencies that are willing to give an estimate loading for nitrate-nitrites from Adrian muck soil.

Excess nitrate-nitrite loading, equal to a concentration of 2.73 mg/L greater than the target of 1.0 mg/L, is impairing Brights ditch above TR 197 which eventually enters the Blanchard River above the water intake for the City of Findlay

Goal 1: To reduce the nitrate-nitrites loadings from leaching into Brights Ditch to reach the TMDL target of 1.0 mg/L.

Objective 1 Install bioreactors on a drainage system to remove nitrate-nitrite from the draining water.

Action 1: Grant money will be sought to cover the cost of the bioreactor.

Action 2: A bioreactor contractor will be hired to do the installation.

Action 3: State agencies/universities will be contacted to see if there is interest in over-seeing the project.

Objective 2 Install a drainage management system to control the flow of water from the tile, thus limiting the nitrate-nitrite loading.

Action 1: Local governmental agencies, such as Hancock SWCD, ODNR, NRCS, and EDF will work with farmers to install the practices using EQIP and other programs.

Objective 3 — Install floating wetlands in the channel of the ditch to help remove nitrate-nitrites that have entered the ditch. (See Appendix E pages E-1 through E-13 for information on floating wetlands.)

Action 1: Grant money will be sought to cover the cost of the floating wetlands.

Action 2: A floating wetlands contractor will be hired to do the installation.

Action 3: State agencies/universities will be contacted to see if there is interest in over-seeing the project.

Objective 4 — Construct a 10 acre wetland on the area of Brights ditch just west of the TR 197 bridge.

Action 1: Local governmental agencies, such as Hancock SWCD, ODNR, NRCS, and EDF will work with farmers to install the practice using CRP, CREP, EQIP and other programs.

Action 2: Seek funding to provide Cost Sharing Funding and financial incentives to farmers.

Objective 5 — Soil testing and a nutrient management plan will be developed to prevent excess nitrogen from being added to the Adrian Muck Soil.

Action 1: Local governmental agencies, such as Hancock SWCD, ODNR, NRCS, OSU Extension, and EDF will work with farmers to develop the plan.

Action 2: Seek funding to help cover the cost of soil testing.

See Table 7.10 on page 7-54 for a summary of these strategies.

Problem Area 3 The Outlet (2) Watershed (HUC 04100008-020-030)

Background: The Outlet enters the Blanchard River at RM 63.63. The Outlet runs eastward for approximately 8.5 miles ending in the Springville Marsh area in Seneca County, The Outlet drains 24,418 acres of which 17,585 acres is cultivated cropland. The headwaters of The Outlet originate in an area of Adrian muck (Ad) (organic) soil. There are approximately 610 acres of Adrian muck soil in The Outlet subwatershed. The TMDL Report showed that every grab taken by the Ohio EPA during their 2005 study was above the median target for nitrate-nitrites. There were four testing sites between SR 568, near the mouth to CR 11 on the Hancock-Seneca County line. The Outlet is not under county maintenance. As a result, small trees and bushes are found along both sides of the ditch in many stretches. Most of the ditch bank is higher than the field level in the Adrian muck soil area. See Appendix D on pages D-25 through D-31for pictures, aerial photo map, and soils of this area.

There are several sources of impairments in The Outlet:

1. Like most waterways in the Blanchard River Watershed, The Outlet shows a high degree of flashiness. Erosion, mainly from agricultural runoff, during high flow periods is the main cause of sediment loading and siltation.
2. The Outlet shows a high level of nitrate-nitrite at each TMDL site (RM 0.51 SR 568; RM 4.47 - CR 330; RM 6.05 - CR 264; and RM 7.68 - CR 11). The two probable sources of this nitrogen is the Adrian Muck soil that flows into The Outlet upstream of CR 330 and agriculture run-off from excess fertilizer. Nitrate-nitrite loading is a major concern since this watershed is in the water supply area for the City Of Findlay.

   NOTE OF CONCERN - Brights Ditch enters the Blanchard River at RM3.45 above the City of Findlay's water intake located along TR 208. Any loadings, especially nitrate-nitrites from Brights Ditch that enters the river, become a potential problem for the City of Findlay's water supply. The TMDL Study showed nitrate-nitrites level to be above the target of 1.5 mg/L in 5 out of 6 grabs averaging 3.33 mg/L per grab.

The BRWP asked Mr. Ralph Heimlich, an ACE, to analyze The Outlet subwatershed to determine the estimated sediment, and nitrogen loadings from agricultural runoff. Table 7.4 below shows the calculated load reduction needed to be the target goal from the TMDL Report. Table 7.4 does not include the Adrian Muck soil. In the Adrian Muck soil area, every grab taken during the 2005 TMDL study was above the target goal of 1.0 mg/L set by the OEPA. The average concentration for 18 sites was 6.63 mg/L. Table 7.4 shows the calculated loadings for this area. The complete analysis can be found in Appendix D on pages D-2 through D-18.

Table 7.4 The Outlet (HUC #04100008-020-030)

Non-Adrian Muck Soil area

Crop Acres	Acres to Treat (51.2%)	P Reduction (.455 lbs/ac/yr)	Sediment Load (tons/yr)	N Reduction (.875 lbs/ac/yr)
17,585	9004	4097	2540	7878

Problem Statement 3.1 Sediment Loadings: The Outlet Watershed

The Blanchard River is impaired by sediment loading equal to approximately 2600 tons of excess sediment eroding from agricultural fields per year.

Goal 1 - Reduce field erosion from agriculture cropland by 2500 tons per year.

Objective 1 Establish riparian buffers/filter strips that treat 9000 acres of cropland.

Action 1: Local governmental agencies, such as Hancock SWCD, ODNR, NRCS, and EDF will work with farmers to install the practices using CRP, CREP, EQIP and other programs.

Action 2: Seek funding to provide Cost Sharing Funding and financial incentives to farmers.

Action 3: Conduct a Conservation Practice Day in the watershed for the farmers.

Objective 2 Increase Conservation Tillage/residual management by 200 acres/yr.

Action 1: Conduct annual no-till day.

Action 2: Seek funding to provide $ 25/acre no-till.

Objective 3 Increase Cover Crop usage by 100 acres/yr.

Action 1: Local governmental agencies, such as Hancock SWCD, ODNR, NRCS, and EDF will work with farmers to install the practice using CRP, CREP, EQIP and other programs.

Action 2: Seek funding to provide $ 10/acre for cover crops.

Objective 4 Install 4000 linear feet of grass waterways.

Action 1: Local governmental agencies, such as Hancock SWCD, ODNR, NRCS, and EDF will work with farmers to install the practice using CRP, CREP, EQIP and other programs.

Action 2: Seek funding to provide Cost Sharing Funding and financial incentives to farmers.

See Table 7.10 on page 7-55 for a summary of these strategies.

Problem Statement 3.2 Nitrate-nitrite Loading: The Outlet, except the Adrain Muck soil

The Outlet is impaired by sediment-associated nitrate-nitrite loading equal to approximately 7900 lbs/yr of nitrate-nitrite from agricultural fields per year.

Goal 1 - Reduce nitrate-nitrite loading from agriculture cropland by 7800 lbs per year.

Objective 1 Establish riparian buffers/filter strips that treat 9,000 acres of cropland.

Action 1: Local governmental agencies, such as Hancock SWCD, ODNR, NRCS, and EDF will work with farmers to install the practices using CRP, CREP, EQIP and other programs.

Action 2: Seek funding to provide Cost Sharing Funding and financial incentives to farmers.

Action 3: Conduct a Conservation Practice Day in the watershed for the farmers.

Objective 2 Increase Conservation Tillage/residual management by 200 acres/yr.

Action 1: Conduct annual no-till day.

Action 2: Seek funding to provide $ 25/acre no-till.

Objective 3 Increase Cover Crop usage by 100 acres/yr.

Action 1: Local governmental agencies, such as Hancock SWCD, ODNR, NRCS, and EDF will work with farmers to install the practice using CRP, CREP, EQIP and other programs.

Action 2: Seek funding to provide $ 10/acre for cover crops.

Objective 4 Install 1000 linear feet of grass waterways.

Action 1: Local governmental agencies, such as Hancock SWCD, ODNR, NRCS, and EDF will work with farmers to install the practice using CRP, CREP, EQIP and other programs.

Action 2: Seek funding to provide Cost Sharing Funding and financial incentives to farmers.

See Table 7.10 on page 7-56 for a summary of these strategies.

Problem 3.3 Nitrate-nitrite Loading - Adrian Muck soil area

Background: The nitrogen loading in the Adrian Muck soil is probably coming from the leaching of surface water through the Adrian Muck soil into the plastic drainage tile. Normal BMPs, such as filter strips and riparian buffers, will not work since the banks are higher than the fields and rain water does not run off. Many potential BMPs are still experimental and will be used as demonstrative projects.

The Outlet is impaired in the Adrian Muck soil area by nitrate-nitrite loading from surface water leaching though the soil into the drainage tile. The measured concentration is 5.63 mg/L higher than the TMDL target goal of 1.0 mg/L

Goal 1: To reduce the nitrate-nitrites loadings into Brights Ditch to reach the TMDL target of 1.0 mg/L.

Objective 1 Install 3 bioreactors on the drainage system to remove nitrate-nitrites from the draining water.

Action 1: Grant money will be sought to cover the cost of the bioreactor.

Action 2: A bioreactor contractor will be hired to do the installation.

Action 3: State agencies/universities will be contacted to see if there is interest in over-seeing the project.

Objective 2 Install 3 drainage management systems to control the flow of water from the tile, thus limiting the nitrate-nitrite loading.

Action 1: Local governmental agencies, such as Hancock SWCD, ODNR, NRCS, and EDF will work with farmers to install the practices using EQIP and other programs.

Objective 3 Install Floating Wetlands in the channel of the ditch to help remove nitrate-nitrites that have entered the ditch. (See Appendix E for information on floating wetlands.)

Action 1: Grant money will be sought to cover the cost of the bioreactor.

Action 2: A floating wetlands contractor will be hired to do the installation.

Action 3: State agencies/universities will be contacted to see if there is interest in over-seeing the project.

See Table 7.10 on page 7-57 for a summary of these strategies.

Objective 4 Construct a 5 acre wetland on The Outlet where feasible.

Action 1: Local governmental agencies, such as Hancock SWCD, ODNR, NRCS, and EDF will work with farmers to install the practice using CRP, CREP, EQIP and other programs.

Action 2: Seek funding to provide Cost Sharing Funding and financial incentives to farmers.

Objective 5 Soil testing and a nutrient management plan will be developed to prevent excess nitrogen from being added to the Adrian Muck Soil.

Action 1: Local governmental agencies, such as Hancock SWCD, ODNR, NRCS, OSU Extension, and EDF will work with farmers to develop the plan.

Action 2: Seek funding to help cover the cost of soil testing.

See Table 7.10 on page 7-57 for a summary of these strategies.

Phosphorus Loading: Even though phosphorus was not identified as an impairment in The Outlet during the TMDL Study, there were grabs that were high at times. The reduction of sediment loading described under Problem Statement 3.1 on page 7-22 would result in an estimated phosphorus reduction of 4000 lbs./yr.

Problem Area 4 Blanchard River above The Outlet (2) to below Eagle Creek (HUC # 04100008-020-040)

Background: This subwatershed starts at the mouth of The Outlet and flows westward into the City of Findlay, ending just above the mouth of Eagle Creek. The Blanchard River becomes a small river at the start of this subwatershed, since it now drains more than 200 mi^2. The subwatershed covers 10,174 acres of which 5,025, or 49%, is cultivated cropland. The dam for the City of Findlay's water intake is located at RM 62.4 in this subwatershed. The other dam in this subwatershed is located at Riverside Park (RM 58.80). The Headwaters, Brights Ditch, and The Outlet/Lye Creek subwatersheds all flow into the Blanchard River upstream of this subwatershed. Any loading or pollutants that flows through the upstream subwatershed must be dealt with in this subwatershed.

Approximately 3,400 acres of this subwatershed is developed. The development includes residential areas, shopping centers, industry, and small businesses. Problem Area 6 deals with the Storm Water Phase II MS4 plan for the City of Findlay.

> ***NOTE OF CONCERN - Since this subwatershed includes the primary water intake for the City of Findlay located along TR 208, any loadings above the dam become a potential problem for the City of Findlay's water supply.***

There are several sources of impairments in this subwatershed:

1. Like most waterways in the Blanchard River Watershed, this subwatershed shows a high degree of flashiness. Erosion, mainly from agricultural runoff, during high flow periods is the main cause of sediment loading and siltation.
2. In addition, there are two lowhead dams located in this subwatershed. Both of these dams have a significant amount of sediment collected behind them. Removal of this sediment is important to restore the aquatic habitat. Removal of sediment that is in the river is important to prevent filling that area behind each dam with more sediment. ***Note: The first goal is always to prevent sediment from entering a waterway in the first place. Problem Areas 1, 2, & 3 are all upstream of this watershed and address sediment loading.***
3. The only site that any data was collected from during TMDL study was at the water intake for the City of Findlay located along TR 208. The nitrate-nitrate level was above the 1.5 mg/L goal set by the EPA during 5 of the 6 grabs and averaged 3.33 over the study period.

Although this subwatershed was not analyzed by Mr. Heimlich, the soils in this subwatershed remaining pretty much the same as the surrounding watersheds. An estimate of the loadings will be based on this data. Table 7.5 below shows the calculated load reductions needed to meet the target goal from the TMDL Report. The complete analysis can be found in Appendix D on pages D-2 through D-18.

Table 7.5 Load Reductions Blanchard River above The Outlet (2) to below Eagle Creek (HUC # 04100008-020-040)

Crop Acres	Acres to Treat (51.2%)	P Reduction (.455 lbs/ac/yr)	Sediment Load (tons/yr)	N Reduction (.875 lbs/ac/yr)
5,025	2,573	1,171	1,050	3,276

See Appendix D on pages D-32 and D-33 for pictures, aerial photo map, and soils of this area.

Problem Statement 4.1 Sediment loading

The Blanchard River in this subwatershed is impaired by sediment loading equal to approximately 1100 tons per year from agricultural runoff.

Goal 1 - Reduce field erosion from agriculture cropland by 1000 tons per year.

Objective 1 Establish riparian buffers/filter strips that treat 2500 acres of cropland.

Action 1: Local governmental agencies, such as Hancock SWCD, ODNR, NRCS, and EDF will work with farmers to install the practices using CRP, CREP, EQIP and other programs.

Action 2: Seek funding to provide Cost Sharing Funding and financial incentives to farmers.

Action 3: Conduct a Conservation Practice Day in the watershed for the farmers.

Objective 2 Increase Conservation Tillage/residual management by 100 acres/yr.

Action 1: Conduct annual no-till day.

Action 2: Seek funding to provide $25/acre no-till.

Objective 3 Increase Cover Crop usage by 100 acres/yr.

Action 1: Local governmental agencies, such as Hancock SWCD, ODNR, NRCS, and EDF will work with farmers to install the practice using CRP, CREP, EQIP and other programs.

Action 2: Seek funding to provide $10/acre for cover crops.

See Table 7.10 on page 7-58 for a summary of these strategies.

Although phosphorus was not identified as an impairment in this subwatershed, reducing the sediment loading described in Problem Statement 4.1 above would result in the reduction of sediment-associated phosphorus by an estimated load of 1,171 lbs./yr.

Problem Statement 4.2 Nitrate-nitrite Loading

The Blanchard River is impaired by sediment-associated nitrate-nitrite loading equal to approximately 3300 lbs/yr of nitrate-nitrite from agricultural fields per year.

Goal 1 - Reduce nitrate-nitrite loading from agriculture cropland by 3200 lbs per year.

Objective 1 Establish riparian buffers/filter strips that treat 2,500 acres of cropland.

Action 1: Local governmental agencies, such as Hancock SWCD, ODNR, NRCS, and EDF will work with farmers to install the practices using CRP, CREP, EQIP and other programs.

Action 2: Seek funding to provide Cost Sharing Funding and financial incentives to farmers.

Action 3: Conduct a Conservation Practice Day in the watershed for the farmers.

Objective 2 Increase Conservation Tillage/residual management by 200 acres/yr.

Action 1: Conduct annual no-till day.

Action 2: Seek funding to provide $25/acre no-till.

Objective 3 Increase Cover Crop usage by 100 acres/yr.

Action 1: Local governmental agencies, such as Hancock SWCD, ODNR, NRCS, and EDF will work with farmers to install the practice using CRP, CREP, EQIP and other programs.

Action 2: Seek funding to provide $10/acre for cover crops.

See Table 7.10 on page 7-59 for a summary of these strategies.

Problem Statement 4.3 Riverside Dam Area at Riverside Park in Findlay

Background: The Riverside Park Dam near Riverside Park is a cultural landmark in Findlay. Although not listed as a historical dam, the surrounding Riverside Park is a historical area. This area is associated with Tell Taylor and his writing of "*Down By the Old Millstream.*" The dam also serves as the potential third water intake site for the City of Findlay. The dam also serves to pool the water, thus providing enough depth to allow fishing, canoeing, and other water activities in the park area. The OEPA TMDL report noted that Riverside Park Dam needs to be modified to improve quality of aquatic habitat and stream flow conditions. The area behind the dam covers approximately 16 acres with a depth between 6-10 feet. Figure 7.3 on page 7-30 points out the sediment depth in this area ranges from 1 to 88 inches. The water depth ranges from 7 to 81 inches. Note that the main channel area (X3, X4, X8, and X9) shows the least depth of water. Between X3 and X4 is a sediment island. See Figure 7.3 on page 7-30. At one time, this area was an excellent fishing area. Now the fishing would be considered poor.

> ***There is approximately 29,435 yd^3 of accumulated organic sediments and debris (eutrophication) filling the 4 acres of the "old reservoir" area at Riverside Park in the City of Findlay. This has resulted in a severe loss of aquatic habitat and recreational use (fishing and canoeing) in this area.***

Goal 1 - To remove approximately 29,400 cubic yards of organic sediments in order to restore the aquatic habitat and recreational use of this area.

Objective 1. To destratify the dissolved oxygen water profile, establish a benthic aerobic cap, and convert the reservoir into an extended aeration system thus reversing the effects of organic sediments, nutrients, and eutrophication.

Action 1. The City of Findlay and the BRWP will contract with an establish contractor to remove the organic sediments.

Action 2. Seek funding to cover the cost of the project.

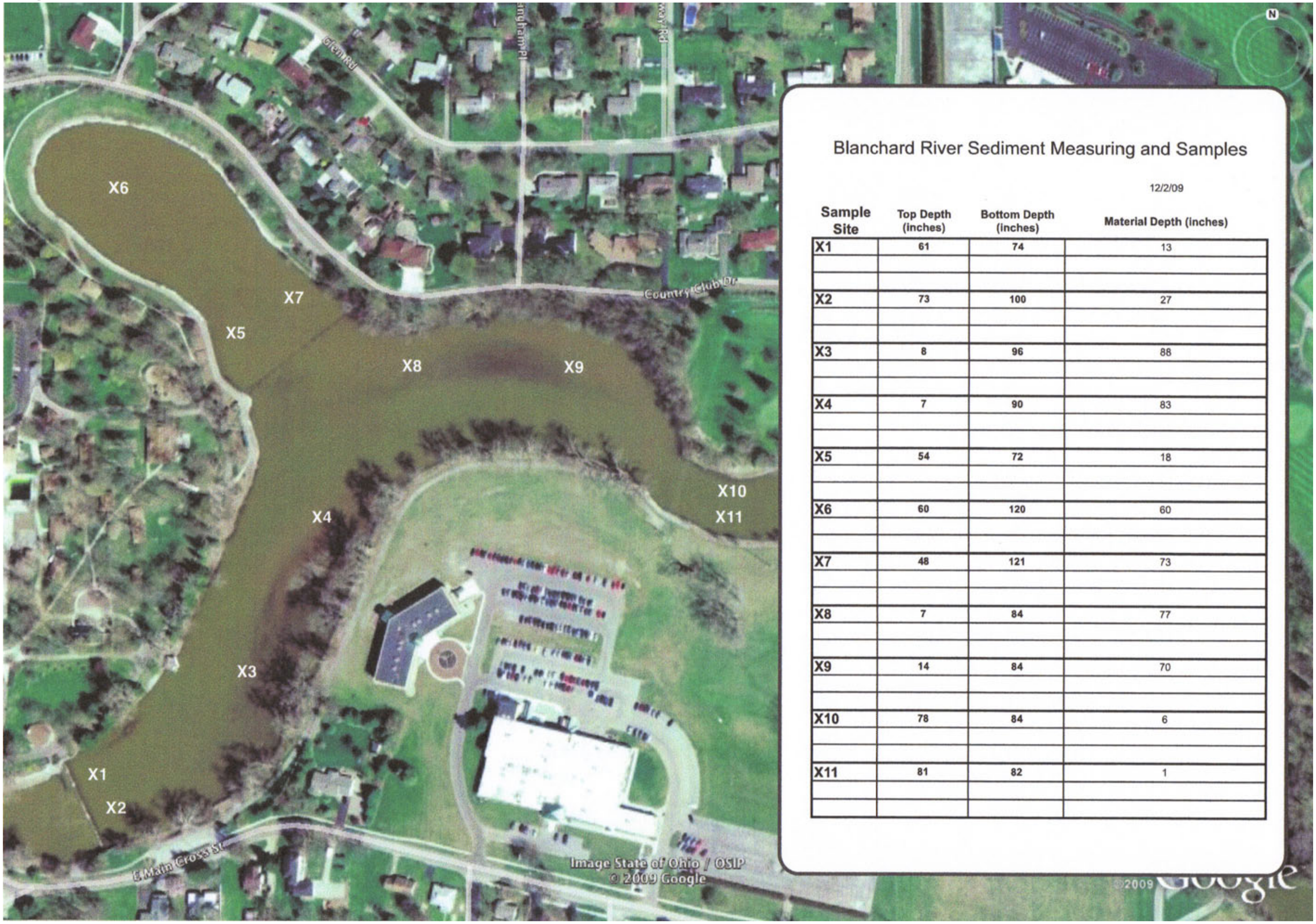
Action 3. ONDR will be asked to help re-establish the fishery.

See Table 7.10 on page 7-60 for a table summary of the strategies.

Picture 7.3 Old Reservoir at Riverside Park.

This area should be 12-13 feet deep, but is less than 3 feet deep due the accumulation of organics that have collected into the reservoir. (Martin)

Figure 7.3 - Riverside Dam and area behind



Blanchard River Sediment Measuring and Samples

12/2/09

Sample Site	Top Depth (inches)	Bottom Depth (inches)	Material Depth (inches)
X1	61	74	13
X2	73	100	27
X3	8	96	88
X4	7	90	83
X5	54	72	18
X6	60	120	60
X7	48	121	73
X8	7	84	77
X9	14	84	70
X10	78	84	6
X11	81	82	1

Fact Sheet for Riverside Dam

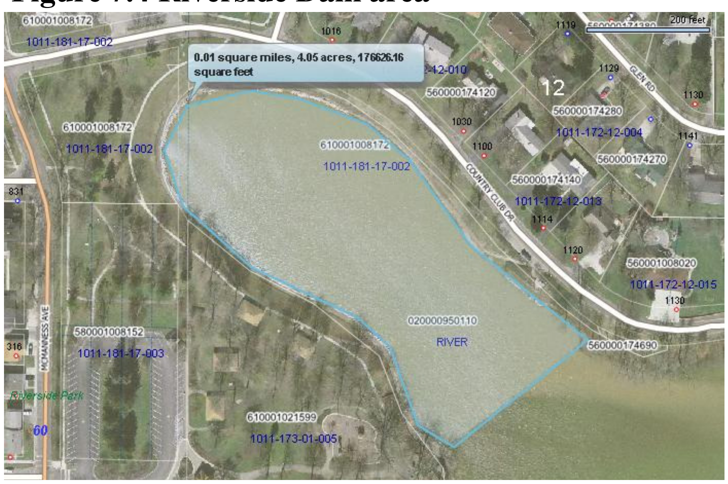
Old Reservoir Area:

- covers 4.05 acres or 176,607 ft^2 (Hancock Auditor)
- average depth of organic matter (based on Streamside Systems sampling) 4-5 feet
- estimated cubic yards of organics (176,607 ft^2 X 4.5 ft. [depth] = 794,732 ft^3 / 27 ft^3/yd^3 = 29,435 yd^3 of organics.

Area Behind Dam (except for Old Reservoir)

- covers 11.08 acres or 482,589 ft^2 (Hancock Auditor)
- average depth of bedload sediment (based on Streamside Systems sampling) 4-5 feet
- estimated cubic yards of bedload (482,589 ft^2 X 4.5 ft. [depth] = 2,171,651 ft^3 / 27 ft^3/yd^3 = 80,432 yd^3 of bedload sediment.

Figure 7.4 Riverside Dam area



Old Reservoir Area

Main Channel behind Riverside Dam (except old reservoir)

Problem State 4.4 Bedload Sediment behind Riverside Dam

Background: There are approximately 80,432 yd^3 of bedload sediment filling approximately 11 acres of the river channel behind the Riverside Park Dam at Riverside Park in the City of Findlay. (See page 7-31.)

There are approximately 80,000 yd^3 of bedload sediment behind the Riverside Dam covering roughly 11 acres of the river channel. This has resulted in a severe loss of aquatic habitat and recreational use (fishing and canoeing) in this area.

Goal 1: To restore the aquatic habitat in the 11 acres of area behind the Riverside Dam by removing approximately 80,000 yd^3 of bedload sediment.

Objective 1. To remove the sandbar that has formed along the east side of the channel in this area. See Picture 7.4 below.

Action 1. The City of Findlay and the BRWP will contract with an established contractor to remove the organic sediments.

Action 2. Seek funding to cover the cost of the project.

Action 3. ONDR will be asked to help re-establish the fishery.

Objective 2. To remove the remaining bedload sediment from the area behind the Riverside Dam area.

Action 1. The City of Findlay and the BRWP will contract with an established contractor to remove the organic sediments.

Action 2. Seek funding to cover the cost of the project.

Action 3. ONDR will be asked to help re-establish the fishery.

See Table 7.10 on page 7-60 for a summary of these strategies.

Picture 7.4 Sediment Island behind the Riverside Dam.

Sediment Island

(Martin)

Problem Statement 4.5 City of Findlay Water Intake located along TR 208

Background: Sediment loading that has already entered the river upstream needs to be removed before the sediment can reach the area behind the dam. This sediment is causing problems for the City of Findlay when it is pumped into reservoir #2. The sediment carries phosphorus into the reservoir which is causing algae growth in the reservoir. Dr. Baker from the National Water Quality Research Center (NWQRC), located at Heidelberg University in Tiffin, Ohio, reported that during the 2008 water year there were 725 lbs./ac. of suspended sediment measured at their sediment loading gauge located at the USGS site on the Blanchard River at CR 140. Based on this data, the two 11-digit watersheds (175,456 acres) that contribute sediment loading above the water intake for the City of Findlay are contributing approximately 63,602.8 tons of sediment per year to the river. This sediment needs to be removed, not only to prevent the problems in the reservoir, but to prevent the area behind the Riverside Dam in Problem 4.4 from filling up again.

Approximately 63,600 tons of bedload sediment flow by the City of Findlay's water intake each year. Some of this sediment is carried into the City of Findlay's reservoir #2 when the city pumps water from the river into the reservoir. This sediment carries an estimated 117.5 tons of attached phosphorus. Some portion of this phosphorus is pumped into the reservoir #2. Removal of the sediment prevents the attached phosphorus from being carried downstream and eventually into Lake Erie.

Bedload sediment equal to approximately 63,600 tons/yr. is impairing the river flow and adding to the sediment, phosphorus, and nitrogen loading when pumped into the City of Findlay's reservoir #2. The bedload sediment also is adding to the potential load in Lake Erie.

Goal 1: Reduce the amount of sediment in the river and the amount being pumped into the reservoir by 90% or approximately 57,240 tons/yr.

Objective 1: Removal of 90% of the bedload sediment flow down the Blanchard River past the water intake point for the City of Findlay.

Action 1: The City of Findlay will install a river-wide sediment collector upstream of the water intake on TR 208.

Action 2. Seek funding to cover the cost of the project.

See Table 7.10 on page 7-61 for a summary of these strategies.

Problem Area 5 Lye Creek Watershed (HUC 04100008-020-050)

Background: Lye Creek subwatershed covers 17,906 acres of land. Of this, 13,269 acres or 74.1% is cultivated cropland. Lye Creek enters the Blanchard River at RM 58.38 and runs for 8.5 miles in mainly a southward direction. The average fall for Lye Creek is 5.2 ft/mile. There are several sources of impairments in Lye Creek:

1. Like most waterways in the Blanchard River Watershed, Lye Creek shows a high degree of flashiness. Sedimentation, mainly from agricultural runoff, during these high flow periods is the main cause of nutrient loading (phosphorus) in the creek.
2. The creek experiences short periods of high discharge followed by longer periods of low to very low flow. Once Lye Creek passes SR 15, the flow will get so low during the summer months that the creek bed is either dry or has small stagnant pools. Restoring a year round aquatic habitat south of SR 15 would be next to impossible and very costly.
3. The village of Houcktown is the only concentrated area of homes in the subwatershed. It has a group of 50+ older homes and trailers. Houcktown is an older community with most septic systems more than 25 years old or older. The TMDL report points to Houcktown as the probable source of pathogens found in Lye Creek at CR 26.

The TMDL Report states that 73.640 % of the excess phosphorus is probably from cultivated crops. This amounts to an estimated phosphorus loading of 20.7573 tons/yr. from cultivated crops. Another 4.366 % of the phosphorus is from septic systems or an estimated loading of 1.2308 tons/yr. The TMDL report, in Table 7.1 on page 101, calls for a 52.6 % or 10.918 tons/yr. reduction of phosphorus from cultivated cropland and a 90 % or 1.1078 tons/yr. reduction of phosphorus from septic systems.

The BRWP asked Ralph Heimlich (ACE) to analyze the Lye Creek watershed to determine the estimated sediment and phosphorus loadings from soil erosion. Present farming practices, the amount of filter strips, and crop rotation were included in the final analysis. Table 7.6 below shows the calculated load reductions needed to meet the target goal from the TMDL Report. The complete analysis can be found in Appendix D on pages D-2 through D-18. See Appendix D on pages D-34 through D-43 for pictures, aerial photo map, and soils of this area.

Table 7.6 Load Reductions Lye Creek HUC # 04100008-020-050

Crop Acres	Acres to Treat (51.2%)	P Reduction (.455 lbs/ac/yr)	Sediment Load (tons/yr)	N Reduction (.875 lbs/ac/yr)
10637	5542	2522	1174	4849

Problem Statement 5.1: Sediment loadings

Background: Lye Creek, from RM.10.05 to RM 6.0, is impaired by high levels of sediment and phosphorus due to run-off from crop production. A second source of phosphorus is discharge from failed home septic systems located in and around the village of Houcktown. Excessive nutrient loading in the form of phosphorus in the Lye Creek watershed is impairing use attainment. There are estimated to be 3073 acres of cropland that are being treated by riparian buffers/ filter strips. This lowers the amount of acres that need to be treated to 5809 acres. This area covers all the area of the watershed south of SR 15. (See Appendix E for additional photos, soils maps, and pictures of this problem area.)

The area of Lye Creek south of SR 15 is impaired by sediment loading equal to approximately 1500 tons per year from agricultural runoff.

Goal 1 - Reduce field erosion from agriculture cropland by 1400 tons per year.

Objective 1 Establish riparian buffers/filter strips that treat 5800 acres of cropland.

Action 1: Local governmental agencies, such as Hancock SWCD, ODNR, NRCS, and EDF will work with farmers to install the practices using CRP, CREP, EQIP and other programs.

Action 2: Seek funding to provide Cost Sharing Funding and financial incentives to farmers.

Action 3: Conduct a Conservation Practice Day in the watershed for the farmers.

Objective 2 Increase Conservation Tillage/residual management by 200 acres/yr.

Action 1: Conduct annual no-till day.

Action 2: Seek funding to provide $ 25/acre no-till.

Objective 3 Increase Cover Crop usage by 200 acres/yr.

Action 1: Local governmental agencies, such as Hancock SWCD, ODNR, NRCS, and EDF will work with farmers to install the practice using CRP, CREP, EQIP and other programs.

Action 2: Seek funding to provide $ 10/acre for cover crops.

See Table 7.10 on page 7-61 for a summary of these strategies.

Objective 4 Install 5000 linear feet of grass waterways.

Action 1: Local governmental agencies, such as Hancock SWCD, ODNR, NRCS, and EDF will work with farmers to install the practice using CRP, CREP, EQUP and other programs.

Action 2: Seek funding to provide Cost Sharing Funding and financial incentives to farmers.

See Table 7.10 on page 7-61 for a summary of these strategies.

The area of Lye Creek south of SR 15 is impaired by phosphorus loading from run-off from crop production and failed home septic systems located in and around the Village of Houcktown equaling approximately 2.2 tons per year.

Problem Statement 5.2: Phosphorus loadings

Goal 1 - Reduce sediment-associated phosphorus by 1.5 tons per year.

Objective 1 Establish riparian buffers/filter strips that treat 5809 acres of cropland.

Action 1: Local governmental agencies, such as Hancock SWCD, ODNR, NRCS, and EDF will work with farmers to install the practices using CRP, CREP, EQIP and other programs.

Action 2: Seek funding to provide Cost Sharing Funding and financial incentives to farmers.

Action 3: Conduct a Conservation Practice Day in the watershed for the farmers.

Objective 2 Increase Conservation Tillage/residual management by 200 acres/yr.

Action 1: Conduct annual no-till day.

Action 2: Seek funding to provide $25/acre no-till.

Objective 3 Increase Cover Crop usage by 200 acres.

Action 1: Local governmental agencies, such as Hancock SWCD, ODNR, NRCS, and EDF will work with farmers to install the practice using CRP, CREP, EQIP and other programs.

Action 2: Seek funding to provide $10/acre for cover crops.

See Table 7.10 on page 7-62 for a summary of these strategies.

Objective 4 Install 5000 linear feet of grass waterways.

Action 1: Local governmental agencies, such as Hancock SWCD, ODNR, NRCS, and EDF will work with farmers to install the practice using CRP, CREP, EQIP and other programs.

Action 2: Seek funding to provide Cost Sharing Funding and financial incentives to farmers.

See Table 7.10 on page 7-62 for a summary of these strategies.

Goal 2 - Reduce phosphorus from failing HSTS by 1.0 tons per year.

Objective 1 Inventory and Inspect/dye test all existing HSTS in the problem area and Houcktown.

Action 1: Hancock Board of Health will conduct door-to-door inspection of all HSTS.

Action 2: Grants will be pursued to cover the cost of the inspection.

Action 3: A centralized database will be developed to keep better track of HSTS.

Objective 2 Install a Decentralized System to hook all the HSTS together thus reducing the phosphorus loading by approximately 1200 lbs./yr.
(A decentralized system is the preferred method due to cost.)

Action 1: Hancock County Commissioners will pursue the installation of a Decentralized System for Houcktown.

Action 2: Grants will be pursued to cover the cost of the Decentralized System.

See Table 7.10 on page 7-63 for a summary of these strategies.

Objective 3 Repair/replace all individual HSTS that are failing and are not a part of the Houcktown Decentralized system thus reducing the phosphorus loading 200 lbs./yr.

Action 1: Hancock Board of Health will conduct door-to-door inspection of all HSTS.

Action 2: Grants will be pursued to cover the cost of the inspection.

Action 3: A centralized database will be developed to better keep track of HSTS.

Objective 4 To provide educational materials on proper care and maintenance of HSTS to stakeholders.

Action 1: The Hancock Board of Health will develop educational materials to share with homeowners.

See Table 7.10 on page 7-63 for a summary of these strategies.

Problem 5.3 Pathogens in Lye Creek

Approximately 4 miles of Lye Creek, from RM 10.05 to RM 6.0, are impaired by high levels of pathogens from failed HSTS systems in and around the village of Houcktown according to the EPA TMDL Report. There are approximately 50+ potential septic systems that are either non-permitted or more than 25 years old. All of these are probably in need of being replaced or restored by the Hancock Board of Health. After studying five potential solutions, the OEPA has agreed that only a centralized or decentralized system is an acceptable solution. Due to the cost of a centralized system, only the decentralized system will be pursued.

The area of Lye Creek from RM 6.0 to RM 10.5 is impaired by pathogens from failed home septic systems located in and around the Village of Houcktown to reach the recreation criteria goal of 161 e coli counts/100 mL.

Goal 1 - Eliminate 50% of failing home septic systems by 2015, 100% by 2017 thus, stopping pathogens from entering Lye Creek.

Objective 1 Inventory and Inspect/dye test all existing HSTS in the problem area and Houcktown.

Action 1: Hancock Board of Health will conduct door-to-door inspection of all HSTS.

Action 2: Grants will be pursued to cover the cost of the inspection.

Action 3: A centralized database will be developed to keep better track of HSTS.

Objective 2 Install a Decentralized System to hook all the HSTS together thus reducing pathogens from entering Lye Creek. (A Decentralized System is the preferred method due to cost.)

Action 1: Hancock County Commissioners will pursue the installation of a Decentralized System for Houcktown.

Action 2: Grants will be pursued to cover the cost of the Decentralized System.

Objective 3 Repair/replace all individual HSTS that are failing and are not a part of the Houcktown Decentralized System.

Action 1: Hancock Board of Health will conduct door-to-door inspection of all HSTS.

Action 2: Grants will be pursued to cover the cost of the inspection.

Action 3: A centralized database will be developed to keep better track of HSTS.

Objective 4 To provide educational materials on proper care and maintenance of HSTS to stakeholders.

Action 1: The Hancock Board of Health will develop educational materials to share with homeowners.

See Table 7.10 on page 7-64 for a summary of these strategies.

Problem Statement 5.4: Aquatic Habitat Restoration

Background: Lye Creek is on a county maintenance contract that calls for periodic clean-outs and no trees in the riparian corridor. As a result, the aquatic habitat has been disrupted. The creek is subjected to high temperatures from sun exposure which leads to low dissolved oxygen and a QHEI score of 39.5 at RM 2.6. Once the creek channel passes SR 15, the flow gets so low during the summer that the creek dries up and small stagnant pools form. The entire substrate of Lye Creek is bedrock. Restoration of the aquatic habitat would be too costly in this area south of SR 15. The area north of SR 15 has the potential for aquatic life restoration.

This region is an area of concern for the flood mitigation studies being conducted by the NWOFMP and USACE. Where and how much of each of the following suggested actions fit into the flood mitigations plans will determine which of the practices finally are installed.

> ***The aquatic habitat of Lye Creek between the mouth and SR. 15 has been impaired due to channelization and habitat alteration. The QHEI score from the TMDL Study was 39.5 at RM 2.6.***

Goal 1 - Restore the Aquatic Habitat and raise the QHEI score of Lye Creek from 39.5 to 50 between the mouth and SR 15.

Objective 1 — Install a two-stage ditch between the mouth of Lye Creek and SR. 15, where applicable.

Action 1: Monies will be sought to cover the cost of installation of the two-stage ditch.

Action 2: The City of Findlay and Hancock County will oversee the installation of the two-stage ditch.

Action 3: The two-stage ditch will be incorporated into the flood mitigation plans.

Objective 2 — To create/restore wetlands where applicable.

Action 1: Monies will be sought to cover the cost of installation of any wetlands.

Action 2: The City of Findlay and Hancock County Engineer will oversee the installation of any wetlands.

Action 3: The wetlands will be incorporated into the flood mitigation plans.

See Table 7.10 on page 7-65 for a summary of these strategies.

Problem Area 6: City of Findlay (COF) - Storm Water Management

Background: The U.S. EPA created the Storm Water Phase II Rule as the next step in the effort of the EPA to "preserve, protect, and improve the nation's water resources from polluted storm water runoff." Phase II covers small municipal separate storm sewer systems (MS4s) that are located in "urbanized areas." The goal of Phase II is to "reduce adverse water quality and aquatic habitat conditions by instituting the use of controls on the unregulated sources of storm water discharges that have the greatest likelihood of causing environmental degradation. The Phase II Rule defines a small MS4 storm water management program as comprised of six minimum control measures that, when administered in concert, are expected to result in reduction of the discharge of pollutants into receiving bodies. These six control measures are:

1. Public Outreach and Education
2. Public Participation/Involvement
3. Illicit Discharge Detection and Elimination
4. Construction Site Runoff Control
5. Post-Construction Runoff Control
6. Pollution Prevention/Good Housekeeping

(USEPA)

The most downstream portion of two of 14-digits watersheds located within The Outlet/Lye Creek watershed flow through the City of Findlay's Phase II MS4 area. These two 14-digit watersheds are Lye Creek (HUC #04100008-020-050) and the Blanchard River below The Outlet (2) to above the Eagle Creek (HUC # 04100008-020-040). See Map 7.1 on the next page. More detailed information on the SWMP may be found in Appendix E on pages E-14 through E-21.

The City of Findlay will develop and implement a Storm Water Management Plan (SWMP) that is approved by the EPA by 2013.

Problem Statement 6.1 Storm Water Management Plan

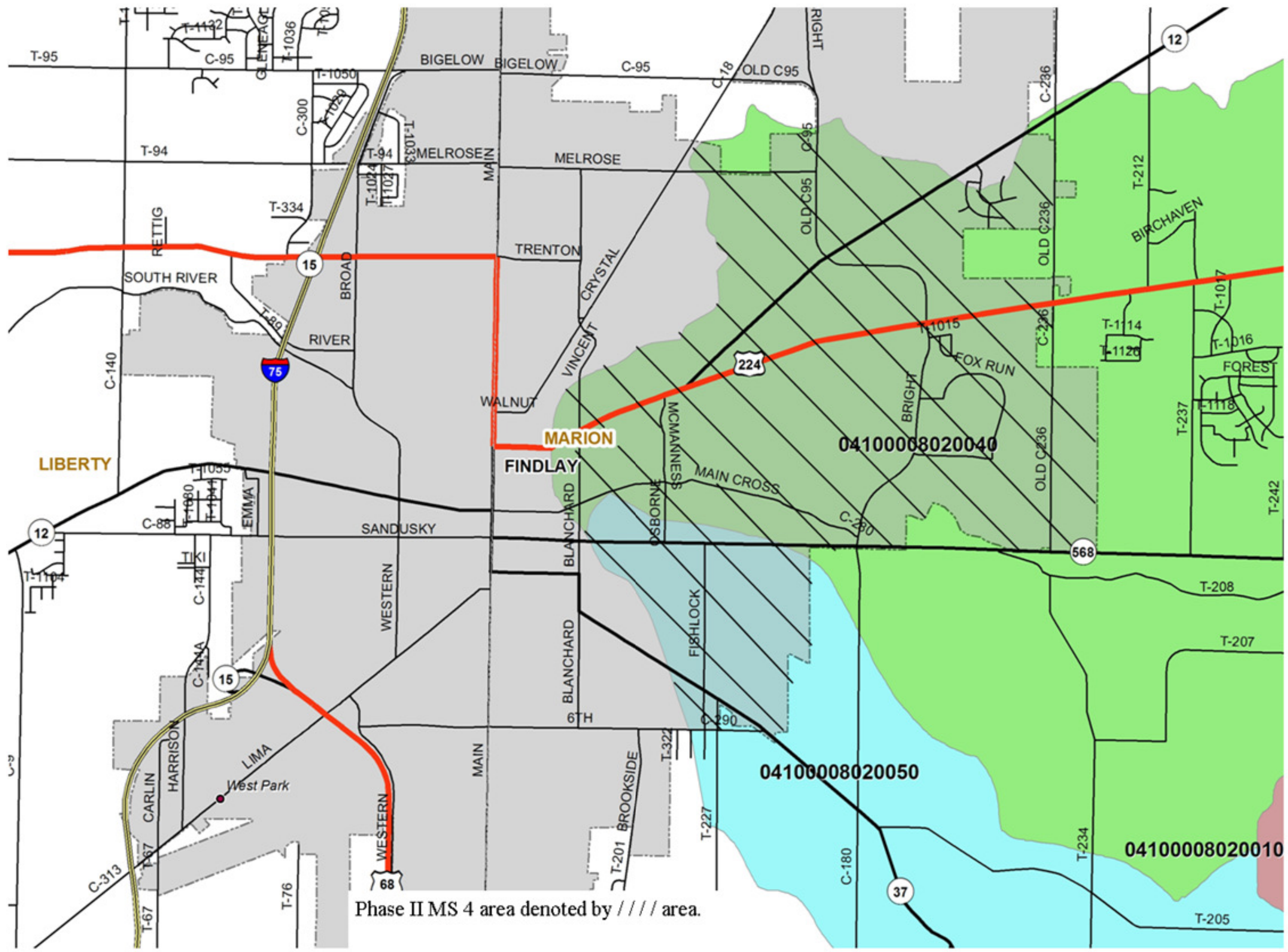
Goal 1 The City of Findlay will develop the SWMP that includes the six minimum control measures.

Objective 1: The City of Findlay will enter into a contract with a professional company to write the SWMP based on the data and information gathered.

Objective 2: Develop and implement a Public Education and Outreach Plan to inform the citizens of Findlay concerning the BMPs and other activities being used to implement the SWMP.

Objective 3: Develop and implement a Public Involvement and Participation Plan for the SWMP.

Map 7.1 Storm Water Phase II MS 4 areas of the City of Findlay located in The Outlet/Lye Creek subwatershed



Objective 4: Develop and implement a plan for Illicit Discharge Detection and Elimination in the SWMP.

Objective 5: Development and implement a plan to handle Construction Site Storm Water Runoff Control.

Objective 6: Develop a plan for Post-Construction Storm Water Management.

Objective 7: Develop a Pollution Prevention/Good Housekeeping manual for Municipal Operations Plan for the SWMP.

Goal 2 The City of Findlay will implement the approved Storm Water Management Plan (SWMP)

Objective 1: Form a Storm Water Advisory Committee (SWAC) made up of local officials, developers, contractors and citizens to help guide the implementation of the SWMP.

Objective 2: Enter into a memorandum of understanding with the Blanchard River Watershed Partnership to provide assistance with implementing activities in the public outreach/education and public involvement/participation elements of the SWMP.

Objective 3: Monitor implementation progress of the six minimum control measures and report out to local officials and stakeholders.

Other Areas of Concern

There are two other sources of concern in the watershed involving sediment.

1. Tile Blow-outs - These blow-outs in agriculture tile add to the sediment loading and will need to be addressed on an individual basis.
2. Streambank Stability - Since most of the ditches are under maintenance contract, streambank problems are handled under the contract. There are areas along the river where bank stabilization may need to be addressed in the future.

Table 7.10 Strategies for Implementing Restoration projects in The Outlet/Lye Creek Watershed

The purpose of this table is to summarize the restoration strategies for each problem statement in the watershed. The table includes a description, estimated load reduction (where applicable), timeline, what agencies are involved, funding, and performance indicators. The BRWP thanks all the agencies that were involved in completing the watershed action plan.

Acronyms for Table

BRWP - Blanchard River Watershed Partnership
CF - City of Findlay
EDF - Environmental Defense Fund
FCE - Findlay City Engineers
HCBH - Hancock County Board of Health
HCC - Hancock County Commissioners
HCE - Hancock County Engineers
HSWCD - Hancock Soil & Water Conservation District
NRCS - National Reserve Conservation Service
ODNR - Ohio Department of Natural Resources
USACE - United States Army Corps of Engineers
WCC - Wyandot County Commissioners
WCE - Wyandot County Engineer
WCHD - Wyandot County Health Department
WSWCD - Wyandot Soil & Water Conservation District

Table 7.10 Problem Area 1: Strategies for Implementation of Restoration Activities for the Blanchard River below Potato Run to above The Outlet (2), except for Brights Ditch (HUC 04100008-020-010)

Strategy	Description	Estimated load reduction (Avg.)	Timeline	Resources	Funding	Performance Indicator
Problem Statement 1.2 Goal 1	**Reduce field erosion by 1200 tons/year**					
Increase filter strips and riparian buffers	Program to increase sign-up for farm bill programs with additional incentives	1200 tons/yr (S)	2012-2016	NRCS, EDF HSWCD, ODNR	CREP CRP EQIP Grants	Increase filter strip /riparian buffer drainage area by 800 acres/yr.
Increase Conservation Tillage/residue management	Program to increase sign-up for farm bill programs with additional incentives	0.25 tons/yr (S)	2012-2016	NRCS HSWCD ODNR EDF	CREP CRP EQIP Grants	Increase conservation tillage/residue management by 50 acres/year
Increase cover crop usage	Program to increase sign-up for farm bill programs with additional incentives	0.25 tons/yr (S)	2012-2016	NRCS, EDF HSWCD ODNR	CREP CRP EQIP Grants	Increase cover crop usage by 50 acres/year
Install Grass Waterways where needed	Program to increase sign-up for farm bill programs with additional incentives	0.125 tons/yr (S)	2012-2016	NRCS, EDF HSWCD ODNR	CREP CRP EQIP	Install 500 linear feet/year.

Table 7.10 Problem Area 1: Strategies for Implementation of Restoration Activities for the Blanchard River below Potato Run to above The Outlet (2), except for Brights Ditch (HUC 04100008-020-010)

Strategy	Description	Estimated load reduction (Avg.)	Timeline	Resources	Funding	Performance Indicator
Problem Statement 1.2 Goal 1	**Reduce nitrate-nitrite loading by 4800 lbs./year**					
Increase filter strips and riparian buffers	Program to increase sign-up for farm bill programs with additional incentives	4800 lbs./yr (N)	2012-2016	NRCS, EDF HSWCD, ODNR	CREP CRP EQIP Grants	Increase filter strip /riparian buffer drainage area by 800 acres/yr.
Increase Conservation Tillage/residue management	Program to increase sign-up for farm bill programs with additional incentives	50 lbs./yr (N)	2012-2016	NRCS HSWCD ODNR EDF	CREP CRP EQIP Grants	Increase conservation tillage/residue management by 50 acres/year
Increase cover crop usage	Program to increase sign-up for farm bill programs with additional incentives	50 lbs./yr (N)	2012-2016	NRCS, EDF HSWCD ODNR	CREP CRP EQIP Grants	Increase cover crop usage by 50 acres/year
Install Grass Waterways where needed	Program to increase sign-up for farm bill programs with additional incentives	25 lbs./yr (N)	2012-2016	NRCS, EDF HSWCD ODNR	CREP CRP EQIP	Install 500 linear feet/year.

Table 7.10 Problem Area 1: Strategies for Implementation of Restoration Activities for the Blanchard River below Potato Run to above The Outlet (2), except for Brights Ditch (HUC 04100008-020-010)

Strategy	Description	Estimated load reduction (Avg.)	Timeline	Resources	Funding	Performance Indicator
Problem Statement 1.2 Goal 2	**Reduce the nitrate-nitrite loading**					
Install a bioreactor to remove nitrate-nitrite	A bioreactor will be installed on a drainage system	Demonstration Project	2012-2016	HSWCD OSU landowner	grants	Chemical testing before and after
Install a drainage management system to control the flow from the tile	Drainage management system will regulate when water is released into the waterway	Demonstration Project	2012-2016	HSWCD EDF landowner	grants	Chemical testing before and after
Install Floating Wetlands	Floating wetlands will be placed in channel during spring-fall seasons	Demonstration Project	2012-2016	Floating Wetlands Contractor BRWP	grants	Chemical testing before and after
Soil Testing & Nutrient Manage-ment Plan	Soil testing will allow the proper amount of nitrogen be applied	N/A	2010-2016	HSWCD BRWP landowner	grants	Chemical testing before and after

Table 7.10 Problem Area 2: Strategies for Implementation of Restoration Activities for the Brights Ditch watershed; except for Stahls Ditch upstream of TR 199 (HUC 04100008-020-020)

Strategy	Description	Estimated load reduction (Avg.)	Timeline	Resources	Funding	Performance Indicator
Problem Statement 2.1 Goal 1	**Reduce field erosion by 1900 tons/year**					
Increase filters strips and riparian buffers	Program to increase sign-up for farm bill programs with additional incentives	1352 tons/yr (S)	2012-2016	NRCS, EDF, HSWCD, WSWCD, ODNR	CREP CRP EQIP Grants	Increase filter strip drainage area by 1200 acres/yr.
Increase Conservation Tillage/residue management	Program to increase sign-up for farm bill programs with additional incentives	0.25 tons/ac/yr (S)	2012-2016	NRCS HSWCD WSWCD ODNR EDF	CREP CRP EQIP Grants	Increase conservation tillage/residue management by 50 acres/year
Increase cover crop usage	Program to increase sign-up for farm bill programs with additional incentives	0.25 tons/ac/yr (S)	2012-2016	NRCS, EDF HSWCD WSWCD ODNR	CREP CRP EQIP Grants	Increase cover crop usage by 50 acres/year
Install Grass Waterways where needed	Program to increase sign-up for farm bill programs with additional incentives	0.125 tons/ac/yr (S)	2012-2016	NRCS, EDF HSWCD ODNR	CREP CRP EQIP	Install 250 linear feet/year.

Table 7.10 Problem Area 2: Strategies for Implementation of Restoration Activities for the Brights Ditch watershed; except for Stahls Ditch upstream of TR 199 (HUC 04100008-020-020)

Strategy	Description	Estimated load reduction (Avg.)	Timeline	Resources	Funding	Performance Indicator
Problem Statement 2.2 Goal 1	**Reduce Phosphorus by 2100 lbs./year**					
Increase filters strips and riparian buffers	Program to increase sign-up for farm bill programs with additional incentives	2100 lbs./yr (P)	2012-2016	NRCS, EDF, HSWCD, WSWCD, ODNR	CREP CRP EQIP Grants	Increase filter strip drainage area by 1200 acres/yr.
Increase Conservation Tillage/residue management	Program to increase sign-up for farm bill programs with additional incentives	100 lbs/yr (P)	2012-2016	NRCS HSWCD WSWCD ODNR EDF	CREP CRP EQIP Grants	Increase conservation tillage/residue management by 50 acres/year
Increase cover crop usage	Program to increase sign-up for farm bill programs with additional incentives	100 lbs/yr (P)	2012-2016	NRCS, EDF HSWCD WSWCD ODNR	CREP CRP EQIP Grants	Increase cover crop usage by 50 acres/year
Install Grass Waterways where needed	Program to increase sign-up for farm bill programs with additional incentives	44 lbs/yr (P)	2012-2016	NRCS, EDF HSWCD ODNR	CREP CRP EQIP	Install 250 linear feet/year.

Table 7.10 Problem Area 2: Strategies for Implementation of Restoration Activities for the Brights Ditch watershed, except for Stahls Ditch upstream of TR 199 (HUC 04100008-020-020)

Strategy	Description	Estimated load reduction (Avg.)	Timeline	Resources	Funding	Performance Indicator
Problem Statement 2.3 Goal 1	**Reduce nitrate-nitrite loading by 4200 lbs./year**					
Increase filter strips and riparian buffers	Program to increase sign-up for farm bill programs with additional incentives	4200 lbs./yr (N)	2012-2016	NRCS, EDF HSWCD, ODNR	CREP CRP EQIP Grants	Increase filter strip /riparian buffer drainage area by 800 acres/yr.
Increase Conservation Tillage/residue management	Program to increase sign-up for farm bill programs with additional incentives	50 lbs./yr (N)	2012-2016	NRCS HSWCD ODNR EDF	CREP CRP EQIP Grants	Increase conservation tillage/residue management by 50 acres/year
Increase cover crop usage	Program to increase sign-up for farm bill programs with additional incentives	50 lbs./yr (N)	2012-2016	NRCS, EDF HSWCD ODNR	CREP CRP EQIP Grants	Increase cover crop usage by 25 acres/year
Install Grass Waterways where needed	Program to increase sign-up for farm bill programs with additional incentives	25 lbs./yr (N)	2012-2016	NRCS, EDF HSWCD ODNR	CREP CRP EQIP	Install 250 linear feet/year.

Table 7.10 Problem Area 2: Strategies for Implementation of Restoration Activities for Stahl ditch located in the Brights Ditch watershed. (HUC 04100008-020-020)

Strategy	Description	Estimated load reduction (Avg.)	Timeline	Resources	Funding	Performance Indicator
Problem Statement 2.4 Goal 1	**Reduce field erosion by 900 tons/year**					
Increase filter strips and riparian buffers	Program to increase sign-up for farm bill programs with additional incentives	900 tons/yr (S)	2012-2016	NRCS, EDF, HSWCD, WSWCD, ODNR	CREP CRP EQIP Grants	Increase filter strip drainage area by 2250 acres/yr.
Increase Conservation Tillage/residue management	Program to increase sign-up for farm bill programs with additional incentives	0.25 tons/ac/yr (S)	2012-2016	NRCS HSWCD WSWCD ODNR EDF	CREP CRP EQIP Grants	Increase conservation tillage/residue management by 25 acres/year
Increase cover crop usage	Program to increase sign-up for farm bill programs with additional incentives	0.10 tons/ac/yr (S)	2012-2016	NRCS, EDF HSWCD WSWCD ODNR	CREP CRP EQIP Grants	Increase cover crop usage by 15 acres/year
Install Grass Waterways where needed	Program to increase sign-up for farm bill programs with additional incentives	0.125 tons/ac/yr (S)	2012-2016	NRCS, EDF HSWCD ODNR	CREP CRP EQIP	Install 1250 linear feet/year.

Table 7.10 Problem Area 2: Strategies for Implementation of Restoration Activities for Stahl ditch located in the Brights Ditch watershed. (HUC 04100008-020-020)

Strategy	Description	Estimated load reduction (Avg.)	Timeline	Resources	Funding	Performance Indicator
Problem Statement 2.5 Goal 1	**Reduce Phosphorus loading by 1050 lbs./year**					
Increase filter strips and riparian buffers	Program to increase sign-up for farm bill programs with additional incentives	550 lbs./yr (P)	2012-2016	NRCS, EDF, HSWCD, WSWCD, ODNR	CREP CRP EQIP Grants	Increase filter strip drainage area by 2250 acres/yr.
Increase Conservation Tillage/residue management	Program to increase sign-up for farm bill programs with additional incentives	50 lbs./yr (P)	2012-2016	NRCS HSWCD WSWCD ODNR EDF	CREP CRP EQIP Grants	Increase conservation tillage/residue management by 25 acres/year
Increase cover crop usage	Program to increase sign-up for farm bill programs with additional incentives	25 lbs./yr (P)	2012-2016	NRCS, EDF HSWCD WSWCD ODNR	CREP CRP EQIP Grants	Increase cover crop usage by 15 acres/year
Install Grass Waterways where needed	Program to increase sign-up for farm bill programs with additional incentives	40 lbs/yr (P)	2012-2016	NRCS, EDF HSWCD ODNR	CREP CRP EQIP	Install 1250 linear feet/year.

Table 7.10 Problem Area 2: Strategies for Implementation of Restoration Activities for Stahl ditch located in the Brights Ditch watershed. (HUC 04100008-020-020)

Strategy	Description	Estimated load reduction (avg.)	Timeline	Resources	Funding	Performance Indicator
Problem Statement 2.5 Goal 2	**Reduce/eliminate Phosphorus from HSTS**					
Inventory all existing HSTS in the problem area	The H/WBH estimates that has many as 50% of the HSTS are nonpermitted or 25 years old or older	N/A	2011-2016	HCBH, WCHD, WCE, HCE WCC, HCC	Grants 319 grant	Each time a system is replaced or a tank is pumped, the Health Depts. are notified.
Repair/replace all failing HSTS repaired/replaced	There are several HSTS are in need of being repair/replacement	16.4 lbs./HSTS/yr	2011-2016	HCBH, WCC, HCC, WCHD,	Grants 319 grants	Final tally
Provide educational materials on proper care/maintenance of HSTS	Homeowners will be provided information on how to care and maintain their HSTS	not applicable	on going	WCHD HCBH BRWP	local money grants	Final handouts

Table 7.10 Problem Area 2: Strategies for Implementation of Restoration Activities for Brights Ditch upstream of TR 97 HUC 0410008-020-020

Strategy	Description	Estimated load reduction (Avg.)	Timeline	Resources	Funding	Performance Indicator
Problem Statement 2.6 Goal 1	**Reduce the nitrate-nitrite loading**					
Install a bioreactor to remove nitrate-nitrite	A bioreactor will be installed on a drainage system	Demonstration Project	2012-2016	HSWCD OSU landowner	grants	Chemical testing before and after
Install a drainage management system to control the flow from the tile	Drainage management system will regulate when water is released into the waterway	Demonstration Project	2012-2016	HSWCD EDF landowner	grants	Chemical testing before and after
Install Floating Wetlands	Floating wetlands will be placed in channel during spring-fall seasons	Demonstration Project	2012-2016	Floating Wetlands Contractor BRWP	grants	Chemical testing before and after
Install a 10 acre wetland	Wetland will be placed so the ditch flows through the wetland	50% reduction	2012-2016	HSWCD EDF	CREP grants	Chemical testing before and after
Soil Testing & Nutrient Manage-ment Plan	Soil Testing will allow the proper amount of nitrogen be applied	N/A	2010-2016	HSWCD BRWP landowner	grants	Chemical testing before and after

Table 7.10 Problem Area 3: Strategies for Implementation of Restoration Activities for The Outlet (2) (HUC 04100008-020-030)

Strategy	Description	Estimated load reduction (Avg.)	Timeline	Resources	Funding	Performance Indicator
Problem Statement 3.1 Goal 1	**Reduce field erosion by 2500 tons/year**					
Increase filter strips and riparian buffers	Program to increase sign-up for farm bill programs with additional incentives	2500 tons/yr (S)	2012-2016	NRCS, EDF HSWCD, ODNR	CREP CRP EQIP Grants	Increase filter strip /riparian buffer drainage area by 2250 acres/yr.
Increase Conservation Tillage/residue management	Program to increase sign-up for farm bill programs with additional incentives	0.50 tons/ac/yr (S)	2012-2016	NRCS HSWCD ODNR EDF	CREP CRP EQIP Grants	Increase conservation tillage/residue management by 100 acres/year
Increase cover crop usage	Program to increase sign-up for farm bill programs with additional incentives	0.50 tons/ac/yr (S)	2012-2016	NRCS, EDF HSWCD ODNR	CREP CRP EQIP Grants	Increase cover crop usage by 100 acres/year
Increase Nutrient Management practices	Program to increase sign-up for farm bill programs with additional incentives	0.25 tons/ac/yr (S)	2012-2016	NRCS HSWCD ODNR EDF	CREP CRP EQIP	Increase Nutrient Management by 2 practices/yr.
Install Grass Waterways where needed	Program to increase sign-up for farm bill programs with additional incentives	0.75 tons/ac/yr (S)	2012-2016	NRCS, EDF HSWCD ODNR	CREP CRP EQIP	Install 1000 linear feet/year.

Table 7.10 Problem Area 3: Strategies for Implementation of Restoration Activities for the Blanchard River below Potato Run to above The Outlet (2), except for Brights Ditch (HUC 04100008-020-010)

Strategy	Description	Estimated load reduction (Avg.)	Timeline	Resources	Funding	Performance Indicator
Problem Statement 3.2 Goal 1	**Reduce nitrate-nitrite loading by 7800 lbs./year**					
Increase filter strips and riparian buffers	Program to increase sign-up for farm bill programs with additional incentives	7800 lbs./yr (N)	2012-2016	NRCS, EDF HSWCD, ODNR	CREP CRP EQIP Grants	Increase filter strip /riparian buffer drainage area by 1950 acres/yr.
Increase Conservation Tillage/residue management	Program to increase sign-up for farm bill programs with additional incentives	100 lbs./yr (N)	2012-2016	NRCS HSWCD ODNR EDF	CREP CRP EQIP Grants	Increase conservation tillage/residue management by 100 acres/year
Increase cover crop usage	Program to increase sign-up for farm bill programs with additional incentives	100 lbs./yr (N)	2012-2016	NRCS, EDF HSWCD ODNR	CREP CRP EQIP Grants	Increase cover crop usage by 100 acres/year
Install Grass Waterways where needed	Program to increase sign-up for farm bill programs with additional incentives	25 lbs./yr (N)	2012-2016	NRCS, EDF HSWCD ODNR	CREP CRP EQIP	Install 250 linear feet/year.

Table 7.10 Problem Area 3: Strategies for Implementation of Restoration Activities for Adrian Muck soil in The Outlet Watershed (HUC 0410008-020-030)

Strategy	Description	Estimated load reduction (Avg.)	Timeline	Resources	Funding	Performance Indicator
Problem Statement 3.3 Goal 1	**Reduce the nitrate-nitrite loading**					
Install a bioreactor to remove nitrate-nitrite	A bioreactor will be installed on a drainage system	Demonstration Project	2012-2016	HSWCD OSU landowner	grants	Chemical testing before and after
Install a drainage management system to control the flow from the tile	Drainage management system will regulate when water is released into the waterway	Demonstration Project	2012-2016	HSWCD EDF landowner	grants	Chemical testing before and after
Install Floating Wetlands	Floating wetlands will be placed in channel during spring-fall seasons	Demonstration Project	2012-2016	Floating Wetlands Contractor BRWP	grants	Chemical testing before and after
Install a 5 acre wetland	Wetland will be placed so the ditch flows through the wetland	50% reduction	2012-2016	HSWCD EDF	CREP grants	Chemical testing before and after
Soil Testing & Nutrient Management Plan	Soil Testing will allow the proper amount of nitrogen be applied	N/A	2010-2016	HSWCD BRWP landowner	grants	Chemical testing before and after

Table 7.10 Problem Area 4: Strategies for Implementation of Restoration Activities for the Blanchard River below The Outlet (2) to above Eagle Creek (HUC 04100008-020-040)

Strategy	Description	Estimated load reduction (Avg.)	Timeline	Resources	Funding	Performance Indicator
Problem Statement 4.1 Goal 1	**Reduce field erosion by 1000 tons/year**					
Increase filter strips and riparian buffers	Program to increase sign-up for farm bill programs with additional incentives	1000 tons/yr (S)	2012-2016	NRCS, EDF HSWCD, ODNR	CREP CRP EQIP Grants	Increase filter strip /riparian buffer drainage area by 625 acres/yr.
Increase Conservation Tillage/residue management	Program to increase sign-up for farm bill programs with additional incentives	0.25 tons/ac/yr (S)	2012-2016	NRCS HSWCD ODNR EDF	CREP CRP EQIP Grants	Increase conservation tillage/residue management by 25 acres/year
Increase cover crop usage	Program to increase sign-up for farm bill programs with additional incentives	0.25 tons/ac/yr (S)	2012-2016	NRCS, EDF HSWCD ODNR	CREP CRP EQIP Grants	Increase cover crop usage by 25 acres/year

Table 7.10 Problem Area 4: Strategies for Implementation of Restoration Activities for the Blanchard River below The Outlet (2) to above Eagle Creek (HUC 04100008-020-040)

Strategy	Description	Estimated load reduction (Avg.)	Timeline	Resources	Funding	Performance Indicator
Problem Statement 4.2 Goal 1	**Reduce nitrate-nitrite loading by 1000 tons/year**					
Increase filter strips and riparian buffers	Program to increase sign-up for farm bill programs with additional incentives	3200 lbs./yr (N)	2012-2016	NRCS, EDF HSWCD, ODNR	CREP CRP EQIP Grants	Increase filter strip /riparian buffer drainage area by 625 acres/yr.
Increase Conservation Tillage/residue management	Program to increase sign-up for farm bill programs with additional incentives	25 lbs./yr (N)	2012-2016	NRCS HSWCD ODNR EDF	CREP CRP EQIP Grants	Increase conservation tillage/residue management by 25 acres/year
Increase cover crop usage	Program to increase sign-up for farm bill programs with additional incentives	25 lbs./yr (N)	2012-2016	NRCS, EDF HSWCD ODNR	CREP CRP EQIP Grants	Increase cover crop usage by 25 acres/year
Install Grass Waterways where needed	Program to increase sign-up for farm bill programs with additional incentives	25 lbs./yr (N)	2012-2016	NRCS, EDF HSWCD ODNR	CREP CRP EQIP	Install 250 linear feet/year

Table 7.10 Problem Area 4: Riverside Dam Area at Riverside Park in Findlay (HUC 04100008-020-040)

Strategy	Description	Estimated load reduction (Avg.)	Timeline	Resources	Funding	Performance Indicator
Problem Statement 4.3 Goal 1	**Restore Aquatic Habitat & Recreational Use**					
Install surface aerators to increase oxygen to speed decomposition	Removal of organic sediments in Old Reservoir area	29,400 yd^3 of organic sediments	2012-2013	CF FCE Streamside Systems	local money grants	final product
Problem Statement 4.4 Goal 1	**Removal of bedload sediment from behind dam**					
Use a Pontoon-Mounted, Submersible Dredge Pump w/ separator	Removal of sediment island from behind dam	20,000 yd^3	2012-2013	CF FCE Contractor	local money grants	final product amount removed
Use a Pontoon-Mounted, Submersible Dredge Pump w/ separator	Removal of sediment island from behind dam	60,000 yd^3	2012-2013	CF FCE Contractor	local money grants	final product amount removed

Table 7.10 Problem Area 4: City of Findlay Water Intake Area located along TR 208 (HUC 04100008-020-040)

Strategy	Description	Estimated load reduction (Avg.)	Timeline	Resources	Funding	Performance Indicator
Problem Statement 4.5 Goal 1	**Removal of sediment and nutrient loading**					
Install a river-wide sediment collector upstream of the dam	A river-wide sediment collector will be installed	57,240 tons/yr (S) 117.5 tons/yr (P)	2012-2014	HCE, HCC, FCE, CF Contractor	local money grants	final product amount removed
Problem Area 5: The Outlet (2) Watershed (HUC 0410008-020-030)						
Problem Statement 5 Goal 1	**Reduce the nitrate-nitrite loading.**					
Install a bioreactor to remove nitrate-nitrite	A bioreactor will be installed on a drainage system	Demonstration Project	2012-2016	HSWCD OSU landowner	grants	Chemical testing before and after
Install a drainage management system to control the flow from the tile	Drainage management system will regulate when water is released into the waterway	Demonstration Project	2012-2016	HSWCD EDF landowner	grants	Chemical testing before and after
Install Floating Wetlands	Floating wetlands will be placed in channel during spring-fall seasons	Demonstration Project	2012-2016	Streamside Systems BRWP	grants	Chemical testing before and after

Table 7.10 Problem Area 5: Strategies for Implementation of Restoration Activities for the Lye Creek Watershed (HUC 04100008-020-050)

Strategy	Description	Estimated load reduction (Avg.)	Timeline	Resources	Funding	Performance Indicator
Problem Statement 5.2 Goal 1	**Reduce phosphorus loading by 1.5 tons/year**					
Increase filter strips and riparian buffers	Program to increase sign-up for farm bill programs with additional incentives	1.5 tons/yr (P)	2012-2016	NRCS, EDF HSWCD, ODNR	CREP CRP EQIP Grants	Increase filter strip /riparian buffer drainage area by 1450 acres/yr.
Increase Conservation Tillage/residue management	Program to increase sign-up for farm bill programs with additional incentives	200 lbs./yr (P)	2012-2016	NRCS HSWCD ODNR EDF	CREP CRP EQIP Grants	Increase conservation tillage/residue management by 50 acres/year
Increase cover crop usage	Program to increase sign-up for farm bill programs with additional incentives	200 lbs./yr (P)	2012-2016	NRCS, EDF HSWCD ODNR	CREP CRP EQIP Grants	Increase cover crop usage by 50 acres/year
Install Grass Waterways where needed	Program to increase sign-up for farm bill programs with additional incentives	100 lbs./yr (S)	2012-2016	NRCS, EDF HSWCD ODNR	CREP CRP EQIP	Install 1250 linear feet/year.
Increase Nutrient Management practices	Program to increase sign-up for farm bill programs with additional incentives	200 lbs./yr (S)	2012-2016	NRCS, EDF HSWCD ODNR	CREP CRP EQIP	Increase Nutrient Management by 2 practices/year

Table 7.10 Problem Area : Strategies for Implementation of Restoration Activities for Lye Creek Subwatershed (HUC 04100008-020-050)

Strategy	Description	Estimated load reduction (Avg.)	Timeline	Resources	Funding	Performance Indicator
Problem Statement 5.2 Goal 2	**Reduce/eliminate Phosphorus from HSTS**					
Inventory all existing HSTS in the problem area	The HCBH estimates that has many as 50% of the HSTS are nonpermitted 25 years old or older	not applicable	2012-2015	HCBH HCC HCE	Grants 319 grant	Each time a system is replaced or a tank is pumped, the HCBH is notified.
Install a Decentralized System in Houcktown area	Decentralized system is the preferred method to replace HSTS in Houcktown	not applicable	2012-2015	HCBH HCC HCE	Grants	Completion of project - discharge will be monitored
Replace/replace HSTS that are not a part of Houcktown	There are HSTS that are not close enough to be include in the area of Houcktown	not applicable	2012-2015	HCBH HCC HCE	Grants Landowner	Completion of project - discharge will be monitored
To provide educational materials to stakeholders	Educational materials on proper care and maintenance of HSTS	not applicable	2012-2015	HCBH BRWP	Grants	Final handouts

Table 7.10 Problem Area : Strategies for Implementation of Restoration Activities for Lye Creek Subwatershed (HUC 04100008-020-050)

Strategy	Description	Estimated load reduction (Avg.)	Timeline	Resources	Funding	Performance Indicator
Problem Statement 5.3 Goal 1	**Reduce/eliminate Pathogens from HSTS**					
Inventory all existing HSTS in the problem area	The HCBH estimates that has many as 50% of the HSTS are nonpermitted 25 years old or older	not applicable	2012-2015	HCBH HCC HCE	Grants 319 grant	Each time a system is replaced or a tank is pumped, the HCBH is notified.
Install a Decentralized System in Houcktown area	Decentralized system is the preferred method to replace HSTS in Houcktown	not applicable	2012-2015	HCBH HCC HCE	Grants	Completion of project - discharge will be monitored
Replace/replace HSTS that are not a part of Houcktown	There are HSTS that are not close enough to be include in the area of Houcktown	not applicable	2012-2015	HCBH HCC HCE	Grants Landowner	Completion of project - discharge will be monitored
To provide edu-cational materials to stakeholders	Educational materials on proper care and maintenance of HSTS	not applicable	2012-2015	HCBH BRWP	Grants	Final handouts

Table 7.10 Problem Area : Lye Creek Watershed (HUC 04100008-020-050)

Strategy	Description	Estimated load reduction (Avg.)	Timeline	Resources	Funding	Performance Indicator
Problem Statement 5.1Goal 1	**Restore aquatic habitat**					
Install a two-stage ditch	Two-stage ditch will create a trough that will give a year long aquatic habitat	Nutrient loading will be cut 50%	2012-2016	HSWCD EDF BRWP HCE FCE	Grants	QHEI will be done each year after project
Create/restore wetlands	Wetlands will be built or restored where applicable	not applicable	2012-2016	HSWCD EDF, FCE HCE	CREP Grants	QHEI will be done each year after project

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Chapter 8 Coastal Management Measures

Purpose

This chapter will present a review of the applicability of management measures specified in the Coastal Nonpoint Pollution Control Program and implementation strategies to address those measures within The Outlet/Lye Creek watershed. Many objectives address more than one management measure. To simplify this review process, only primary objectives are listed for each measure. A table at the end of this chapter identifies where overlap in the objective strategies exist.

Chapter Acknowledgements
This chapter was prepared using material from the *Old Woman Creek Action Plan with permission* and by the watershed coordinator and BRWP partners.

Coastal Nonpoint Pollution Control in TO/LC

As stated in Chapter 3, the Coastal Nonpoint Pollution Control Program (CNPCP) is a nonpoint source management program for restoring and protecting coastal waters from specific categories of nonpoint source pollution. The CNPCP is administered by the ODNR Division of Soil and Water Conservation. The Division requires that all Watershed Action Plans being developed for the Lake Erie watersheds under the Watershed Coordinator Grant Program are to include implementation strategies to address management measures identified within CNPCP.

The Outlet/Lye Creek watershed is a sub-basin of the Blanchard River watershed, which is a sub-basin of both the Maumee River basin and Lake Erie watershed. Thus, the land use and overall health of the watershed has a direct impact on the integrity of Lake Erie. Although The Outlet/Lye Creek watershed is mostly an agricultural watershed, there is an urbanized area near the mouth of Lye Creek as it travels through the southeastern portion of Findlay. There are also two small villages, Vanlue and Houcktown, in the watershed. Vanlue is on a lagoon treatment system while Houcktown is unsewered.

Applicable Management Measures

- New Development Watershed Protection
- Site Development
- Existing Development
- New Household Treatment Systems
- Operating Household Treatment Systems
- Planning, Siting, Developing Roads, Highways, and Bridges
- Bridges (Local Only)
- Roads, Highways, and Bridge Operation and Maintenance (excludes Inter and Intrastate)

- Roads, Highways, and Bridge Runoff Systems (excludes Inter and Intrastate)
- Operation and Maintenance Program for Existing Channels - Protect Surface Water and Restore In-Stream and Riparian Habitat
- Eroding Streambanks and Shorelines
- Dams - Protection of Surface Water Quality and In-Stream and Riparian Habitat

Non-Applicable Management Measures

- Roads, Highways, and Bridge Operation and Maintenance (Inter and Intrastate Only)
- Roads, Highways, and Bridge Runoff Systems (Inter and Intrastate only)

Inter and Intrastate highways and bridges maintained by the Ohio Department of Transportation (ODOT) are considered a Metropolitan Statistical Area (MSA) by the Ohio EPA and thus must comply with the NPDES Phase II program. All areas under Phase II permit are considered exempt from the CNPCP. Although these transportation corridors transect the watershed, they will not be addressed in this section. Information about ODOT's Stormwater Management Program can be accessed at http://www.dot.state.oh.us/stormwater/Pages/default.aspx.

New Development Management Measure

This management measure is intended to accomplish the following:

1. Decrease the erosive potential of increased runoff volumes and velocities associated with development-induced changes in hydrology.
2. Remove suspended solids and associated pollutants entrained in runoff that result from activities occurring during and after development.
3. Retain hydrological conditions to closely resemble those of the predisturbance condition.
4. Preserve natural systems including in-stream habitat.

Approximately 80% of the watershed is located in Hancock County. There is not a county-wide plan to address this area. The EPA does not require the county to have such a plan at the present time. However, as of March 10, 2003, the EPA mandated that if a project disturbs 1 or more acres of ground, a permit must be issued to discharge storm water from the site. Additional information on this mandate can be found at http://www.epa.ohio.gov/dsw/storm/construction_index.aspx#Background. The portion of the watershed that lies within the City of Findlay is under the storm water management plan for the city. Findlay is a Phase II MS4 community. Findlay submitted a Storm Water Management Plan to the EPA in 2010. Once the EPA approves the plan, Findlay will create a Storm Water Management Manual that addresses this issue in more detail. At this time, there is a storm water retention policy that requires post construction runoff must be equal to pre construction runoff.

Primary Objective

- The Blanchard River Watershed Partnership (BRWP) will pursue the development of a storm water management plan for the entire watershed as a part of the watershed management plan

Watershed Protection Management Measure

The purpose of this management measure is to reduce the generation of nonpoint source pollutants and to mitigate the impacts of urban runoff and associated pollutants that result from new development or redevelopment, including the construction of new and relocated roads, highways, and bridges. The measure is intended to provide general goals for states and local governments to use in developing comprehensive programs for guiding future development and land use activities in a manner that will prevent and mitigate the effects of nonpoint source pollution. This management measure will develop a watershed protection program to:

1. Avoid conversion, to the extent practicable, of areas that are particularly susceptible to erosion and sediment loss;
2. Preserve areas that provide important water quality benefits and/ or are necessary to maintain riparian and aquatic biota; and
3. Site development, including roads, highways, and bridges, to protect, to the extent practicable, the natural integrity of waterbodies and natural drainage systems.

To accomplish the goals of this measure, the partners of the BRWP will utilize several strategies to protect critical areas to maintain water quality in The Outlet/ Lye Creek watershed and work with local communities to guide development in a way that is ecologically and economically sustainable.

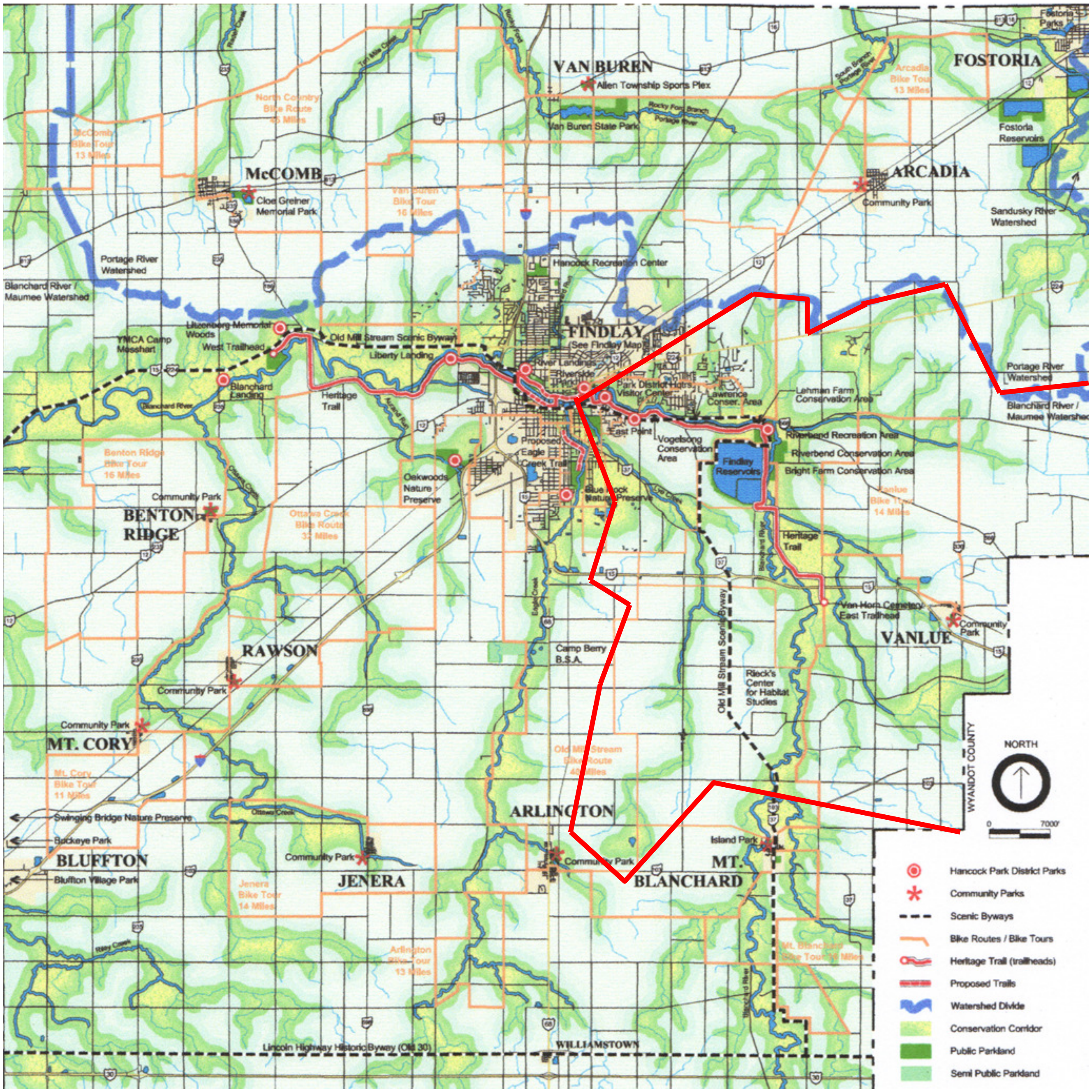
Riparian and Wetland Setbacks

At present there is no plan in Hancock County and only Marion, Amanda, and Jackson townships have zoning. The setbacks will be based on drainage area, with a NRCS recommended minimum size of 50 feet on upland landscapes and 150 to 300 feet on floodplain soils. The City of Findlay has completed a new zoning code that includes 25 foot setbacks on creeks and ditches and 75 feet setback along the Blanchard River.

Critical Area Protection

Priority areas of conservation have been identified in the Comprehensive Land Use Plan done by the City of Findlay and during the General Investigation Study done by the Northwest Ohio Flood Mitigation Partnership for the Army Corps of Engineers which specifically includes wetlands. (See Map 8.1 on the next page). The BRWP partners, including the Hancock Regional Planning Commission, the Hancock Park District, Hancock SWCD, and the BRWP will develop land conservation options which may include easements or acquisition of areas identified as critical to maintaining water quality in The Outlet/Lye Creek watershed.

Map 8.1 Hancock County Map showing Conservation Corridors



The Outlet/Lye Creek watershed in Hancock County is outlined in red on the map

Watershed-based Comprehensive Planning

The BRWP partners will assist in the creation of a comprehensive plan based on a watershed which will utilize the principles established in the Ohio Balanced Growth Program. The comprehensive plan will center future development on the existing resources of the watershed area which allow for preservation of both cultural and natural heritage unique to the watershed.

Primary Objectives

- Adoption of riparian and wetland setbacks
- Watershed-based comprehensive plan
- Land conservation through easements and land acquisition
- Develop a site development plan

Site Development

The goal of this management measure is to reduce the generation of nonpoint pollution and to mitigate the impacts of urban runoff and associated pollutants from all site development, including activities associated with roads, highways, and bridges. Management Measure II.C is intended to provide guidance for controlling nonpoint source pollution through the proper design and development of individual sites. This management measure differs from Management Measure II.A, which applies to post-development runoff, Management Measure II.C is intended to provide controls and policies that are to be applied during the site planning and review process. These controls and policies are necessary to ensure that development occurs so that nonpoint source concerns are incorporated during the site selection and the project design and review phases. While the goals of the Watershed Protection Management Measure (II.B) are similar to watershed basins or regional drainage basins plans, the goals of both the Site Development and Watershed Protection Management Measures are, however, intended to be complementary and the measures should be used within a comprehensive framework to reduce nonpoint source pollution.

Plan, design, and develop sites to:

1. Protect areas that provide important water quality benefits and/or are particularly susceptible to erosion and sediment loss;
2. Limit increases of impervious areas, except where necessary;
3. Limit land disturbance activities such as cleaning and grading, and cut and fill to reduce erosion and sediment loss; and
4. Limit disturbance of natural drainage features and vegetation.

As stated in the Hancock County Subdivision Rules and Regulations for storm water regulations for pre and post-construction storm water management plans, there are measures to maintain and improve water quality of developed sites where applicable. This document stresses preserving the use of natural hydrology in the storm water design, maintaining or improving hydrology as not to negatively impact the receiving waters, and utilizing structural and non-structural BMPs for reducing erosion and sedimentation that may result from the development. These regulations currently cover unincorporated areas of the county which include much of The Outlet/Lye Creek watershed. These regulations do not cover the areas of the watershed within the Village of Vanlue, Wyandot County, and Seneca County. Adoption of these regulations or similar documents by the unregulated communities would fully address this management measure within the watershed. This only applies to a subdivision plan and not an individual plan. The Hancock Regional Planning Commission is responsible for enforcement of Hancock County Subdivision Rules and Regulations for stormwater. More information can be found at http://www.hancockrpc.org/.

The new Zoning Code for the City of Findlay requires the use of landscape to break up impervious areas into smaller areas. The City of Findlay will incorporate pre and post construction Best Management Practices into future site development plans. The zoning code can be found at the following web site: http://www.ci.findlay.oh.us/?id=69.

Primary Objective

- Site plans review process to include environmental considerations (wetlands, riparian corridors, TMDL reports, etc.)
- Revisions to be based on the EPA-SP3 model

Existing Development Management

The purpose of this management measure is to protect or improve surface water quality by the development and implementation of watershed management programs that pursue the following objectives:

1. Reduce surface water runoff pollution loadings from areas where development has already occurred;
2. Limit surface water runoff volumes in order to minimize sediment loadings resulting from the erosion of streambanks and other natural conveyance systems; and
3. Preserve, enhance, or establish buffers that provide water quality benefits along waterbodies and their tributaries.

The City of Findlay currently has the highest amount of impervious surface in The Outlet/Lye Creek watershed. The Village of Vanlue and residential developed areas adjacent to Findlay in Marion Township have large areas of impervious surface. Installation of stormwater BMP retrofits within these areas would best concentrate efforts to reduce negative impacts affecting Lye Creek and the Blanchard River. Opportunities for such retrofits need to be identified within the area and implemented with the purpose of reducing potential run-off impacts and increasing individual stewardship of the creek.

In conjunction with reducing stormwater related impacts within the urbanized area of the watershed, the BRWP partners will seek out individual partnerships with local landowners to increase preservation and enhancement of the Blanchard River's natural corridor. Natural corridors provide many essential benefits to the integrity of the river: flood storage, pollutant assimilation, and habitat. To improve the natural corridor of the river, the BRWP seeks to promote a Riparian Buffer Restoration Program within the Blanchard River corridor of the watershed based on landowner interest.

Primary Objectives

- Identify opportunities and develop cost/benefit report for stormwater retrofits possible within the City of Findlay's portion of The Outlet/Lye Creek watershed, the Village of Vanlue, and the adjacent area to Findlay on the east side in Marion Township.
- Develop a Riparian Buffer Restoration Program

New On-Site Disposal Systems (OSDS)

The purpose of this management measure is to protect the Coastal Zone management area from pollutants discharged by OSDS. The measure requires that OSDS be sited, designed, and installed so that impacts to waterbodies will be reduced. Factors such as soil type, soil depth, depth to water table, rate of sea level rise, and topography must be considered in siting and installing a conventional OSDS.

1. Ensure that new Onsite Disposal Systems (OSDS) are located, designed, installed, operated, inspected, and maintained to prevent the discharge of pollutants to the surface of the ground and to the extent practicable reduce the discharge of pollutants into ground waters that are closely hydrologically connected to the surface waters. Where necessary to meet these objectives: (a) discourage the installation of garbage disposals to reduce hydraulic and nutrient loadings; and (b) where low volume plumbing fixtures have not been installed in new developments or redevelopments, reduce total hydraulic loadings to the OSDS by 25 percent. Implement OSDS inspection schedules for preconstruction, construction, and postconstruction.
2. Direct placement of OSDS away from unsuitable areas. Where OSDS placement in unsuitable areas is not practicable, ensure that the OSDS is designed or sited at a density so as not to adversely affect surface waters or ground water that is closely hydrologically connected to surface water. Unsuitable areas include, but are not limited to, areas with poorly or excessive drained soils; areas with shallow water tables or areas with high seasonal water tables; areas overlaying fractured bedrock that drain directly to ground water; areas with floodplains; or areas where nutrient and/or pathogen concentrations in the effluent cannot be sufficiently treated or reduced before the effluent reaches sensitive waterbodies.

3. Establish protective setbacks from surface waters, wetlands, and floodplains for conventional as well as alternative OSDS. The lateral setbacks should be based on soil type, slope, hydrologic factors, and type of OSDS. Where uniform protective setbacks cannot be achieved, site developments with OSDS so as not to adversely affect waterbodies and/or contribute to a public health nuisance.
4. Establish protective separation between OSDS system components and groundwater which is closely hydrologically connected to surface waters. The separation distances should be based on soil type, distance to ground water, hydrologic factors, and type of OSDS.
5. Where conditions indicate that nitrogen-limited surface waters may be adversely affected by excess nitrogen loadings from ground water, require the installation of OSDS that reduce nitrogen loadings by 50% to ground water that is closely hydrologically connected to surface water.

Currently the Hancock County Health Department follows more stringent rules for reviewing and approving the installation of new Home Sewage Treatment Systems (HSTS). For more information on the Hancock County Board of Health's Sewage Treatment and Disposal Rules go to: http://co.hancock.oh.us/bdhealth/uploads/Files/127/127_1.pdf.

The village of Houcktown is an older community with small lots located in Jackson township. Most, if not all, of the home septic systems are either more than 25 years old or nonpermitted. The lot size doesn't allow for on-site replacement of the home septic systems. A decentralized wastewater systems needs to be explored.

Primary Objectives

- Complete cost/benefit analysis for installing a decentralized wastewater treatment system for the village of Houcktown.
- Develop a wastewater treatment plan for the village of Houcktown

Operating On-Site Disposal Systems

The purpose of this management measure is to minimize pollutant loadings from operating OSDS. This management measure requires that OSDS be modified, operated, repaired, and maintained to reduce nutrient and pathogen loadings in order to protect and enhance surface waters. In the past, it has been common practice to site conventional OSDS in coastal areas that have inadequate separation distances to ground water, fractured bedrock, sandy soils, or other conditions that prevent or do not allow adequate treatment of OSDS-generated pollutants. Eutrophication in surface waters has also been attributed to the low nitrogen reductions provided by conventional OSDS designs.

Operating On-Site Disposal Systems cont.

1. Establish and implement policies and systems to ensure that existing OSDS are operated and maintained to prevent the discharge of pollutants to the surface of the ground and to the extent practicable reduce the discharge of pollutants into ground waters that are closely hydrologically connected to surface waters. Where necessary to meet these objectives, encourage the reduced use of garbage disposals, encourage the use of low-volume plumbing fixtures, and reduce total phosphorus loadings to the OSDS by 15 percent (if the use of low-level phosphate detergents has not been required or widely adopted by OSDS users). Establish and implement policies that require an OSDS to be repaired, replaced, or modified where the OSDS fails, threatens, or impairs surface waters.
2. Inspect OSDS at a frequency adequate to ascertain whether OSDS are failing.
3. Consider replacing or upgrading OSDS to treat effluent so that total nitrogen loadings in the effluent are reduced by 50 percent. This provision applies only:

    - where conditions indicate that nitrogen-limited surface waters may be adversely affected by significant ground water nitrogen loadings from OSDS, and
    - where nitrogen loadings from OSDS are delivered to ground water that is closely hydrologically connected to surface water.

The Hancock County Board of Health currently has the authority to initiate an Operations and Maintenance Program that requires residents to have a service contract for operating and maintaining their system properly. However, the HCBH does have a central digital database of existing systems in Hancock County that are permitted or have been pumped since 2004. Most inspection of presumed failing HSTS is by complaint. Creation of this database has streamlined the review process of maintenance and performance of existing systems and reduced costly source investigation. Completing the data base to include all systems is still a goal. For more information on the Hancock County Board of Health's Sewage Treatment and Disposal Rules go to: http://co.hancock.oh.us/bdhealth/uploads/Files/127/127_1.pdf.

Primary Objectives

- Complete central database of HSTS in The Outlet/Lye Creek watershed, which may include individual inspection and testing of all HSTS.
- Develop an education campaign for proper maintenance of HSTS and use of low-flow plumbing fixtures to reduce discharge of pollutants.

Planning, Siting, and Developing Roads and Highways (Local Only)

The best time to address control of NPS pollution from roads and highways is during the initial planning and design phase. New roads and highways should be located with consideration of natural drainage patterns and planned to avoid encroachment on surface waters and wet areas. Where this is not possible, appropriate controls will be needed to minimize the impacts of NPS runoff on surface waters.

Plan, site, and develop roads and highways to:

1. Protect areas that provide important water quality benefits or are particularly susceptible to erosion or sediment loss;
2. Limit land disturbance such as clearing, grading, cutting, and filling to reduce erosion and sediment loss; and
3. Limit disturbance of natural drainage features and vegetation.
4. Use BMPs during construction to minimize disturbance.

To address this issue, pollution prevention and habitat loss minimization should be performed in the form of proper stormwater regulations and zoning setbacks.

Bridges (Local Only)

This measure requires that NPS runoff impacts on surface waters from bridge decks be assessed and the appropriate management and treatment be employed to protect critical habitats, wetlands, fisheries, shellfish beds, and domestic water supplies. The siting of bridges should be a coordinated effort among the States, the FHWA, the U.S. Coast Guard, and the Army Corps of Engineers. Locating bridges in coastal areas can cause significant erosion and sedimentation, resulting in the loss of wetlands and riparian areas. Additionally, since bridge pavements are extensions of the connecting highway, runoff waters from the bridge decks also deliver loadings of heavy metals, hydrocarbons, toxic substances, and deicing chemicals to the surface waters as a result of discharge through scupper drains with no overland buffering. Bridge maintenance can also contribute heavy loads of lead, rust particles, paint, abrasives, solvents, and cleaners into surface waters. Protection against possible pollutant overloads can be afforded by minimizing the use of scuppers on bridges transversing very sensitive waters and conveying deck drainage to land for treatment. Whenever practical, bridge structures should be located to avoid crossing over sensitive fisheries and shellfish-harvesting areas to prevent washing polluted runoff through scuppers into the waters below. Also, bridge design should account for potential scour and erosion, which may affect shellfish beds and bottom sediments.

Site, design, and maintain bridge structures so that sensitive and valuable aquatic ecosystems and areas providing important water quality benefits are protected from adverse effects.

According to the Hancock County Engineers, there are 2 bridge projects occurring within the Hancock portion of The Outlet/Lye Creek watershed in the next 5 years. According to the Seneca County Engineers, there are no bridge projects occurring within the Seneca portion of The Outlet/Lye Creek watershed in the next 5 years. According to the Wyandot County Engineers, there are no bridge projects occurring within the Wyandot portion of The Outlet/Lye Creek watershed in the next 5 years.

Operation and Maintenance of Roads, Highways and Bridges

Incorporate pollution prevention procedures into the operation and maintenance of roads, highways, and bridges to reduce pollutant loadings to surface waters. Substantial amounts of eroded material and other pollutants can be generated by operation and maintenance procedures for roads, highways, and bridges, and from sparsely vegetated areas, cracked pavements, potholes, and poorly operating urban runoff control structures. This measure is intended to ensure that pollutant loadings from roads, highways, and bridges are minimized by the development and implementation of a program and associated practices to ensure that sediment and toxic substance loadings from operation and maintenance activities do not impair coastal surface waters. The program to be developed, using the practices described in this management measure, should consist of and identify standard operating procedures for nutrient and pesticide management, road salt use minimization, and maintenance guidelines (e.g., capture and contain paint chips and other particulates from bridge maintenance operations, resurfacing, and pothole repairs). Incorporate pollution prevention procedures into the operation and maintenance of roads, highways, and bridges to reduce pollutant loadings to surface waters.

Maintenance of transportation corridors within The Outlet/Lye Creek watershed is performed by either ODOT, the County, City of Findlay, or local townships. These agencies, particularly ODOT and County Engineers, must follow good housekeeping measures for reducing nonpoint pollution in relation to general maintenance of the roads as part of their NPDES permit obligations. The ODOT Storm Water Management Plan can be found at: http://www.dot.state.oh.us/stormwater/Pages/default.aspx.
To expand the best management measure of roadway maintenance to include township roads and county roads, the BRWP partners will assist the local townships and County Engineers in reviewing current operation standards and methods and provide suggestions for improving good housekeeping practices to reduce water pollution. The City of Findlay's Storm Water Management Plan addresses this issue. A link can be provided when the plan is endorsed by the EPA.

Primary Objectives

- Review current transportation corridor maintenance operation practices performed by local townships within the watershed.
- Investigate to see if there is a need for an Emergency Spill Response Plan for the entire watershed.

Runoff Systems for Roads, Highways, and Bridges

Develop and implement runoff management systems for existing roads, highways, and bridges to reduce runoff pollutant concentrations and volumes entering surface waters.

This measure requires that operation and maintenance systems include the development of retrofit projects, where needed, to collect NPS pollutant loadings from existing, reconstructed, and rehabilitated roads, highways, and bridges. Poorly designed or maintained roads and bridges can generate significant erosion and pollution loads containing heavy metals, hydrocarbons, sediment, and debris that threaten the quality of surface waters and their tributaries. In areas where such adverse impacts to surface waters can be attributed to adjacent roads or bridges, retrofit management projects to protect these waters may be needed (e.g., installation of structural or nonstructural pollution controls). Retrofit projects can be located in existing rights-of-way, within the interchange loops, or adjacent land areas. Areas with severe erosion and pollution runoff problems may require relocation or reconstruction to mitigate these impacts. Runoff management systems are a combination of nonstructural and structural practices selected to reduce nonpoint source loadings from roads, highways, and bridges. These systems are expected to include structural improvements to existing runoff control structures for water quality purposes; construction of new runoff control devices, where necessary to protect water quality; and scheduled operation and maintenance activities for these runoff control practices. Typical runoff controls for roads, highways, and bridges include vegetated filter strips, grassed swales, detention basins, constructed wetlands, and infiltration trenches.

1. Identify priority and watershed pollutant reduction opportunities (e.g., improvements to existing urban runoff control structures); and
2. Establish schedules for implementing appropriate controls.

Although most pollutant loading occurring in The Outlet/Lye Creek is the result of agricultural run-off, there are a few bridges were concentrated flows have eroded the streambank. The BRWP partners will categorize these areas where stormwater improvements will protect the bank and reduce sediment loading to the waterway and develop associated costs for implementing various control features.

Primary Objective

- Identify opportunities and develop cost/benefits analysis report for stormwater retrofits for inter/intrastate transportation infrastructure transecting the watershed for the purpose of reducing runoff related pollution

Channelization and Channel Modification (Physical and Chemical Characteristics of Surface Waters)

The purpose of this management measure is to ensure that the planning process for new hydromodification projects address changes to physical and chemical characteristics of surface waters that may occur as a result of the proposed work. Implementation of this management measure is intended to occur concurrently with the implementation of Management Measure B (In-stream and Riparian Habitat Restoration) of this section. For existing projects, the purpose of this management measure is to ensure that the operation and maintenance program uses any opportunities available to improve the physical and chemical characteristics of the surface waters. Changes created by channelization or channel modification activities are problematic if they unexpectedly alter environmental parameters to levels outside normal or desired ranges.

The physical and chemical characteristics of surface waters that may be influenced by channelization and channel modification include sediment turbidity, salinity, temperature, nutrients, dissolved oxygen, oxygen demand, and contaminants.

Implementation of this management measure in the planning process for new projects will require a two-pronged approach:

1. Evaluate, with numerical models for some situations, the types of NPS pollution related to in-stream changes and watershed development.
2. Address some types of NPS problems stemming from in-stream changes or watershed development with a combination of nonstructural and structural practices.

Channelization and Channel Modification (In-stream and Riparian Habitat Restoration)

The purpose of this management measure is to correct or prevent detrimental changes to in-stream and riparian habitat from the impacts of channelization and channel modification projects. Implementation of this management measure is intended to occur concurrently with the implementation of Management Measure A (Physical and Chemical Characteristics of Surface Water) of this section.

Contact between floodwaters and overbank soil and vegetation can be increased by a combination of setback levees and use of compound-channel designs. Levees set back away from the streambank (setback levees) can be constructed to allow for overbank flooding, which provides surface water contact to important streamside areas (including wetlands and riparian areas). Additionally, setback levees still function to protect adjacent property from flood damage. Compound-channel designs consist of an incised, narrow channel to carry surface water during low (base)-flow periods, a staged overbank area into which the flow can expand during design flow events, and an extended overbank area, sometimes with meanders, for high-flow events. Planting of the extended overbank with suitable vegetation completes the design.

Preservation of ecosystem benefits can be achieved by site-specific design to obtain predefined optimum or existing ranges of physical environmental conditions. Mathematical models can be used to assist in site-specific design. In -stream and riparian habitat alterations caused by secondary effects can be evaluated by the use of models and other decision aids in the design process of a channelization and channel modification activity. After using models to evaluate secondary effects, restoration programs can be established.

Primary Objective

- Enhance riparian habitat and wetland enhancement
- Establish Watershed Monitoring program
- Complete one demonstration project using natural design
- Work with flood mitigation efforts to ensure that levees and earthen mounds protect the water quality of the watershed

Eroding Streambanks and Shorelines
(Note: there are no shorelines in the watershed)

Several streambank and stabilization techniques will be effective in controlling streambank erosion wherever it is a source of nonpoint pollution. Techniques involving vegetative bank stabilization ("soil bioengineering") will usually be effective at sites with limited exposure to strong currents. In other cases, the use of engineering approaches may need to be considered. In addition to controlling those sources of sediment input to the surface waters which are causing NPS pollution, these techniques can halt the destruction of wetlands and riparian areas located along the river and tributaries. Once these features are protected, they can serve as a filter for surface water runoff from upland areas, or as a sink for nutrients, contaminants, or sediment already present as NPS pollution in surface waters.

As listed in Chapter 7, there are some areas in need of streambank stabilization. Changes in hydrologic patterns and channel morphology have subsequently altered a portion of the Blanchard River within the watershed. These alterations combined with higher gradient and highly erodible soils make stabilization of streambanks a priority project.

The BRWP will seek financial assistance to stabilize eroding banks by utilizing natural channel design. The use of natural channel design allows greater interface between water and vegetation which helps filter out pollutants and disperse high energy of peak flows as well as reduce streambank erosion. The work will be done under the guidance of the SWCDs and County Engineers.

Primary Objectives

- Establish Riparian Buffer Restoration Program
- Watertable management program to restore natural flow regimes in watershed
- To seek grant money to help with streambank restoration

Dams (Protection of Surface Water Quality and Instream and Riparian Habitat)

NOTE: The lowhead dams near the reservoirs and on TR 208 do not meet the height requirement. Handling of these dams will still be included.

The purpose of this management measure is to protect the quality of surface waters and aquatic habitat in reservoirs and in downstream portions of rivers and streams that are influenced by the quality of water contained in the releases (tailwaters) from reservoir impoundments. Impacts from the operation of dams to surface water quality and aquatic and riparian habitat should be assessed and the potential for improvement evaluated. Additionally, new upstream and downstream impacts to surface water quality and aquatic and riparian habitat caused by the implementation of practices should be considered in the assessment. The overall program approach is to evaluate a set of practices that can be applied individually or in combination to protect and improve surface water quality and aquatic habitat in reservoirs, as well as in areas downstream of dams. Then, the program should implement the most cost-effective operations to protect surface water quality and aquatic and riparian habitat and to improve water quality and riparian habitat where economically feasible.

There are three lowhead dams located in The Outlet/Lye Creek watershed. All three dams were constructed to serve as water intakes for the City of Findlay's reservoirs. The Riverside Park dam also creates a recreational area behind the dam. Since all three dams are lowhead constructed, they do not create "tailwater" flow from the reservoir. However, each dam does change the aquatic habitat and water quality both upstream and downstream of the dam.

Primary Objectives

- The dam just east of the City of Findlay's reservoirs will be studied to see if removal will improve the aquatic habitat and water quality.
- The dam on TR 208 that serves as the primary water intake for the City of Findlay's reservoirs will be studied, and a waiver sediment collector will be installed to improve the aquatic habitat of the upstream area and to improve the water quality being pumped into the reservoirs. See Problem Area 4 in Chapter 7.
- The sediment will be removed from behind the lowhead dam at Riverside Park in Findlay. See Problem Area 4 in Chapter 7 for the plan on how the aquatic habitat will be restored.

Table 8.1 Summary of implementation strategies associated with the Coastal Nonpoint Pollution Control Program Management Measures.

Strategies	Coastal Nonpoint Pollution Control Management Measure													Implementation			
	New Development	Watershed Protection	Site Development	Existing Development	New On-Site Disposal System	Operating On-Site Disposal System	Planning, Sitting, Developing Roads and Highways	Bridges (local only)	Operation and Maintenance of Roads, Highways, and Bridges	Runoff Systems for Roads, Highways, and Bridges	Channelization and Channel Modification (Physical and Chemical Characteristics of Surface Waters)	Channelization and Channel Modification (in-stream and Riparian Habitat	Dams	Timeline	Cost (estimates)	Reference WAP Chapter 7 & 9	Lead Agencies
Site plan reviews to include environmental considerations (wetlands, riparian corridors, TMDL reports, etc.)		X	X				X							2011 - ongoing	$ 10,000		HCE, WCE HCC, WCC TWPs FCE
Adoption of Riparian and Wetland Setback Regulations		X	X					X						2011 - 2013	$ 9,000		HCE, WCE HCC, WCC TWPs FCE
Comprehensive planning for the Blanchard River Watershed utilizing Balanced Growth Principles	X	X	X	X			X	X						2011 - 2015	$ 25,000		HRPC, HCC, FCE BRWP
Land conservation through easements and land acquisition utilizing areas outlined in the Hancock Regional Land Use Plan		X	X	X										Dependent on willing sellers	Site Specific		HSWCD WSWCD SSWCD HRPC
Identify opportunities and develop cost/benefit report for stormwater retrofits in applicable areas of The Outlet/Lye Creek watershed			X	X										2011 - 2015	$ 10,000		HCE, FCE

Table 8.1 Summary of implementation strategies associated with the Coastal Nonpoint Pollution Control Program Management Measures.

Strategies	Coastal Nonpoint Pollution Control Management Measure													Implementation			
	New Development	Watershed Protection	Site Development	Existing Development	New On-Site Disposal System	Operating On-Site Disposal System	Planning, Sitting, Developing Roads and Highways	Bridges (local only)	Operation and Maintenance of Roads, Highways, and Bridges	Runoff Systems for Roads, Highways, and Bridges	Channelization and Channel Modification (Physical and Chemical Characteristics of Surface Waters)	Channelization and Channel Modification (in-stream and Riparian Habitat	Dams	Timeline	Cost (estimates)	Reference WAP Chapter 7	Lead Agencies
Riparian Buffer Restoration Program				X							X	X		2012-2014	$ 80,000	X	HSWCD WSWCD
Complete cost/benefit analysis for installing a decentralized wastewater treatment system for the village of Houcktown					X	X								2011-2012	$ 5000.00	X	HCBH, HCC, HCE
Develop a wastewater treatment plan for the village of Houcktown					X	X								2011-2012	$ 5000.00	X	HCBH, HCE, HCC
Complete a central database of HSTS in The Outlet/Lye Creek watershed					X	X								2011 - 2014	$ 3000.00	X	HCBH, WCHD
Initiate Hancock Board of Health Operations and Management Program as defined in Chapter 29 15.1 of the Hancock County Sewage and Disposal Rules.					X	X								2011 - 2013	$ 2000.00		HCBH, HCC, HCE

Table 8.1 Summary of implementation strategies associated with the Coastal Nonpoint Pollution Control Program Management Measures.

Strategies	Coastal Nonpoint Pollution Control Management Measure													Implementation			
	New Development	Watershed Protection	Site Development	Existing Development	New On-Site Disposal System	Operating On-Site Disposal System	Planning, Sitting, Developing Roads and Highways	Bridges (local only)	Operation and Maintenance of Roads, Highways, and Bridges	Runoff Systems for Roads, Highways, and Bridges	Channelization and Channel Modification (Physical and Chemical Characteristics of Surface Waters)	Channelization and Channel Modification (in-stream and Riparian Habitat	Dams	Timeline	Cost (estimates)	Reference WAP Chapter 7	Lead Agencies
Develop an education campaign for proper maintenance of HSTS and use of low-flow plumbing fixtures to reduce discharge of pollutants					X	X								2011 - 2013	$ 2000.00		WCHD, HCBH, HCC, HCE
Review current transportation corridor maintenance operation practices performed by local townships within the watershed									X					2012	N/A		HCE, WCE, TWPs
Investigate to see if there is a need for an Emergency Spill Response Plan for the entire watershed									X	X				2012	N/A		EMA
Identify opportunities and develop cost/benefits analysis report for stormwater retrofits for inter/ intrastate transportation infrastructure transecting the watershed for the purpose of reducing run-off related pollution										X				2013-2014	$ 10,000-		ODOT HCE SCE WCE

Table 8.1 Summary of implementation strategies associated with the Coastal Nonpoint Pollution Control Program Management Measures.

Strategies	Coastal Nonpoint Pollution Control Management Measure														Implementation			
	New Development	Watershed Protection	Site Development	Existing Development	New On-Site Disposal System	Operating On-Site Disposal System	Planning, Sitting, Developing Roads and Highways	Bridges (local only)	Operation and Maintenance of Roads, Highways, and Bridges	Runoff Systems for Roads, Highways, and Bridges	Channelization and Channel Modification (Physical and Chemical Characteristics of Surface Waters)	Channelization and Channel Modification (in-stream and Riparian Habitat	Dams	Timeline	Cost (estimates)	Reference WAP Chapter 7	Lead Agencies
Riparian and wetland enhancement											X	X		2011-2016	$ 12,000	X	HSWCD WSWCD
Watershed Monitoring Program (Biological, Chemical, Physical parameters							X	X	X	X	X	X		2012-2016	$ 100,000	X	BRWP UNIV. of Findlay
Complete one demonstration project using natural design - two stage ditch											X	X		2011-2016	$ 50,000	X	HCE HSWCD BRWP
Work with flood mitigation efforts to ensure that levees and earthen mounds protect the water quality of the watershed		X									X	X		2012-2016	not applicable	X	HCE FCE BRWP
The area behind Riverside Dam will be cleaned to restore aquatic habitat to the area.		X											X	2012-2014	$ 500,000	X	FCE, Outside Contractor

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Chapter 9 Budget

Purpose

This chapter will address the budget for the implementation plan and the BRWP during the next five years. The budget will project the cost estimate of implementing the BMPs outlined in Chapter 7 and operating the BRWP.

Chapter Acknowledgements
This chapter was prepared using material from the *Old Women Creek Watershed Action Plan with permission* and by the watershed coordinator and BRWP partners.

The budget was calculated using static estimates for various implementation strategies identified in the previous chapter. As such, this budget does not reflect potential increases due to inflation. Agricultural BMP estimates are taken from SWCD previous projects, EDF consultant, NRCS unit cost projects, and other documented case studies.

The budget is represented in several ways including total budget for the BRWP, The Outlet/Lye Creek watershed action plan, and a more detailed breakdown of each implementation strategy's project cost. The cost projections for each strategy are grouped by each Problem Area and Statement. Problem Area 6 deals with the Storm Water Management Plan for the City of Findlay as it applies to The Outlet/Lye Creek Watershed. There is no budget for this area in this chapter. The cost of implementing the Storm Water Management Plan is the responsibility of the City of Findlay.

Table 9.1 BRWP Program Budget (5 year coordinator employment)

Category	Cost	Contingency 10%	Total Cost
Coordinator Salary	$250,000	$25,000	$275,000
BRWP Operations	100,000	10,000	$110,000
Total			**$385,000**

Picture 9.1 The BRWP Steering Committee at their 2011 Planning Meeting for the year. This active group will be responsible for implementing this WAP.

Martin

Table 9.2 TO/LC WAP Implementation Budget Summary

Table	Project Category Detail	Total Cost
	Problem Area 1 Blanchard River below Potato Run to above The Outlet (2), except Brights Ditch Watershed (HUC 04100008-020-010)	
Table 9.3	Problem Statement 1.1 & 1.2 Sediment and Nitrate-nitrite reduction	$351,463
Table 9.4	Problem Statement 1.2 Nitrogen reduction in the waterway	$428,906
	Total Cost for Problem Area 1	**$780,369**
	Problem Area 2 Brights Ditch Watershed (HUC 04100008-020-020)	
Table 9.5	Problem Statement 2.1, 2.2 & 2.3 Sediment, Phosphorus, and Nitrogen reduction	$444,523
Table 9.6	Problem Statement 2.4 Sediment reduction upstream of TR 199 Stahls Ditch	$354,103
Table 9.7	Problem Statement 2.5 Phosphorus reduction upstream of TR 199 Stahls Ditch	$359,686
Table 9.8	Problem Statement 2.5 Phosphorus reduction upstream of TR 199 Stahls Ditch	$481,370
Table 9.9	Problem Statement 2.6 Nitrate-nitrites upstream of TR 197 on Brights Ditch	$332,917
	Total Cost for Problem Area 2	**$1,972,599**
	Problem Area 3 The Outlet Watershed (HUC 04100008-020-030)	
Table 9.10	Problem Statement 3.1 & 3.2 Sediment and Nitrate-nitrite reduction	$507,597
Table 9.11	Problem Statement 3.3 Nitrate-nitrite reduction in the Adrian Muck soil	$717,697
	Total Cost for Problem Area 3	**$1,225,294**
	Problem Area 4 Blanchard River below The Outlet (2) to above Eagle Creek Watershed (HUC 04100008-020-040)	
Table 9.12	Problem Statement 4.1 & 4.2 Sediment and Nitrate-nitrite reduction	$347,613
Table 9.13	Problem Statement 4.3 Restore Aquatic Habitat at Riverside "Old Reservoir" Park	$97,566
Table 9.14	Problem Statement 4.4 Restore Aquatic Habitat behind Riverside Dam	$459,146
Table 9.15	Problem Statement 4.5 Remove sediment behind Water Intake Dam on TR 208	$95,920
	Total Cost for Problem Area 4	**$1,000,245**
	Lye Creek Watershed (HUC 04100008-020-050)	
Table 9.16	Problem Statement 5.1 & 5.2 Goal 1 Sediment & Phosphorus reduction	$395,205
Table 9.17	Problem Statement 5.2 Goal 2 &5.3 Phosphorus & Pathogens reduction from HSTS	$2,122,120
Table 9.18	Problem Statement 5.4 Restore Aquatic Habitat	$455,505
	Total Cost for Problem Area 5	**$2,972,830**
	Total Cost for all Problem Statements	**$7,951,337**

In addition to the Implementation Plan budget, the Blanchard River Watershed Partnership also will be conducting activities in four main areas during the next five years. These areas are: educational opportunities, planning and research strategies, volunteer programs, and land conservation strategies. Tables 9.19-9.22 on pages 9-12 and 9-13 show the estimated budget

Table 9.3 Problem Area 1: Strategies for Implementation of Restoration Activities for the Blanchard River below Potato Run to above The Outlet (2) except for Brights Ditch (HUC 04100008-020-010) 5-year budget

Problem Statement 1.1/1.2 Goal 1 Implementation Action	Contractor/ Technician	BMP Cost Unit	Unit	Project Size	Total BMP	Printing	Marketing/ Mailings	Travel	Subtotal	Contingency 10%	Total
1. Increase Filter Strips	$37,500	$240	acre	500	$120,000	$100	$400	$375	$158,375	$15,838	$174,213
2. Increase Riparian Buffers (Hardwood)	$37,500	$650	acre	50	$70,000	$50	$100	$125	$70,275	$7,028	$77,303
3. Increase Conservation Tillage/ Residue Management	$18,750	$10	acre	100	$1,000	$100	$500	$375	$20,725	$2,073	$22,798
4. Increase Cover Crop Usage	$18,750	$40	acre	50	$2,000	$100	$500	$375	$29,725	$2,973	$32,698
6. Grass Waterways	$2,000	$9,600	acre	4	$38,400	$0	$0	$10	$40,410	$4,041	$44,451
										Total	**$351,463**

Table 9.4 Problem Area 1: Strategies for Implementation of Restoration Activities for the Blanchard River below Potato Run to above The Outlet (2), except Brights Ditch (HUC 04100008-020-010) 5-year budget

Problem Statement 1.2 Goal 2 Implementation Action	Program Manager	Contractor	Printing	Marketing/ Mailings	Subtotal	Contingency 10%	Total
1. Installation of a bioreactor for 200 acres of drainage	$12,000	$20,000	$100	$100	$322,000	$3,220	$35,420
2. Installation of a Drainage Management system for 200 acres	$12,000	$121,463	$100	$100	$133,663	$13,366	$147,029
3. Installation of 100 sq. ft. of Floating Wetlands	$12,000	$17,000	$100	$100	$29,200	$2,920	$32,210
4. Installation of a 10 acre wetland	$37,500	$150,000	$100	$100	$187,700	$18,770	$206,470
5. Soil Testing/Develop Nutrient Management Plan	$5,000	$2,000	$50	$50	$7,070	$707	$7,777
						Total	**$428,906**

Table 9.5 Problem Area 2: Strategies for Implementation of Restoration Activities for Brights Ditch (HUC 04100008-020-020) 5-year budget

Problem Statement 2.1, 2.2 & 2.3 Implementation Action	Contractor/ Technician	BMP Cost Unit	Unit	Project Size	Total BMP	Printing	Market-ing/ Mailings	Travel	Subtotal	Contingency 10%	Total
1. Increase Filter Strips	$37,500	$240	acre	875	$210,000	$100	$400	$375	$248,375	$24,838	$273,213
2. Increase Riparian Buffers (Hardwood)	$37,500	$650	acre	50	$32,500	$50	$100	$125	$70,275	$7,028	$77,303
3. Increase Conservation Tillage/ Residue Management	$18,750	$10	acre	200	$2,000	$100	$500	$375	$21,725	$2,173	$23,898
4. Increase Cover Crop Usage	$18,750	$40	acre	100	$4,000	$100	$500	$375	$23,725	$2,373	$26,098
6. Grass Waterways	$2,000	$9,600	acre	4	$38,400	$0	$0	$10	$40,010	$4,001	$44,011
										Total	**$444,523**

Table 9.6 Problem Area 2: Strategies for Implementation of Restoration Activities for Stahl ditch located in the Brights Ditch watershed. (HUC 04100008-020-020) 5-year budget

Problem Statement 2.4 Goal 1 Implementation Action	Contractor/ Technician	BMP Cost Unit	Unit	Project Size	Total BMP	Printing	Marketing/ Mailings	Travel	Subtotal	Contingency -10%	Total
1. Increase Filter Strips	$37,500	$240	acre	350	$84,000	$100	$400	$375	$122,375	$12,238	$134,613
2. Increase Riparian Buffers (Hardwood)	$37,500	$650	acre	50	$32,500	$50	$100	$125	$70,275	$7,028	$77,303
3. Increase Conservation Tillage/ Residue Management	$18,750	$10	acre	100	$1,000	$100	$500	$375	$20,725	$20,173	$22,798
4. Increase Cover Crop Usage	$18,750	$40	acre	50	$2,000	$100	$500	$375	$29,725	$2,973	$32,698
5. Grass Waterways	$25,000	$9,600	acre	8	$76,800	$0	$0	$10	$78,810	$7,881	$86,691
										Total	**$354,103**

Table 9.7 Problem Area 2: Strategies for Implementation of Restoration Activities for Stahl ditch located in the Brights Ditch watershed. (HUC 04100008-020-020) 5-year budget

Problem Statement 2.5 Goal 1 Implementation Action	Contractor/ Technician	BMP Cost Unit	Unit	Project Size	Total BMP	Printing	Marketing/ Mailings	Travel	Subtotal	Contingency -10%	Total
1. Increase Filter Strips	$37,500	$240	acre	350	$84,000	$100	$400	$375	$122,375	$12,238	$134,613
2. Increase Riparian Buffers (Hardwood)	$37,500	$650	acre	50	$32,500	$50	$100	$125	$70,275	$7,028	$77,303
3. Increase Conservation Tillage/ Residue Management	$18,750	$10	acre	100	$1,000	$100	$500	$375	$20,725	$2,073	$22,798
4. Increase Cover Crop Usage	$18,750	$40	acre	50	$2,000	$100	$500	$375	$29,725	$2,973	$32,698
5. Grass Waterways	$2,000	$9,600	acre	8	$76,800	$0	$0	$10	$78,810	$7,881	$86,691
6. Increase Nutrient Management Practices	$2,500	$10	acre	200	$2,000	$100	$100	$375	$5,075	$508	$5,583
										Total	**$359,686**

Table 9.8 Problem Area 2: Strategies for Implementation Activities for Stahl ditch located in the Brights Ditch watershed. (HUC 04100008-020-020)

Problem Statement 2.5 Goal 2 Implementation Action	Program Manager	Contractor/ Consultant	Units	Replace/ Cost	Printing	Marketing/ Mailings	Subtotal	Contingency -10%	Total
1. Inventory all existing HSTS in the problem area	$5,000	$5,000	90		$3,000	$1,000	$14,000	$1,400	$15,400
2. Repair/replace all failing HSTS	$5,000	$10,000	45*	$450,000	$1,000	$1,000	$457,000	$4,570	$461,570
3. Educational materials on proper care/maintenance of HSTS	$2,000				$1,000	$1,000	$4,000	$400	$4,400
									$481,370

**estimated on 50% failure*

Table 9.9 Problem Area 2: Brights Ditch upstream of TR 197 (HUC 04100008-020-020) 5-year budget

Problem Statement 2.6 Goal 1 Implementation Action	Program Manager	Contractor	Printing	Marketing/ Mailings	Subtotal	Contingency 10%	Total
1. Installation of a bioreactor for 100 acres of drainage	$6,000	$15,000	$75	$75	$21,150	$2,115	$23,265
2. Installation of a Drainage Management system for 100 acres	$6,000	$12,000	$75	$75	$18,150	$1,815	$19,965
3. Installation of 500 sq. ft. of Floating Wetlands	$6,000	$62,432	$75	$75	$68,582	$6,858	$75,440
4. Installation of a 10 acre wetland	$37,500	$150,000	$100	$100	$187,700	$18,770	$206,470
5. Soil Testing/Develop Nutrient Management Plan	$5,000	$2,000	$50	$50	$7,070	$707	$7,777
						Total	**$332,917**

Table 9.10 Problem Area 3: Strategies for Implementation of Restoration Activities for The Outlet Watershed (HUC 04100008-020-030) 5-year budget

Problem Statement 3.1 & 3.2 Goal 1 Implementation Action	Contractor/ Technician	BMP Cost Unit	Unit	Project Size	Total BMP	Printing	Marketing/ Mailings	Travel	Subtotal	Contingency 10%	Total
1. Increase Filter Strips	$40,000	$240	acre	500	$120,000	$100	$400	$375	$160,875	$16,088	$176,963
2. Increase Riparian Buffers (Hardwood)	$45,000	$650	acre	100	$65,000	$50	$100	$125	$175,000	$17,528	$192,803
3. Increase Conservation Tillage/ Residue Management	$18,750	$10	acre	200	$2,000	$100	$500	$375	$21,725	$2,173	$23,898
4. Increase Cover Crop Usage	$18,750	$40	acre	100	$4,000	$100	$500	$375	$53,725	$2,373	$26,098
5. Grass Waterways	$3,000	$9,600	acre	8	$76,800	$0	$0	$10	$79,850	$7,985	$87,835
										Total	$507,597

Table 9.11 Problem Area 3 Strategies for Implementation of Restoration Activities for Adrian Muck soil area in The Outlet Watershed (HUC 04100008-020-030) 5-year budget

Problem Statement 3.3 Goal 1 Implementation Action	Program Manager	Contractor	Printing	Marketing/ Mailings	Subtotal	Contingency 10%	Total
1. Installation of a bioreactor for 400 acres of drainage	$12,000	$40,000	$200	$100	$52,300	$5,230	$57,520
2. Installation of a Drainage Management system for 400 acres	$12,000	$221,465	$200	$100	$222,965	$22,297	$468,227
3. Installation of 200 sq. ft. of Floating Wetlands	$20,000	$34,000	$200	$100	$54,300	$5,430	$59,730
4. Installation of a 5 acre wetland	$20,000	$100,000	$100	$100	$120,200	$12,020	$132,220
						Total	**$717,697**

Table 9.12 Problem Area 4: Strategies for Implementation of Restoration Activities for the Blanchard River above The Outlet (2) to below Eagle Creek (HUC 04100008-020-040

Problem Statement 4.1 & 4.2 Goal 1 Implementation Action	Contractor/ Technician	BMP Cost Unit	Unit	Project Size	Total BMP	Printing	Marketing/ Mailings	Travel	Subtotal	Contingency 10%	Total
1. Increase Filter Strips	$37,500	$240	acre	350	$84,000	$100	$400	$375	$122,375	$12,238	$134,613
2. Increase Riparian Buffers (Hardwood)	$37,500	$650	acre	100	$65,000	$50	$100	$125	$102,775	$10,278	$113,053
3. Increase Conservation Tillage/ Residue Management	$18,750	$10	acre	100	$1,000	$100	$500	$375	$20,725	$2,073	$22,798
4. Increase Cover Crop Usage	$18,750	$40	acre	50	$2,000	$100	$500	$375	$29,725	$2,973	$32,698
5. Grass Waterways	$2,000	$9,600	acre	4	$38,400	$0	$0	$10	$40,410	$4,041	$44,451
										Total	**$347,613**

Table 9.13 Problem Area 4: Strategies for Implementation of Restoration Activities for the Blanchard River below The Outlet (2) to above Eagle Creek at Riverside Park (HUC 04100008-020-040) 5-year budget

Problem Statement 4.3 Goal 1 Implementation Action	Program Manager	Contractor	Printing	Marketing/ Mailings	Subtotal	Contingency 10%	Total
1. Restore the aquatic habitat in the Old Reservoir	$4,000	$92,000	$500	$100	$96,600	$966	$97,566
						Total	**$97,566**

Table 9.14 Problem Area 4: Strategies for Implementation Activities for the Blanchard above The Outlet (2) to below Eagle Creek (HUC 04100008-020-040) 5-year budget

Problem Statement 4.4 Goal 1 Implementation Action	Program Manager	Contractor	Printing	Marketing/ Mailings	Subtotal	Contingency 10%	Total
Restoring the aquatic habitat behind the Riverside Dam	$4,000	$450,000	$500	$100	$454,600	$4,546	$459,146
						Total	**$459,146**

Table 9.15 Problem Area 4: Strategies for Restoration Activities for the Blanchard River above The Outlet (2) to below Eagle at Water Intake on TR 208 (HUC 04100008-020-040)

Problem Statement 4.5 Goal 1 Implementation Action	Program Manager	Contractor	Printing	Marketing/ Mailings	Subtotal	Contingency 10%	Total
Install river-wide sediment collector	$12,000	$75,000	$100	$100	$87,200	$8,720	$95,920
						Total	**$95,920**

Table 9.16 Problem Area 5: Strategies for Implementation of Restoration Activities for Lye Creek (HUC 04100008-020-050) (5 year budget)

Problem Statement 5.1 & 5.2 Goal 1 Implementation Action	Contractor/ Technician	BMP Cost Unit	Unit	Project Size	Total BMP	Printing	Marketing/ Mailings	Travel	Subtotal	Contingency 10%	Total
1. Increase Filter Strips	$37,500	$240	acre	400	$96,000	$100	$400	$375	$134,375	$13,438	$147,813
2. Increase Riparian Buffers (Hardwood)	$37,500	$650	acre	50	$70,000	$50	$100	$125	$70,275	$7,028	$77,303
3. Increase Conservation Tillage/ Residue Management	$18,750	$10	acre	250	$21,250	$100	$500	$375	$22,225	$2,223	$24,448
4. Increase Cover Crop Usage	$18,750	$40	acre	250	$28,750	$100	$500	$375	$29,725	$2,973	$32,698
5. Grass Waterways	$25,000	$9,600	acre	8	$76,800	$100	$400	$375	$102,675	$10,268	$112,943
										Total	**$395,205**

Table 9.17 Problem Area 5: Strategies for Implementation of Restoration Activities for Lye Creek (HUC 04100008-020-050) 5-year budget

Problem Statement 5.2 Goal 2 & 5.3 Goal 1 Implementation Action	Program Manager	Contractor/ Consultant	O & M	Printing	Marketing/ Mailings	Subtotal	Contingency 10%	Total
1. Inventory all existing HSTS in the problem area	$5,000	$5,000		$3,000	$1,000	$14,000	$1,400	$15,400
2. Install a Decentralized System in the Houcktown area	$60,000	$513,000	$93,300	$3,000	$1,500	$670,800	$67,080	$737,880
3. Repair/replace all failing HSTS outside of Houcktown	$40,000	$1,200,000*		$200	$200	$1,240,400	$ 124,040	$1,364,440
4. Educational materials on proper care/maintenance of HSTS	$2,000			$1,000	$1,000	$4,000	$400	$4,400
*estimated 80 HSTS							**Total**	**$2,122,120**

Table 9.18 Problem Area 5: Strategies for Implementation of Restoration Activities for Lye Creek (HUC 04100008-020-050) 5-year budget

Problem Statement 5.4 Goal 1 Implementation Action	Program Manager	BMP Cost Unit	Unit	Project Size	Total BMP	Printing	Marketing/ Mailings	Subtotal	Contingency -10%	Total
1. Install a two-stage ditch between the mouth and SR 15 where allowed	$37,550	$ 20/ln-ft.	linear ft	15,000	$300,000	$1,000	$1,000	$338,550	$33,855	$372,355
2. Create/restore wetlands where applicable	$37,500	$1,750	acre	20	$72,500	$2,000	$1,000	$75,500	$7,550	$83,050
									Total	**$455,505**

Table 9.19 Educational Opportunities (5-year Budget)

Opportunity Strategy	Program Manager	Consultant	Event Cost	Printing	Marketing/ Mailings	Events/Mailings Updates	Subtotal	Contingency 10%	Total
1. Newsletter	$800			$800	$500	20	$42,000	$4,200	$46,200
2. Website	$700	$500			$100	5	$6,500	$650	$7,150
3. BMP Tour	$2,800		$1,500	$200	$500	2	$10,000	$1,000	$11,000
4. Septic System Workshops	$1,400	$500	$100	$100	$250	2	$4,700	$470	$5,170
5. Public Information Meetings WAP	$400		$100	$200	$100	1	$800	$80	$880
6. State of Watershed Report	$600			$600	$500	5	$8,500	$850	$9,350
								Total	**$79,750**

Table 9.20 Planning and Research Strategies (5 year Budget)

Opportunity Strategy	Program Manager	Consultant	Printing	Marketing/ Mailings	Subtotal	Contingency 10%	Total
Comprehensive Planning	$5,000	$4,000	$250	$250	$9,500	$950	$10,450
WAP Revision	$12,000	$1,500	$1,500	$500	$15,500	$1,550	$17,050
GIS Mapping	$3,000	$2,000	$750		$5,750	$575	$6,325
Hazardous Spill Response Plan	$2,000	$3,000	$500	$250	$5,750	$575	$6,325
						Total	**$40,150**

Table 9.21 Volunteer Programs
(5 year Budget)

Opportunity Strategy	Program Manager	Printing	Marketing/ Mailings	Equip-Supplies	Miscellaneous	Number of Events	Subtotal	Contingency 10%	Total
Chemical Testing	$500	$50	$50	$2,000	$500	10	$31,000	$3,100	$34,100
Stream Clean-ups	$500	$50	$150	$100	$100	10	$9,000	$900	$9,900
Volunteer Monitoring	$500	$50	$100	$1,000	$500	10	$21,500	$2,150	$23,650
Restoration Activities	$500	$50	$100	$300	$100	5	$5,250	$525	$5,775
								Total	**$73,425**

Table 9.22 Land Conservation Strategies
(5 year budget)

Opportunity Strategy	Program Manager	Cost/Acre	Project Size	Total Acreage Cost	Printing	Marketing/ Mailings	Subtotal	Contingency 10%	Total
Riparian Corridor	$3,200	$4,500	200 ac.	$900,000	$500	$500	$904,200	$90,420	$994,620
								Total	**$994,620**

Chapter 10 Evaluation and Revision

Purpose

This chapter will outline of how the Implementation Plan will be evaluated and revised when needed.

Chapter Acknowledgements
This chapter was prepared using material from the *Old Women Creek Watershed Action Plan with permission* and by the watershed coordinator and BRWP partners.

The main objective of The Outlet/Lye Creek Watershed Action Plan is to improve the water quality and ecological integrity of the waterways that are not meeting attainment status as defined in the Ohio EPA's 2009 TMDL Report.

The BRWP partners recognize that accomplishment of these goals depends not only on use of conservation practices, such as BMPs, but also on the involvement and development of a sense of ownership among the people living in and near the watershed. Evaluation of this plan will address both water quality and community engagement.

Water Quality

The evaluation portion of this chapter outlines how the BRWP and its partners will evaluate how successfully the implementation plan outlined in Chapter 7 is being accomplished.

Chemical testing is being planned at nine sites. The nine sites correspond to the Problem Areas outlined in Chapter 7. Map 10.1 on page 10-3 shows the location of the sites for chemical testing. The chemical testing plan is being developed using input from the University of Findlay, Owens Community College, and the Ohio EPA. The testing will be used to form a baseline data level for each site. Additional test results will add to the baseline data and to give the level of improvement achieved after the BMPs proposed in the Implementation Plan are completed. Water Quality monitoring, by use of macroinvertebrate identification, will continue in the spring and fall of each year. Map 10.1 on page 10-3 shows the sites that are being monitoring in this watershed. Table 7.10 includes a column marked "Performance Indicator" that points how each strategy will be evaluated. A report of how much has been accomplished in implementing the Plan will be prepared annually for the stakeholders.

Community Engagement

The participation of the stakeholders is essential to the lasting success of water quality improvement projects. The BRWP plans to utilize its partners to continue the education and outreach efforts of watershed stewardship within the watershed. A summary of the BRWP's community engagement can be found in Table 10.1 on page 10-4.

Review and Revision

The BRWP will conduct an internal review of the plan strategies each year. This review will be conducted by the BRWP coordinator and the Board of Directors. Accomplishments and challenges will be discussed and the WAP timeline adjusted accordingly. After this annual review, a "State of the Watershed" report will be presented to The Outlet/Lye Creek watershed stakeholders and will be included in the next newsletter and posted on the web site. An update of the plan will be initiated by the Board of Directors after five years (2017), unless otherwise stated by the Board. This update will include input from residents, business owners, civic groups, public officials, and the Steering Committee of the Blanchard River Watershed Partnership.

Map 10.1 Chemical Testing & Macroinvertebrate Sites

Potential Chemical Testing Sites - The Outlet/Lye Creek Watershed

(TMDL target - phosphorus = 0.10 mg/L; nitrate-nitrite = 1.00 mg/L pg 71 TSD

Site 1: Brights Ditch @ TR 197 near Vanlue's Lagoon (nitrate-nitrite only)

Site 2: Corbin's (Brights Ditch) @ TR 244 just south of CR 205 (nitrate-nitrite only)

Site 3: Stahl Ditch @ TR 199 (phosphorus only)

Site 4: The Outlet @ CR 11 (nitrate-nitrite only)

Site 5: The Outlet @ CR 330 (nitrate-nitrite only)

Site 6: The Outlet @ SR 568 (nitrate-nitrite only)

Site 7: Lye Creek @ CR 26 (phosphorus only)

Site 8: Lye Creek @ SR 37 (phosphorus only)

Site 9: Blanchard River @ SR 37 (phosphorus only)

Water Quality (Macroinvertebrate) Monitoring Sites

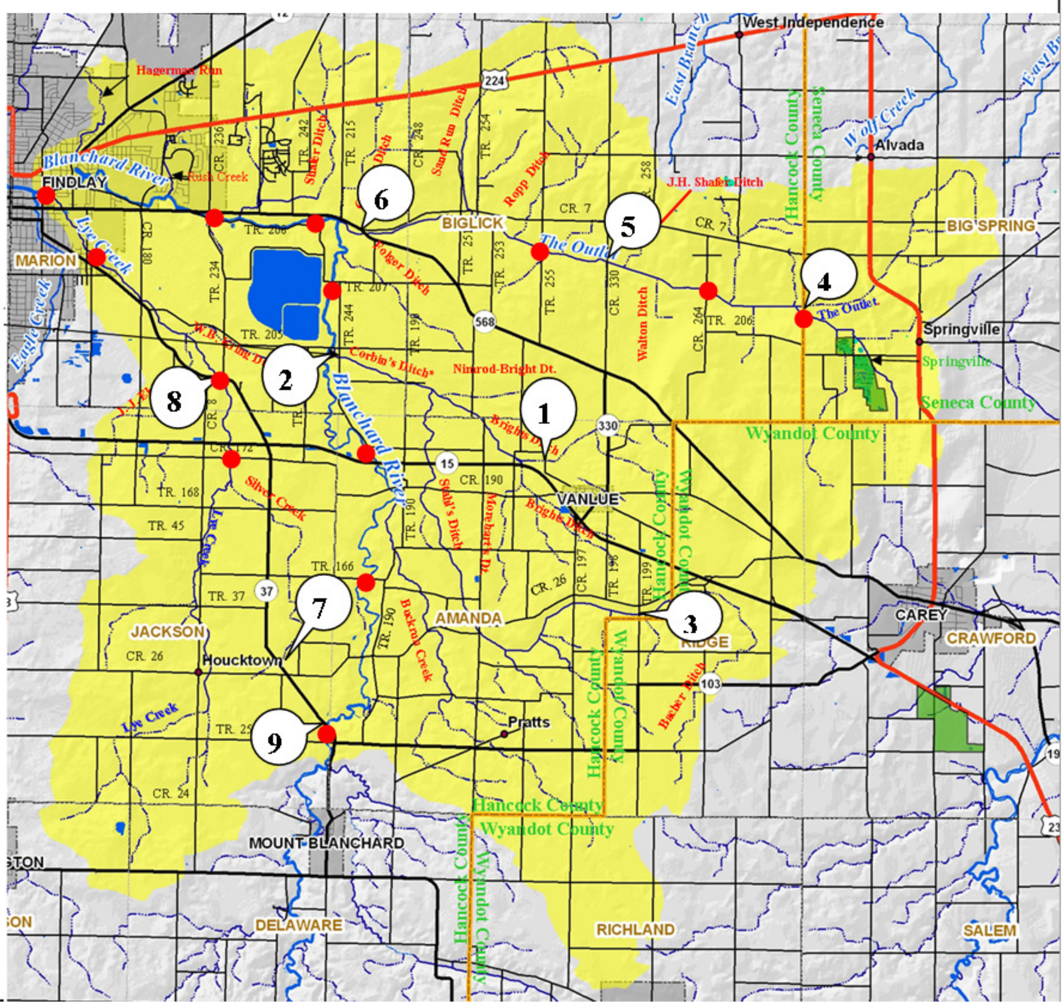

Table 10.1 Overview of Community Engagement Tools Utilized in 2009-2010

Engagement Tool	Opportunity Type	Mode of engagement	Benefits	Challenges
Website	Education/outreach	Indirect	Provide a source for detailed information	Internet is not a main tool for information in this local context
BRWP Times (newsletter)	Education/outreach	Indirect	Ability to educate, inform, highlight events, and accomplishments,	No guarantee it is read
County Fair Displays	Education/outreach	Indirect	Ability to educate, inform, highlight events, and accomplishments,	No guarantee it is read
Printed Materials - brochures, placemats, etc.	Education/outreach	Indirect	Ability to educate, inform, highlight events, and accomplishments,	No guarantee it is read
Technical subcommittees	Technical Advisory	Direct	Utilizes stakeholder knowledge and skills	Time commitment makes it difficult to recruit and retain
Annual Meeting	Education/outreach	Direct	Opportunity for public to hear and discussion issues	May not be well attended
Official Public Meetings	Education/outreach	Direct	Opportunity for public to hear and discussion issues	May not be well attended
Riley Creek Stakeholder Survey	Feedback	Direct	Allows for a broad range of questions	Volunteer participation required
Volunteer Opportunities	Education/Active Involvement	Direct	Data collection, clean-up, etc.	Requires commitment of time, may require training
Professional/Support Agencies	Technical Advisory & Grant Sources	Direct/ Indirect	Utilize professional knowledge & money	Working with professional agencies and having enough money to fund the budget

Appendix A

Coastal Nonpoint Pollution Control Management Plan - Ohio

August 2006

GUIDANCE FOR WATERSHED PROJECTS TO ADDRESS OHIO'S COASTAL NONPOINT POLLUTION CONTROL PROGRAM (CNPCP)

A brief history of the Coastal Nonpoint Pollution Control Program

In recognition of the intense pressures facing our nation's coastal regions, Congress enacted the Coastal Zone Management Act (CZMA) which was signed into law on October 27, 1972. To address more specifically the impact of nonpoint source pollution on coastal water quality, Congress enacted section 6217 of the Coastal Zone Act in November 1990. Section 6217 requires that each state with an approved coastal zone management program develop and submit for approval a Coastal Nonpoint Pollution Control Program(CNPCP) to the USEPA and the National Oceanic and Atmospheric Administration (NOAA). The purpose of the program "shall be to develop and implement management measures for nonpoint source pollution to restore and protect coastal waters, working in close conjunction with other State and local authorities."

To gain Federal approval, each state CNPCP must provide for the implementation, at a minimum, of management measures in conformance with those specified in the USEPA guidance published under subsection (g) of section 6217.

Status of Ohio's Coastal Nonpoint Pollution Control Program (CNPCP)

(November 24, 2003)

The Ohio CNPCP is administered by the ODNR Division of Soil and Water Conservation. Ohio received conditional approval of the CNPCP on June 4, 2002.

Year One Conditions

Ohio was provided one year to submit a legal opinion verifying that Ohio "has in place back-up authorities that can be used as enforceable policies and mechanisms in order to prevent nonpoint source based pollution and require management measure implementation." The legal opinion was developed by John Shailer, Assistant Attorney General - Environmental Enforcement Section/ODNR, and submitted by ODNR Office of Coastal Management to NOAA and USEPA June 4, 2003. The one-year conditions have been met.

Year Two Conditions

There are specific conditions that will need to be met for Ohio to receive final approval of its CNPCP. These conditions are organized by the major nonpoint source categories and subcategories. **These can be found on page 8 of the Appendix 8 update - outline of a watershed plan from "A guide to Developing Local Watershed Action Plans in Ohio."**

<u>NPS Management Measures that need addressed by Lake Erie Basin Watersheds</u>

This area includes the entire Lake Erie Watershed, which includes portions of 35 counties and covers an area of 11,649 square miles. **The major sub-watersheds, or streams within the Lake Erie watershed include the Maumee, Portage, Sandusky, Huron, Vermillion, Black, Rocky, Chagrin, Cuyahoga, Grand and Ashtabula.** Watershed plans within the Ohio Lake Erie Basin must (others are strongly encouraged) describe how the following **Management Measures** of the Ohio Coastal Nonpoint Pollution Control Program will be implemented within the specific watershed, if watershed inventory or sources and causes of impairment indicate applicability.

Management Measures (Defined)

Management measures are defined in section 6217 of the Coastal Zone Act Reauthorization Amendments of 1990 (CZARA) as economically achievable measures to control the addition of pollutants to our coastal waters, which reflect the greatest degree of pollutant reduction achievable through the application of the best available nonpoint pollution control practices, technologies, processes, siting criteria, operating methods, or other alternatives.

Management Practices (Defined)

In addition to specifying management measures, this chapter also lists and describes management practices for illustrative purposes only. While State programs are required to specify management measures in conformity with this guidance, State programs need not specify or require the implementation of the particular management practices described in this document. However, as a practical matter, EPA anticipates that the management measures generally will be implemented by applying one or more management practices appropriate to the source, location, and climate. The practices listed in this document have been found by EPA to be representative of the types of practices that can be applied successfully to achieve the management measures. EPA has also used some of these practices, or appropriate combinations of these practices, as a basis for estimating the effectiveness, costs, and economic impact of achieving the management measures. (Economic impact of the management measures are addressed in a separate document entitled *Economic Impacts of EPA Guidance Specifying Management Measures for Sources of Nonpoint Pollution in Coastal Waters*.)

EPA recognizes that there is often site-specific, regional, and national variability in the selection of appropriate practices, as well as in the design constraints and pollution control effectiveness of practices. The list of practices for each management measure is not all-inclusive and does not preclude States or local agencies from using other technically sound practices. In all cases, however, the practice or set of practices chosen by a State needs to achieve the management measure.

URBAN

New Development Management Measure - This management measure is intended to accomplish the following: (1) decrease the erosive potential of increased runoff volumes and velocities associated with development-induced changes in hydrology; (2) remove suspended solids and associated pollutants entrained in runoff that result from activities occurring during and after development; (3) retain hydrological conditions to closely resemble those of the predisturbance condition; and (4) preserve natural systems including in-stream habitat. For the purposes of this management measure, "similar" is defined as "resembling though not completely identical."

During the development process, both the existing landscape and hydrology can be significantly altered. As development occurs, the following changes to the land may occur (USEPA, 1977):

- Soil porosity decreases;
- Impermeable surfaces increase;
- Channels and conveyances are constructed;
- Slopes increase;
- Vegetative cover decreases; and
- Surface roughness decreases.

These changes result in increased runoff volume and velocities, which may lead to increased erosion of streambanks, steep slopes, and unvegetated areas (Novotny, 1991). In addition, destruction of in-stream and riparian habitat, increases in water temperature (Schueler et al., 1992), streambed scouring, and downstream siltation of streambed substrate, riparian areas, estuarine habitat, and reef systems may occur. An example of predicted effects of increased levels of urbanization on runoff volumes is presented in Table 4-4 (USDA-SCS, 1986). Methods are also available to compute peak runoff rates (USDA-SCS, 1986).

1. By design or performance:

- After construction has been completed and the site is permanently stabilized, reduce the average annual total suspended solid (TSS) loadings by 80 percent. For the purposes of this measure, an 80 percent TSS reduction is to be determined on an average annual basis, or
- Reduce the postdevelopment loadings of TSS so that the average annual TSS loadings are no greater than predevelopment loadings, and

2. To the extent practicable, maintain postdevelopment peak runoff rate and average volume at levels that are similar to predevelopment levels.

Sound watershed management requires that both structural and nonstructural measures be employed to mitigate the adverse impacts of storm water. Nonstructural Management Measures II.B and II.C can be effectively used in conjunction with Management Measure II.A to reduce both the short- and long-term costs of meeting the treatment goals of this management measure.

Applicability

This management measure is intended to be applied by States to control urban runoff and treat associated pollutants generated from new development, redevelopment, and new and relocated roads, highways, and bridges. Under the Coastal Zone Act Reauthorization Amendments of 1990, States are subject to a number of requirements as they develop coastal nonpoint source (NPS) programs in conformity with this management measure and will have flexibility in doing so. The application of management measures by States is described more fully in *Coastal Nonpoint Pollution Control Program: Program Development and Approval Guidance*, published jointly by the U.S. Environmental Protection Agency (EPA) and the National Oceanic and Atmospheric Administration (NOAA) of the U.S. Department of Commerce.

For design purposes, postdevelopment peak runoff rate and average volume should be based on the 2-year/24-hour storm. **Areas under Stormwater Phase II permit requirements are exempt.**
http://www.epa.gov/owow/nps/MMGI/Chapter4/ch4-2a.html

Watershed Protection Management Measure - The purpose of this management measure is to reduce the generation of nonpoint source pollutants and to mitigate the impacts of urban runoff and associated pollutants that result from new development or redevelopment, including the construction of new and relocated roads, highways, and bridges. The measure is intended to provide general goals for States and local governments to use in developing comprehensive programs for guiding future development and land use activities in a manner that will prevent and mitigate the effects of nonpoint source pollution.

A watershed is a geographic region where water drains into a particular receiving waterbody. As discussed in the introduction, comprehensive planning is an effective nonstructural tool available to control nonpoint source pollution. Where possible, growth should be directed toward areas where it can be sustained with a minimal impact on the natural environment (Meeks, 1990). Poorly planned growth and development have the potential to degrade and destroy entire natural drainage systems and surface waters (Mantel et al., 1990). Defined land use designations and zoning direct development away from areas where land disturbance activities or pollutant loadings from subsequent development would severely impact surface waters. Defined land use designations and zoning also protect environmentally sensitive areas such as riparian areas, wetlands, and vegetative buffers that serve as filters and trap sediments, nutrients, and chemical pollutants. Refer to Chapter 7 for a thorough description of the benefits of wetlands and vegetative buffers.

Areas such as streamside buffers and wetlands may also have the added benefit of providing long-term pollutant removal capabilities without the comparatively high costs usually associated with structural controls. Conservation or preservation of these areas is important to water quality protection. Land acquisition programs help to preserve areas critical to maintaining surface water quality. Buffer strips along streambanks provide protection for stream ecosystems and help to stabilize the stream and prevent streambank erosion (Holler, 1989). Buffer strips protect and maintain near-stream vegetation that attenuates the release of sediment into stream channels and prevent excessive loadings. Levels of suspended solids increase at a slower rate in stream channel sections with well-developed riparian vegetation (Holler, 1989).

The availability of infrastructure, specifically sewage treatment facilities, is also a factor in watershed planning. If centralized sewage treatment is not available, onsite disposal systems (OSDS) most likely will be used for sewage treatment. Because of potential ground-water and surface-water contamination from OSDS, density restrictions may be needed in areas where OSDS will be used for sewage treatment. Section VI of this chapter contains a more detailed discussion of siting densities for OSDS.

Develop a watershed protection program to:

1. Avoid conversion, to the extent practicable, of areas that are particularly susceptible to erosion and sediment loss;
2. Preserve areas that provide important water quality benefits and/or are necessary to maintain riparian and aquatic biota; and
3. Site development, including roads, highways, and bridges, to protect to the extent practicable the natural integrity of waterbodies and natural drainage systems.

Applicability

This management measure is intended to be applied by States to new development or redevelopment including construction of new and relocated roads, highways, and bridges that generate nonpoint source pollutants. Under the Coastal Zone Act Reauthorization Amendments of 1990, States are subject to a number of requirements as they develop coastal nonpoint source programs in conformity with this management measure and will have flexibility in doing so. The application of management measures by States is described more fully in *Coastal Nonpoint Pollution Control Program: Program Development and Approval Guidance*, published by the U.S. Environmental Protection Agency (EPA) and the National Oceanic and Atmospheric Administration (NOAA) of the U.S. Department of Commerce.
http://www.epa.gov/owow/nps/MMGI/Chapter4/ch4-2b.html
Site Development- The goal of this management measure is to reduce the generation of nonpoint source pollution and to mitigate the impacts of urban runoff and associated pollutants from all site development, including activities associated with roads, highways, and bridges. Management Measure II.C is intended to provide guidance for controlling nonpoint source pollution through the proper design and development of individual sites. This management measure differs from Management Measure II.A, which applies to postdevelopment runoff, in that Management Measure II.C is intended to provide controls and policies that are to be applied during the site planning and review process. These controls and policies are necessary to ensure that development

occurs so that nonpoint source concerns are incorporated during the site selection and the project design and review phases. While the goals of the Watershed Protection Management Measure (II.B) are similar, Management Measure II.C is intended to apply to individual sites rather than watershed basins or regional drainage basins. The goals of both the Site Development and Watershed Protection Management Measures are, however, intended to be complementary and the measures should be used within a comprehensive framework to reduce nonpoint source pollution.

Plan, design, and develop sites to:

1. Protect areas that provide important water quality benefits and/or are particularly susceptible to erosion and sediment loss;
2. Limit increases of impervious areas, except where necessary;
3. Limit land disturbance activities such as clearing and grading, and cut and fill to reduce erosion and sediment loss; and
4. Limit disturbance of natural drainage features and vegetation.

Applicability

This management measure is intended to be applied by States to all site development activities including those associated with roads, highways, and bridges. Under the Coastal Zone Act Reauthorization Amendments of 1990, States are subject to a number of requirements as they develop coastal NPS programs in conformity with this management measure and will have flexibility in doing so. The application of management measures by States is described more fully in *Coastal Nonpoint Pollution Control Program: Program Development and Approval Guidance*, published jointly by the U.S. Environmental Protection Agency (EPA) and the National Oceanic and Atmospheric Administration (NOAA) of the U.S. Department of Commerce. http://www.epa.gov/owow/nps/MMGI/Chapter4/ch4-2c.html

Existing Development Management- The purpose of this management measure is to protect or improve surface water quality by the development and implementation of watershed management programs that pursue the following objectives:

1. Reduce surface water runoff pollution loadings from areas where development has already occurred;
2. Limit surface water runoff volumes in order to minimize sediment loadings resulting from the erosion of streambanks and other natural conveyance systems; and
3. Preserve, enhance, or establish buffers that provide water quality benefits along waterbodies and their tributaries.

Maintenance of water quality becomes increasingly difficult as areas of impervious surface increase and urbanization occurs. For the purpose of this guidance, urbanized areas are those areas where the presence of "man-made" impervious surfaces results in increased peak runoff volumes and pollutant loadings that permanently alter one or more of the following: stream channels, natural drainageways, and in-stream and adjacent riparian habitat so that predevelopment aquatic flora and fauna are eliminated or reduced to unsustainable levels and predevelopment water quality has been degraded. Increased bank cutting, streambed scouring, siltation damaging to aquatic flora and fauna, increases in water temperature, decreases in dissolved oxygen, changes to the natural structure and flow of the stream or river, and the presence of anthropogenic pollutants that are not generated from agricultural activities, in general, are indications of urbanization.

The effects of urbanization have been well described in the introduction to this chapter. Protection of water quality in urbanized areas is difficult because of a range of factors. These factors include diverse pollutant loadings, large runoff volumes, limited areas suitable for surface water runoff treatment systems, high implementation costs associated with structural controls, and the destruction or absence of buffer zones that can filter pollutants and prevent the destabilization of streambanks and shorelines.

Comprehensive watershed planning facilitates integration of source reduction activities and treatment strategies to mitigate the effects of urban runoff. Through the use of watershed management, States and local governments can identify local water quality objectives and focus resources on control of specific pollutants and sources. Watershed plans typically incorporate a combination of nonstructural and structural practices.

An important nonstructural component of many watershed management plans is the identification and preservation of buffers and natural systems. These areas help to maintain and improve surface water quality by filtering and infiltrating urban runoff. In areas of existing development, natural buffers and conveyance systems may have been altered as urbanization occurred. Where possible and appropriate, additional impacts to these areas should be minimized and if degraded, the functions of these areas restored. The preservation, enhancement, or establishment of buffers along waterbodies is generally recommended throughout the section 6217 management area as an important tool for reducing NPS impacts. The establishment and protection of buffers, however, is most appropriate along surface waterbodies and their tributaries where water quality and the biological integrity of the waterbody is dependent on the presence of an adequate buffer/riparian area. Buffers may be necessary where the buffer/riparian area (1) reduces significant NPS pollutant loadings, (2) provides habitat necessary to maintain the biological integrity of the receiving water, and (3) reduces undesirable thermal impacts to the waterbody. For a discussion of protection and restoration of wetlands and riparian areas, refer to Chapter 7.

Institutional controls, such as permits, inspection, and operation and maintenance requirements are also essential components of a watershed management program. The effectiveness of many of the practices described in this chapter is dependent on administrative controls such as inspections. Without effective compliance mechanisms and operation and maintenance requirements, many of these practices will be ineffective.

Where existing development precludes the use of effective nonstructural controls, structural practices may be the only suitable option to decrease the NPS pollution loads generated from developed areas. In such situations, a watershed plan can be used to integrate the construction of new surface water runoff treatment structures and the retrofit of existing surface water runoff management systems.

Retrofitting is a process that involves the modification of existing surface water runoff control structures or surface water runoff conveyance systems, which were initially designed to control flooding, not to serve a water quality improvement function. By enlarging existing surface water runoff structures, changing the inflow and outflow characteristics of the device, and increasing detention times of the runoff, sediment and associated pollutants can be removed from the runoff. Retrofit of structural controls, however, is often the only feasible alternative for improving water quality in developed areas. Where the presence of existing development or financial constraints limits treatment options, targeting may be necessary to identify priority pollutants and select the most appropriate retrofits.

Once key pollutants have been identified, an achievable water quality target for the receiving water should be set to improve current levels based on an identified objective or to prevent degradation of current water quality. Extensive site evaluations should then be performed to assess the performance of existing surface water runoff management systems and to pinpoint low-cost structural changes or maintenance programs for improving pollutant-removal efficiency. Where flooding problems exist, water quality controls should be incorporated into the design of surface water runoff controls. Available land area is often limited in urban areas, and the lack of suitable areas will frequently restrict the use of conventional pond systems. In heavily urbanized areas, sand filters or water quality inlets with oil/grit separators may be appropriate for retrofits because they do not limit land usage.

Develop and implement watershed management programs to reduce runoff pollutant concentrations and volumes from existing development:

1. Identify priority local and/or regional watershed pollutant reduction opportunities, e.g., improvements to existing urban runoff control structures;
2. Contain a schedule for implementing appropriate controls;
3. Limit destruction of natural conveyance systems; and
4. Where appropriate, preserve, enhance, or establish buffers along surface waterbodies and their tributaries.

Applicability

This management measure is intended to be applied by States to all urban areas and existing development in order to reduce surface water runoff pollutant loadings from such areas. Under the Coastal Zone Act Reauthorization Amendments of 1990, States are subject to a number of requirements as they develop coastal NPS programs in conformity with this management measure and will have flexibility in doing so. The application of management measures by States is described more fully in *Coastal Nonpoint Pollution Control Program: Program Development and Approval Guidance*, published jointly by the U.S. Environmental Protection Agency (EPA) and the National Oceanic and Atmospheric Administration (NOAA). **Areas under Stormwater Phase II permit requirements are exempt.**
http://www.epa.gov/owow/nps/MMGI/Chapter4/ch4-4.html

New On-Site Disposal Systems - The purpose of this management measure is to protect the 6217 management area from pollutants discharged by Onsite Disposal Systems (OSDS). The measure requires that OSDS be sited, designed, and installed so that impact to waterbodies will be reduced, to the extent practicable. Factors such as soil type, soil depth, depth to water table, rate of sea level rise, and topography must be considered in siting and installing conventional OSDS.

1. Ensure that new Onsite Disposal Systems (OSDS) are located, designed, installed, operated, inspected, and maintained to prevent the discharge of pollutants to the surface of the ground and to the extent practicable reduce the discharge of pollutants into ground waters that are closely hydrologically connected to surface waters. Where necessary to meet these objectives: (a) discourage the installation of garbage disposals to reduce hydraulic and nutrient loadings; and (b) where low-volume plumbing fixtures have not been installed in new developments or redevelopments, reduce total hydraulic loadings to the OSDS by 25 percent. Implement OSDS inspection schedules for preconstruction, construction, and postconstruction.

2. Direct placement of OSDS away from unsuitable areas. Where OSDS placement in unsuitable areas is not practicable, ensure that the OSDS is designed or sited at a density so as not to adversely affect surface waters or ground water that is closely hydrologically connected to surface water. Unsuitable areas include, but are not limited to, areas with poorly or excessively drained soils; areas with shallow water tables or areas with high seasonal water tables; areas overlaying fractured bedrock that drain directly to ground water; areas within floodplains; or areas where nutrient and/or pathogen concentrations in the effluent cannot be sufficiently treated or reduced before the effluent reaches sensitive waterbodies.

3. Establish protective setbacks from surface waters, wetlands, and floodplains for conventional as well as alternative OSDS. The lateral setbacks should be based on soil type, slope, hydrologic factors, and type of OSDS. Where uniform protective setbacks cannot be achieved, site development with OSDS so as not to adversely affect waterbodies and/or contribute to a public health nuisance.

Establish protective separation distances between OSDS system components and

1. groundwater which is closely hydrologically connected to surface waters. The separation distances should be based on soil type, distance to ground water, hydrologic factors, and type of OSDS.

2. Where conditions indicate that nitrogen-limited surface waters may be adversely affected by excess nitrogen loadings from ground water, require the installation of OSDS that reduce total nitrogen loadings by 50 percent to ground water that is closely hydrologically connected to surface water.

Applicability

This management measure is intended to be applied by States to all new OSDS including package plants and small-scale or regional treatment facilities not covered by NPDES regulations in order to manage the siting, design, installation, and operation and maintenance of all such OSDS. Under the Coastal Zone Act Reauthorization Amendments of 1990, States are subject to a number of requirements as they develop coastal NPS programs in conformity with this management measure and will have flexibility in doing so. The application of this management measure by States is described more fully in *Coastal Nonpoint Pollution Control Program: Program Development and Approval Guidance*, published jointly by the U.S. Environmental Protection Agency (EPA) and the National Oceanic and Atmospheric Administration (NOAA) of the U.S. Department of Commerce. http://www.epa.gov/owow/nps/MMGI/Chapter4/ch4-2c.html

Operating On-Site Disposal Systems -The purpose of this management measure is to minimize pollutant loadings from operating OSDS. This management measure requires that OSDS be modified, operated, repaired, and maintained to reduce nutrient and pathogen loadings in order to protect and enhance surface waters. In the past, it has been a common practice to site conventional OSDS in coastal areas that have inadequate separation distances to ground water, fractured bedrock, sandy soils, or other conditions that prevent or do not allow adequate treatment of OSDS-generated pollutants. Eutrophication in surface waters has also been attributed to the low nitrogen reductions provided by conventional OSDS designs.

1. Establish and implement policies and systems to ensure that existing OSDS are operated and maintained to prevent the discharge of pollutants to the surface of the ground and to the extent practicable reduce the discharge of pollutants into ground waters that are closely hydrologically connected to surface waters. Where necessary to meet these objectives, encourage the reduced use of garbage disposals, encourage the use of low-volume plumbing fixtures, and reduce total phosphorus loadings to the OSDS by 15 percent (if the use of low-level phosphate detergents has not been required or widely adopted by OSDS users). Establish and implement policies that require an OSDS to be repaired, replaced, or modified where the OSDS fails, or threatens or impairs surface waters.

2. Inspect OSDS at a frequency adequate to ascertain whether OSDS are failing.

3. Consider replacing or upgrading OSDS to treat influent so that total nitrogen loadings in the effluent are reduced by 50 percent. This provision applies only:

- where conditions indicate that nitrogen-limited surface waters may be adversely affected by significant ground water nitrogen loadings from OSDS, and
- where nitrogen loadings from OSDS are delivered to ground water that is closely hydrologically connected to surface water.

Applicability

This management measure is intended to be applied by States to all operating OSDS. Under the Coastal Zone Act Reauthorization Amendments of 1990, States are subject to a number of requirements as they develop coastal NPS programs in conformity with this management measure and will have flexibility in doing so. The application of management measures by States is described more fully in *Coastal Nonpoint Pollution Control Program: Program Development and Approval Guidance*, published jointly by the U.S. Environmental Protection Agency (EPA) and the National Oceanic and Atmospheric Administration (NOAA) of the U.S. Department of Commerce. This management measure does not apply to existing conventional OSDS that meet all of the following criteria: (1) treat wastewater from a single family home; (2) are sited where OSDS density is less than or equal to one OSDS per 20 acres; and (3) the OSDS is sited at least 1,250 feet away from surface waters.
http://www.epa.gov/owow/nps/MMGI/Chapter4/ch4-5b.html

Planning, Siting and Developing Roads and Highways (Local Only) - The best time to address control of NPS pollution from roads and highways is during the initial planning and design phase. New roads and highways should be located with consideration of natural drainage patterns and planned to avoid encroachment on surface waters and wet areas. Where this is not possible, appropriate controls will be needed to minimize the impacts of NPS runoff on surface waters.

Plan, site, and develop roads and highways to:

1. Protect areas that provide important water quality benefits or are particularly susceptible to erosion or sediment loss;
2. Limit land disturbance such as clearing and grading and cut and fill to reduce erosion and sediment loss; and
3. Limit disturbance of natural drainage features and vegetation.

Applicability

This measure is intended to be applied by States to site development and land disturbing activities for new, relocated, and reconstructed (widened) roads (including residential streets) and highways in order to reduce the generation of nonpoint source pollutants and to mitigate the impacts of urban runoff and associated pollutants from such activities. Under the Coastal Zone Act Reauthorization Amendments of 1990, States are subject to a number of requirements as they develop coastal NPS programs in conformity with this management measure and will have some flexibility in doing so. The application of management measures by States is described more fully in *Coastal Nonpoint Pollution Control Program: Program Development and Approval Guidance*, published jointly by the U.S. Environmental Protection Agency (EPA) and the National

Oceanic and Atmospheric Administration (NOAA) of the U.S. Department of Commerce. http://www.epa.gov/owow/nps/MMGI/Chapter4/ch4-7a.html

Bridges (Local Only) - This measure requires that NPS runoff impact on surface waters from bridge decks be assessed and that appropriate management and treatment be employed to protect critical habitats, wetlands, fisheries, shellfish beds, and domestic water supplies. The siting of bridges should be a coordinated effort among the States, the FHWA, the U.S. Coast Guard, and the Army Corps of Engineers. Locating bridges in coastal areas can cause significant erosion and sedimentation, resulting in the loss of wetlands and riparian areas. Additionally, since bridge pavements are extensions of the connecting highway; runoff waters from bridge decks also deliver loadings of heavy metals, hydrocarbons, toxic substances, and deicing chemicals to surface waters as a result of discharge through scupper drains with no overland buffering. Bridge maintenance can also contribute heavy loads of lead, rust particles, paint, abrasive, solvents, and cleaners into surface waters. Protection against possible pollutant overloads can be afforded by minimizing the use of scuppers on bridges traversing very sensitive waters and conveying deck drainage to land for treatment. Whenever practical, bridge structures should be located to avoid crossing over sensitive fisheries and shellfish-harvesting areas to prevent washing polluted runoff through scuppers into the waters below. Also, bridge design should account for potential scour and erosion, which may affect shellfish beds and bottom sediments.

Site, design, and maintain bridge structures so that sensitive and valuable aquatic ecosystems and areas providing important water quality benefits are protected from adverse effects.

Applicability (Local Only)

This management measure is intended to be applied by States to new, relocated, and rehabilitated bridge structures in order to control erosion, streambed scouring, and surface runoff from such activities. Under the Coastal Zone Act Reauthorization Amendments of 1990, States are subject to a number of requirements as they develop coastal NPS programs in conformity with this management measure and will have some flexibility in doing so. The application of management measures by States is described more fully in Coastal Nonpoint Pollution Control Program: Program Development and Approval Guidance, published jointly by the U.S. Environmental Protection Agency (EPA) and the National Oceanic and Atmospheric Administration (NOAA) of the U.S. Department of Commerce. http://www.epa.gov/owow/nps/MMGI/Chapter4/ch4-7b.html

Operation and Maintenance of Roads, Highways and Bridges - Incorporate pollution prevention procedures into the operation and maintenance of roads, highways, and bridges to reduce pollutant loadings to surface waters.

Substantial amounts of eroded material and other pollutants can be generated by operation and maintenance procedures for roads, highways, and bridges, and from sparsely vegetated areas, cracked pavements, potholes, and poorly operating urban runoff control structures. This measure is intended to ensure that pollutant loadings from roads, highways, and bridges are minimized by the development and implementation of a program and associated practices to ensure that sediment and toxic substance loadings from operation and maintenance activities do not impair coastal surface waters. The program to be developed, using the practices described in this management measure, should consist of and identify standard operating procedures for nutrient and pesticide management, road salt use minimization, and maintenance guidelines (e.g., capture and contain paint chips and other particulates from bridge maintenance operations, resurfacing, and pothole repairs).

Incorporate pollution prevention procedures into the operation and maintenance of roads, highways, and bridges to reduce pollutant loadings to surface waters.

Applicability

This management measure is intended to be applied by States to existing, restored, and rehabilitated roads, highways, and bridges. Under the Coastal Zone Act Reauthorization Amendments of 1990, States are subject to a number of requirements as they develop coastal NPS programs in conformity with this management measures and will have some flexibility in doing so. The application of measures by States is described more fully in *Coastal Nonpoint Pollution Control Program: Program Development and Approval Guidance*, published jointly by the U.S. Environmental Protection Agency (EPA) and the National Oceanic and Atmospheric Administration (NOAA) of the U.S. Department of Commerce. **Areas under Stormwater Phase II permit requirements are exempt. http://www.epa.gov/owow/nps/MMGI/Chapter4/ch4-7e.html**

Runoff Systems for Roads, Highways, and Bridges - Develop and implement runoff management systems for existing roads, highways, and bridges to reduce runoff pollutant concentrations and volumes entering surface waters.

This measure requires that operation and maintenance systems include the development of retrofit projects, where needed, to collect NPS pollutant loadings from existing, reconstructed, and rehabilitated roads, highways, and bridges. Poorly designed or maintained roads and bridges can generate significant erosion and pollution loads containing heavy metals, hydrocarbons, sediment, and debris that run off into and threaten the quality of surface waters and their tributaries. In areas where such adverse impacts to surface waters can be attributed to adjacent roads or bridges, retrofit management projects to protect these waters may be needed (e.g., installation of structural or nonstructural pollution controls). Retrofit projects can be located in existing rights-of-way, within interchange loops, or on adjacent land areas. Areas with severe erosion and pollution runoff problems may require relocation or reconstruction to mitigate these impacts.

Runoff management systems are a combination of nonstructural and structural practices selected to reduce nonpoint source loadings from roads, highways, and bridges. These systems are expected to include structural improvements to existing runoff control structures for water quality purposes; construction of new runoff control devices, where necessary to protect water quality; and scheduled operation and maintenance activities for these runoff control practices. Typical runoff controls for roads, highways, and bridges include vegetated filter strips, grassed swales, detention basins, constructed wetlands, and infiltration trenches2. Establish schedules for implementing appropriate controls.

1. Identify priority and watershed pollutant reduction opportunities (e.g., improvements to existing urban runoff control structures; and
2. Establish schedules for implementing appropriate controls.

Applicability

This management measure is intended to be applied by States to existing, resurfaced, restored, and rehabilitated roads, highways, and bridges that contribute to adverse effects in surface waters. Under the Coastal Zone Act Reauthorization Amendments of 1990, States are subject to a number of requirements as they develop coastal NPS programs in conformity with this management measure and will have some flexibility in doing so. The application of management measures by States is described more fully in *Coastal Nonpoint Pollution Control Program: Program Development and Approval Guidance*, published jointly by the U.S. Environmental Protection Agency (EPA) and the National Oceanic and Atmospheric Administration (NOAA) of the U.S. Department of Commerce. **Areas under Stormwater Phase II permit requirements are exempt.** http://www.epa.gov/owow/nps/MMGI/Chapter4/ch4-7f.html

HYDROMODIFICATION

Channelization and Channel Modification

(Physical and Chemical Characteristics of Suface Waters) - The purpose of this management measure is to ensure that the planning process for new hydromodification projects addresses changes to physical and chemical characteristics of surface waters that may occur as a result of the proposed work. Implementation of this management measure is intended to occur concurrently with the implementation of Management Measure B (Instream and Riparian Habitat Restoration) of this section. For existing projects, the purpose of this management measure is to ensure that the operation and maintenance program uses any opportunities available to improve the physical and chemical characteristics of the surface waters. Changes created by channelization and channel modification activities are problematic if they unexpectedly alter environmental parameters to levels outside normal or desired ranges. The physical and chemical characteristics of surface waters that may be influenced by channelization and channel modification include sediment, turbidity, salinity, temperature, nutrients, dissolved oxygen, oxygen demand, and contaminants.

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1. Identify priority and watershed pollutant reduction opportunities (e.g., improvements to existing urban runoff control structures; and
2. Establish schedules for implementing appropriate controls.

Applicability

This management measure is intended to be applied by States to existing, resurfaced, restored, and rehabilitated roads, highways, and bridges that contribute to adverse effects in surface waters. Under the Coastal Zone Act Reauthorization Amendments of 1990, States are subject to a number of requirements as they develop coastal NPS programs in conformity with this management measure and will have some flexibility in doing so. The application of management measures by States is described more fully in *Coastal Nonpoint Pollution Control Program: Program Development and Approval Guidance*, published jointly by the U.S. Environmental Protection Agency (EPA) and the National Oceanic and Atmospheric Administration (NOAA) of the U.S. Department of Commerce. **Areas under Stormwater Phase II permit requirements are exempt.** http://www.epa.gov/owow/nps/MMGI/Chapter4/ch4-7f.html

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Implementation of this management measure in the planning process for new projects will require a two-pronged approach:

1. Evaluate, with numerical models for some situations, the types of NPS pollution related to instream changes and watershed development.

2. Address some types of NPS problems stemming from instream changes or watershed development with a combination of nonstructural and structural practices.

Applicability

This management measure is intended to be applied by States to public and private channelization and channel modification activities in order to prevent the degradation of physical and chemical characteristics of surface waters from such activities. This management measure applies to any proposed channelization or channel modification projects, including levees, to evaluate potential changes in surface water characteristics, as well as to existing modified channels that can be targeted for opportunities to improve the surface water characteristics necessary to support desired fish and wildlife. Under the Coastal Zone Act Reauthorization Amendments of 1990, States are subject to a number of requirements as they develop coastal NPS programs in conformity with management measures and will have some flexibility in doing so. The application of this management measure by States is described more fully in *Coastal Nonpoint Pollution Control Program: Program Development and Approval Guidance*, published jointly by the U.S. Environmental Protection Agency (EPA) and the National Oceanic and Atmospheric Administration (NOAA) of the U.S. Department of Commerce. http://www.epa.gov/owow/nps/MMGI/Chapter6/ch6-2a.html#Description

Channelization and Channel Modification

(Instream and Riparian Habitat Restoration) - The purpose of this management measure is to correct or prevent detrimental changes to instream and riparian habitat from the impacts of channelization and channel modification projects. Implementation of this management measure is intended to occur concurrently with the implementation of Management Measure A (Physical and Chemical Characteristics of Surface Waters) of this section.

Contact between floodwaters and overbank soil and vegetation can be increased by a combination of setback levees and use of compound-channel designs. Levees set back away from the streambank (setback levees) can be constructed to allow for overbank flooding, which provides surface water contact to important streamside areas (including wetlands and riparian areas). Additionally, setback levees still function to protect adjacent property from flood damage. Compound-channel designs consist of an incised, narrow channel to carry surface water during low (base)-flow periods, a staged overbank area into which the flow can expand during design flow events, and an extended overbank area, sometimes with meanders, for high-flow events. Planting of the extended overbank with suitable vegetation completes the design.

Preservation of ecosystem benefits can be achieved by site-specific design to obtain predefined optimum or existing ranges of physical environmental conditions.

Mathematical models can be used to assist in site-specific design. Instream and riparian habitat alterations caused by secondary effects can be evaluated by the use of models and other decision aids in the design process of a channelization and channel modification activity. After using models to evaluate secondary effects, restoration programs can be established.

Applicability

This management measure pertains to surface waters where channelization and channel modification have altered or have the potential to alter instream and riparian habitat such that historically present fish or wildlife are adversely affected. This management measure is intended to apply to any proposed channelization or channel modification project to determine changes in instream and riparian habitat and to existing modified channels to evaluate possible improvements to instream and riparian habitat. Under the Coastal Zone Act Reauthorization Amendments of 1990, States are subject to a number of requirements as they develop coastal NPS programs in conformity with management measures and will have some flexibility in doing so. The application of this management measure by States is described more fully in *Coastal Nonpoint Pollution Control Program: Program Development and Approval Guidance*, published jointly by the U.S. Environmental Protection Agency (EPA) and the National Oceanic and Atmospheric Administration (NOAA) of the U.S. Department of Commerce.

Dams

(Protection of Surface Water Quality and Instream and Riparian Habitat) - The purpose of this management measure is to protect the quality of surface waters and aquatic habitat in reservoirs and in the downstream portions of rivers and streams that are influenced by the quality of water contained in the releases (tailwaters) from reservoir impoundments. Impacts from the operation of dams to surface water quality and aquatic and riparian habitat should be assessed and the potential for improvement evaluated. Additionally, new upstream and downstream impacts to surface water quality and aquatic and riparian habitat caused by the implementation of practices should also be considered in the assessment. The overall program approach is to evaluate a set of practices that can be applied individually or in combination to protect and improve surface water quality and aquatic habitat in reservoirs, as well as in areas downstream of dams. Then, the program should implement the most cost-effective operations to protect surface water quality and aquatic and riparian habitat and to improve the water quality and aquatic and riparian habitat where economically feasible.

Applicability

This management measure is intended to be applied by States to dam operations that result in the loss of desirable surface water quality, and of desirable instream and riparian habitat. Dams are defined as constructed impoundments which are either:

- 25 feet or more in height *and* greater than 15 acre-feet in capacity, or
- 6 feet or more in height *and* greater than 50 acre-feet in capacity.

This measure does not apply to projects that fall under NPDES jurisdiction. This measure also does not apply to the extent that its implementation under State law is precluded under *California* v. *Federal Energy Regulatory Commission*, 110 S. Ct. 2024 (1990) (addressing the supersedence of State instream flow requirements by Federal flow requirements set forth in FERC licenses for hydroelectric power plants under the Federal Power Act). http://www.epa.gov/owow/nps/MMGI/Chapter6/ch6-3c.html

Eroding Streambanks and Shorelines - Several streambank and shoreline stabilization techniques will be effective in controlling coastal erosion wherever it is a source of nonpoint pollution. Techniques involving marsh creation and vegetative bank stabilization ("soil bioengineering") will usually be effective at sites with limited exposure to strong currents or wind-generated waves. In other cases, the use of engineering approaches, including beach nourishment or coastal structures, may need to be considered. In addition to controlling those sources of sediment input to surface waters which are causing NPS pollution, these techniques can halt the destruction of wetlands and riparian areas located along the shorelines of surface waters. Once these features are protected, they can serve as a filter for surface water runoff from upland areas, or as a sink for nutrients, contaminants, or sediment already present as NPS pollution in surface waters.

Applicability

This management measure is intended to be applied by States to eroding shorelines in coastal bays and to eroding streambanks in coastal rivers and creeks. The measure does not imply that all shoreline and streambank erosion must be controlled. Some amount of natural erosion is necessary to provide the sediment for beaches in estuaries and coastal bays, for point bars and channel deposits in rivers, and for substrate in tidal flats and wetlands. The measure, however, applies to eroding shorelines and streambanks that constitute an NPS problem in surface waters. It is not intended to hamper the efforts of any States or localities to retreat rather than to harden the shoreline. Under the Coastal Zone Act Reauthorization Amendments of 1990, States are subject to a number of requirements as they develop coastal NPS programs in conformity with this measure and will have some flexibility in doing so. The application of management measures by States is described more fully in *Coastal Nonpoint Pollution Control Program: Program Development and Approval Guidance*, published jointly by the U.S. Environmental Protection Agency (EPA) and the National Oceanic and Atmospheric Administration (NOAA) of the U.S. Department of Commerce. http://www.epa.gov/owow/nps/MMGI/Chapter6/ch6-4.html

ADDITIONAL INFORMATION ON OHIO'S COASTAL NONPOINT POLLUTION CONTROL PROGRAM:

http://www.dnr.state.oh.us/soilandwater/coastalnonpointprogram.htm

The website above is a link to the ODNR, Division of SWC's coastal program. The following information came from that site:

In order to address the unique nonpoint pollution concerns within the Lake Erie basin and to focus public resources on the most achievable solutions, the Ohio Department of

Natural Resources and the Ohio Environmental Protection Agency with funding from the National Oceanic and Atmospheric Administration (NOAA) developed the Ohio Coastal Nonpoint Pollution Control Program Plan. The plan was submitted to NOAA and the U.S. Environmental Protection Agency for comment in September 2000. We arrived at this important milestone thanks to the hard work of numerous individuals, organizations, and other Lake Erie stakeholders. With this achievement, we look confidently toward a successful future.

A copy of the Executive Summary is available for viewing or downloading by clicking on the link below:

Executive Summary (in Acrobat Reader 4.0* format) <docs/CNPCPexecsumm.pdf>

http://www.dnr.state.oh.us/soilandwater/docs/CNPCPexecsumm.pdf

Executive Summary (Microsoft Word format or text only) <docs/ExecutiveSummaryText.doc>

http://www.dnr.state.oh.us/soilandwater/docs/ExecutiveSummaryText.doc

You can also view or download the complete program plan in Acrobat Reader 4.0* format by clicking on the link below:

Coastal Nonpoint Pollution Control Program Plan (36.4 mb) <docs/FinalCNPCP.pdf>

http://www.dnr.state.oh.us/soilandwater/docs/FinalCNPCP.pdf

Or, download or view a specific chapter by clicking on the corresponding link below:

Chapter 1 (Introduction and Program Summary) <docs/Chapter%2001.pdf>

http://www.dnr.state.oh.us/soilandwater/docs/Chapter%2001.pdf

Chapter 2 (General Program Overview) <docs/Chapter%2002.pdf>

http://www.dnr.state.oh.us/soilandwater/docs/Chapter%2002.pdf

Chapter 3 (Management Measures for Agricultural Sources) <docs/Chapter%2003.pdf>

http://www.dnr.state.oh.us/soilandwater/docs/Chapter%2003.pdf

Chapter 4 (Management for Forestry:Request for Exclusion for Forestry) <docs/Chapter%2004.pdf>

http://www.dnr.state.oh.us/soilandwater/docs/Chapter%2004.pdf

Chapter 5 (Management Measures for Urban Areas) <docs/Chapter%2005.pdf>

http://www.dnr.state.oh.us/soilandwater/docs/Chapter%2005.pdf

Chapter 6 (Management Measures for Marinas and Recreational Boating) <docs/ Chapter%2006.pdf>

http://www.dnr.state.oh.us/soilandwater/docs/Chapter%2006.pdf

Chapter 7 (Management Measures for Hydromodification) <docs/Chapter%2007.pdf>

http://www.dnr.state.oh.us/soilandwater/docs/Chapter%2007.pdf

Chapter 8 (Management Measures for Wetlands and Riparian Areas) <docs/Chapter% 2008.pdf>

http://www.dnr.state.oh.us/soilandwater/docs/Chapter%2008.pdf

Chapter 9 (Additional Management Measures for Critical Coastal Areas and Impaired or Threatened Areas) <docs/Chapter%2009.pdf>

http://www.dnr.state.oh.us/soilandwater/docs/Chapter%2009.pdf

Chapter 10 (Developing Sustainable Watershed Protection Programs) <docs/Chapter% 2010.pdf>

http://www.dnr.state.oh.us/soilandwater/docs/Chapter%2010.pdf

Chapter 11 (Water Quality Monitoring and Tracking Techniques) <docs/Chapter% 2011.pdf>

http://www.dnr.state.oh.us/soilandwater/docs/Chapter%2011.pdf

Chapter 12 (Conclusions) <docs/Chapter%2012.pdf>

http://www.dnr.state.oh.us/soilandwater/docs/Chapter%2012.pdf

Chapter 13 (References and Bibliography) <docs/Chapter%2013.pdf>

http://www.dnr.state.oh.us/soilandwater/docs/Chapter%2013.pdf

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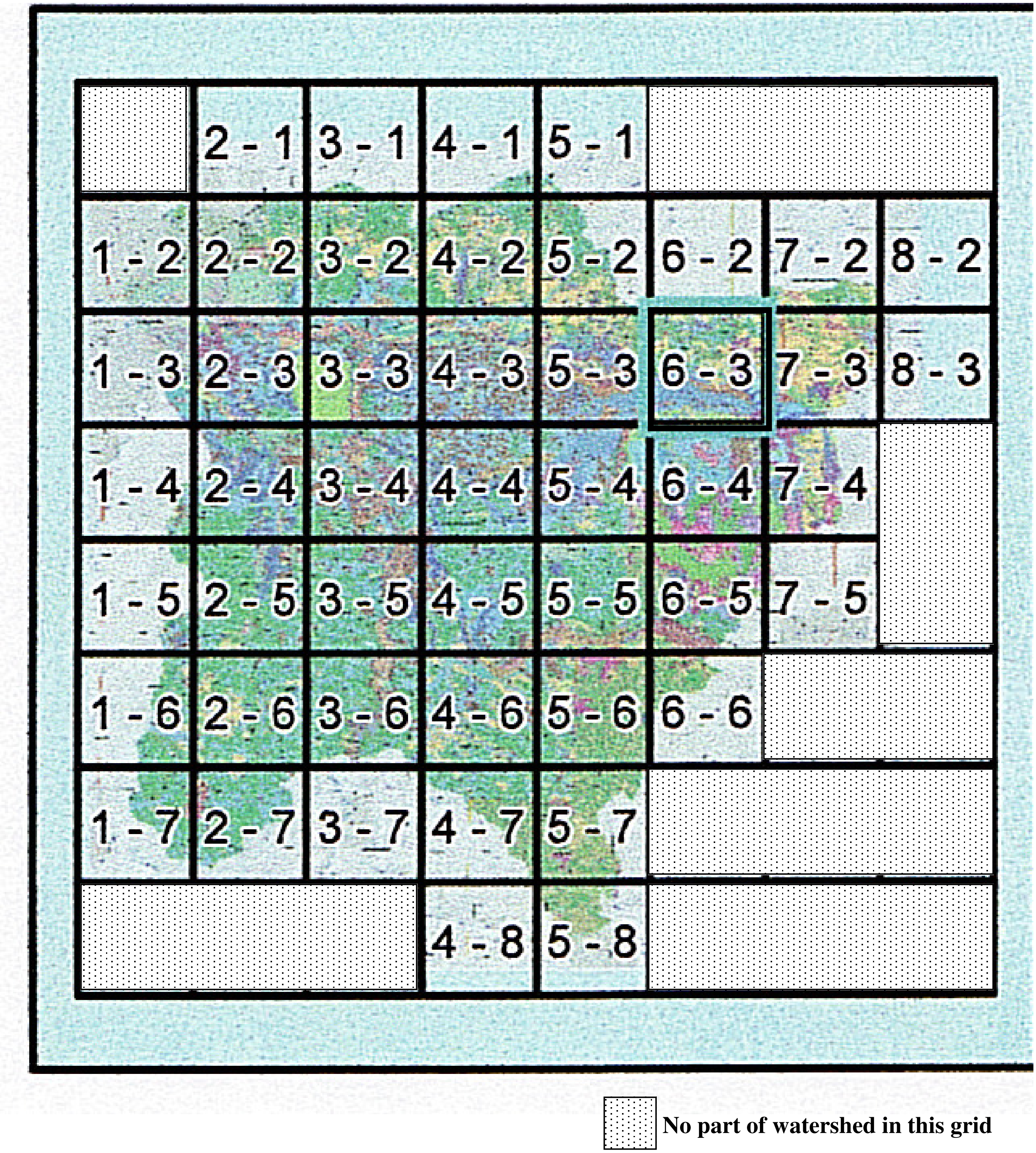
105 West Shoreline Drive
Sandusky, Ohio 44870
(419) 609-4102 phone
(419) 609-4158 fax

The Outlet/Lye Creek Watershed Soils
Map Grid



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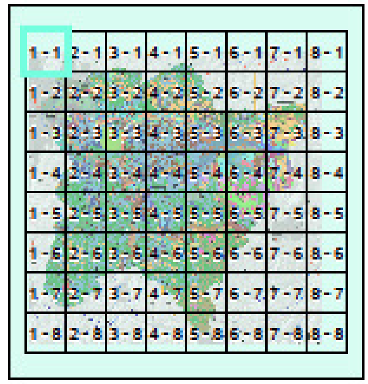
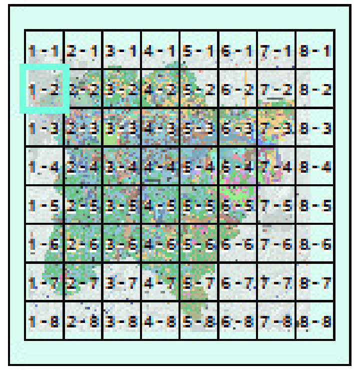
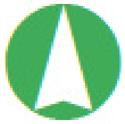
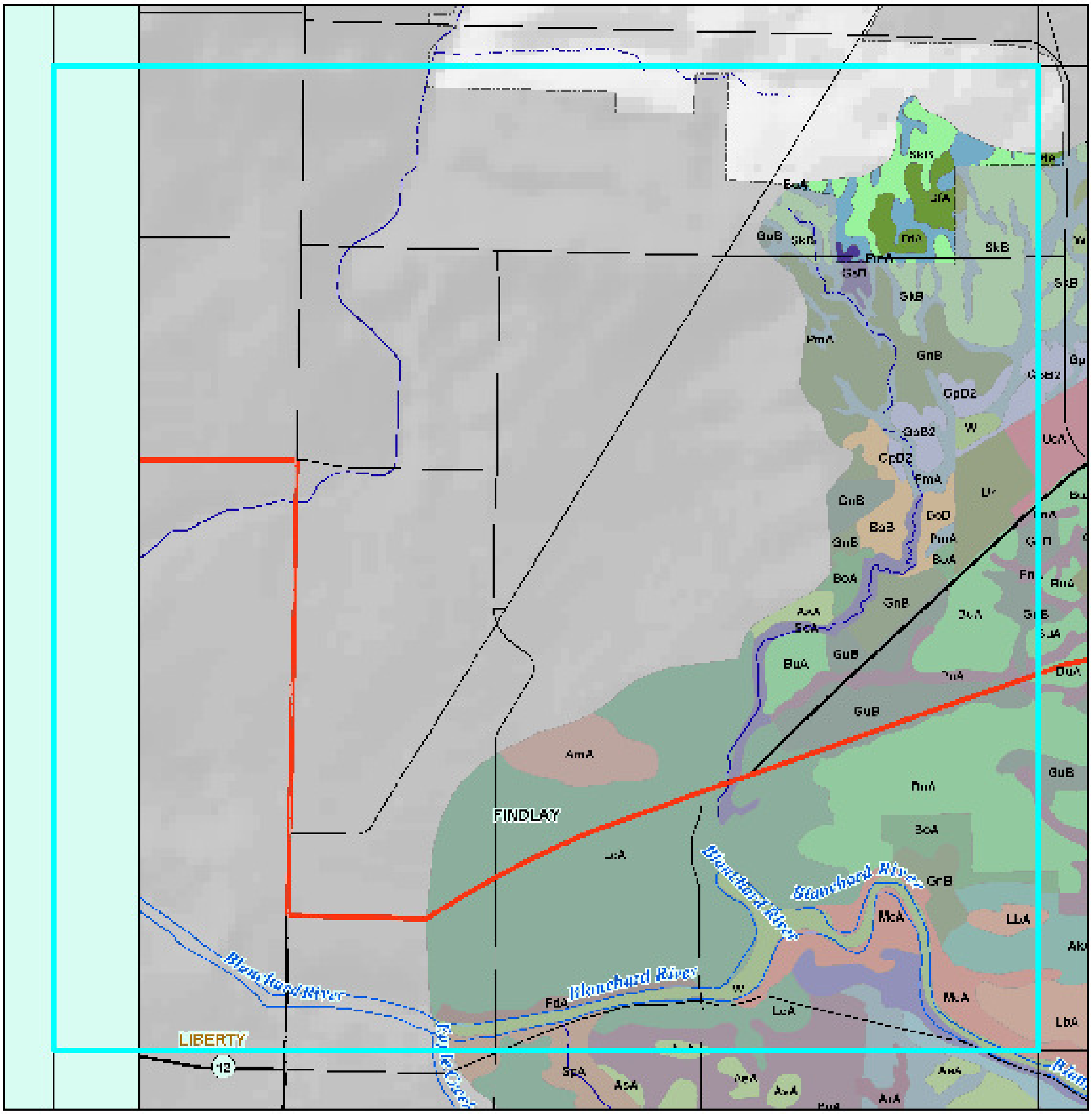


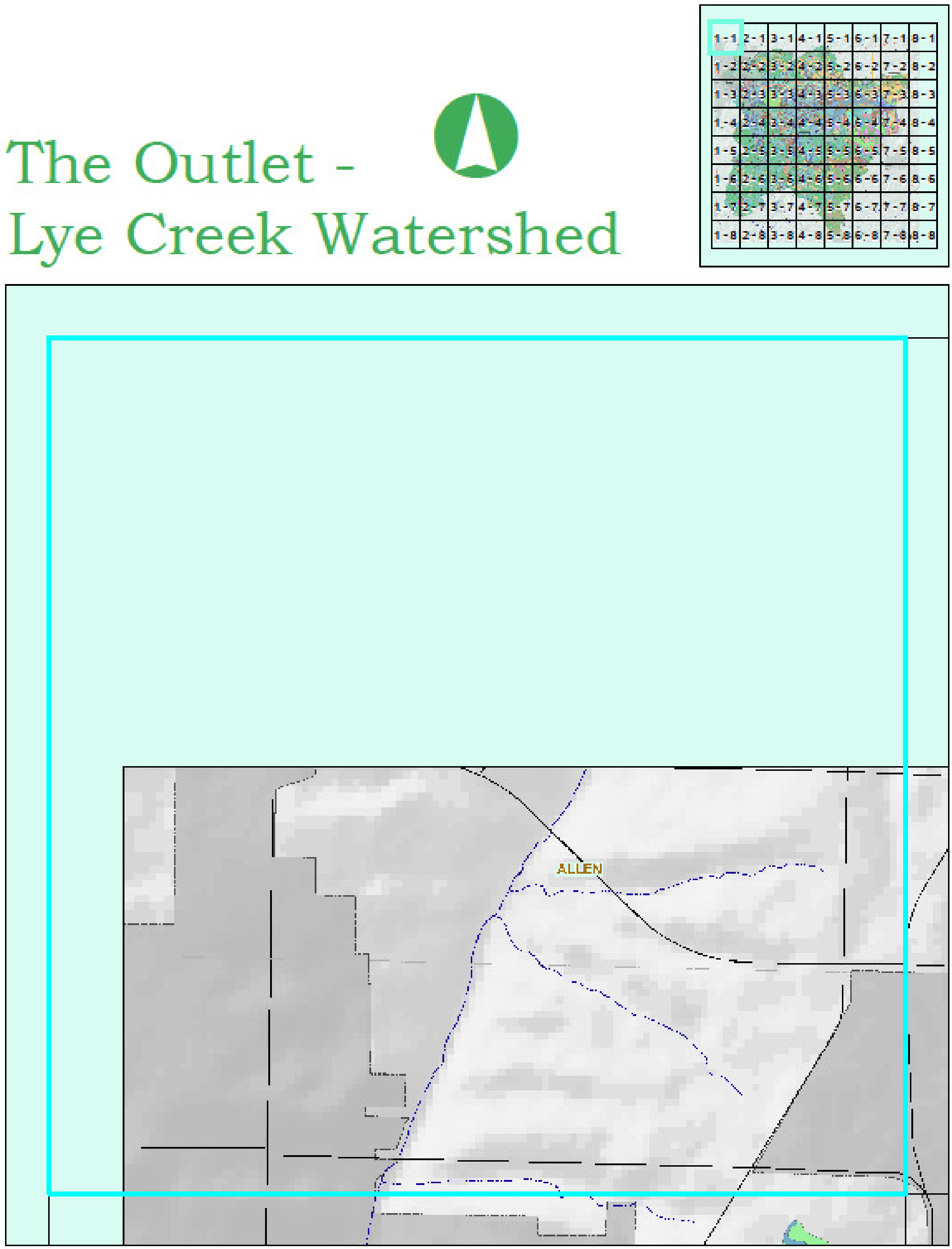
The Outlet -
Lye Creek Watershed






FINDLAY
LIBERTY
Blanchard River
Blanchard River
Blanchard River
Blanchard River
Lye Creek
12

Grid 1-3



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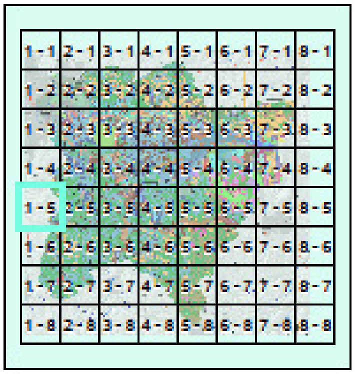
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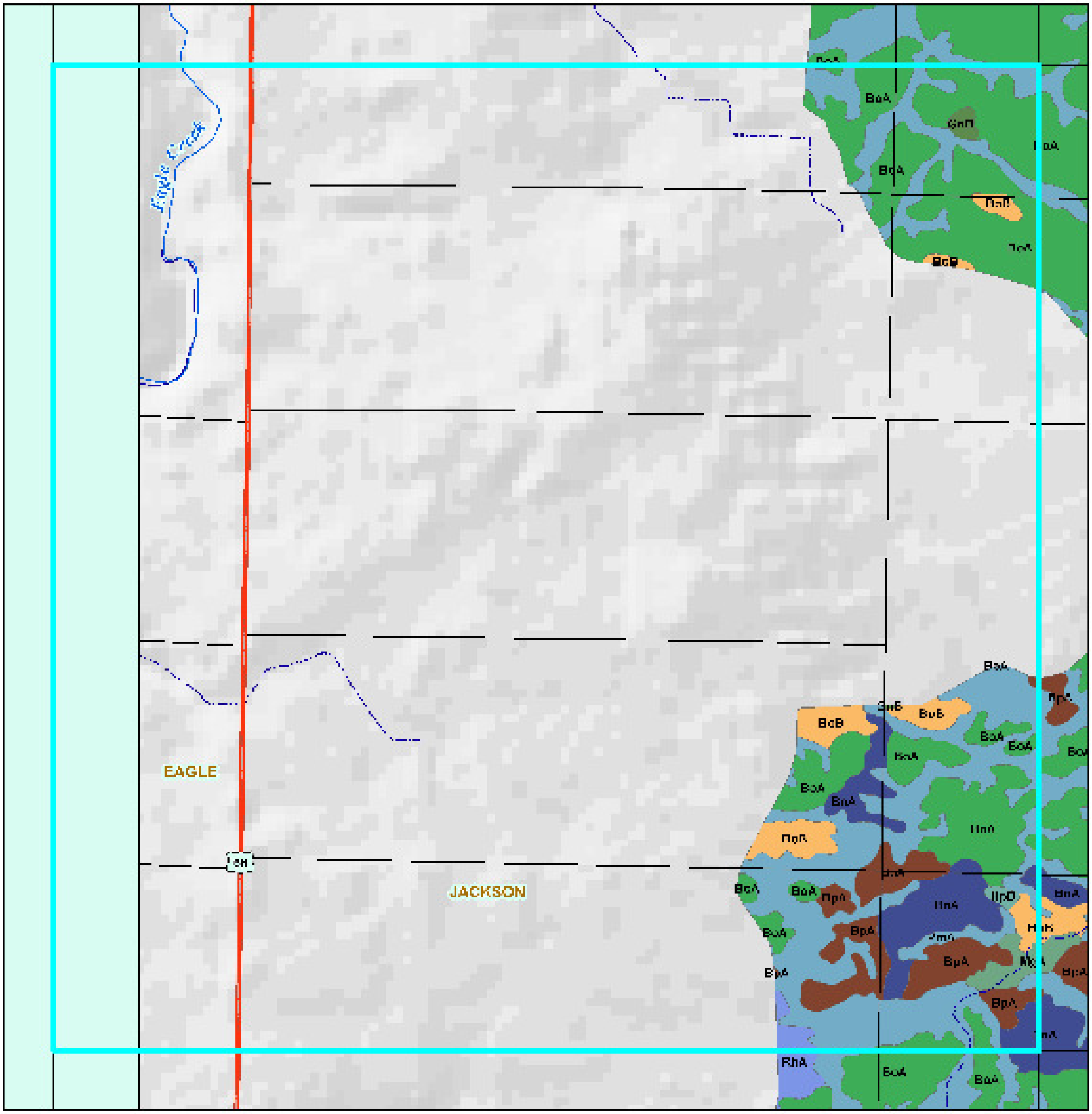
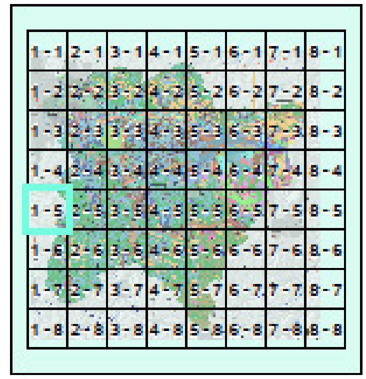
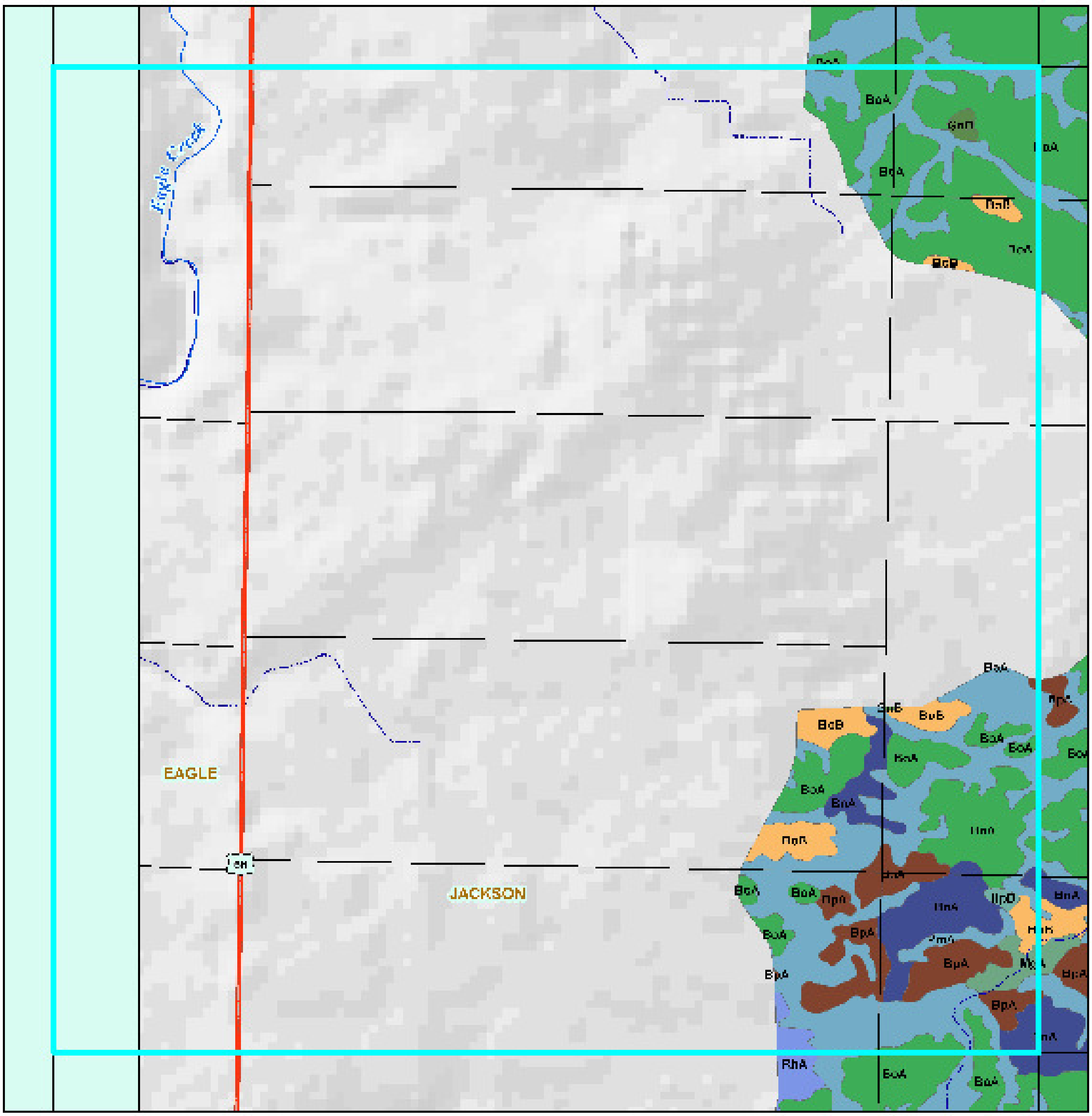

Eagle Creek
EAGLE
JACKSON
BoA
BpA
BoB
BuB
RhA

Grid 1-5





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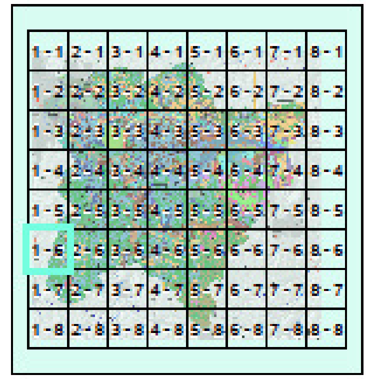

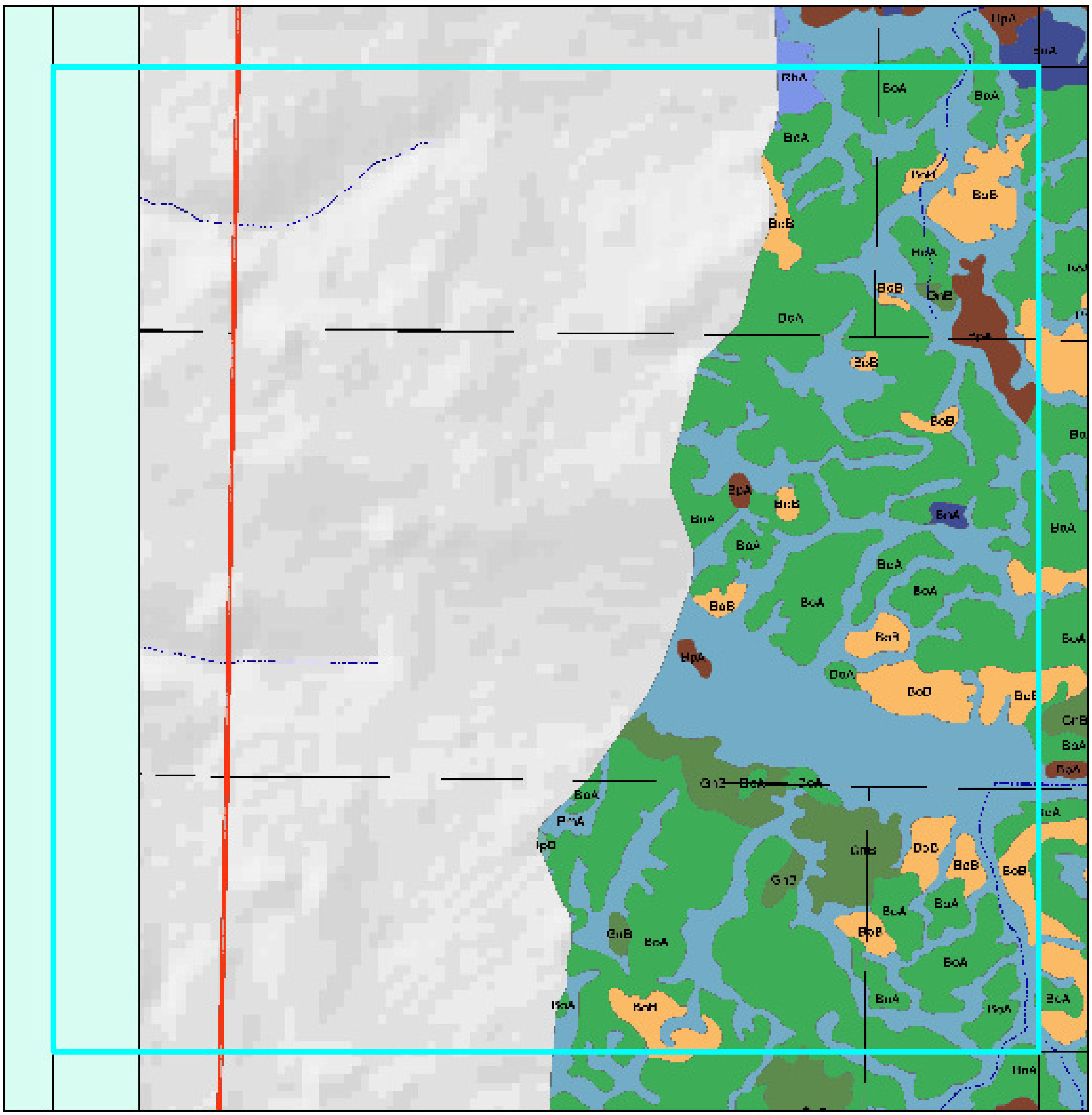

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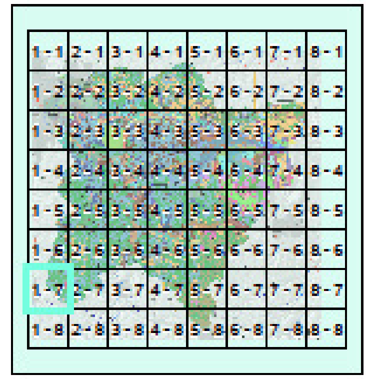

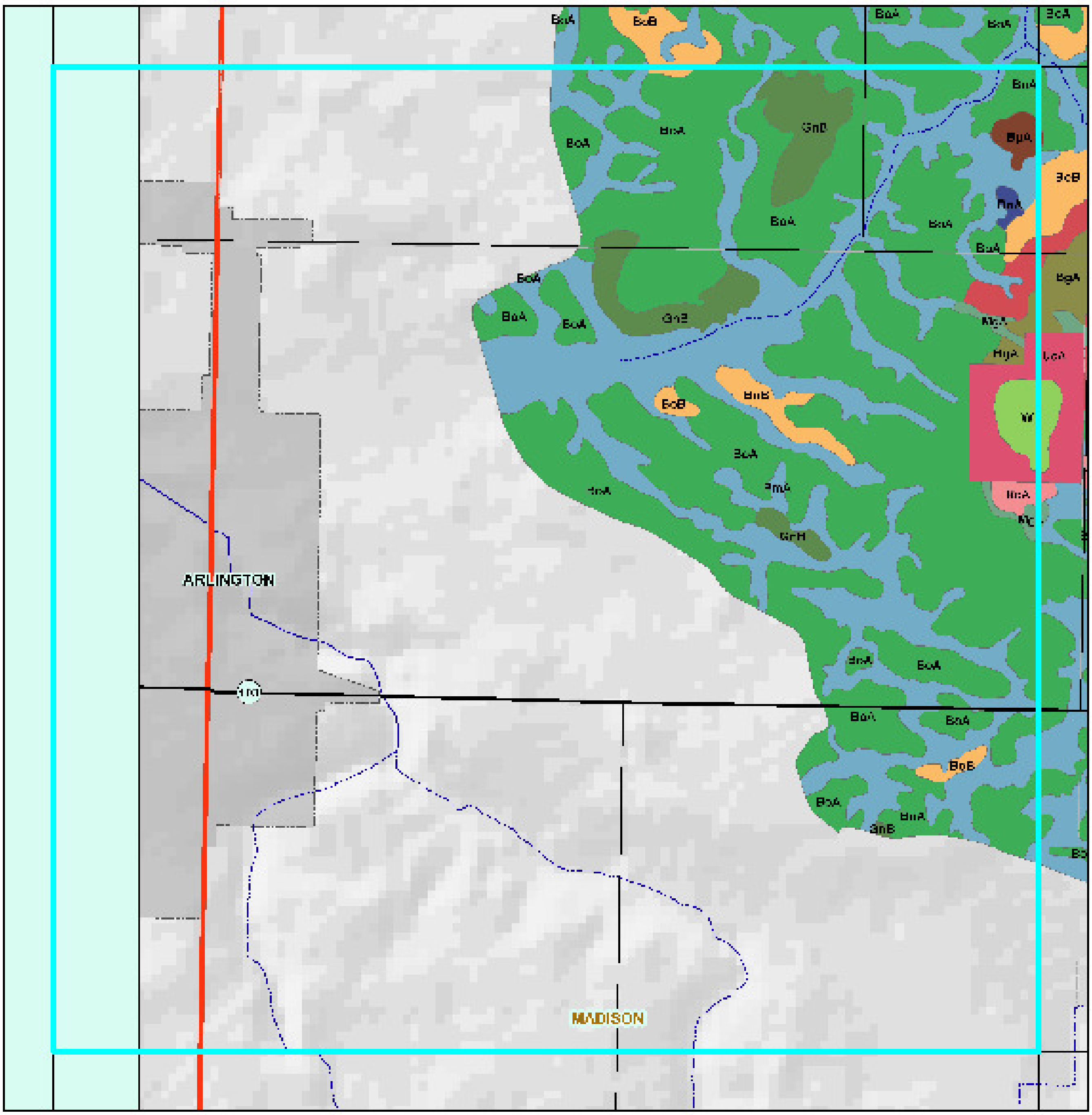

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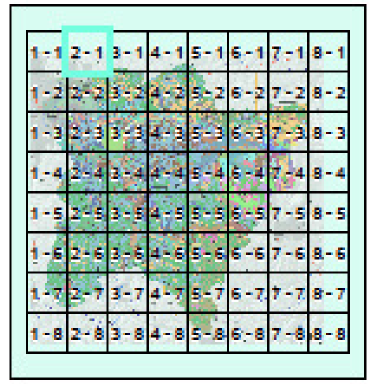
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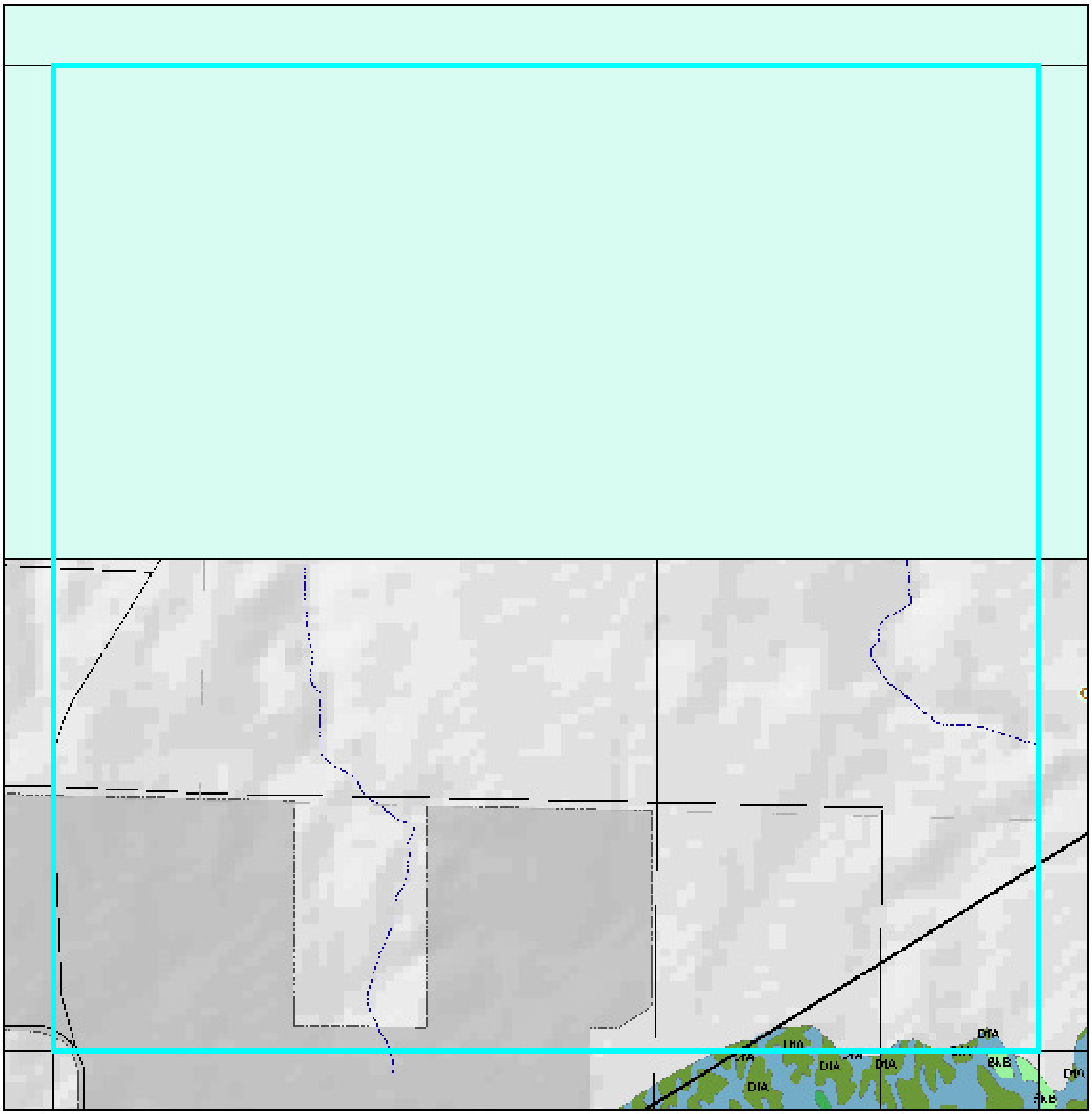

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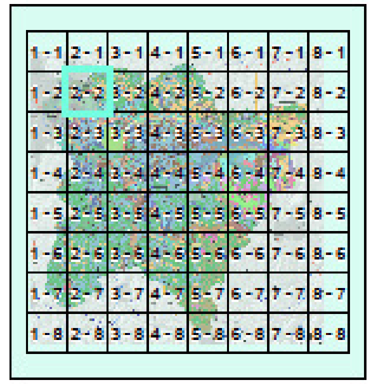
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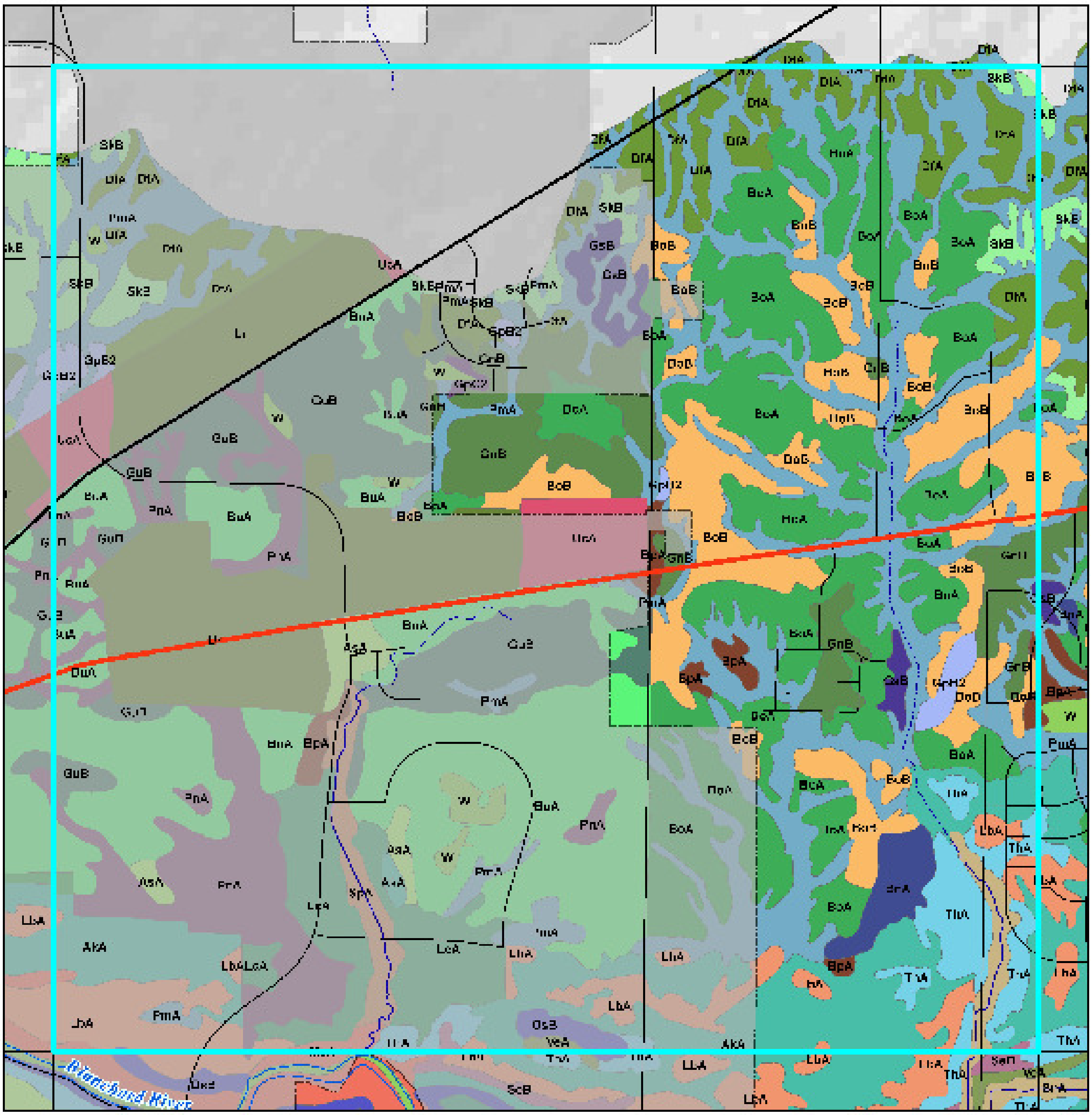
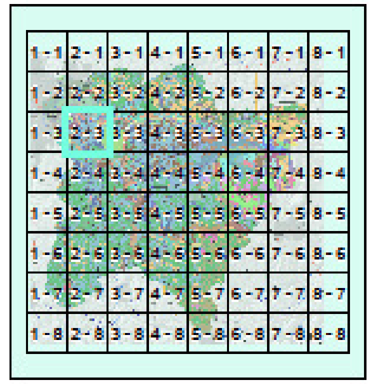

Blanchard River

Grid 2-3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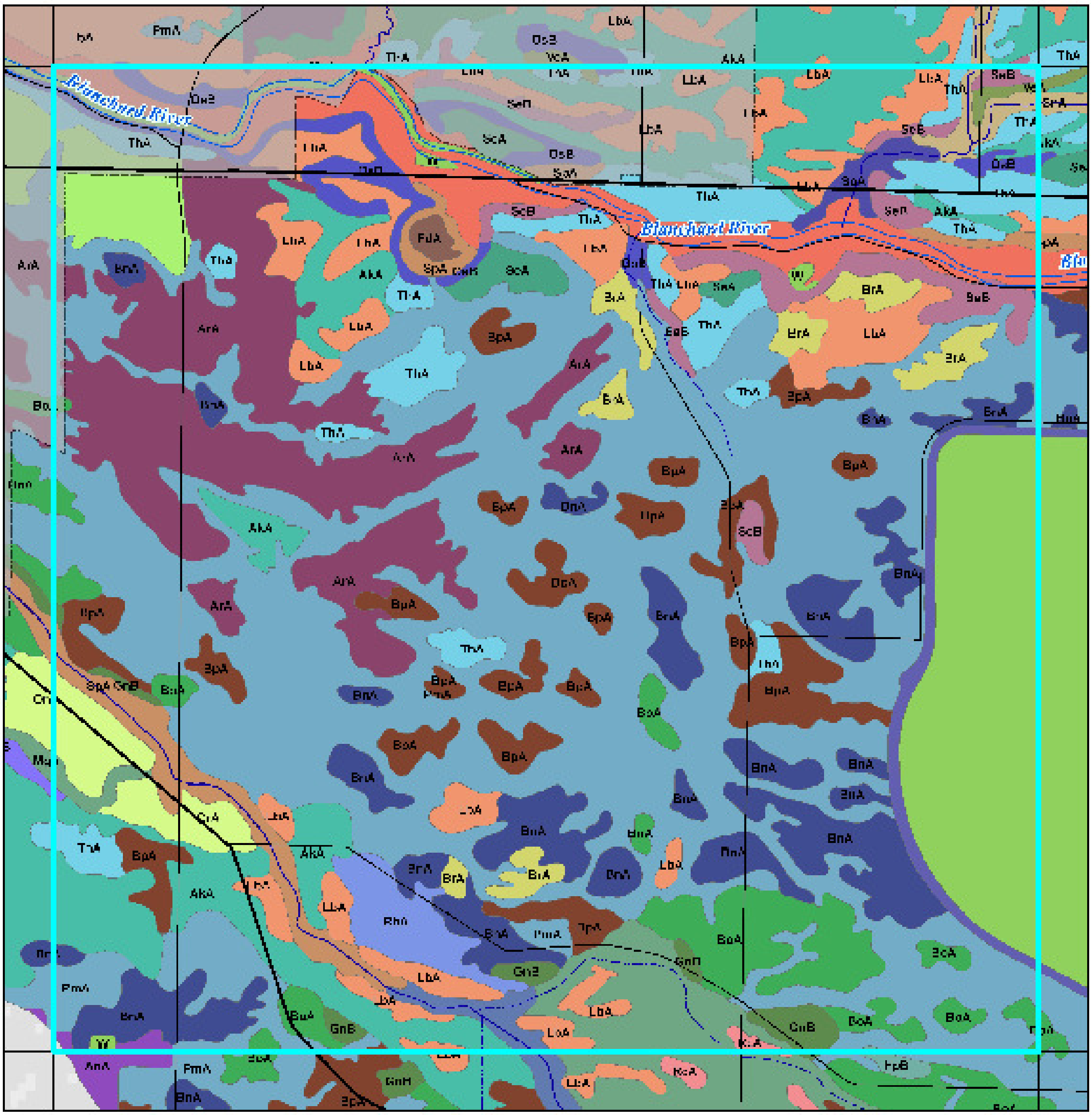
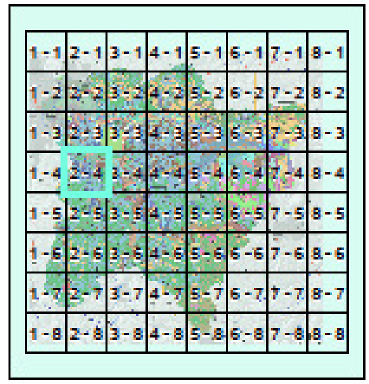

Blanchard River
Blanchard River

Grid 2-4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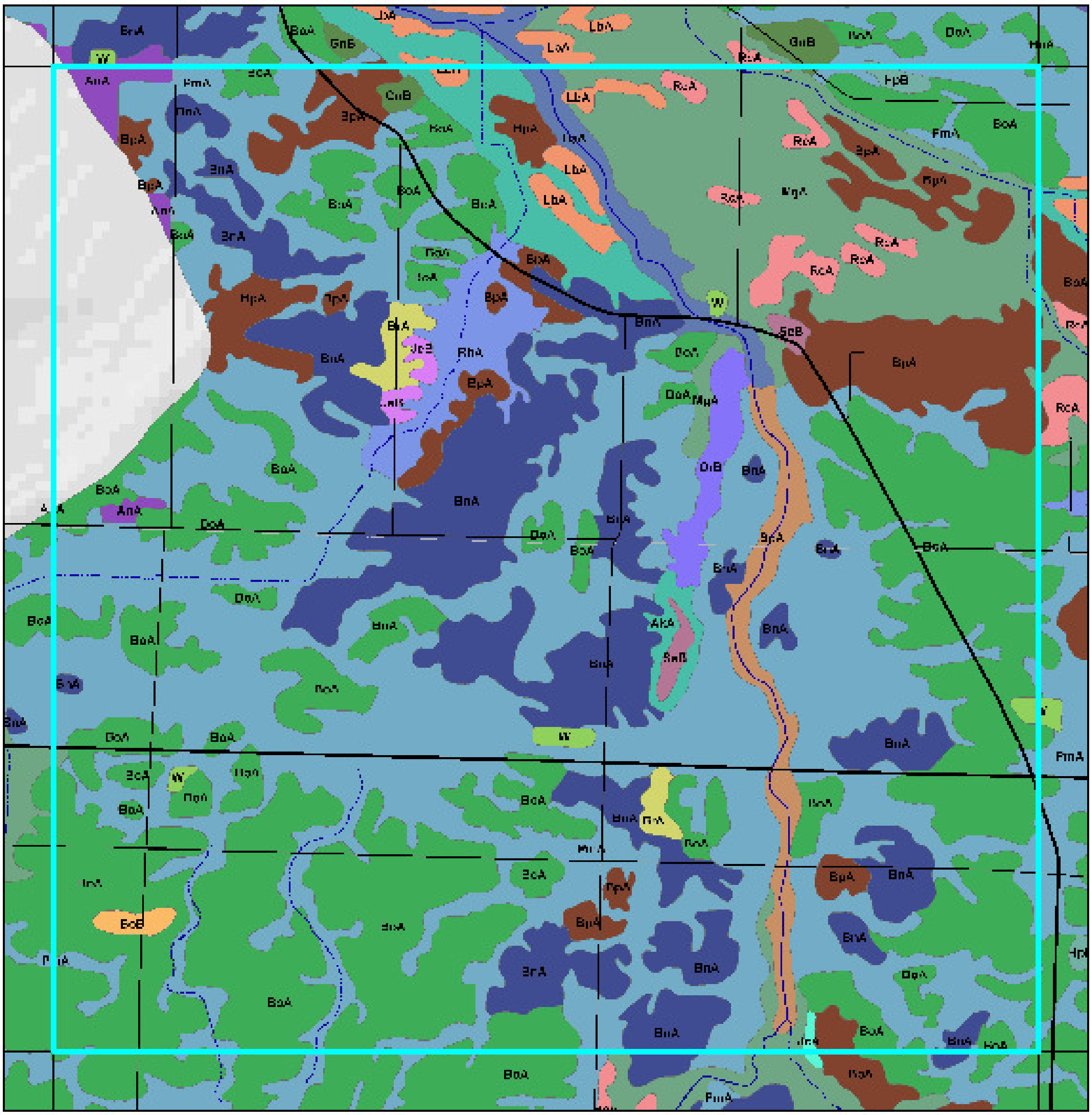
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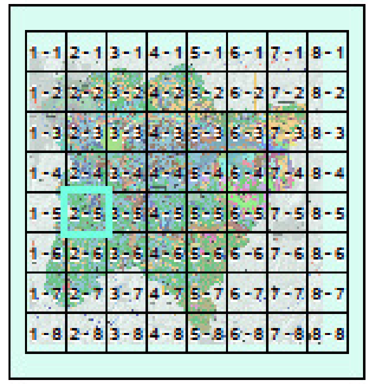
BoA
GnB
CuB
LbA
RcA
HpA
FpB
FmA
BpA
DoA
DiB
AkA
BcB
W

Grid 2-5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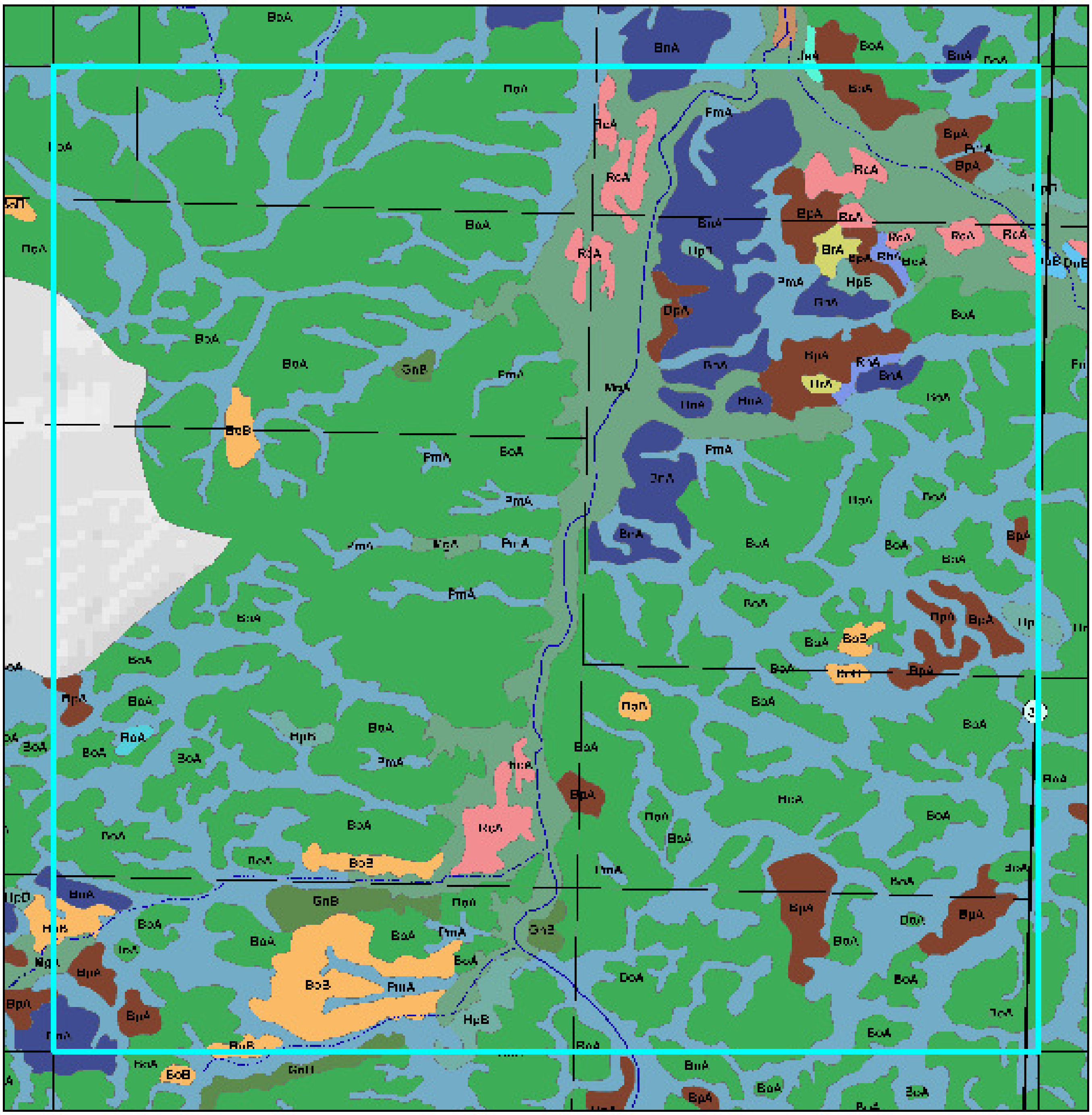

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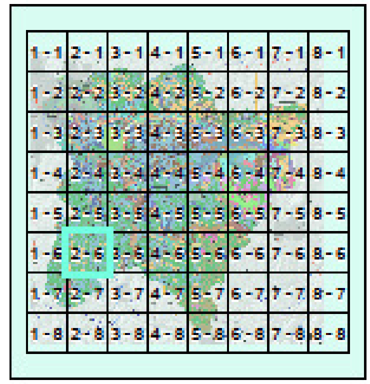

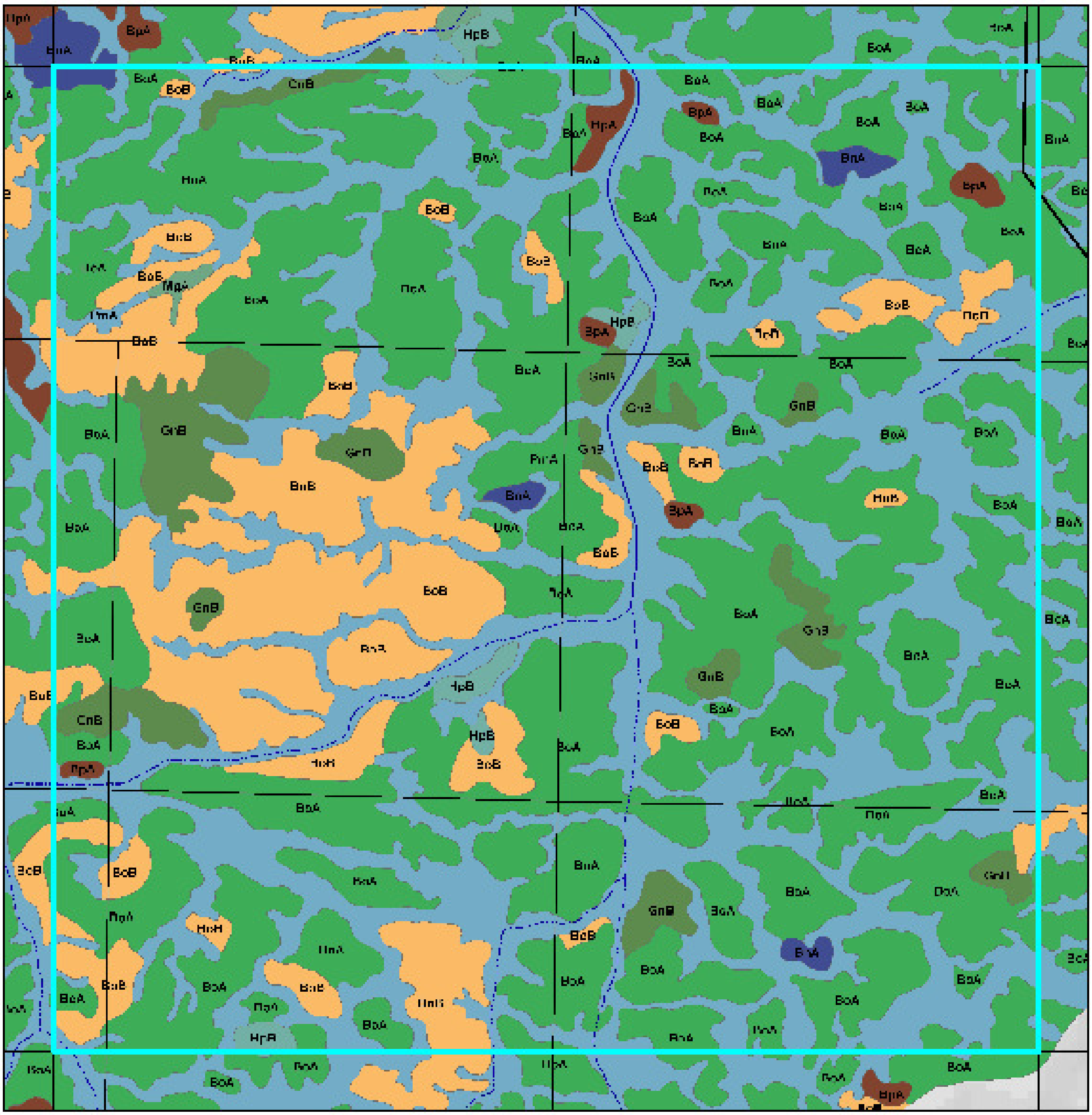

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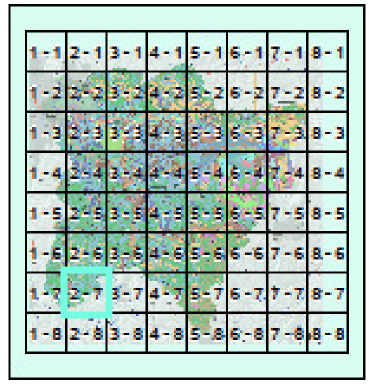

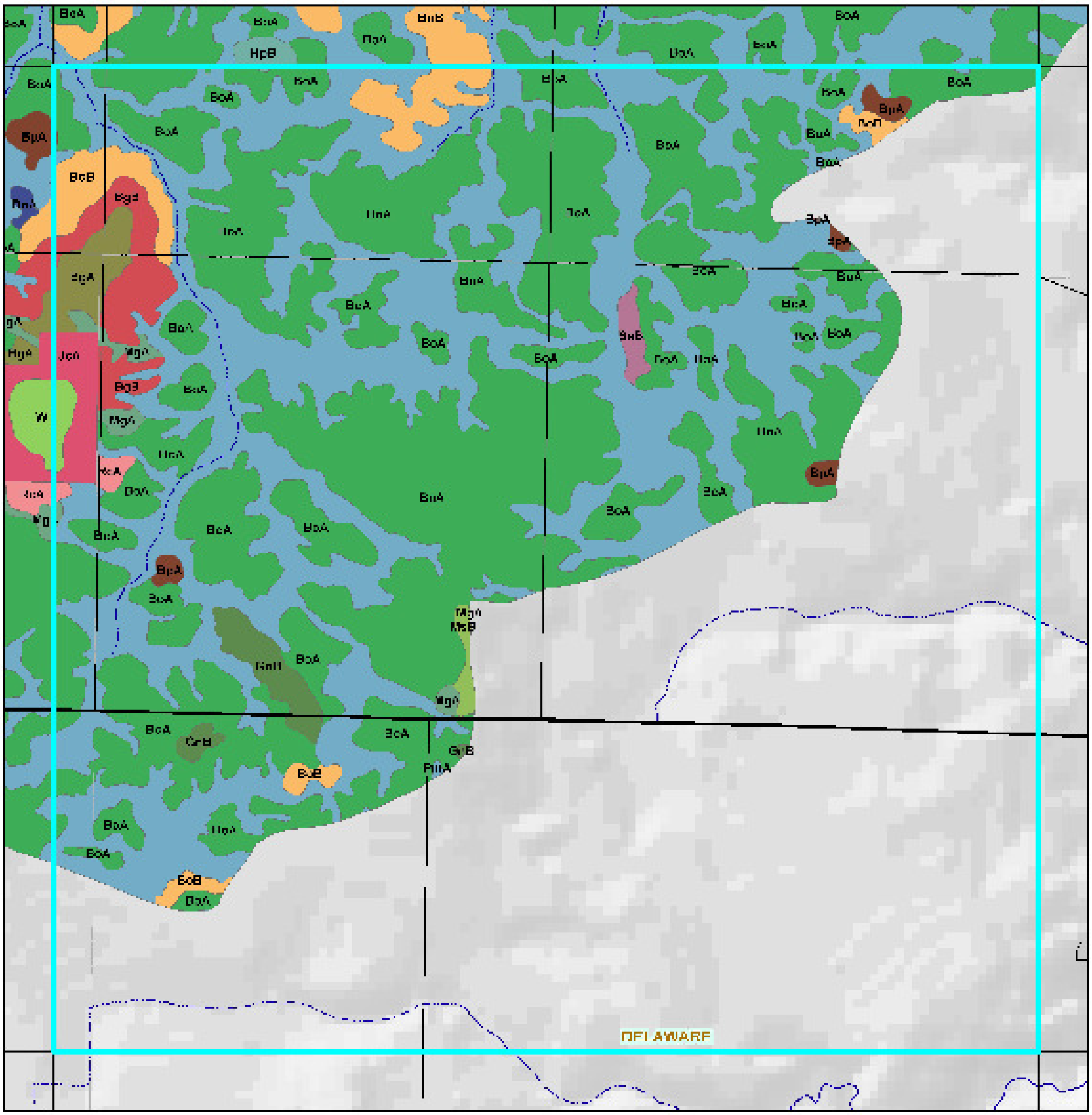

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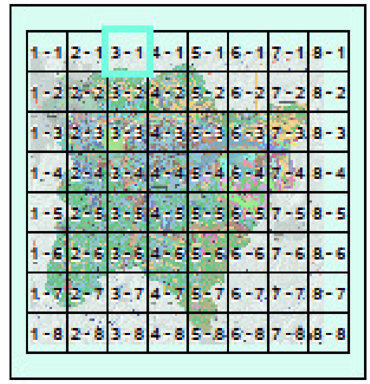

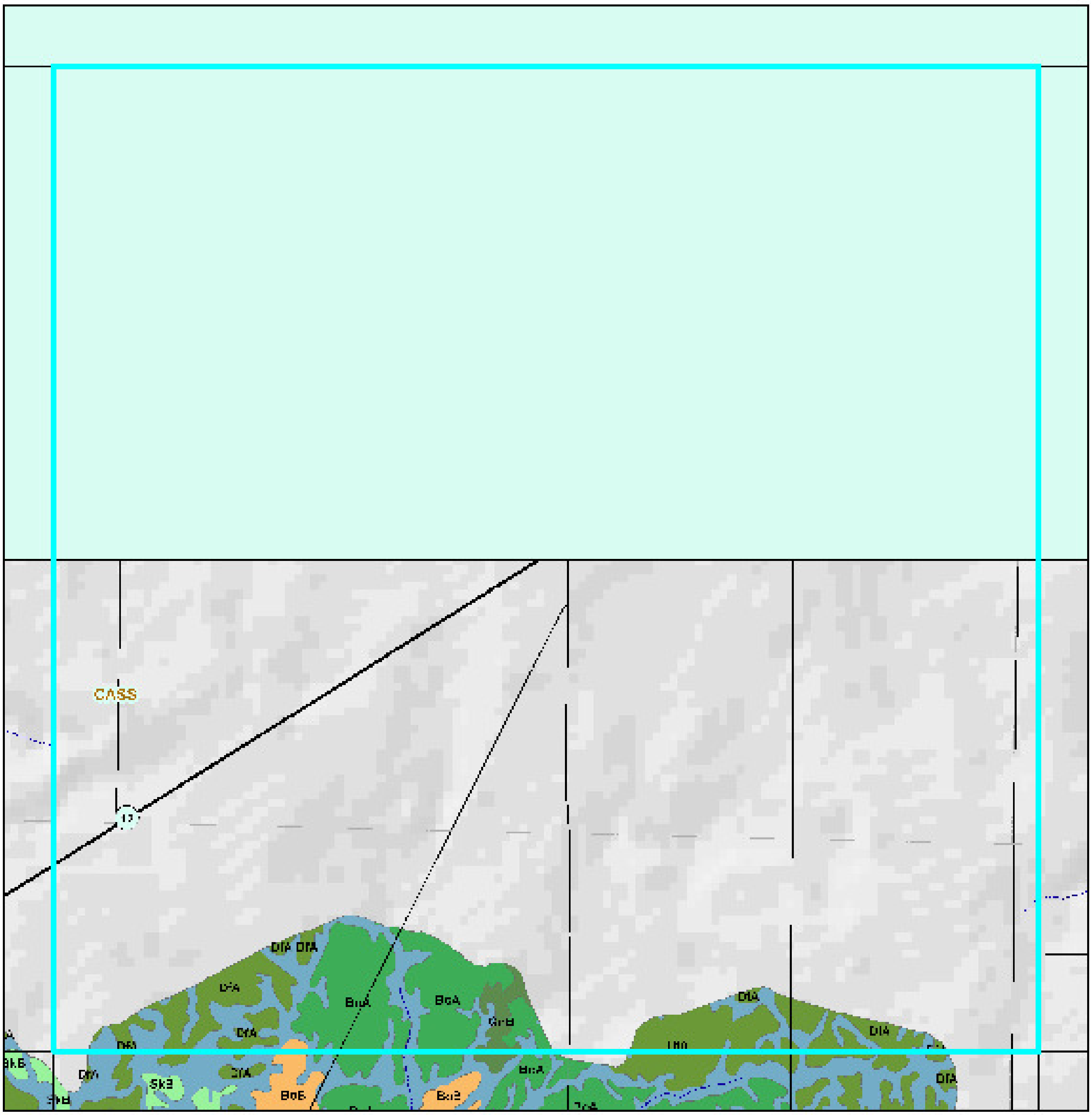

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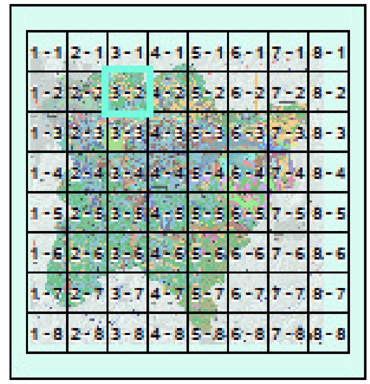

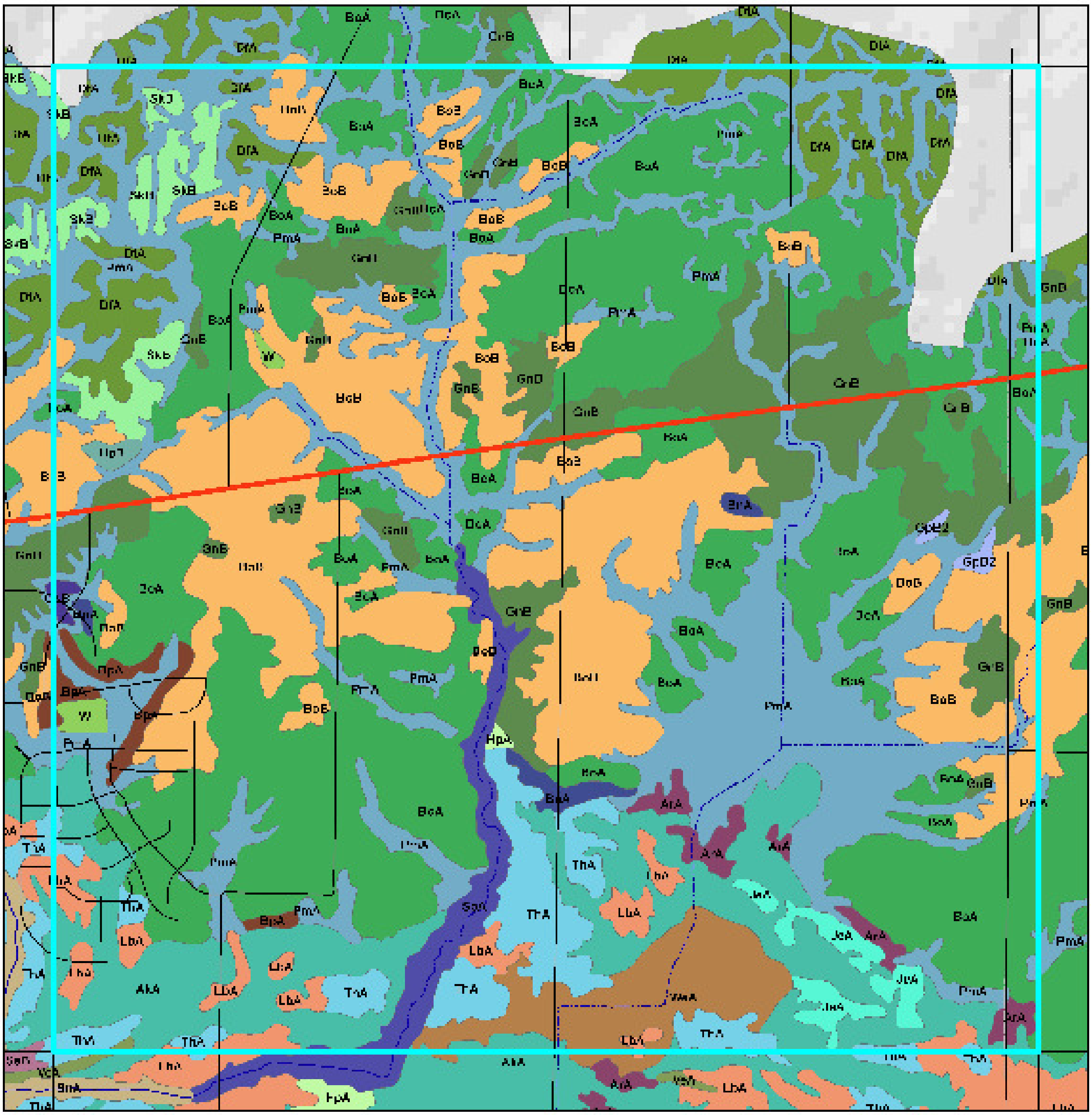

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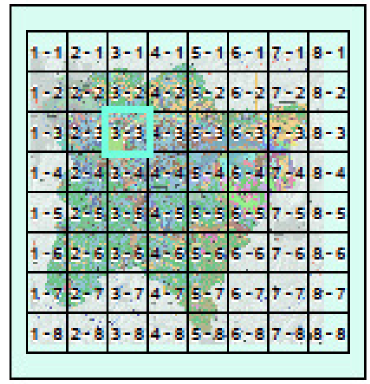

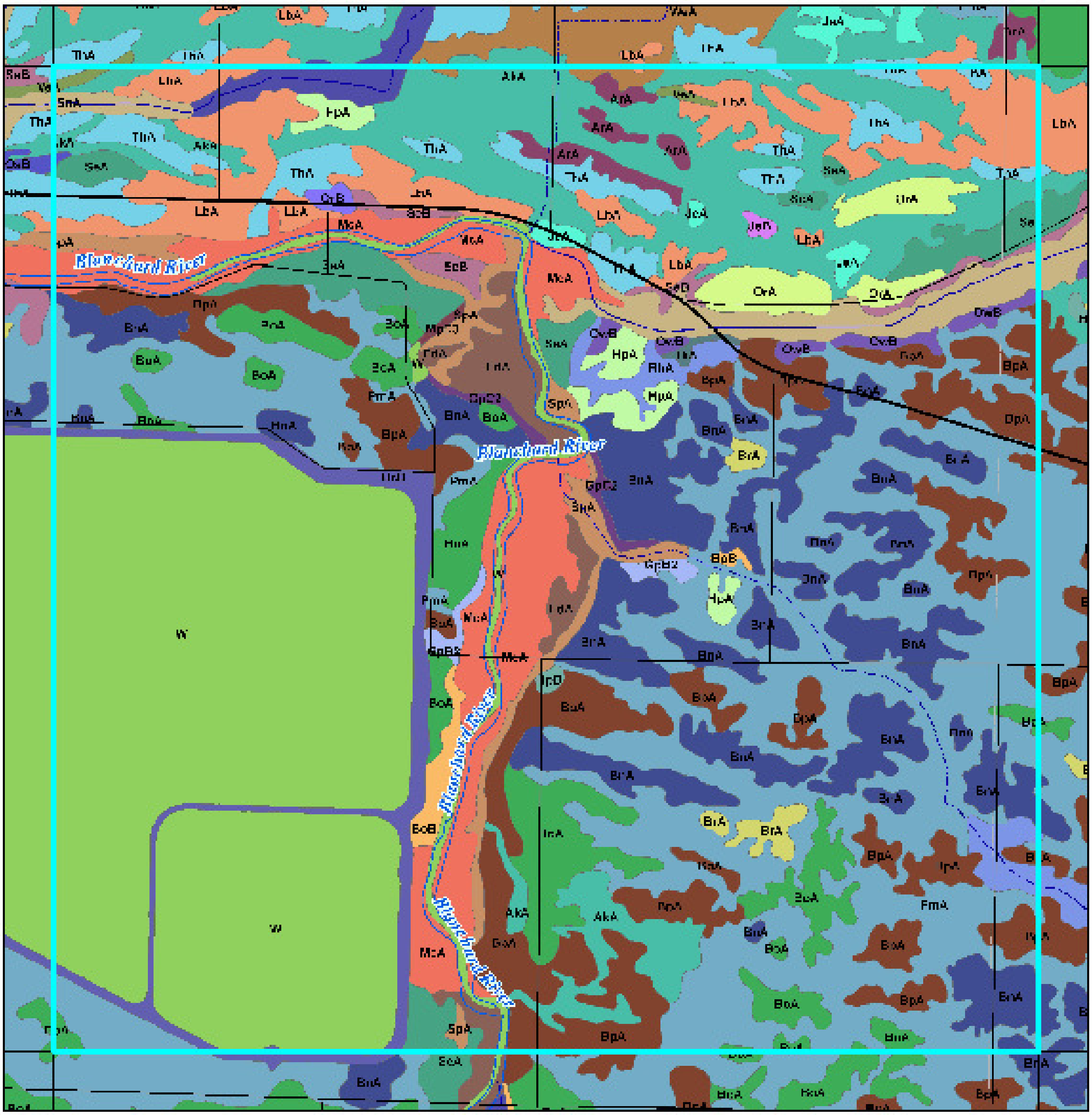

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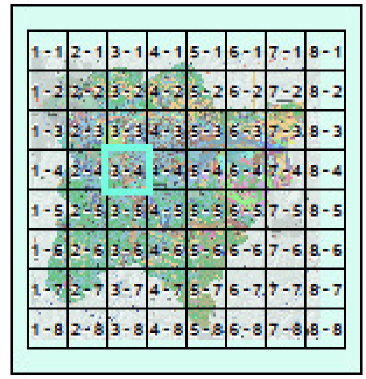
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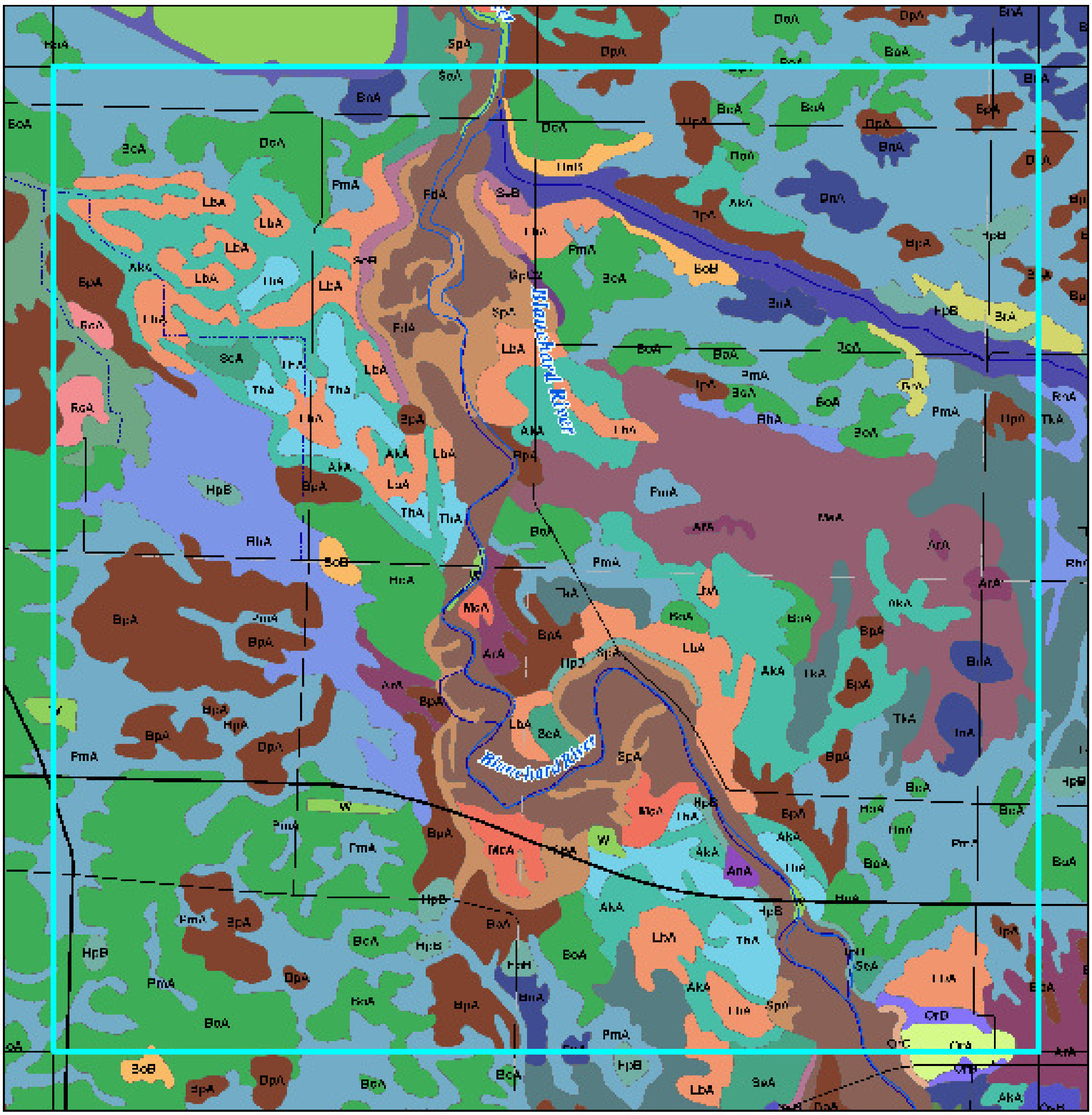
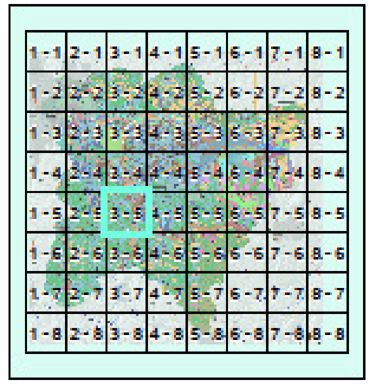

Blanchard River
Blanchard River

Grid 3-5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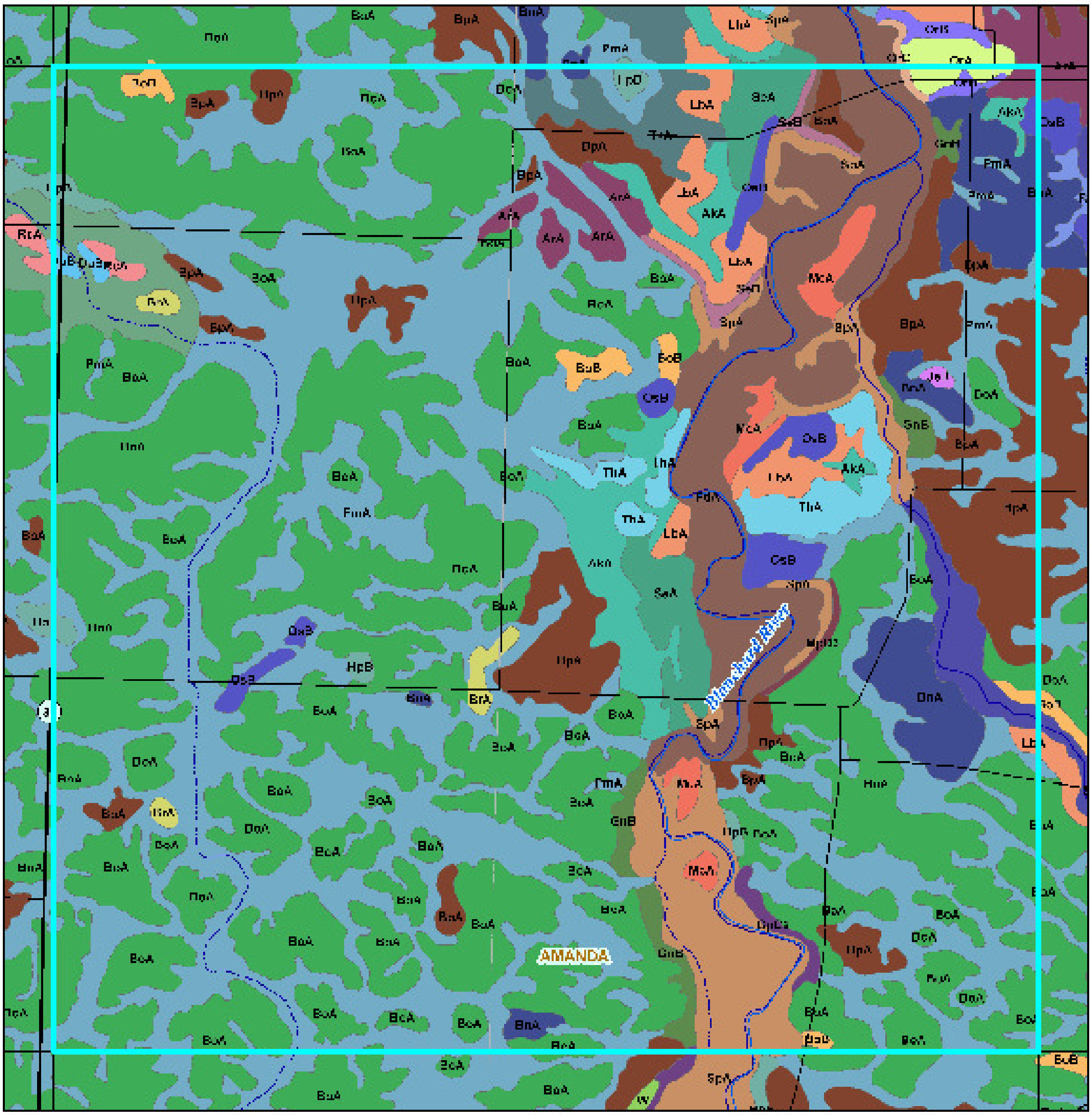
AMANDA
Blanchard River

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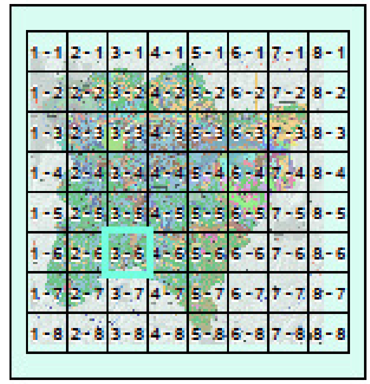
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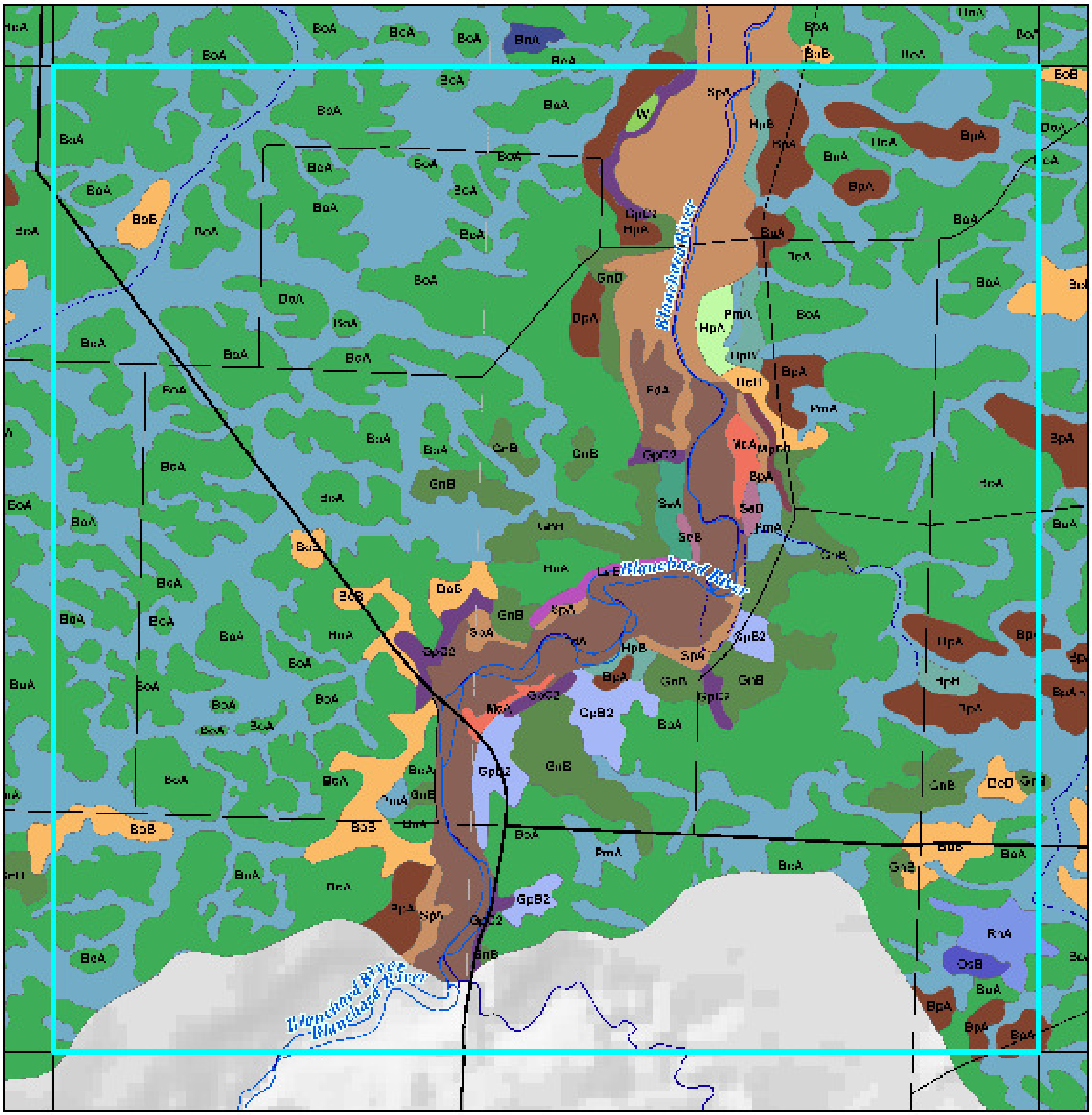
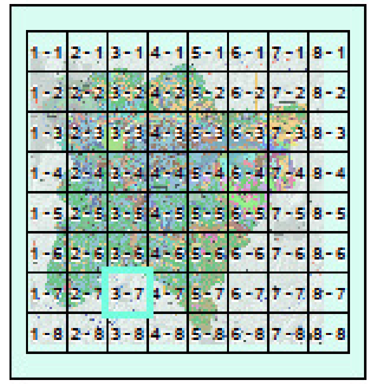

Blanchard River

Grid 3-7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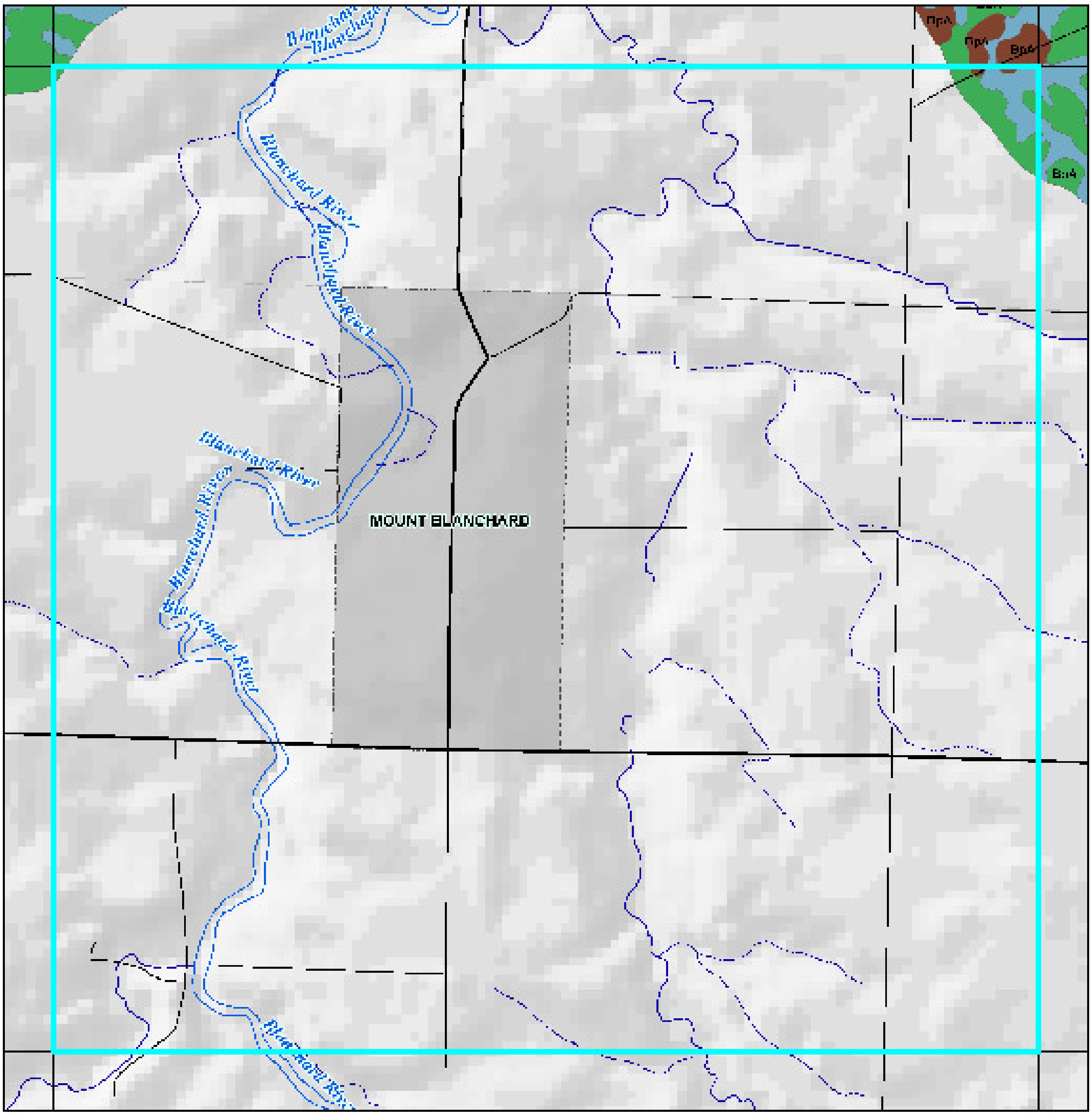
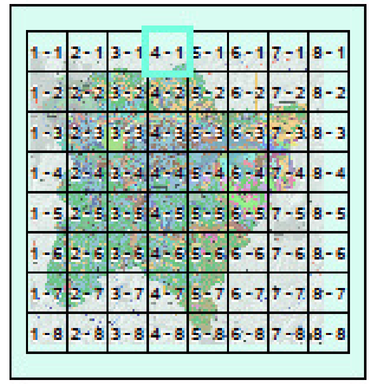

Blanchard River
MOUNT BLANCHARD

Grid 4-1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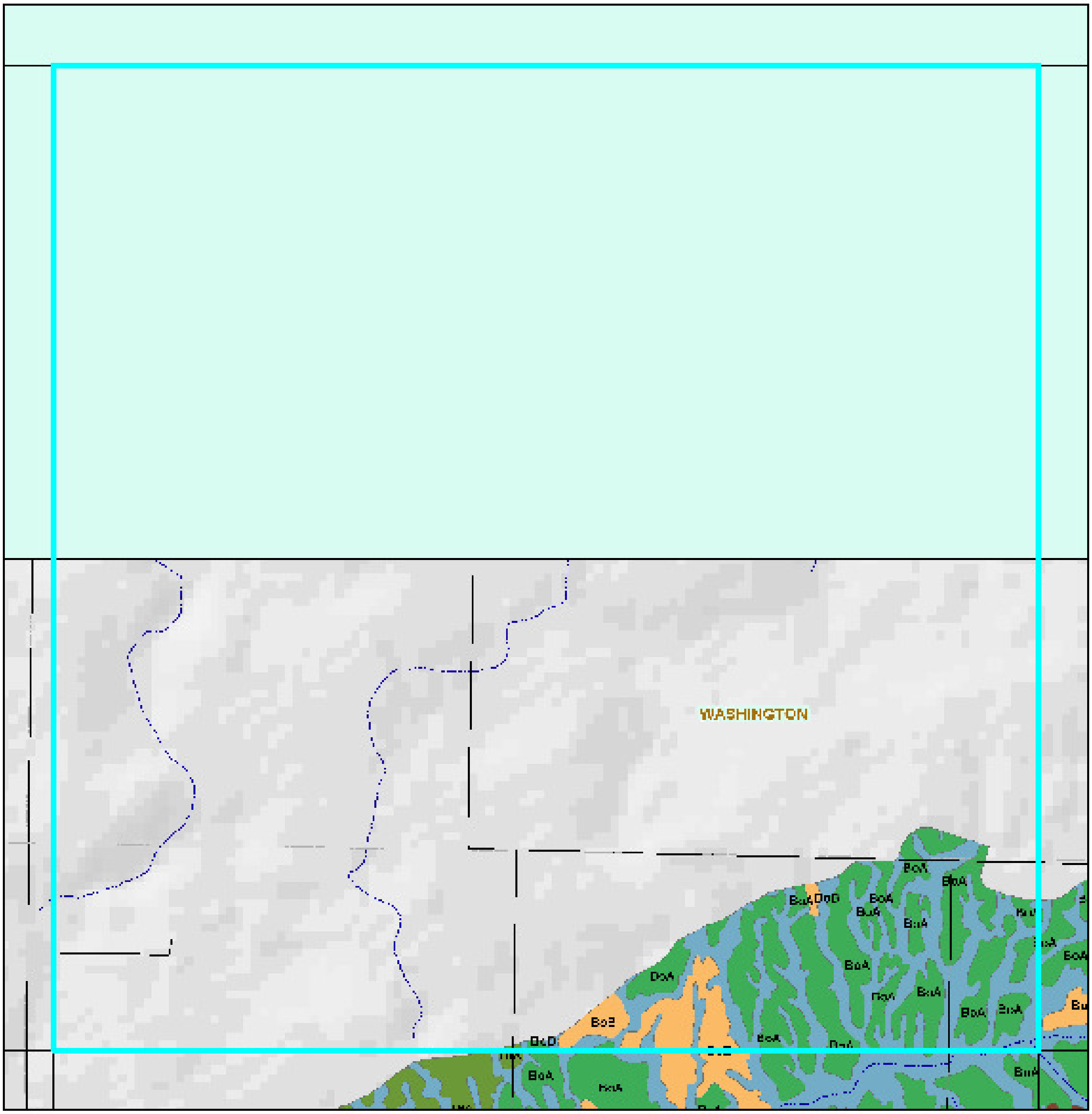
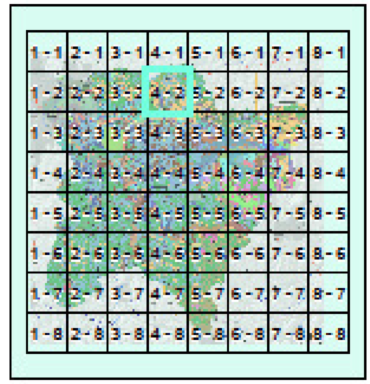
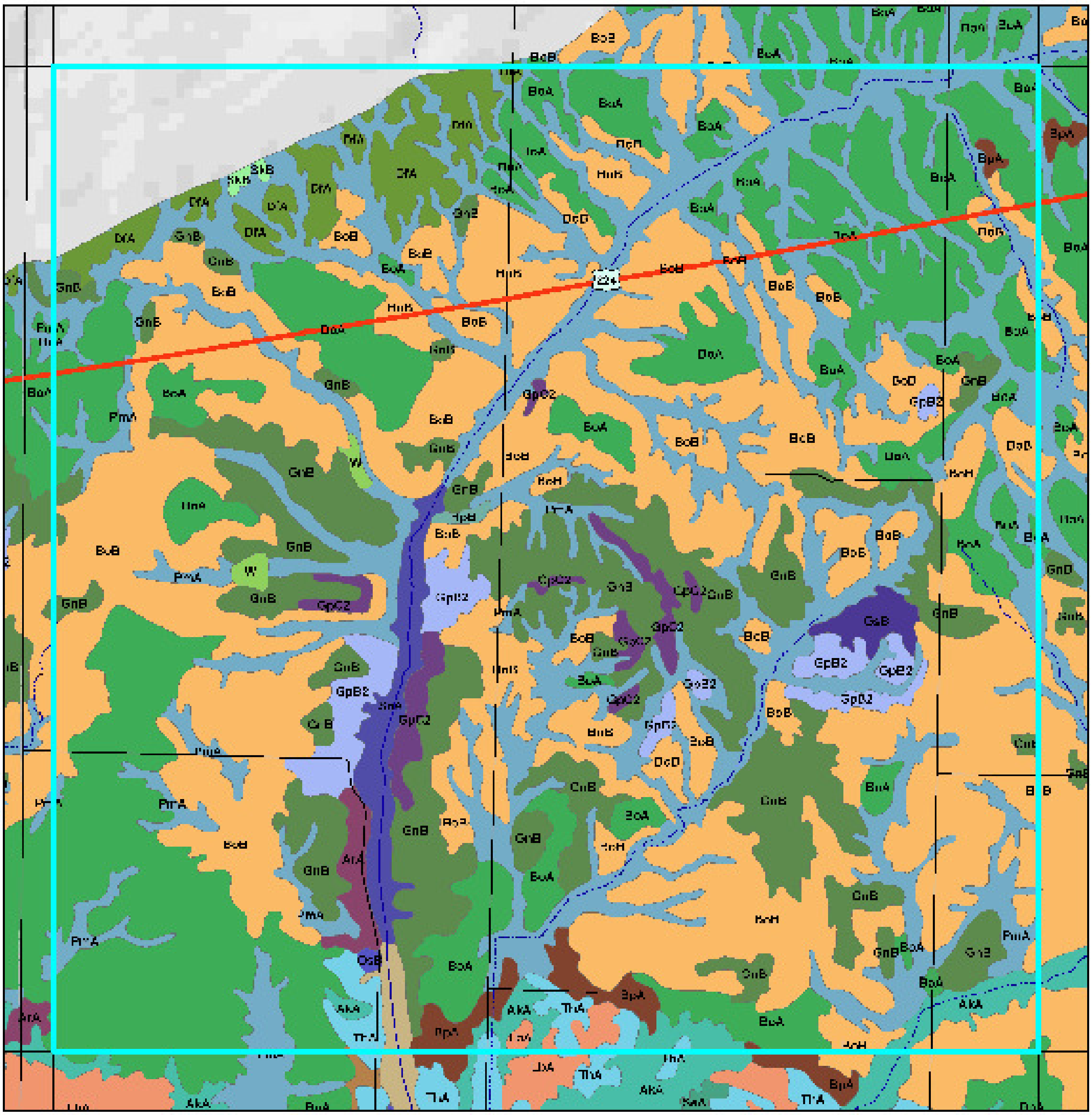
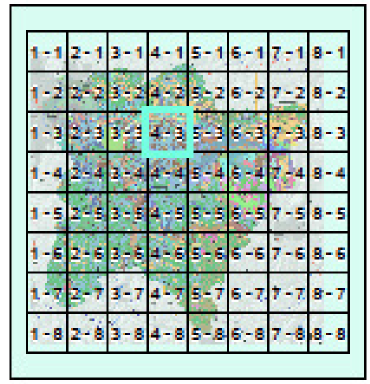

WASHINGTON
BoA
DoD
DoA

Grid 4-2





Grid 4-3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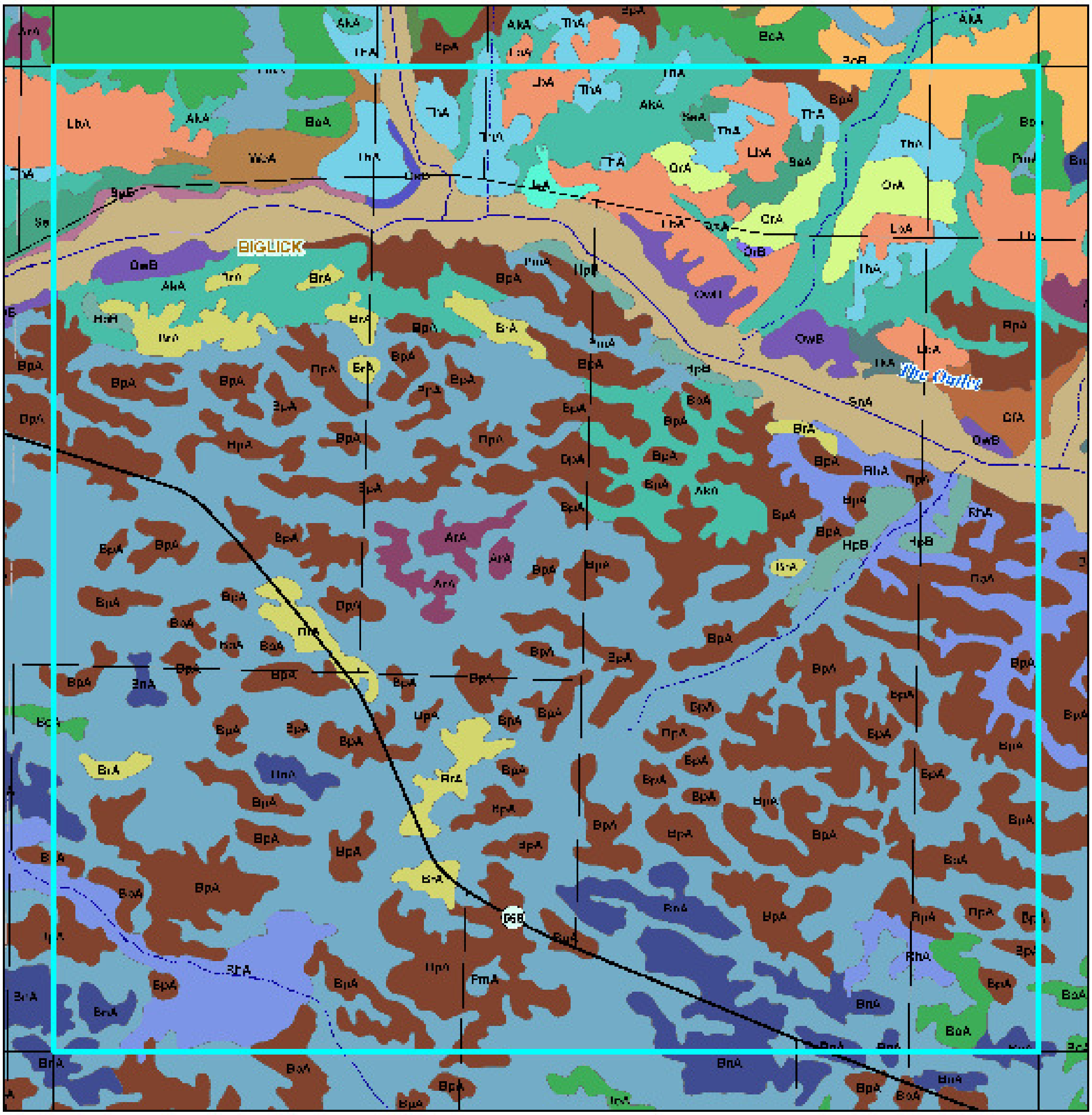
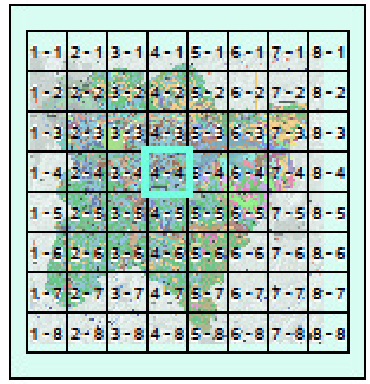

BIGLICK
The Outlet

Grid 4-4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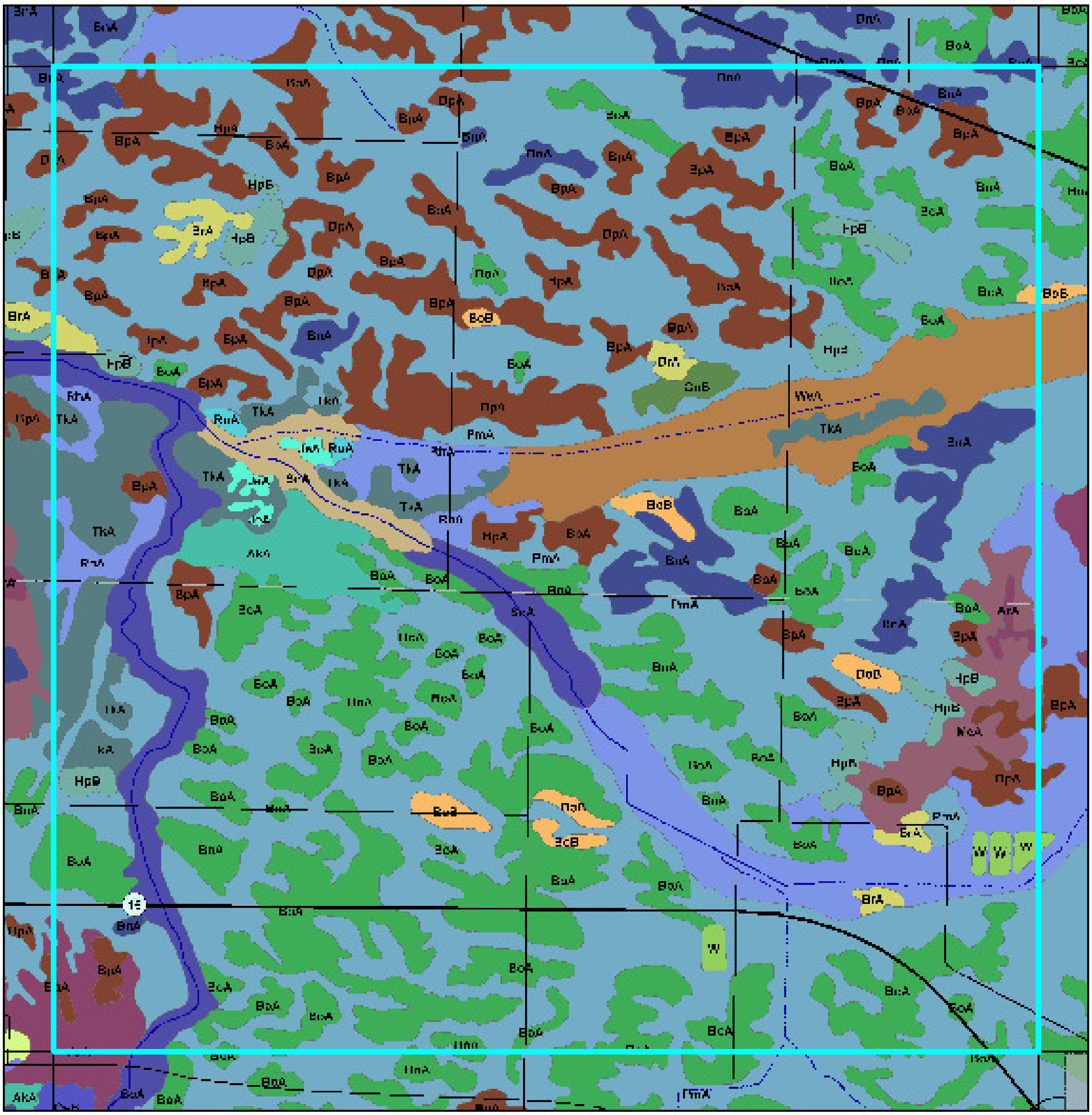

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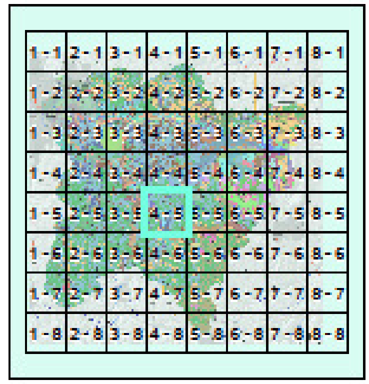
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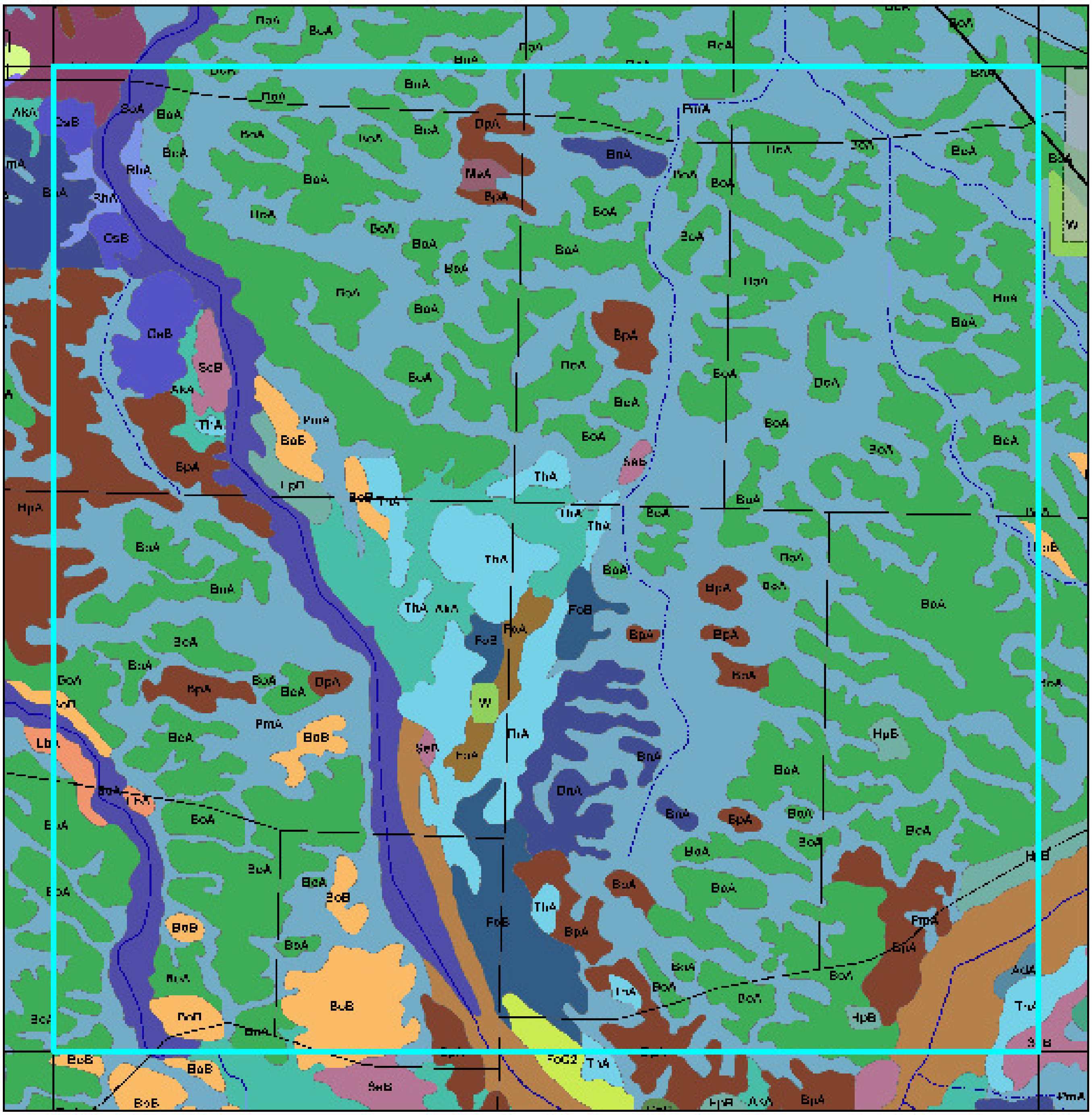

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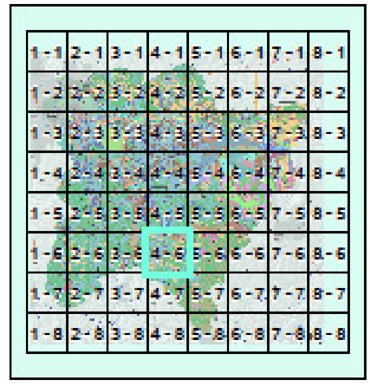
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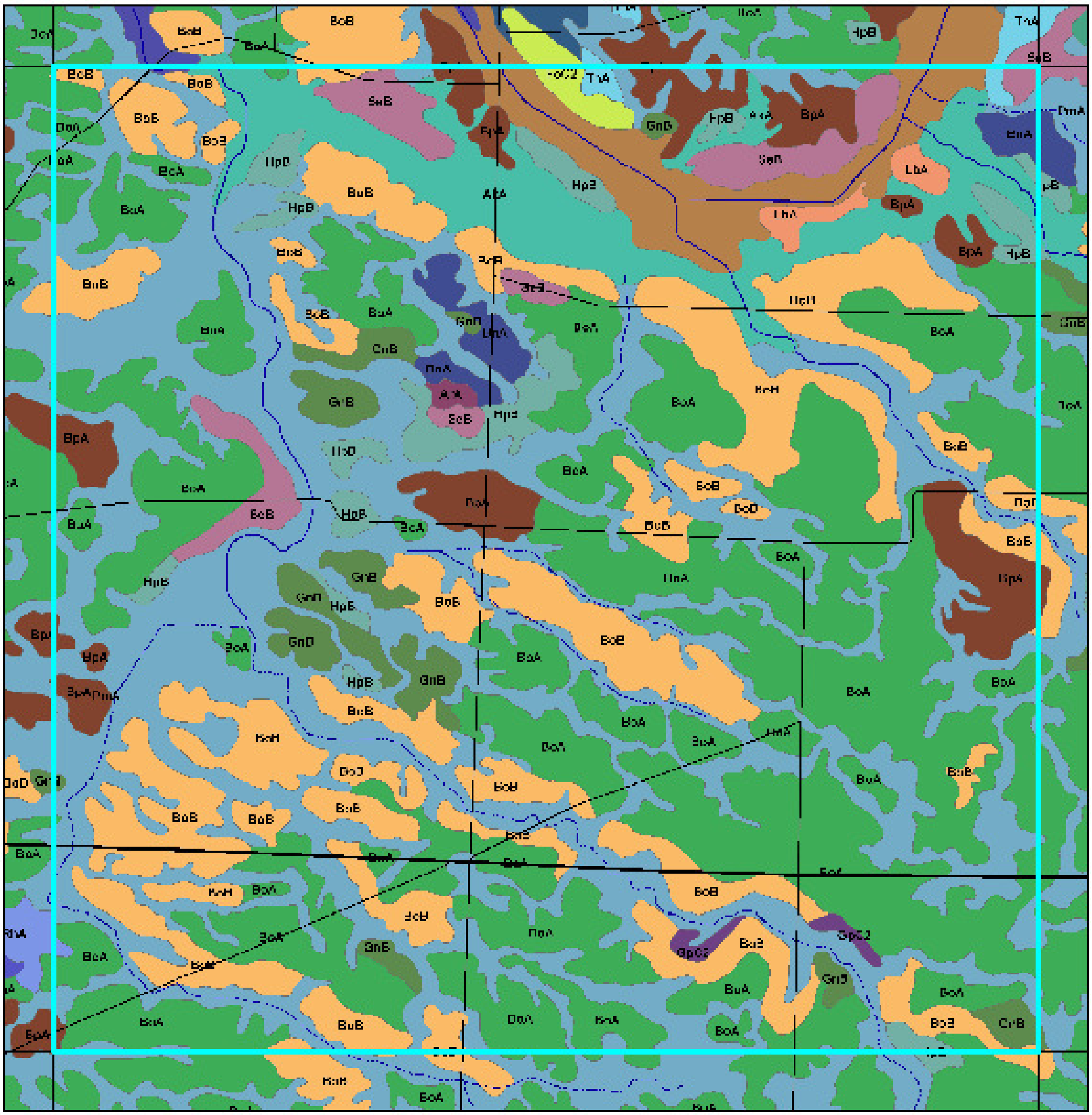

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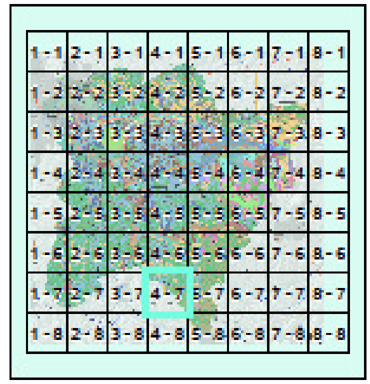

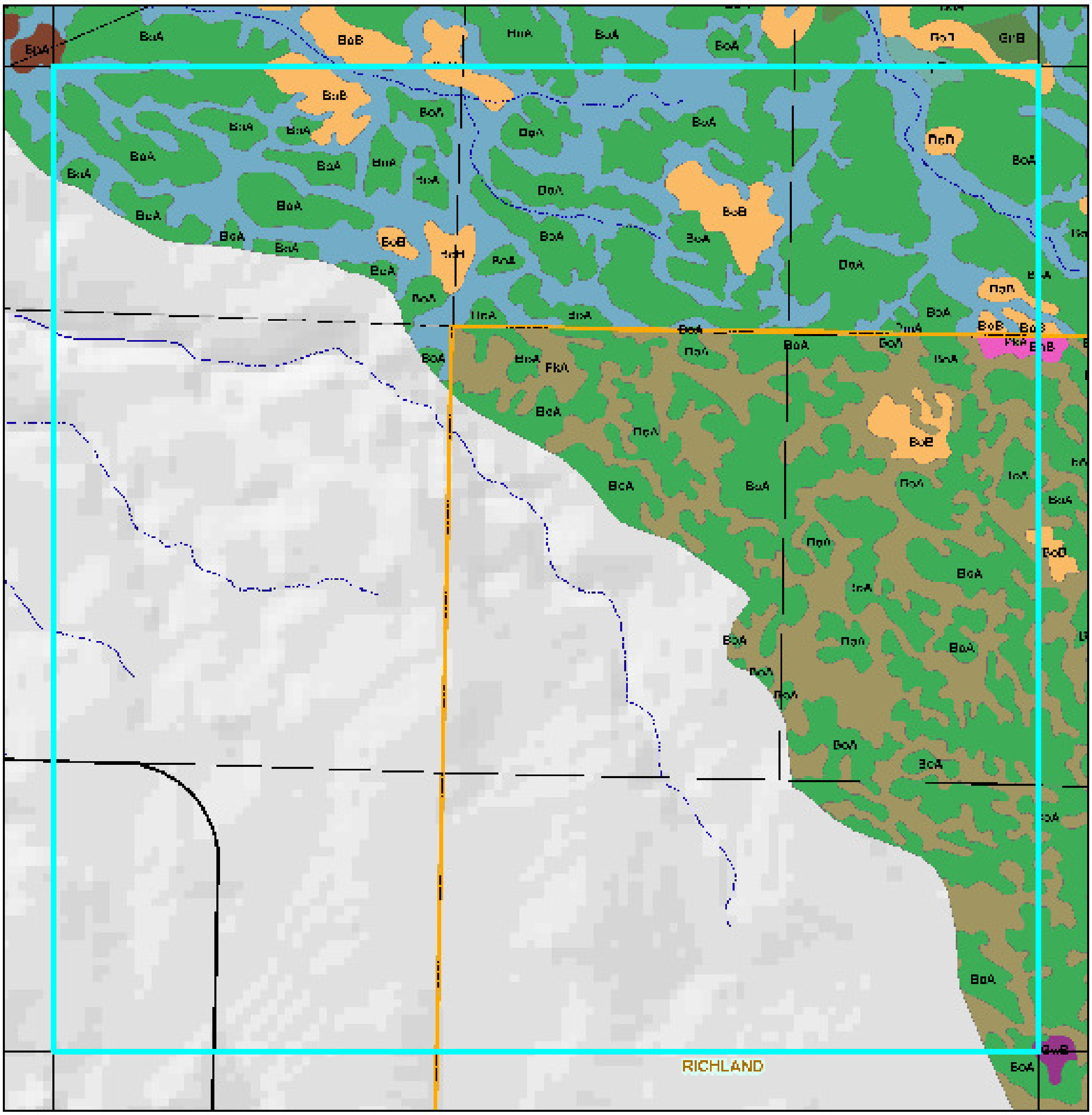

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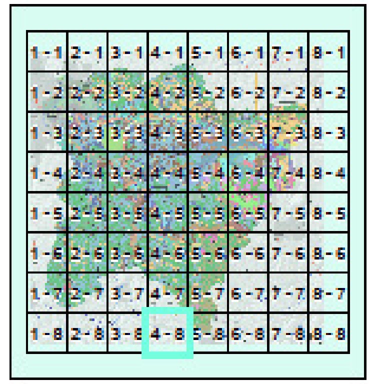

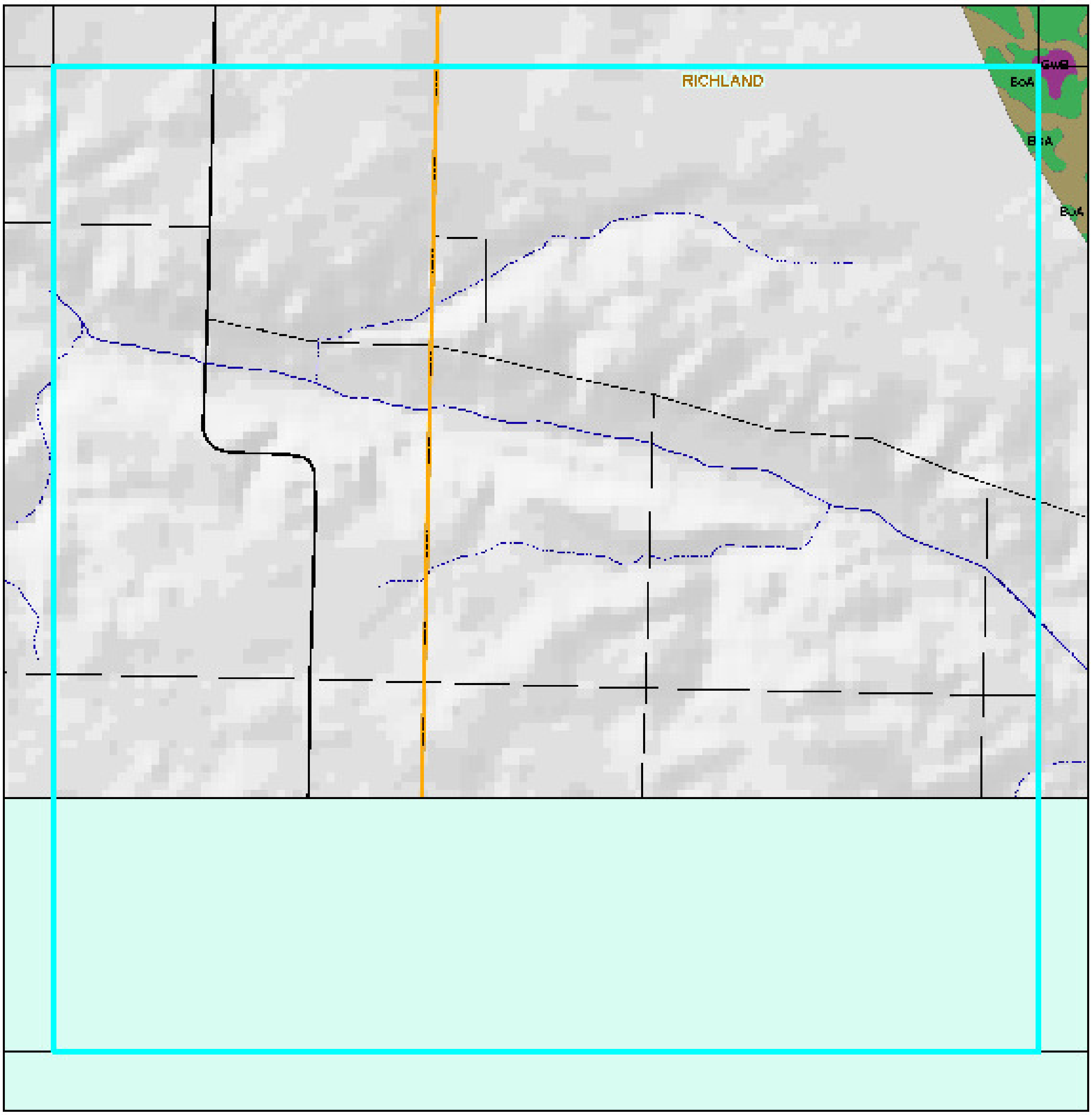

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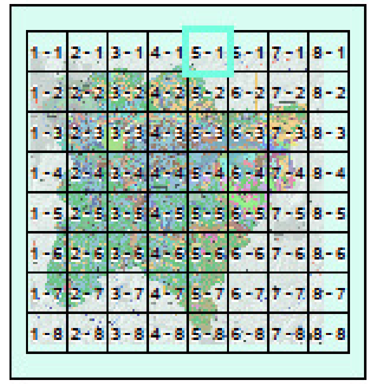
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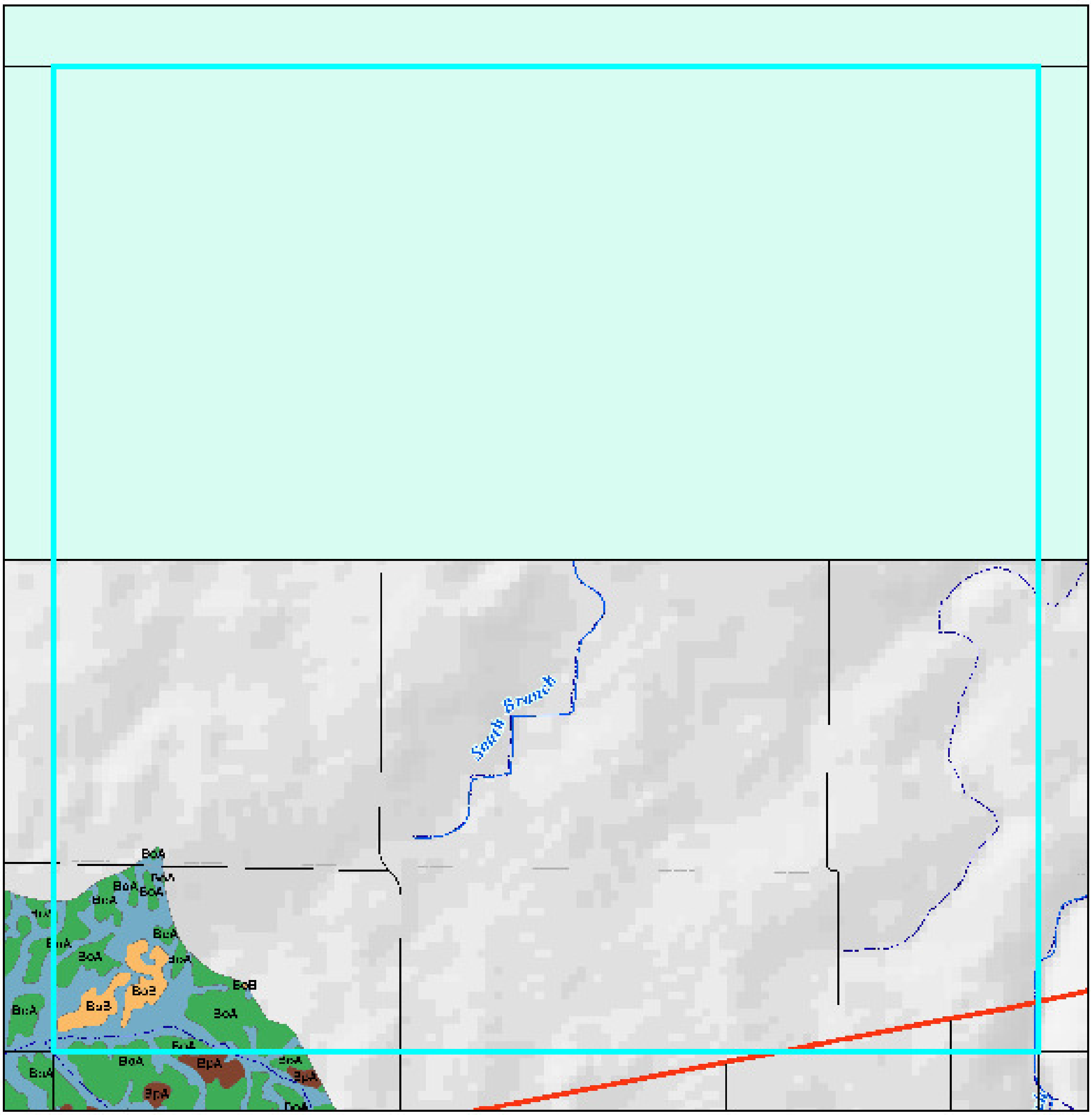
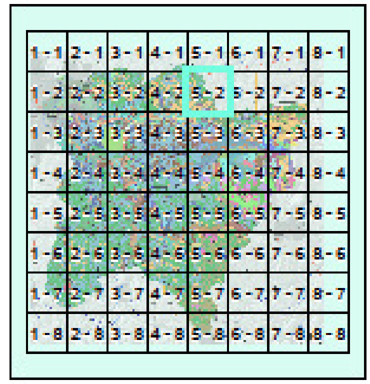

South Branch
BoA
BoB
EpA

Grid 5-2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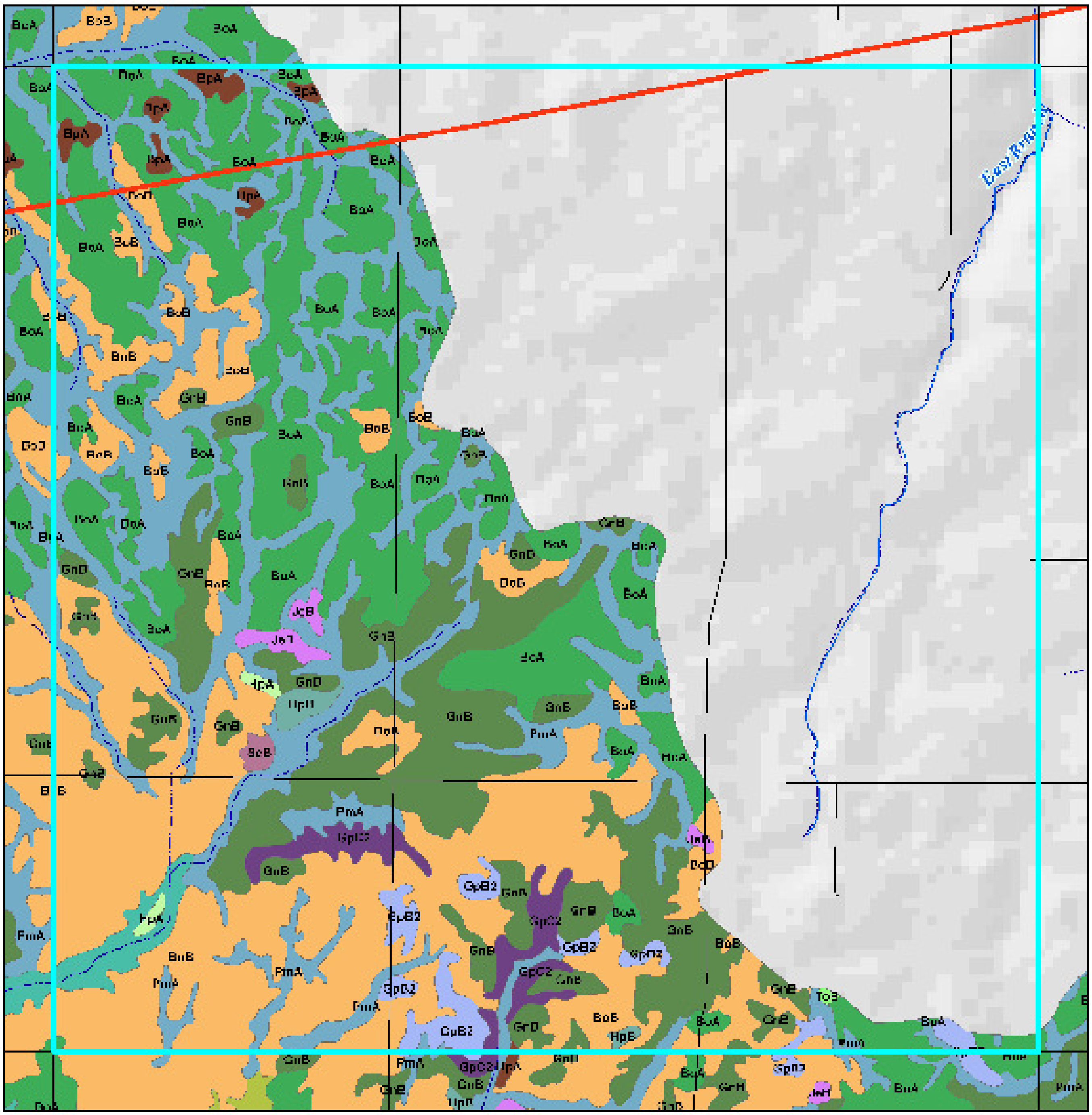

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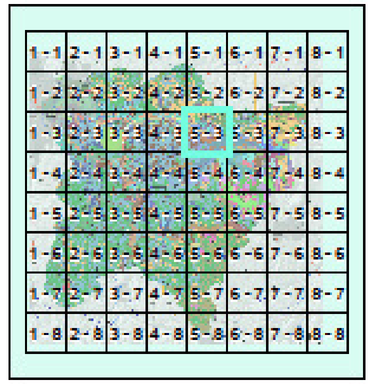

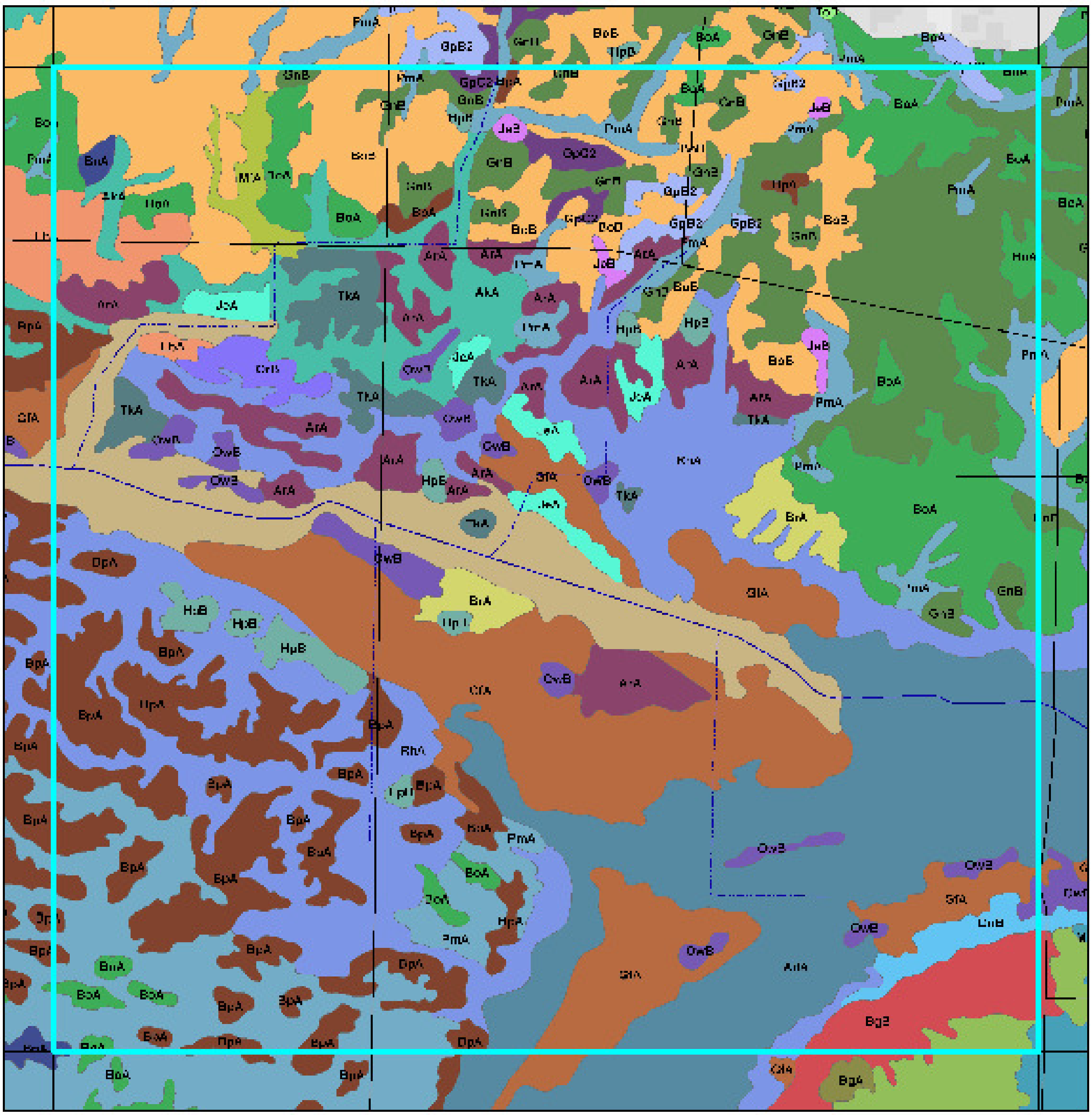

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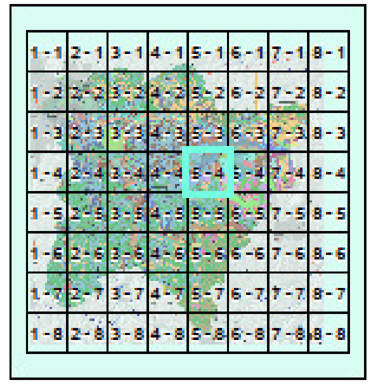

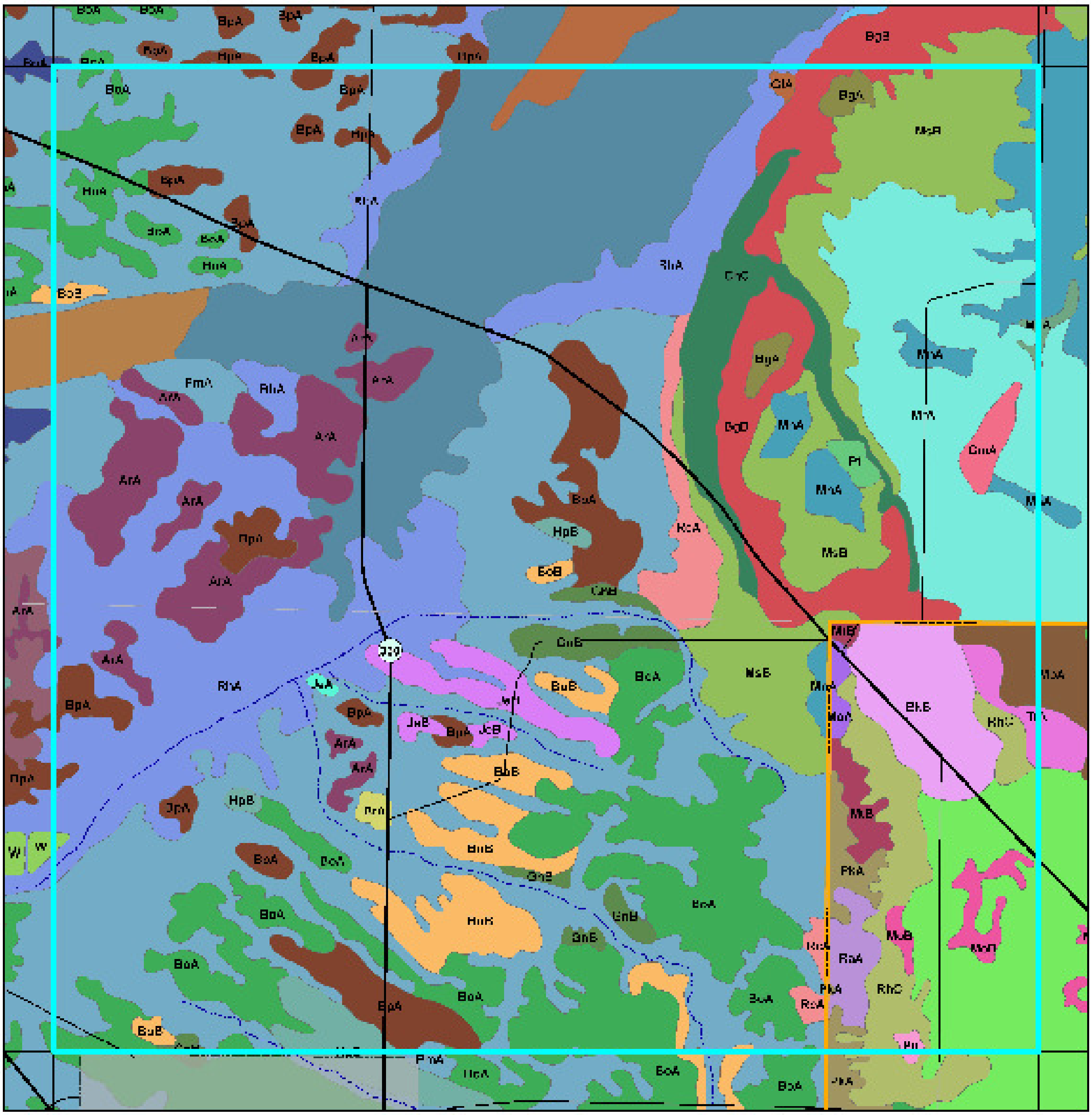

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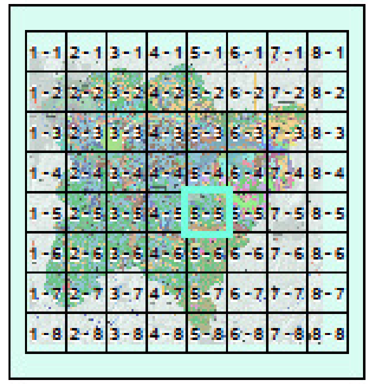
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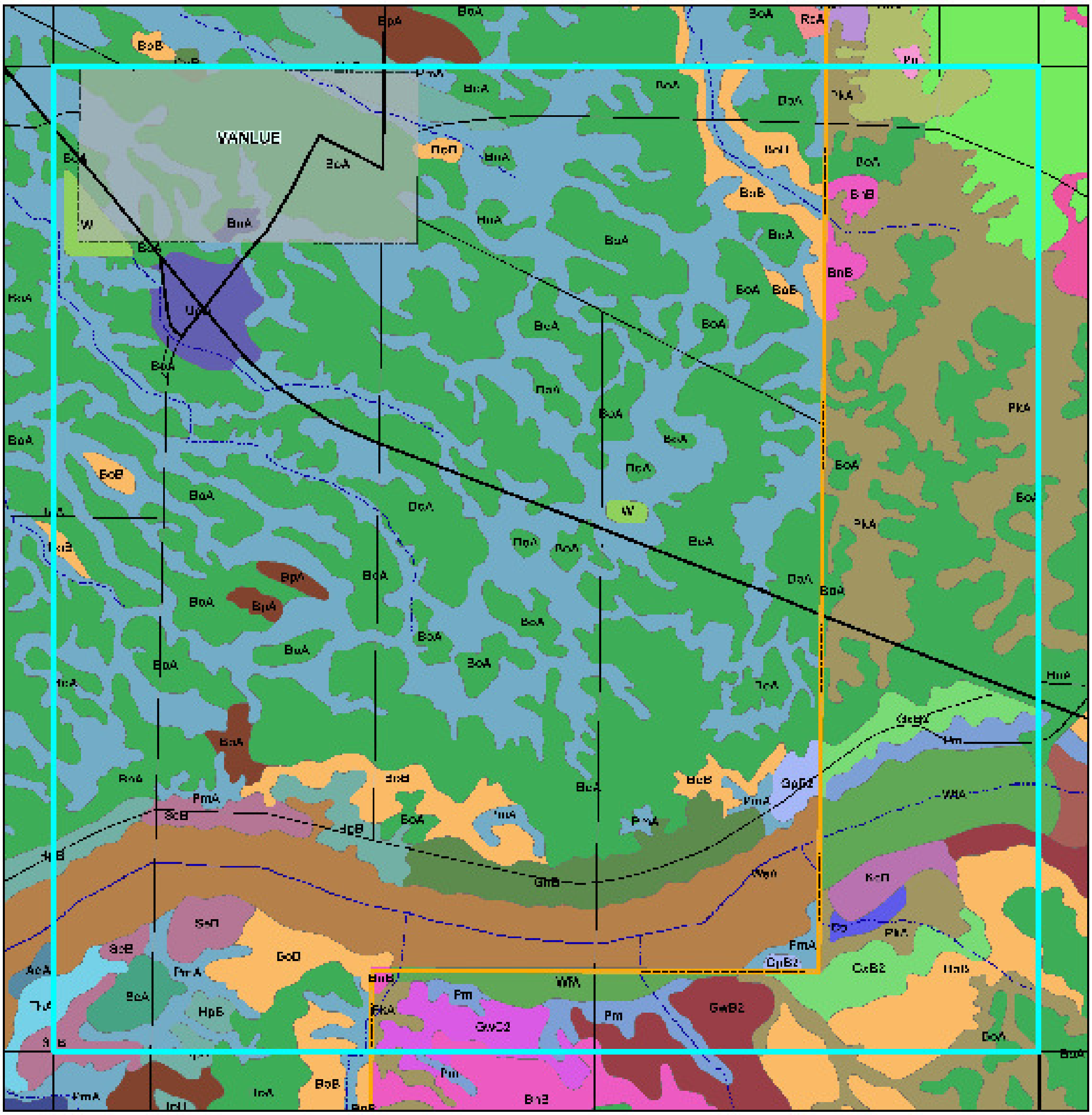
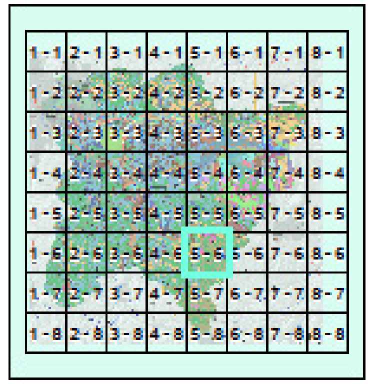

VANLUE

Grid 5-6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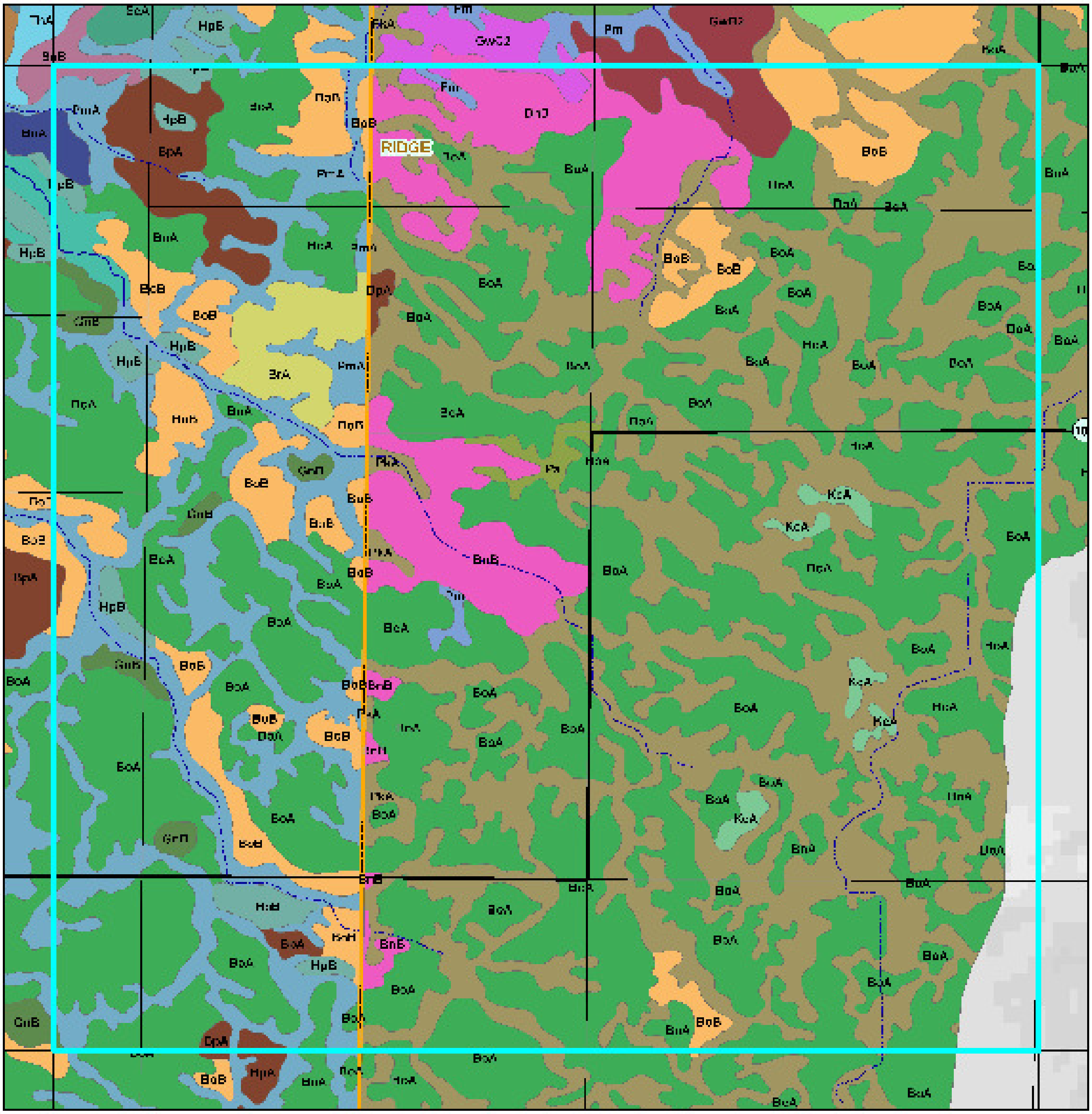
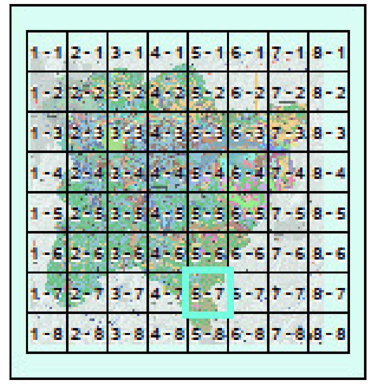
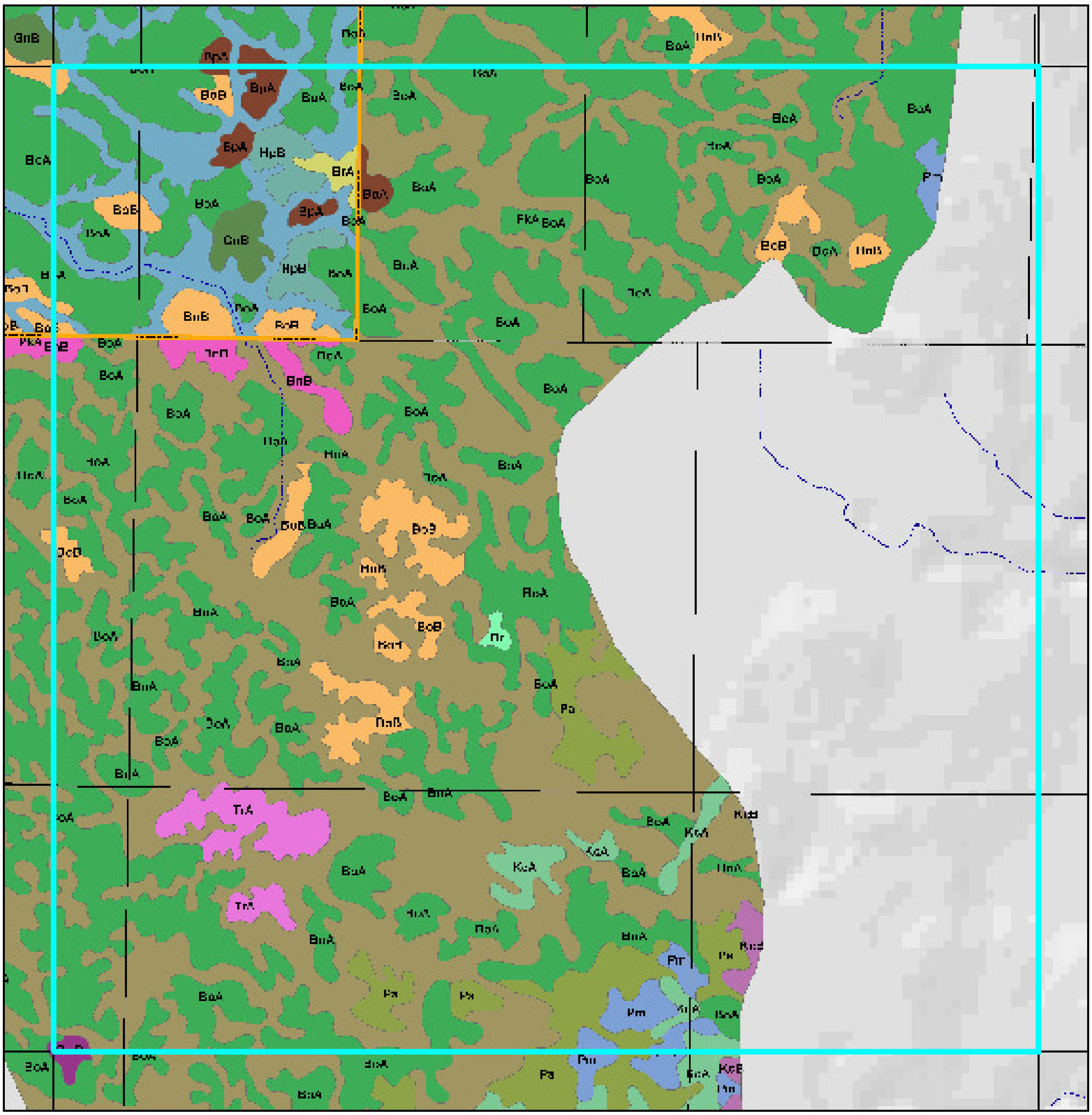

RIDGE

Grid 5-7





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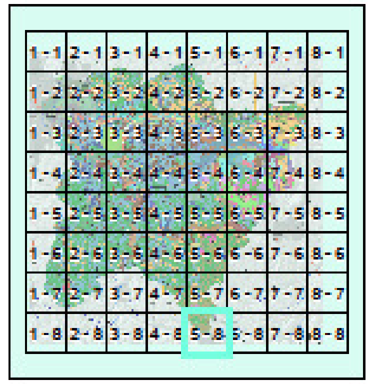
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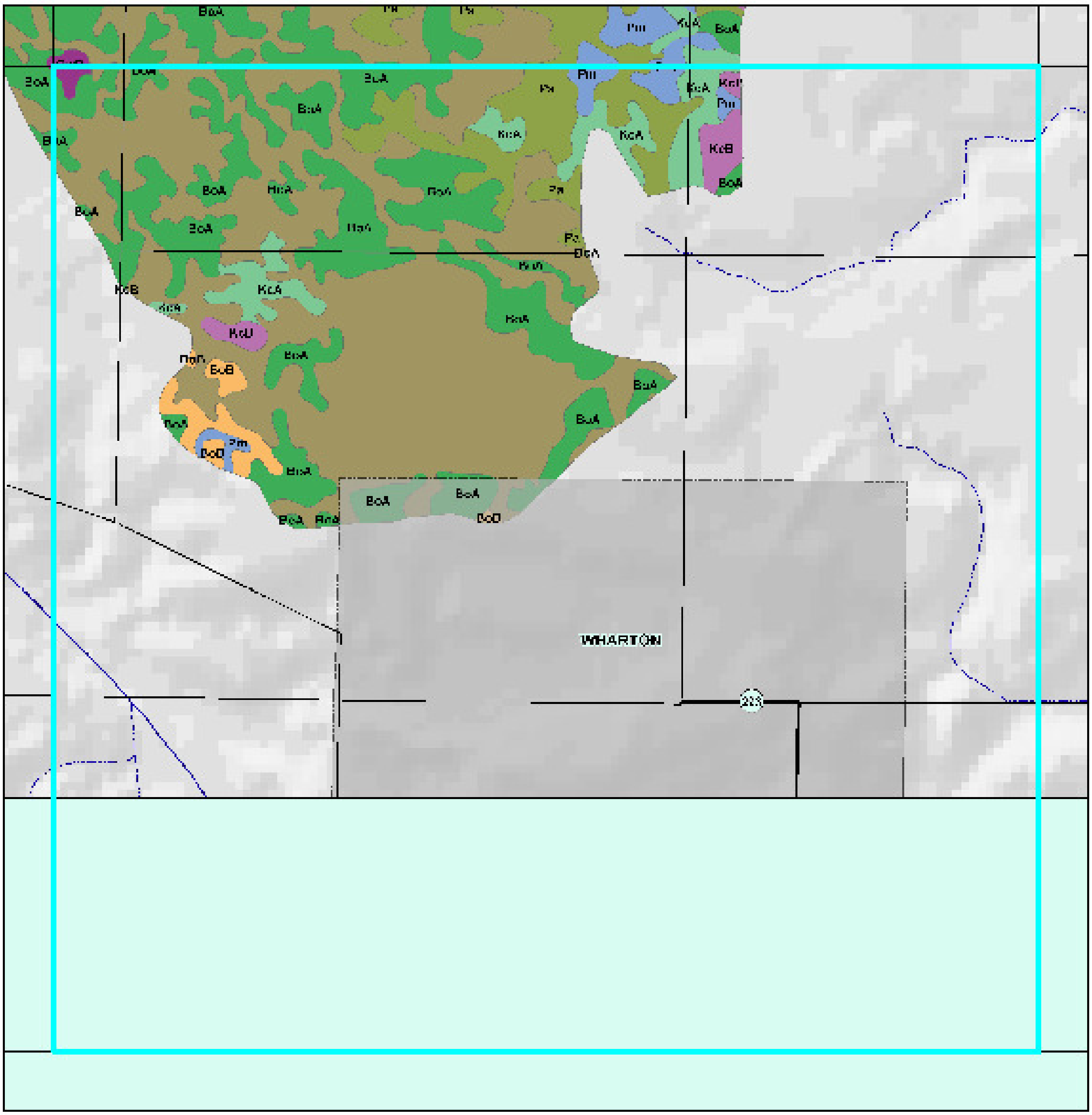
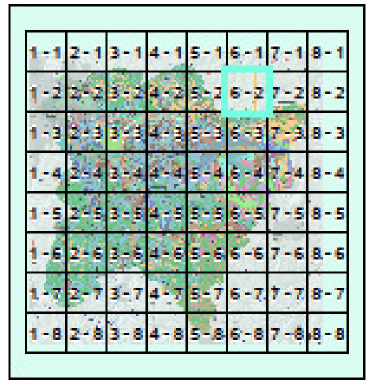

BoA
KcA
KcB
Pm
Pa
BoB
BoD
WHARTON

Grid 6-2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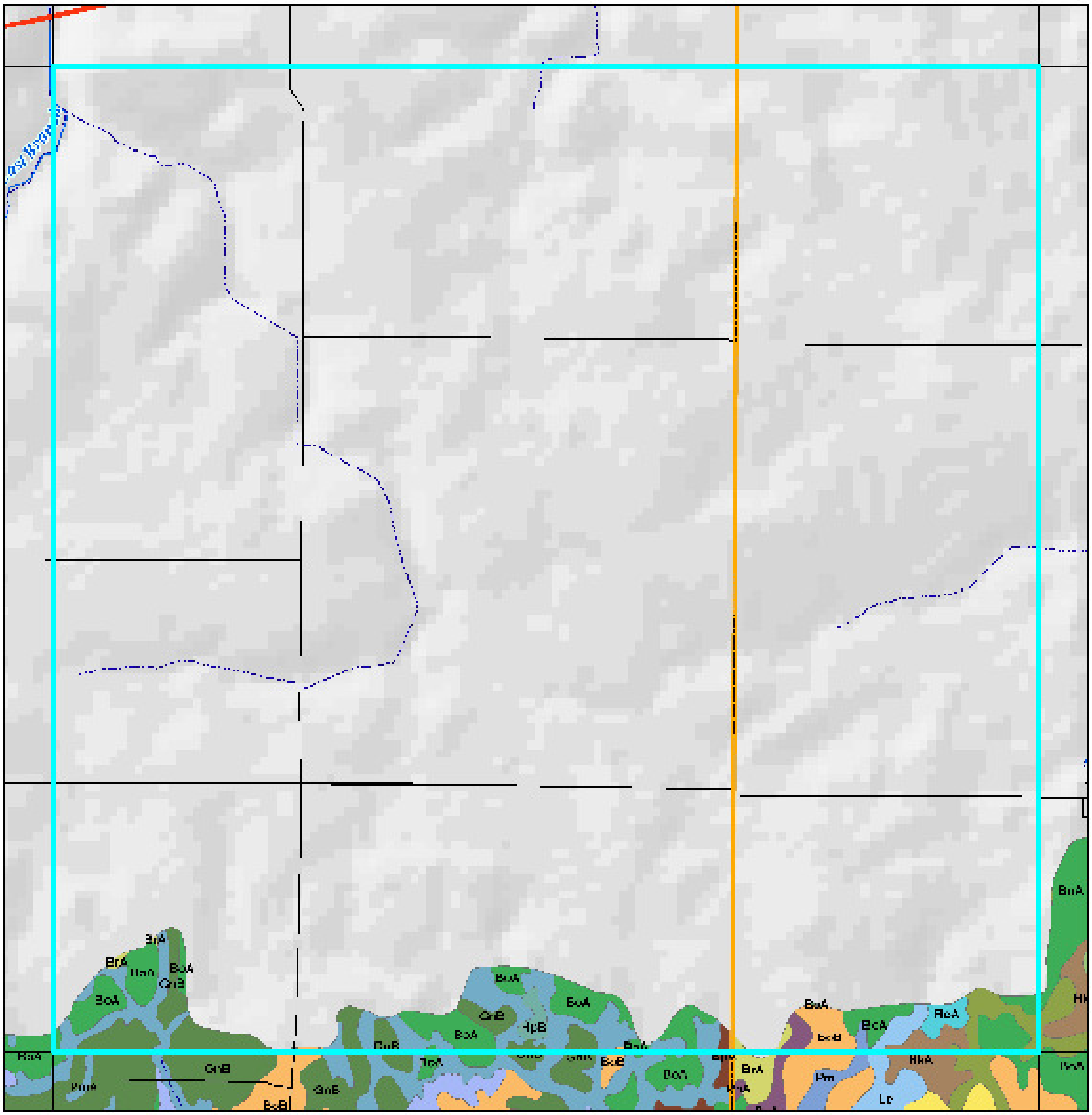

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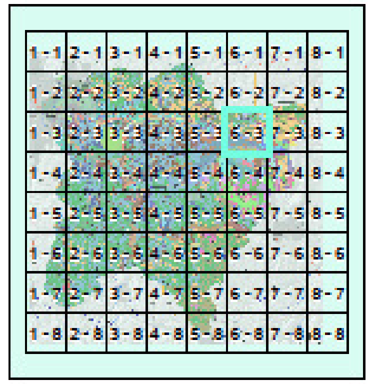
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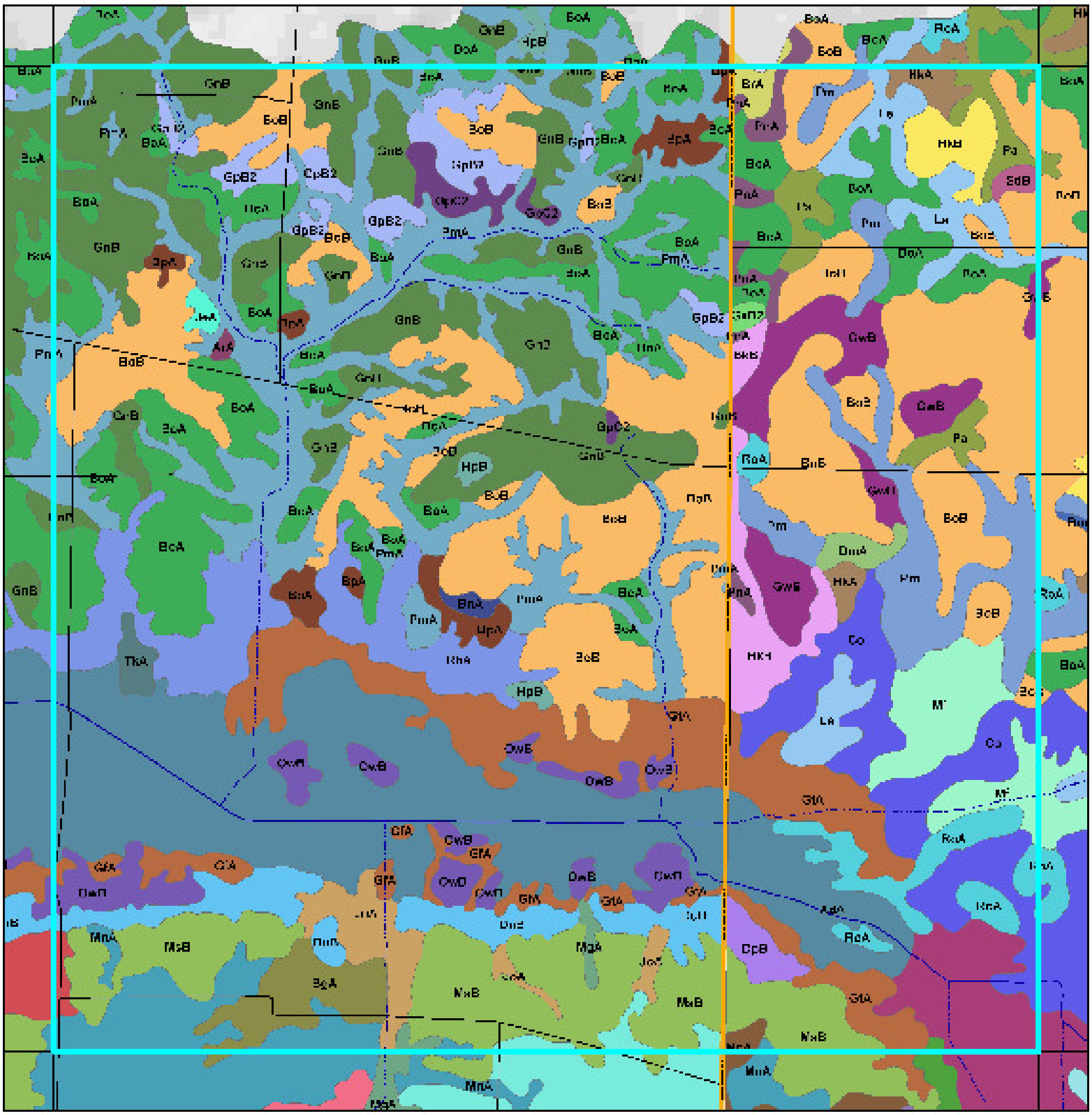

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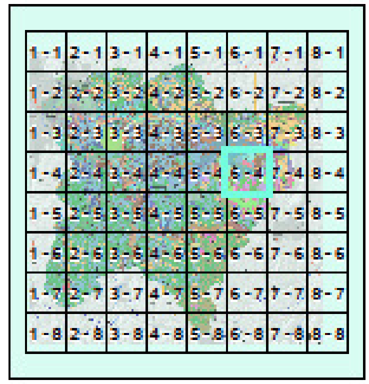
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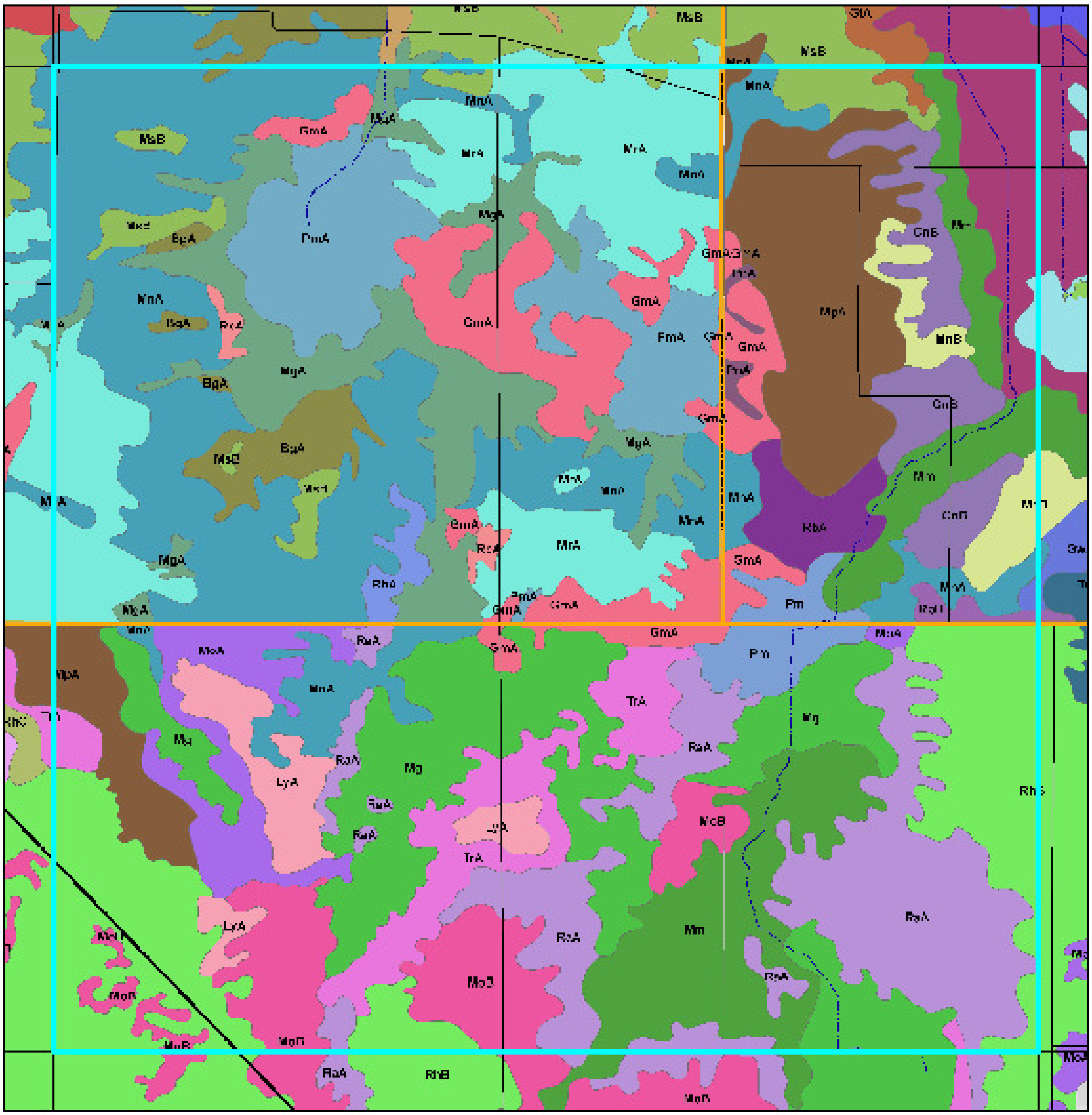
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NsB
MnA
MsB
GmA
MgA
MnA
NrA
MgA
BgA
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GmA
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GmA
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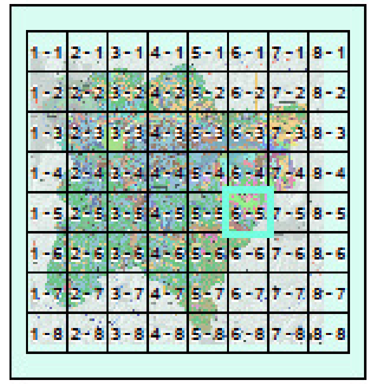
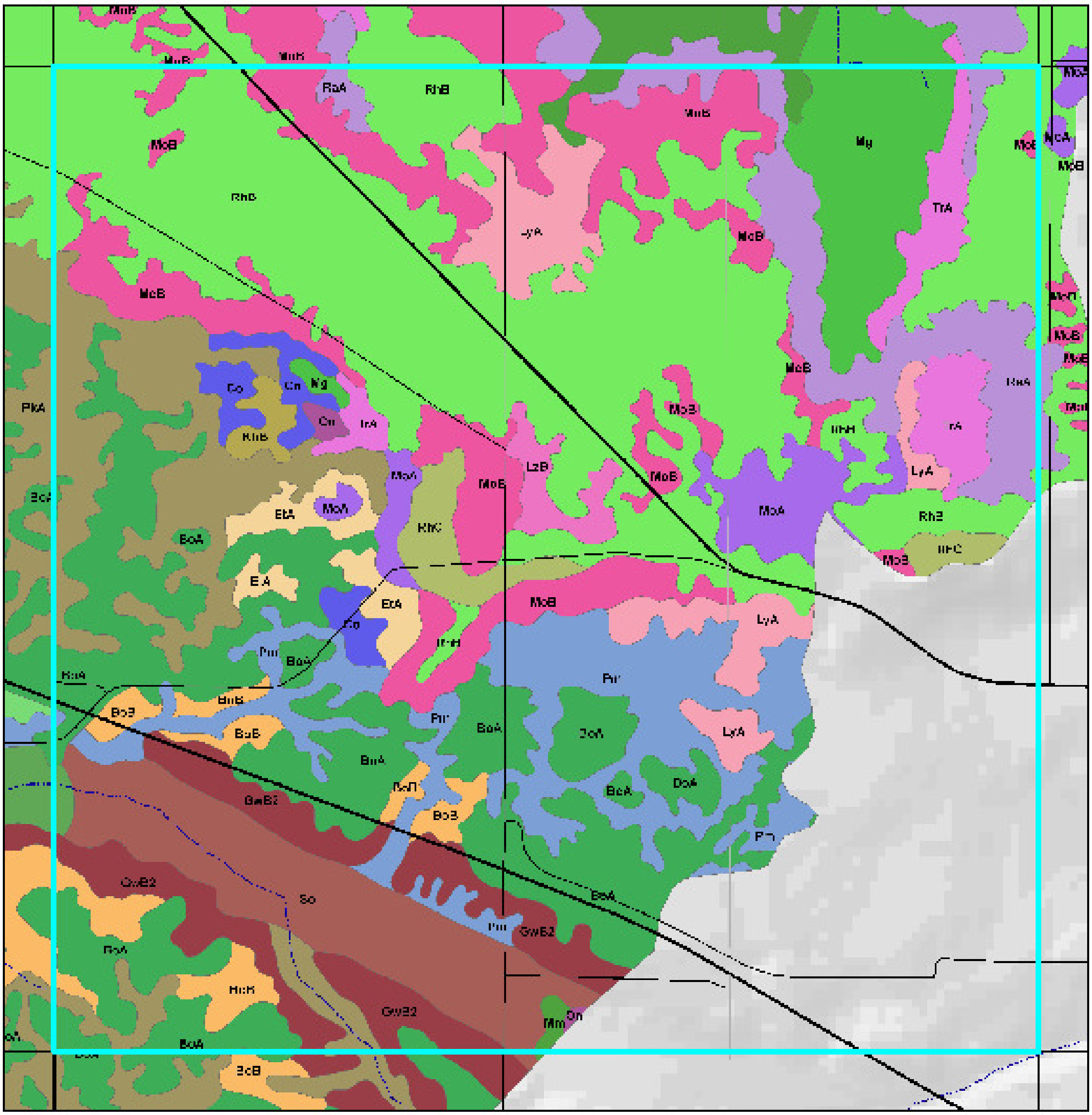
RaA
McB
Mm
MoB
RhB

Grid 6-5





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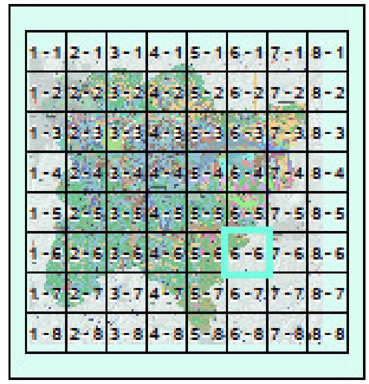

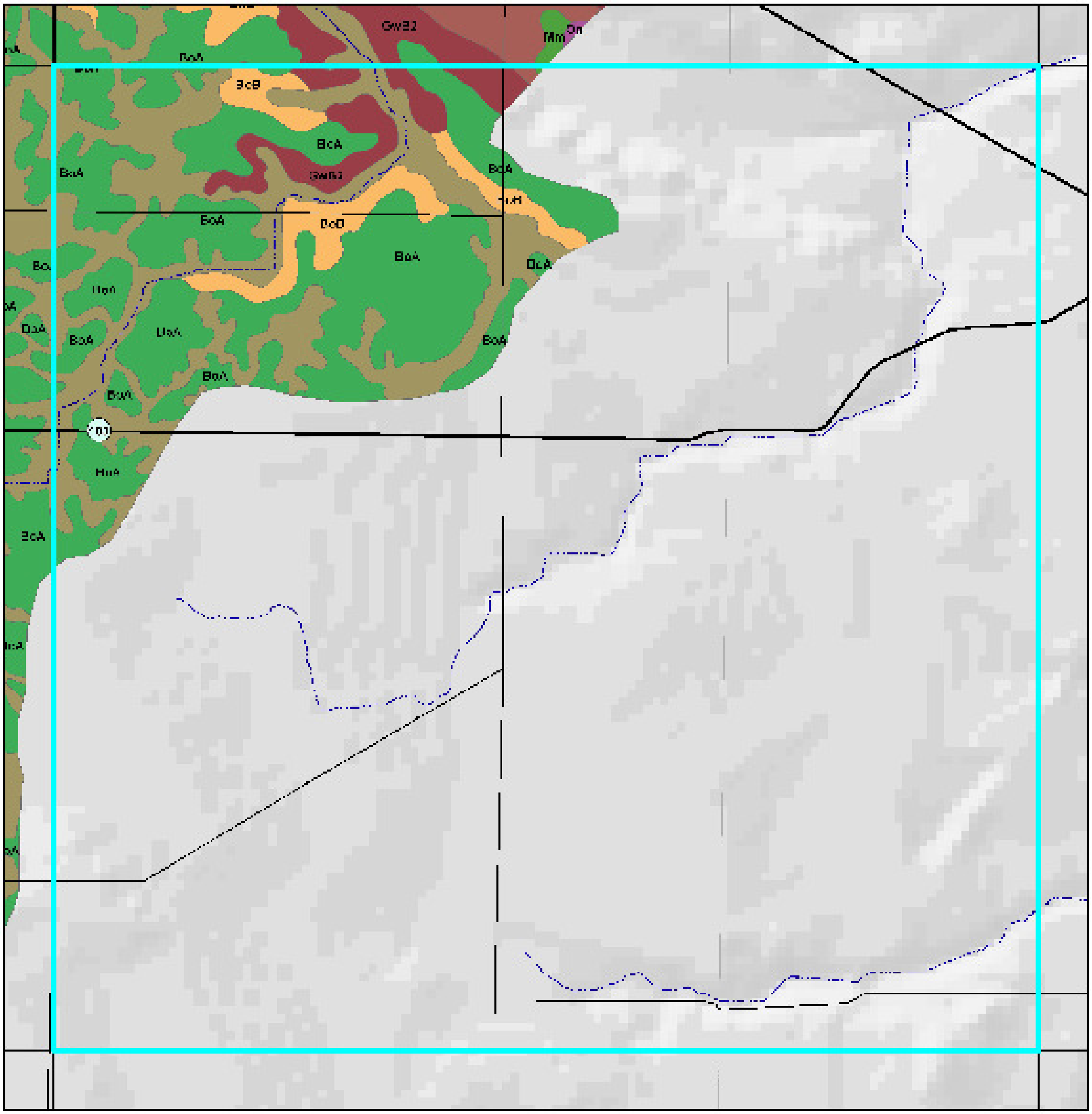

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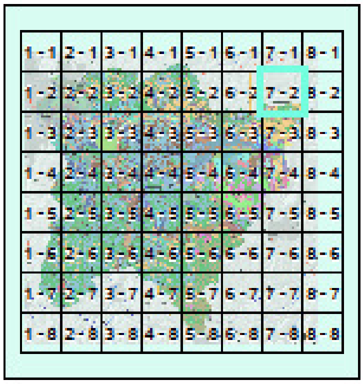

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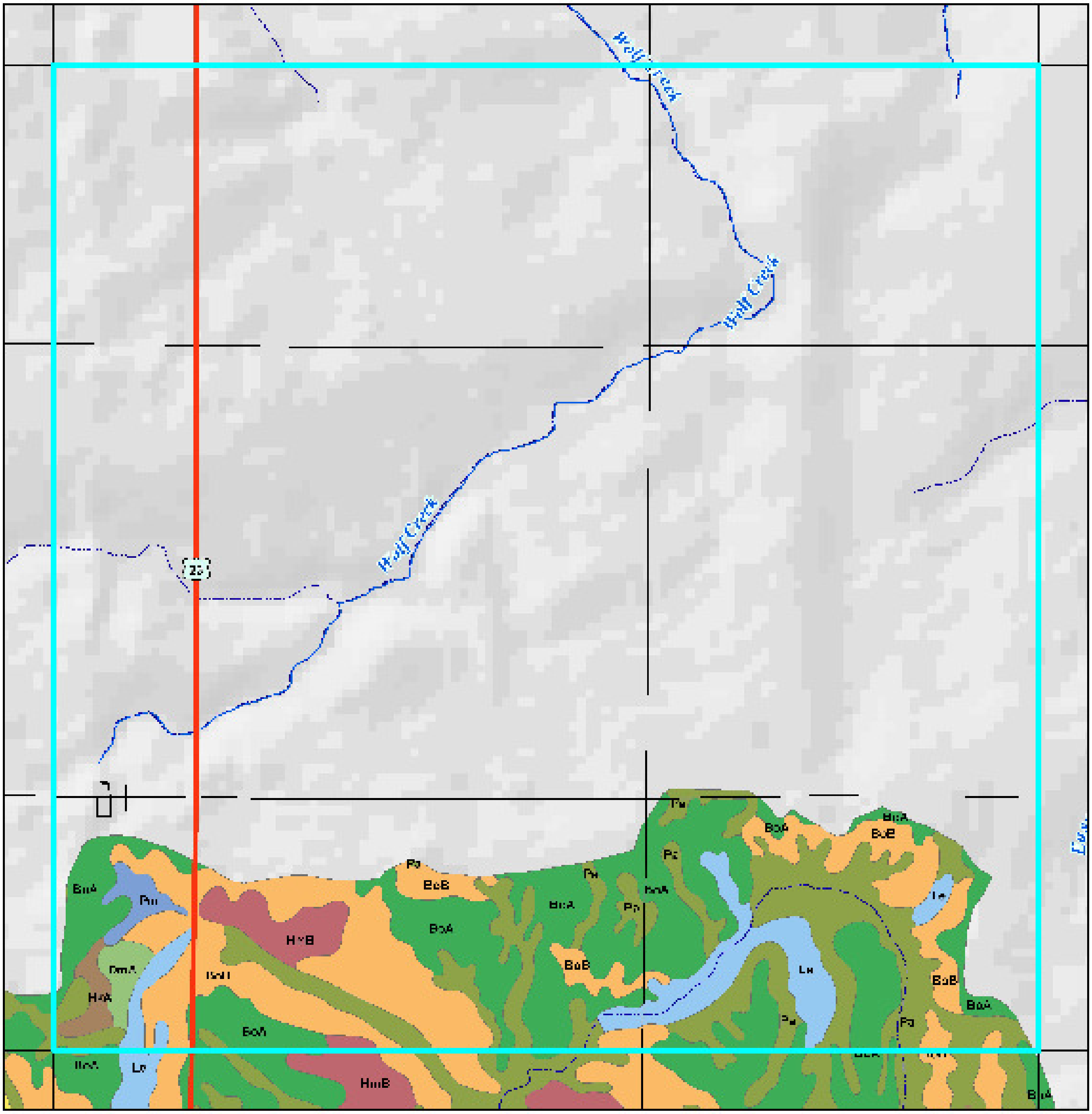
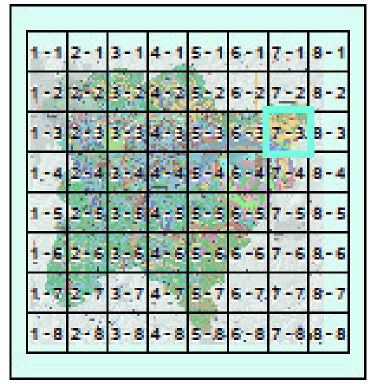
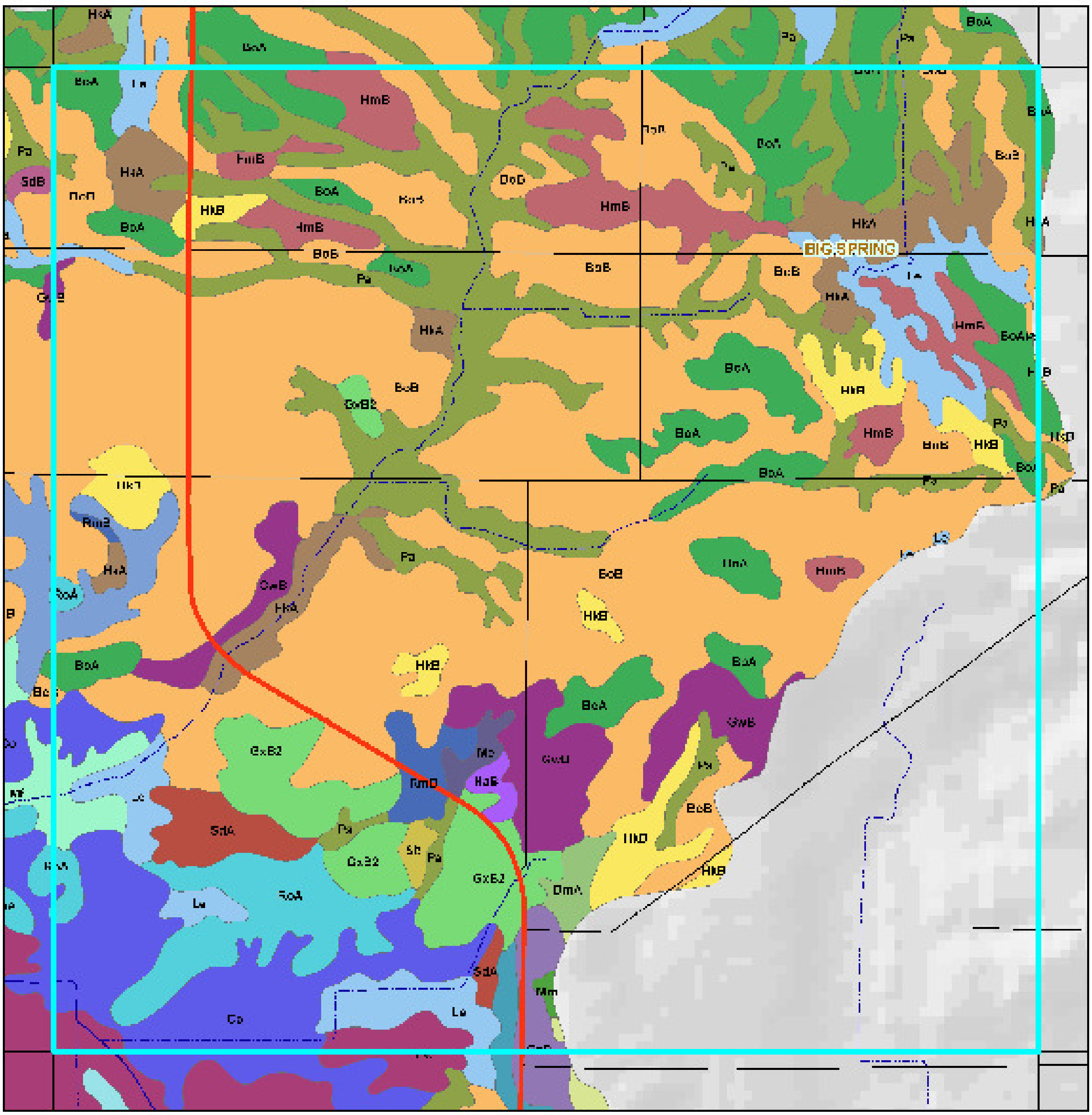


Wolf Creek
Wolf Creek
Wolf Creek
BoA
BoB
HmB

Grid 7-3





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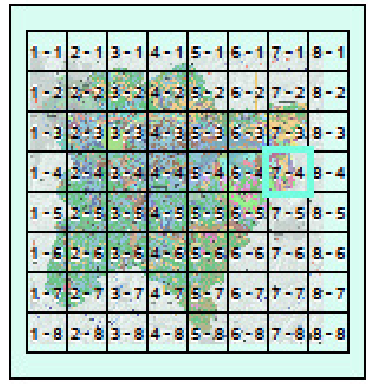
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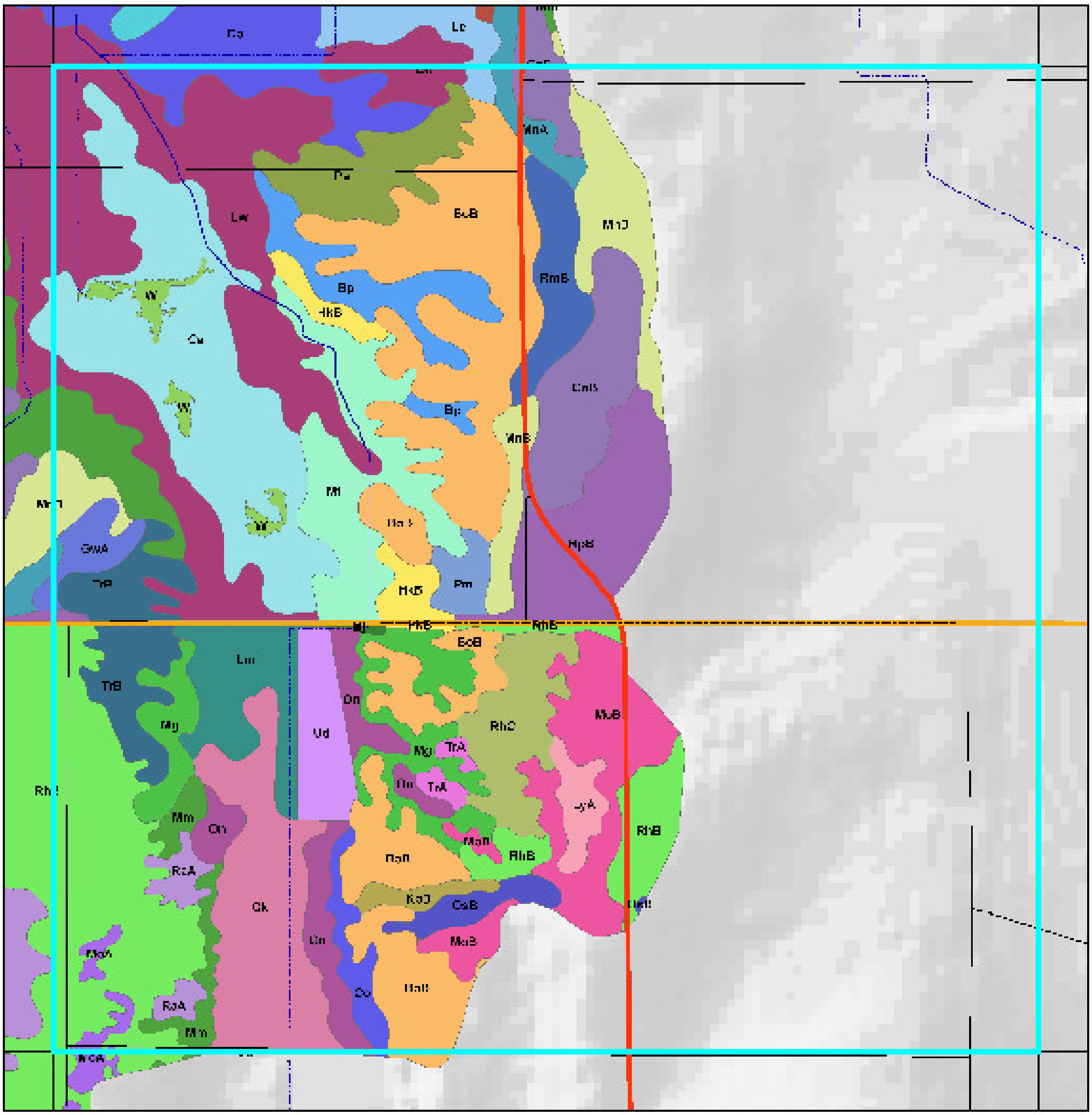
3-1
4-1
5-1
6-1
7-1
8-1
7-4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RmB
BoB
MuB
Ud
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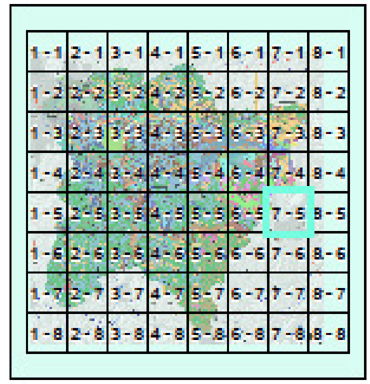
RaA
RhB
TrA
CaB
MaB
GwA
W
Mt
Pm
RhC
TrB

Grid 7-5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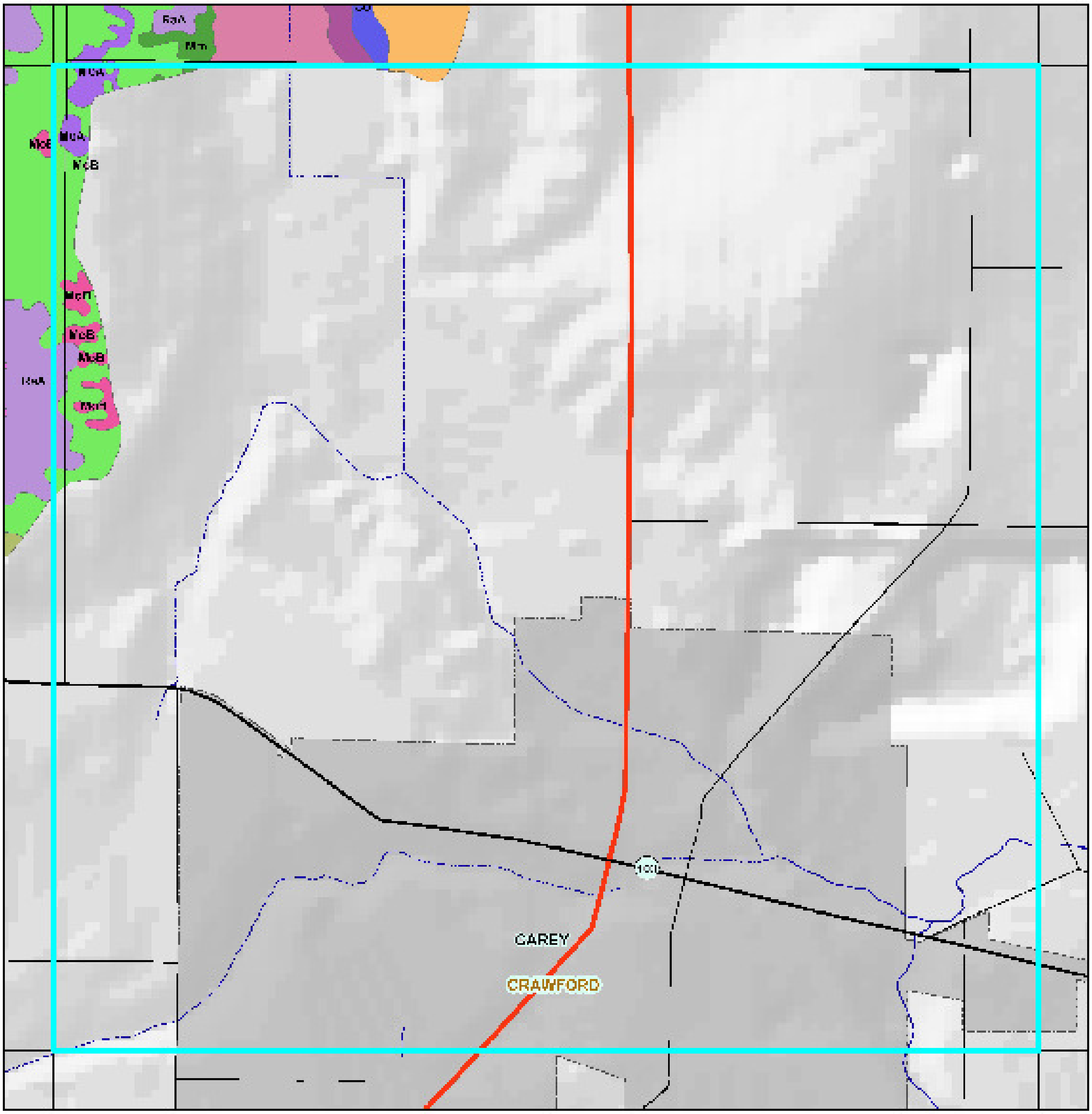
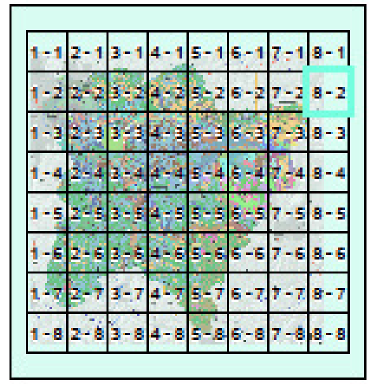

CAREY
CRAWFORD

Grid 8-2



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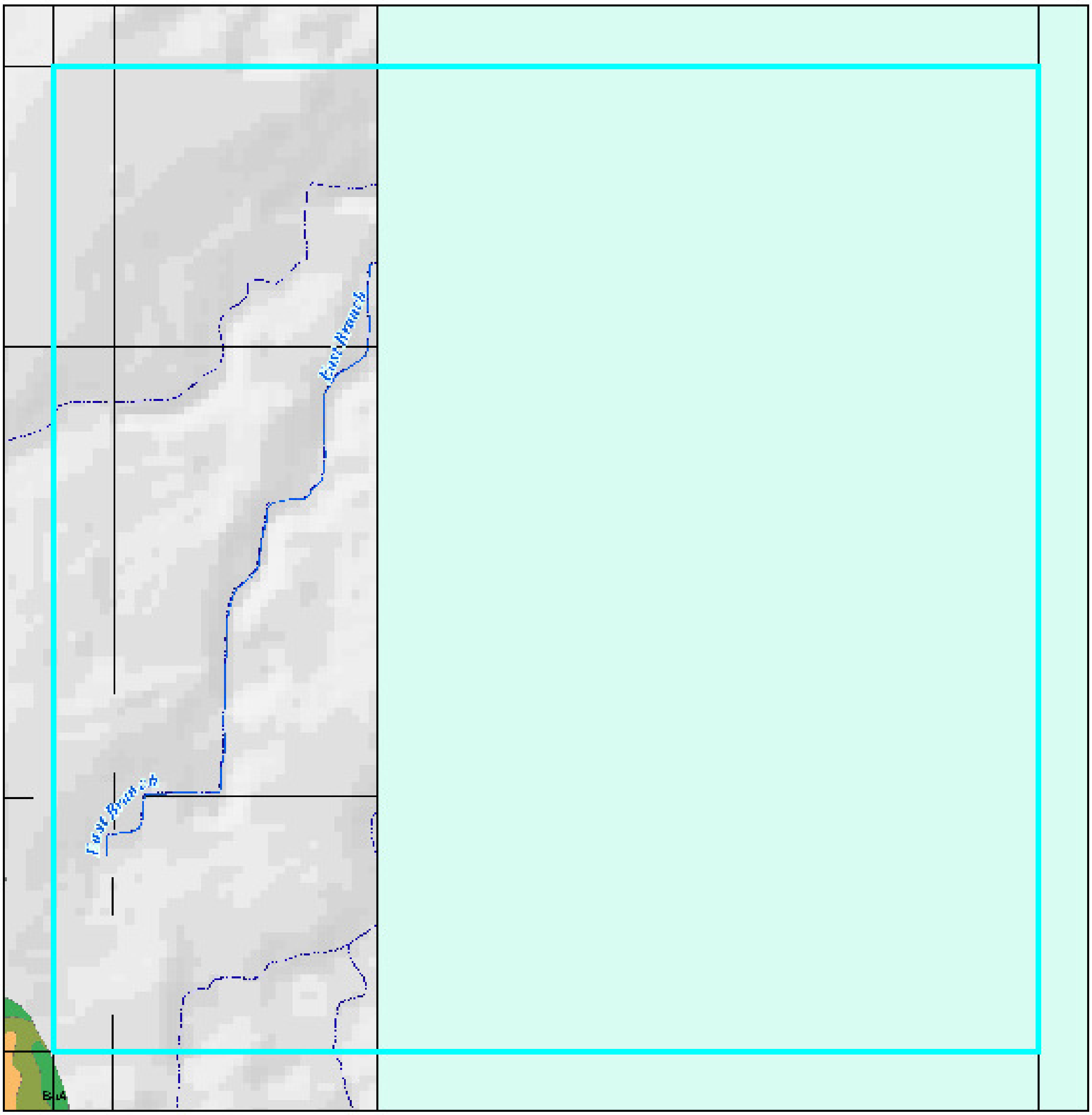
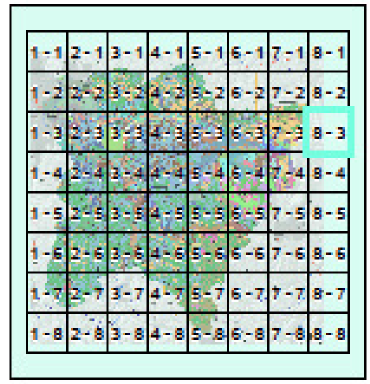


East Branch
East Branch

Grid 8-3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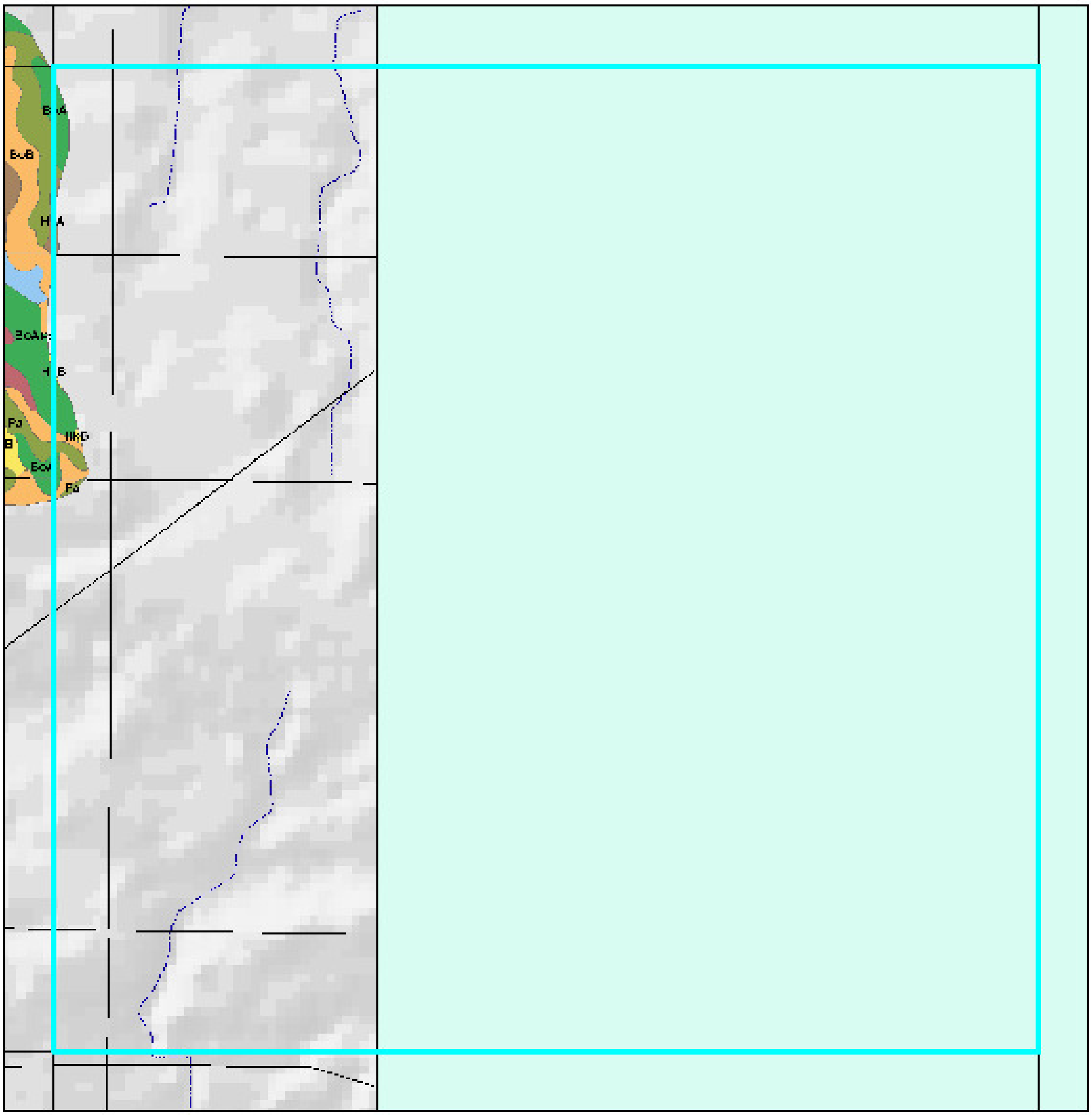

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Appendix C

Biological Resources

Fish

During the 2005 OEPA TMDL study, a comprehensive fish tissue study was conducted by the Ohio Department of Natural Resources - Division of Wildlife. Three sites on the Blanchard River, one site on Lye Creek, two sites on The Outlet, one site on Stahl Ditch, and one site on Buck Run were sampled within The Outlet/Lye Creek watershed. A general summary of the results from these samplings can be seen in Table A.1 on the next page. For a more detailed report use the following web site: http://www.epa.state.oh.us/dsw/document_index/psdindx.html. Look under the year 2007 and click on the Appendices.

Mammals

A list of mammals found in Hancock County was supplied by the Hancock Park District. The list included:

Badger
Coyote
Eastern Chipmunk
Eastern Mole
Evening Bat
Fox Squirrel
Gray Squirrel
House Mouse
Keens Bat
Least Weasel
Masked Shrew
Mink
Norway Rat
Raccoon
Red Fox
Short-tailed Shrew
Striped Skunk
White-footed mouse
Woodchuck.

Big Brown Bat
Deer Mouse
Eastern Cottontail
Eastern Pipistrelle
Flying Squirrel
Gray Fox
Hoary Bat
Indiana Bat*
Least Shrew
Little Brown Bat
Meadow Vole
Muskrat
Opossum
Red Bat
Red Squirrel
Silver-haired Bat
Thirteen-lined Ground Squirrel
White-tailed Deer

*listed on U.S. Endangered Species list.

For the purpose of this WAP, we will assume these mammals are spread throughout the entire Blanchard River Watershed.

Table C.1 Summary of Fish Species from 2005 Fish Study					
Location / Species	Blanchard River	Lye Creek	The Outlet	Stahl Ditch	Buck Run
Largemouth Bass	10	1	1	1	4
Smallmouth Bass	17	0	0	0	0
Rock Bass	84	0	51	37	0
White Crappie	1	0	0	0	0
Green Sunfish	48	19	31	17	1
Bluegill Sunfish	38	5	1	3	1
Orangespotted Sunfish	1	0	0	0	0
Longear Sunfish	114	14	22	32	4
Hybrid X Sunfish	1	0	0	0	0
Green Sf X Longear Sf	11	0	0	0	0
Pumpkinseed Sunfish	0	1	0	0	0
Yellowhead Bullhead	10	2	42	19	5
Black Bullhead	0	7	9	0	0
Gizzard Shad	9	0	0	0	0
Black Redhorse	9	0	0	0	0
Golden Redhorse	80	0	0	0	0
White Sucker	3	18	24	33	284
Spotted Sucker	12	0	0	0	0
Northern Hog Sucker	22	0	0	0	0
Creek Chubsucker	0	0	20	2	0
Common Carp	26	1	18	0	2
Creek Chub	42	1	259	60	318
Bluntnose Minnow	656	281	227	3	492
Suckermouth Minnow	8	0	0	0	0
Flathead Minnow	1	3	3	0	6
Silverjaw Minnow	38	2	1	0	0
Blackstripe Topminnow	1	44	79	12	1
Brindled Madtom	15	0	0	0	0
Tadpole Madtom	0	11	4	0	0
Common Shiner	0	1	0	0	1
Golden Shiner	0	6	19	0	0
Redfin Shiner	85	4	4	0	1
Striped Shiner	13	0	1	0	30
Spotfin Shiner	35	1	0	0	0
Blackside Darter	23	0	0	0	0
Johnny Darter	55	16	129	0	0
Greenside Darter	149	1	205	0	0
Rainbow Darter	93	1	0	2	0
Fantail Darter	20	0	0	0	0
Orangethroater Darter	0	2	156	0	0
Logperch	22	1	0	0	0
Central Stoneroller	8	2	326	207	567
Central Mudminnow	0	0	26	0	0
Redfin Pickerel	0	0	5	2	0
Common Carp X Goldfish	0	0	2	0	0

Birds of The Outlet/Lye Creek Watershed

This is a listing of 294 species of birds that have been recorded in the The Outlet/Lye Creek watershed. It is possible (actually probable) that other species have gone unrecorded, but these would be accidentals or vagrants and only have occurred in the area once or twice.

Species are listed in the currently accepted taxonomic order set forth by the American Ornithological Union. Species listed in **bold** are known to have bred in the sub-watersheds at least once in the past ten years.

After each species is listed a letter (A, M, S, W, Y) which tells generally when this species is most often seen.

- A - Accidental, vagrant or wanderer. Generally only a few records; in many cases a couple at most.
- M - Migrant. Seen in spring or fall as it travels to or from its breeding grounds further north.
- S - Summer. A species, typically arriving in spring, that stays to breed.
- W - Winter. Seen mostly as a winter resident.
- Y - Year-round. Seen at all times of year.

All species except for the year-round birds should be considered also as migrants.

It should be noted that there are three locations in this watershed that are considered significant bird areas: The Clay Pits, part of which is found on the west side of the watershed, is the only wetlands of any real size found in Hancock County; The Findlay Reservoirs which are a major waterfowl and shorebird migratory stopping location; and Springville Marsh State Nature Preserve which is one of the last native marshes left in NW Ohio.

Species:

Greater White-fronted Goose	M	**Wood Duck**	S
Snow Goose	M	Gadwall	M
Ross's Goose	A	Eurasian Wigeon	A
Brant	A	American Wigeon	M
Cackling Goose	W	American Black Duck	M
Canada Goose	Y	**Mallard**	Y
Trumpeter Swan	M	**Blue-winged Teal**	S
Tundra Swan	M	Northern Shoveler	M
Mute Swan	M	Northern Pintail	M

Species cont.

Green-winged Teal	M
Canvasback	M
Redhead	M
Ring-necked Duck	M
Greater Scaup	M
Lesser Scaup	M
Harlequin Duck	A
Surf Scoter	M
Black Scoter	A
White-winged Scoter	M
Long-tailed Duck	M
Bufflehead	M
Common Goldeneye	M
Hooded Merganser	M
Common Merganser	M
Red-breasted Merganser	M
Ruddy Duck	M
Ring-necked Pheasant	Y
Wild Turkey	Y
Northern Bobwhite	A
Red-throated Loon	A
Common Loon	M
Pied-billed Grebe	Y
Horned Grebe	M
Red-necked Grebe	A
Eared Grebe	M
Western Grebe	A
	A
	M
	A

American White Pelican	A
Brown Pelican	A
Double-crested Cormorant	M
American Bittern	M
Least Bittern	Y
Great Blue Heron	M
Great Egret	A
Snowy Egret	A
Cattle Egret	S
Green Heron	M
Black-crowned Night-Heron	A
Yellow-crowned Night-Heron	S
Turkey Vulture	M
Osprey	Y
Bald Eagle	A
Peregrine Falcon	A
Merlin	W
American Kestrel	Y
Northern Harrier	W
Sharp-shinned Hawk	M
Cooper's Hawk	Y
Northern Goshawk	W
Red-shouldered Hawk	Y
Broad-winged Hawk	M
Red-tailed Hawk	Y
Rough-legged Hawk	W

Species cont.

King Rail	M
Virginia Rail	M
Sora	M
Common Moorhen	M
American Coot	M
Sandhill Crane	M
Black-bellied Plover	M
American Golden-Plover	M
Semipalmated Plover	M
Killdeer	S
Whimbrel	A
Black-necked Stilt	A
American Avocet	M
Spotted Sandpiper	S
Upland Sandpiper	A
Solitary Sandpiper	M
Greater Yellowlegs	M
Willet	M
Lesser Yellowlegs	M
Hudsonian Godwit	A
Marbled Godwit	A
Red Knot	A
Ruddy Turnstone	M
Sanderling	M
Baird's Sandpiper	M
White-rumped Sandpiper	M
Semipalmated Sandpiper	M
Western Sandpiper	M
Least Sandpiper	M
Pectoral Sandpiper	M
Dunlin	M
Buff-breasted Sandpiper	M
Short-billed Dowitcher	M
Long-billed Dowitcher	M
Wilson's Snipe	M
American Woodcock	S
Wilson's Phalarope	M
Red-necked Phalarope	A
Red Phalarope	A
Great Black-backed Gull	M
Laughing Gull	A
Franklin's Gull	M
Bonaparte's Gull	M
Ring-billed Gull	Y
Herring Gull	Y
Iceland Gull	A
Lesser Black-backed Gull	M
Glaucous Gull	M
Forster's Tern	M
Black-legged Kittiwake	A
Least Tern	A
Caspian Tern	M
Black Tern	M
Common Tern	M
Mourning Dove	Y
Eurasian Collared-Dove	A
Rock Pigeon	Y

Species cont.

Black-billed Cuckoo	S
Yellow-billed Cuckoo	S
Northern Saw-whet Owl	M
Barn Owl	A
Eastern Screech-Owl	Y
Great Horned Owl	Y
Snowy Owl	W
Barred Owl	Y
Long-eared Owl	W
Short-eared Owl	M
Belted Kingfisher	Y
Chimney Swift	S
Common Nighthawk	S
Whip-poor-will	M
Ruby-throated Hummingbird	Y
Pileated Woodpecker	S
Hairy Woodpecker	Y
Downy Woodpecker	Y
Yellow-bellied Sapsucker	M
Red-bellied Woodpecker	Y
Red-headed Woodpecker	S
Northern Flicker	Y

Eastern Wood-Pewee	S
Yellow-bellied Flycatcher	M
Acadian Flycatcher	S
Alder Flycatcher	S
Willow Flycatcher	S
Least Flycatcher	M
Eastern Phoebe	S
Great Crested Flycatcher	S
Eastern Kingbird	S
Scissor-tailed Flycatcher	A
Olive-sided Flycatcher	M
Northern Shrike	W
Blue Jay	Y
White-eyed Vireo	S
Yellow-throated Vireo	S
Blue-headed Vireo	M
Warbling Vireo	S
Philadelphia Vireo	M
Red-eyed Vireo	S
American Crow	Y
Horned Lark	S
Barn Swallow	S
Cliff Swallow	M
Bank Swallow	S
Northern Rough-winged Swallow	S
Purple Martin	S
Tree Swallow	S

Species cont.

Black-capped Chickadee	Y
Carolina Chickadee	Y
Tufted Titmouse	Y
White-breasted Nuthatch	Y
Red-breasted Nuthatch	M
Brown Creeper	M
Marsh Wren	S
Sedge Wren	M
Winter Wren	M
Carolina Wren	Y
House Wren	S
Brown Thrasher	S
Northern Mockingbird	Y
Gray Catbird	S
Blue-gray Gnatcatcher	S
Golden-crowned Kinglet	W
Ruby-crowned Kinglet	M
American Robin	Y
Veery	M
Eastern Bluebird	Y
Varied Thrush	A
Gray-cheeked Thrush	M
Swainson's Thrush	M
Hermit Thrush	M
Wood Thrush	S

European Starling	Y
American Pipit	M
Cedar Waxwing	M
Bohemian Waxwing	A
American Redstart	S
Back-and-white Warbler	M
Prothonotary Warbler	S
Blue-winged Warbler	M
Golden-winged Warbler	M
Tennessee Warbler	M
Orange-crowned Warbler	M
Nashville Warbler	M
Northern Parula	M
Yellow Warbler	S
Chestnut-sided Warbler	M
Magnolia Warbler	M
Cape May Warbler	M
Black-throated Blue Warbler	M
Yellow-rumped Warbler	M
Black-throated Green Warbler	M
Blackburnian Warbler	M
Yellow-throated Warbler	S
Pine Warbler	M
Prairie Warbler	A
Palm Wabler	M
Bay-breasted Warbler	M
Blackpoll Warbler	M
Cerulean Warbler	M

Species cont.

Worm-eating Warbler	M	White-throated Sparrow	W
Ovenbird	M	White-crowned Sparrow	M
Northern Waterthrush	M	Dark-eyed Junco	W
Louisiana Waterthrush	M	Lapland Longspur	W
Kentucky Warbler	M	Snow Bunting	W
Connecticut Warbler	M	**Dickcissel**	S
Mourning Warbler	M	Summer Tanager	A
Common Yellowthroat	S	**Scarlet Tanager**	S
Hooded Warbler	M	**Northern Cardinal**	Y
Wilson's Warbler	M	**Rose-breasted Grosbeak**	S
Canada Warbler	M	Blue Grosbeak	A
Yellow-breasted Chat	S	**Indigo Bunting**	S
Eastern Towhee	S	Painted Bunting	A
Spotted Towhee	A	Purple Finch	W
Swamp Sparrow	Y	**House Finch**	Y
American Tree Sparrow	W	**Bobolink**	S
Clay-colored Sparrow	A	**Red-winged Blackbird**	S
Chipping Sparrow	S	**Eastern Meadowlark**	S
Field Sparrow	Y	Western Meadowlark	A
Vesper Sparrow	S	Yellow-headed Blackbird	M
Lark Sparrow	A	Rusty Blackbird	M
Lark Bunting	A	Brewer's Blackbird	A
Savannah Sparrow	S	**Common Grackle**	S
Grasshopper Sparrow	S	**Brown-headed Cowbird**	Y
Henslow's Sparrow	A	**Orchard Oriole**	S
LeConte's Sparrow	A	**Baltimore Oriole**	S
Nelson's Sparrow	A	Red Crossbill	W
Fox Sparrow	M	Pine Grosbeak	A
Song Sparrow	Y		
Lincoln's Sparrow	M		

Species cont.

White-winged Crossbill	W
Common Redpoll	W
Pine Siskin	W
American Goldfinch	Y
Evening Grosbeak	W
House Sparrow	Y

Report on the mussels of the Blanchard River in the vicinity of Findlay, Ohio

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Summary

A study of the mussels of the Blanchard River and Eagle Creek in and within the vicinity of the City of Findlay, Ohio was performed on 19-22 September, 26-29 September, and 3-6 October. Water clarity during this time period was excellent and water depth was within acceptable limits throughout the study period. Mussels were collected by hand employing sight and tactile methods involving both general collecting (including some timed sampling methods) and line transect and quadrat sampling. A total of 29 species of mussels were found during the current study. Twenty of these species were found to be extant in the Blanchard River in the study area and seven species were found to be extant in Eagle Creek. Eagle Creek within its lower reaches suffers from water quality and habitat quality problems that limit this stream's ability to serve as habitat for a wider diversity of mussels. Furthermore, habitat constrains the community of mussels within the impounded section of the Blanchard River in the City of Findlay. Only eight species of mussels were found in this reach, none of these species was found alive, and one of these species (*Uniomerous tetralasmus*, an Ohio threatened species) was found only as a weathered dead specimen (indicating that the species is not extant in the reach).

All other reaches examined supported a fairly diverse community of mussels. The second reach upstream from the downstream end of the project area supported the greatest diversity of mussels with 18 species found to be extant in this reach and three others extirpated from the reach. This reach supports Ohio listed species (all Ohio species of concern) and high mussel density (3.8-4.4 mussels/m^2). Another reach (Area 4) produced a living specimen of the Ohio threatened species (*Ligumia recta* – black sandshell) as well as 12 extant species and one extirpated species. Area 1 (furthest downstream section) supported 12 extant species also with five species found to be extirpated from this reach, and Area 6 (upstream of the city) supported seven extant species with three species found to be extirpated from this reach.

No living or freshly dead specimens of Ohio endangered or US endangered (or candidate species) were found during the study. The clubshell, *Pleurobema clava* (Ohio and US endangered species), was found as weathered and subfossil shells in the lowermost two areas sampled, the rayed bean, *Villosa fabalis* (Ohio endangered and in prelisting as a US endangered species) was found as subfossil shells in the lowermost reach, and the purple lilliput, *Toxolasma lividus* (Ohio endangered and candidate for listing as a US endangered species) was found as a weathered shell in the lowermost reach. Similarly, *U. tetralasmus* (described above) and the wavy-rayed lampmussel, *Lampsilis fasciola* (Ohio species of concern) were found to be extirpated from the river. All other listed species (*L. recta*, black sandshell – Ohio threatened, *Alasmidonta marginata*, elktoe, *Lasmigona compressa*, creek heelsplitter, *Simpsonaias ambigua*, salamander mussel, *Ptychobranchus fasciolaris*, kidneyshell, and *Truncilla truncata*, deertoe – all Ohio species of concern) were found alive and/or as freshly dead shells indicating extant populations of these species occur in the project area. Given the presence of these species, the relatively high diversity of mussels in Area 2 and the large number of extant versus extirpated species (20 of 29 species found extant), the unimpounded reaches of the Blanchard River support a locally significant mussel community.

Introduction

Prior to 1990 little data existed concerning the mussels of the Blanchard River (Watters *et al*., 2009). The Museum of Zoology at The Ohio State University (OSUM) had 56 lots of specimens representing 21 species of mussels. No Ohio or US endangered or threatened species were known from the river and the river had only been sampled at five locations for mussels. In 1994 a survey of the mussels of the upper portion of the river was required during environmental assessment of the US Route 30 construction project. The authors of that report listed 15 species of mussels for this reach (upstream of Mt. Blanchard) including five species listed as endangered by Ohio. Upon review of the list included in this report, it was found to list species not known to occur in the Lake Erie drainage system and so later that summer a new study of the mussels of this reach was conducted. That study was continued through the summer of 1996 (Hoggarth *et al*.,2000) and ultimately resulted in the discovery of 21 species of mussels from this reach including one US and Ohio endangered species (*P. clava* – clubshell) and two species listed by Ohio as endangered and candidates for listing as endangered by the USFWS (*T.lividus* – purple lilliput, and *V. fabalis* – rayed bean). Hoggarth *et al*. (2000) documented the fact that *V. fabalis* was more abundant in this reach of the Blanchard River than any other stream in Ohio and perhaps in the Midwest.

Mussels are the most endangered of all aquatic organisms (Neves, 1993) with 14 of 80 Ohio species listed as endangered by the U.S. Fish and Wildlife Service, and another 21 species listed as endangered by the Ohio Department of Natural Resources, Division of Wildlife. In addition, ten species are listed as threatened or of special concern in the state. Sixteen Ohio species of mussels are either extirpated or extinct (ODNR, 2009).

Many factors have contributed to the decline in population number and community structure of these animals (reviewed by Havlik and Marking, 1987 and Marking and Bills, 1980). Chief among these factors are water pollution, sedimentation, habitat destruction, the construction of impoundments, instream construction including dredging and filling operations, and more recently competition with zebra mussels (Starrett, 1971; Fuller, 1974; Neves, 1987). Each of these affects mussels differently; instream construction might increase sedimentation which clogs mussel gills, while water pollution and the formation of impoundments affects the chemical constituency of the water and the physical nature of a stream’s habitats. Taken together these threats to stream ecosystems have resulted in the rarity of many species and populations of mussels.

The current study was performed to determine the mussel resources in the Blanchard River and Eagle Creek in Findlay, Ohio, immediately upstream of the city for both streams and immediately downstream of the city for the Blanchard River (Figures 1 & 2). In recent years the city has suffered significant flooding events which the city, working with state and federal agencies, would like to resolve for the health and welfare of the people of Findlay. This report provides the information needed to determine the impact of any proposed solution to the flooding problem on the mussel communities within the project area as shown in Figures 1, 2 and 3 on pages C-25 through C-27.

Materials and Methods

A study of the community structure and distribution of the mussels of the Blanchard River and Eagle Creek in Findlay (see Figures 1, 2 and 3 on pages C-25 through C-27 for the limits of this study) was performed on the following dates: 19-22 September, 26-29 September, and 3-6 October. Both streams were fairly low during the entire length of this study (Figure 4 on page C-27) with excellent water clarity (extremely important for sight dependent survey methods). Water chemistry parameters were examined late in the study (3-6 October 2009) due to rain events between 29 September 2009 and 3 October 2009 that may have changed water clarity and dropping temperatures (especially night-time temperatures) that may have decreased water temperature below recommended for extracting mussels from the substrate (50 $_{o}$F, 10 $_{o}$C). The following water quality parameters were assessed: water temperature and conductivity (HACH SensIon 5 Conductivity meter), Turbidity (HACH 2100P Turbidimeter) and pH and oxygen concentration (HACH HQ40d mulitprobe meter).

During the current study mussels were collected by employing transect and quadrat sampling and general collecting methods, as well as limited timed collecting techniques. Glass bottom viewers were used to increase the effectiveness of these fairly sight intensive methods. In addition, dead shells were collected from the banks and bottom of the river and creek and live mussels were collected by noodling (employing tactile methods rather than sight methods). The entire reach of the Blanchard River shown in Figures 1, 2 and 3, on pages C-25 through C-27, and Eagle Creek were sampled for mussels during this study. Where possible, the river and creek were walked and where the river was too deep (between dams in the City of Findlay), the river was sampled from a canoe. That is, access to sampling locations was reached by canoe. The Blanchard River was subdivided into five reaches for better communication of the data and Eagle Creek was subdivided into two reaches. The following reaches were assigned for the Blanchard River: Reach 1(furthest downstream) extended from CR 128 to TR 139; Reach 2 extended from TR 139 to CR 140; Reach 3 was from CR 140 to IR 75; Reach 4 was from IR 75 to the first dam upstream of the IR 75 Bridge; Reach 5 was between dams in Findlay; and Reach 6 was immediately downstream of the SR 568 Bridge (in the unimpounded section of the river upstream of the City of Findlay). Eagle Creek was subdivided into two reaches: one upstream of a city park dominated by a natural stream corridor, and one downstream of this reach dominated by an urban stream corridor. A sewer break, which was emptying untreated sewage into Eagle Creek within the upstream reach further distinguished the upstream from the downstream sections (that sewer line break was at 41$_{o}$00”12.59”N by 83$_{o}$38’37.32”W and entered Eagle Creek at 41$_{o}$00”11.10”N by 83$_{o}$38’39.78”W). This outfall significantly impacted the water quality of Eagle Creek and in the water quality data described below.

All live mussels collected in quadrats were measured (length, height, width), aged (annular ring method), and sexed when possible (only one subfamily of mussels shows sexually dimorphism in shells). Live mussels collected during general collecting or during timed sampling were identified and either left *in situ* or extracted from the bottom, identified, tallied, and quickly returned to the substrate. Shells were collected whenever found and determined to be freshly dead (dead less than one year with an intact periostracum and lustrous nacre), weathered dead (dead between one and twenty years with a mostly intact periostracum but lacking luster to the nacre) or subfossil shells (dead longer than twenty years with an abraded periostracum and chalky nacre). Only live and freshly dead shells were used to indicate the existence of an extant population of mussels within the project area.

Results

Twenty-three species of mussels had been recorded from the Blanchard River prior to this study (Table 1). Included in this total were one species (*P. clava* – the clubshell) listed as an Ohio and US endangered species, one species (*V. fabalis* – rayed bean) listed as an Ohio endangered species and in prelisting as a US endangered species, one other species listed as endangered in Ohio (*T. lividus* – purple lilliput), and five species listed in Ohio as species of concern (*A. marginata* – elktoe, *L. compressa* – creek heelsplitter, *P.sintoxia* – round pigtoe, *P. fasciolaris* – kidneyshell, and *L. fasciola* – wavy-rayed lampmussel). All but *P. clava* were found to be extant in the upper reaches of the river (Hoggarth *et al*., 2000). *Pleurobema clava* (clubshell) is believed to be extirpated from the river today (USFWS, 1993). The current study resulted in the discovery of 29 species of mussels from the Blanchard River (with fewer coming from Eagle Creek) including eight species never before reported for the river (Table 2). In addition, two species previously recorded for the river were not found during this study (as live specimens or dead shells). This gives a total of 31 species of mussels for the river. A total of seven species of mussels were found to occur in Eagle Creek (Table 3). Of these species, all were found extant within the upstream section and only two were found extant in the downstream section.

The current study yielded only weathered and subfossil specimens of *P. clava*, *T. lividus*, and *V. fabalis* (Table 4). No other Ohio or US endangered species were found. However, one live specimen of *L. recta* was found in Area 4, an Ohio threatened species, as well as live and/or freshly dead specimens of the following Ohio species of concern: *A. marginata, L. compressa, S. ambigua, P. fasciolaris,* and *T. truncata. Lampsilis fasciola,* an Ohio species of concern, was only found as a weathered shell. This is a first record for *L. recta, S. ambigua* and *T. truncate* for the river. In addition, one weathered dead specimen of *U. tetralasmus* (pondhorn) was collected from this river, which also represents the first time this Ohio threatened species has been collected from the Blanchard River. Given that the shell had been dead for some time and was collected from an impounded section of the river, it probably is not extant in the river today.

All sections of the river and both sections of Eagle Creek (see above for this discussion) produced mussels. Section 5 (between dams in the City of Findlay) produced the fewest extant species (seven), no live mussels, and only 24 freshly dead shells (Table 4). The species found in this reach were slack water or generalist species commonly found in

Ohio rivers and lakes (particularly impoundments). Freshly dead shells of one Ohio species of concern (*T. truncata*) were found in this reach (indicating an extant population of this species in this reach), but that species is more abundant and more widely distributed than its status in Ohio and nearby states indicates (see discussion below). Sections 2 and 4 produced the most mussels (Table 4). Section 2 produced 18 extant species and three species as weathered or subfossil shells. The three dominant species in this reach were *Lasmigona complanata* (white heelsplitter), *Leptodea fragilis* (fragile papershell) and *T. truncata* (deertoe). Quadrat sampling produced estimates of 0.8 mussels/m^2 in a run habitat within this reach and 3.8-4.4 mussels/m^2 in faster water habitats (either in riffles or just downstream of a riffle in a fast run habitat) near Liberty Landing canoe launch area (see Appendix 1 for these data). These same areas produced estimates of the Asiatic clam (*Corbicula fluminea* – an invasive species) in excess of 1000 clams/m^2.

Area 1 (furthest downstream section) produced the second most number of species (17) and specimens of *P. clava, T. lividus* and *V. fabalis*, but these, and other species, were represented here only by weathered or subfossil specimens. This reach only produced 35 live mussels, even though it was the longest natural reach of stream (not impounded) sampled during this study. Section 3 only produced six live mussels and seven extant species, but it was the shortest reach sampled during this study. It was separated here as it represents the reach of the river immediately downstream of the outfall of the wastewater treatment facility for the City of Findlay. We do not believe the relative absence of mussels here is due to that facility but the absence of habitat for mussels in this reach. The water chemistry for this reach was not all that different from reaches immediately upstream or downstream of the outfall (Table 5) and all parameters were within acceptable limits for mussels.

The same cannot be said for Eagle Creek. The site where water was sampled from Eagle Creek was downstream of the sewage line break discussed above and shown in Figure 13. It is probable that the water being helped upriver by the lower water levels experienced on 19-22 September, and 26-29 September (Figure 4) was released downstream by the precipitation event that occurred prior to the 3-6 October collecting period.
This water increased the Biological Oxygen Demand (not quantified) and reduced the oxygen concentration of the creek below 5 mg/l, which is generally thought of as the minimum level necessary to support aquatic life. A combination of water quality and habitat quality problems has eliminated all but the most tolerant of mussels from the lower reaches of Eagle Creek.

Discussion

This report documents the most complete survey for mussels in the vicinity of Findlay, Ohio that has been done. A total of 29 species of mussels were documented for the Blanchard River within this area and seven species were found in Eagle Creek. Prior to this study, Hoggarth *et al*. (2000) documented 21 species for the river and OSUM (Watters *et al*., 2009) document two additional species for the river. During the current study 20 of the 29 species found were found to have extant populations in the reach (mostly upstream and downstream of the impounded section in downtown Findlay).

None of the Ohio endangered species were found to be extant in the study area (including one federal endangered species, *P. clava*, one species in prelisting as an endangered species, *V. fabalis*, and one species a candidate for prelisting, *T. lividus*).

Eight species were reported here for the river for the first time. Six of these maintain extant populations in this reach (including the Ohio threatened species, *L. recta*, and two species listed by Ohio as species of concern, *S. ambigua* and *T. truncata*). The latter species, *T. truncata* is of interest as it, along with *L. fragilis* and *Potamilus alatus* are on the increase in the state as the species' host fish is becoming more abundant and widely distributed statewide and in adjacent states (Hoggarth, 1986, 1990, 1999, 2000, 2008, 2009; Hoggarth and Yankie, 2008). The freshwater drum (*Aplodinotus grunniens*) is the host of the parasitic larval stages of these three aforementioned species. As the drum's abundance and distribution has increased so too have these species. Freshwater drum were observed in the study area particularly downstream of the dams in the Blanchard River.

The mussel community that occurs in the Blanchard River upstream of the impounded sections and downstream of the dams in the river represent locally significant populations of mussels. Although the downstream community is dominated by a relatively silt tolerant and habitat generalist mussel (*L. complanata* accounted for 75-90% of the mussels in this reach), there are sufficient other species in this reach to suggest the mussel community here is of local significance. The presence of numerous state listed species here (including one Ohio threatened species and other species of concern) supports this conclusion. The number of creek heelsplitters (*L. compressa*) in Section 2 of the Blanchard River and kidneyshells (*P. fasciolaris*) in the section immediately upstream of the city is impressive. Both species were found upstream by Hoggarth et al. (2000), but only in similar numbers at the best site in the upper river. The density of mussels in a portion of this area (in the faster water within Section 2) also confirms the significance of the mussel community here (3.8-4.4 mussels/m_2).

Endangered Species

Only weathered and/or subfossil shells of *P. clava* were found in the study area (Sections 1 & 2). No live or freshly dead specimens were found. These data agree with the Recovery Plan for this species (USFWS, 1993) that this species is extirpated from the river. Additionally, only two subfossil shells of *V. fabalis* and one weathered shell of *T. lividus* were found at Station 1 (the only station that yielded these species). Again, these data suggest both species have been extirpated from this reach of the river. Similarly, *U.tetralasmus* (Ohio threatened) and *L. fasciola* (Ohio species of concern) were only found as a weathered shell indicating they too are extirpated from the river today. All other listed species, *L. recta* (Ohio threatened), and *A. marginata, L. compressa, S. ambigua, P.fasciolaris,* and *T. truncata* (all Ohio species of concern) were found to be extant. This is the first record of *L. recta* and *S. ambigua* for the Blanchard River. No Ohio or federally listed species were found to occur in Eagle Creek. This stream lacked suitable habitat in its lower reaches and was suffering from water quality problems upstream.

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Table 1. Species of mussels collected from the Blanchard River by Hoggarth *et al*. (2000) and/or deposited in the collection of the Ohio State University Museum of Zoology.

Species	**Common name**	**Extant**
1. *Pyganodon grandis*	giant floater	Yes
2. *Anodontoides ferussacianus*	cylindrical papershell	Yes
3. *Strophitus undulatus*	creeper	Yes
4. *Alasmidonta viridis*	slippershell	Yes
5. *Alasmidonta marginata*[e]	elktoe	Yes
6. *Lasmigona costata*	fluted-shell	Yes
7. *Lasmigona complanata*	white heelsplitter	Yes
8. *Lasmigona compressa*[e]	creek heelsplitter	Yes
9. *Amblema plicata*	threeridge	Yes
10. *Quadrula quadrula*	mapleleaf	Yes
11. *Quadrula pustulosa*	pimpleback	Yes
12. *Pleurobema clava*[a]	clubshell	No
13. *Pleurobema sintoxia*[e]	round pigtoe	Yes
14. *Fusconaia flava*	Wabash pigtoe	Yes
15. *Elliptio dilatata*	spike	Yes
16. *Ptychobranchus fasciolaris*[e]	kidneyshell	Yes
17. *Toxolasma lividus*[c]	lilliput	Yes
18. *Toxolasma parvum*	purple lilliput	Yes
19. *Villosa iris*	rainbow	Yes
20. *Villosa fabalis*[b]	rayed bean	Yes
21. *Lampsilis radiata luteola*	fat mucket	Yes
22. *Lampsilis cardium*	pocketbook	Yes
23. *Lampsilis fasciola*[e]	wavy-rayed lampmussel	Yes

a – Ohio and US endangered, b – Ohio endangered and US prelisting, c – Ohio endangered, d – Ohio threatened, e – Ohio species of concern

Table 2. Species of mussels collected from the Blanchard River and Eagle Creek during the current study in the vicinity of Findlay, Ohio.

Species	Common name	Extant
1. *Utterbackia imbecillis*	paper pondshell	Yes
2. *Pyganodon grandis*	giant floater	Yes
3. *Anodontoides ferussacianus*	cylindrical papershell	Yes
4. *Strophitus undulatus*	creeper	Yes
5. *Alasmidonta marginata*[e]	elktoe	Yes
6. *Lasmigona costata*	fluted-shell	Yes
7. *Lasmigona complanata*	white heelsplitter	Yes
8. *Lasmigona compressa*[e]	creek heelsplitter	Yes
9. *Simpsonaias ambigua*[e]	salamander mussel	Yes
10. *Amblema plicata*	threeridge	Yes
11. *Quadrula quadrula*	mapleleaf	Yes
12. *Quadrula pustulosa*	pimpleback	Yes
13. *Pleurobema clava*[a]	clubshell	No
14. *Fusconaia flava*	Wabash pigtoe	Yes
15. *Elliptio dilatata*	spike	Yes
16. *Uniomerus tetralasmus*[d]	pondhorn	No
17. *Ptychobranchus fasciolaris*[e]	kidneyshell	Yes
18. *Leptodea fragilis*	fragile papershell	Yes
19. *Potamilus alatus*	pink heelsplitter	Yes
20. *Truncilla truncata*[e]	deertoe	Yes
21. *Toxolasma lividus*[c]	lilliput	No
22. *Toxolasma parvum*	purple lilliput	No
23. *Obovaria subrotunda*	hickorynut	No
24. *Ligumia recta*[d]	black sandshell	Yes
25. *Villosa iris*	rainbow	No
26. *Villosa fabalis*[b]	rayed bean	No
27. *Lampsilis radiata luteola*	fat mucket	Yes
28. *Lampsilis cardium*	pocketbook	No
29. *Lampsilis fasciola*[e]	wavy-rayed lampmussel	No

a – Ohio and US endangered, b – Ohio endangered and US prelisting, c – Ohio endangered, d – Ohio threatened, e – Ohio species of concern

Table 3. Distribution of mussels collected from Eagle Creek during the current study in the vicinity of Findlay, Ohio. Numbers based on total mussels collected – all methods.

Species	Upstream			Downstream.		
	L	D	S	L	D	S
1. *A. ferussacianus*	0	3	--	0	2	--
2. *S. undulatus*	0	3	--	--	--	--
3. *L. complanata*	9	5	--	--	--	--
4. *A. plicata*	2	8	--	--	--	--
5. *F. flava*	0	2	--	--	--	--
6. L. fragilis	1	0	--	--	--	--
7. *L. r. luteola*	7	11	--	4	1	--
Total live mussels	19			4		

a – Ohio and US endangered, b – Ohio endangered and US prelisting, c – Ohio endangered, d – Ohio threatened, e – Ohio species of concern. Upstream and down-stream refer to a sewer line break emptying into Eagle Creek. The break is at 41_o00’12.54”N 83_o38’37.32”W and it enters the stream at 41_o00’11.10”N 83_o38’39.78”W. L – live, D – freshly dead shells (L+D = extant); S – weathered + subfossil shells = extirpated.

Table 4. Distribution of mussels from the Blanchard River during the current study in the vicinity of Findlay, Ohio.

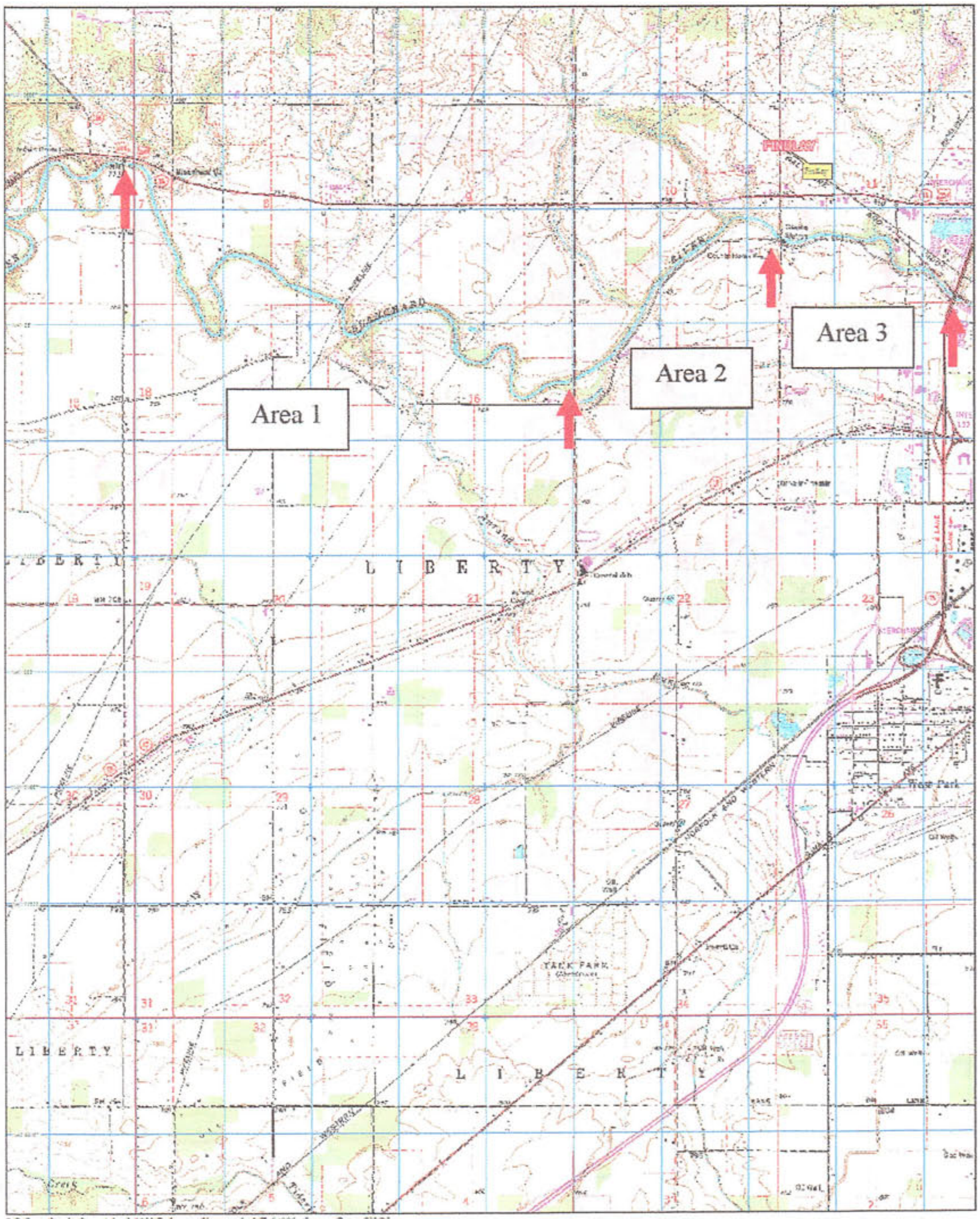
	Species	1			2			3			4			5			6		
		L	D	S	L	D	S	L	D	S	L	D	S	L	D	S	L	D	S
1.	*U. imbecillis*	0	2	--	1	5	--	0	2	--	0	3	--	0	2	--	--	--	--
2.	*P. grandis*	1	3	--	3	4	--	--	--	--	8	17	--	0	9	--	1	1	--
3.	*A. ferussacianus*	0	3	--	2	2	--	--	--	--	--	--	--	--	--	--	--	--	--
4.	*S. undulatus*	--	--	--	0	2	--	--	--	--	0	1	--	0	1	--	0	0	1
5.	*A. marginata*[e]	0	1	--	3	2	--	--	--	--	0	2	--	--	--	--	--	--	--
6.	*L. costata*	--	--	--	1	0	--	--	--	--	--	--	--	--	--	--	10	1	--
7.	*L. complanata*	13	6	--	117	23	--	4	2	--	90	4	--	0	4	--	5	0	--
8.	*L. compressa*[e]	--	--	--	15	6	--	--	--	--	1	0	--	--	--	--	--	--	--
9.	*S. ambigua*[e]	0	1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
10.	*A. plicata*	0	1	--	1	0	--	--	--	--	--	--	--	--	--	--	--	--	--
11.	*Q. quadrula*	2	1	--	3	2	--	0	5	--	1	66	--	--	--	--	--	--	--
12.	*Q. pustulosa*	--	--	--	0	1	--	0	1	--	0	2	--	--	--	--	--	--	--
13.	*P. clava*[a]	0	0	6	0	0	1	--	--	--	--	--	--	--	--	--	--	--	--
14.	*F. flava*	--	--	--	1	0	--	--	--	--	--	--	--	--	--	--	--	--	--
15.	*E. dilatata*	--	--	--	1	0	--	--	--	--	--	--	--	--	--	--	3	8	--
16.	*U. tetralasmus*[d]	--	--	--	--	--	--	--	--	--	--	--	--	0	0	1	--	--	--
17.	*P. fasciolaris*[e]	--	--	--	0	1	--	0	1	--	--	--	--	--	--	--	13	3	--
18.	*L. fragilis*	0	5	--	52	38	--	--	--	--	0	4	--	0	1	--	21	6	--
19.	*P. alatus*	4	1	--	6	2	--	--	--	--	0	1	--	--	--	--	--	--	--
20.	*T. truncata*[e]	6	15	--	25	15	--	1	10	--	0	86	--	0	5	--	--	--	--
21.	*T. lividus*[c]	0	0	1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
22.	*T. parvum*	--	--	--	--	--	--	--	--	--	0	0	2	--	--	--	--	--	--
23.	*O. subrotunda*	0	0	1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
24.	*L. recta*[d]	--	--	--	--	--	--	--	--	--	1	0	--	--	--	--	--	--	--
25.	*V. iris*	0	0	1	0	0	1	--	--	--	--	--	--	--	--	--	0	0	1
26.	*V. fabalis*[b]	0	0	2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
27.	*L. r. luteola*	9	1	--	17	3	--	1	1	--	--	--	--	0	2	--	19	9	--
28.	*L. cardium*	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0	0	1
29.	*L. fasciola*[e]	--	--	--	0	0	1	--	--	--	--	--	--	--	--	--	--	--	--
Total live mussels		35			248			6			101			0			72		

a – Ohio and US endangered, b – Ohio endangered and US prelisting, c – Ohio endangered, d – Ohio threatened, e – Ohio species of concern. 1 – CR 128 to TR 139; 2 – TR 139 to CR 140; 3 – CR 140 to IR 75; 4 – IR 75 to first dam; 5 – between dams in Findlay; 6 – immediately downstream of SR 568. L – live, D – freshly dead shells (L+D = extant); S – weathered + subfossil shells = extirpated.

Table 5. Water chemistry of the Blanchard River and Eagle Creek during the time of this study; 3 & 5 October 2009.

Parameter	Blanchard River 1	2 & 3	4	5	6	Eagle Creek U/D	Units
3 October 2009							
Water Temperature	14.0	14.7	15.6	14.1	12.8	13.4	°C
Conductivity	636	671	720	638	698	862	µS/cm
Turbidity	16.1	11.5	11.3	13.2	13.4	8.4	NTU
Oxygen	7.29	7.58	7.93	7.26	8.17	5.67	mg/l
PH	7.90	7.83	7.84	7.93	8.00	7.87	
5 October 2009							
Water Temperature	11.7	12.7	13.1	12.2	11.7	11.9	°C
Conductivity	768	688	506	773	874	1080	µS/cm
Turbidity	4.8	11.2	13.8	15.2	12.6	7.1	NTU
Oxygen	7.95	7.53	7.53	7.50	8.72	4.69	mg/l
PH	7.79	7.81	7.99	7.96	8.16	7.85	

1 – CR 128 to TR 139; 2 – TR 139 to CR 140; 3 – CR 140 to IR 75; 4 – IR 75 to first dam; 5 – between dams in Findlay; 6 – immediately downstream of SR 568; U/D at the point that separated upstream from downstream.



3-D TopoQuads Copyright © 1999 DeLorme Yarmouth, ME 04096 Source Data: USGS 1000 ft Scale 1: 40,625 Detail: 13-0 Datum: NAD27

Figure 1. Map of the western half of the study area showing three reaches sampled from the Blanchard River: Areas 1 - 3.

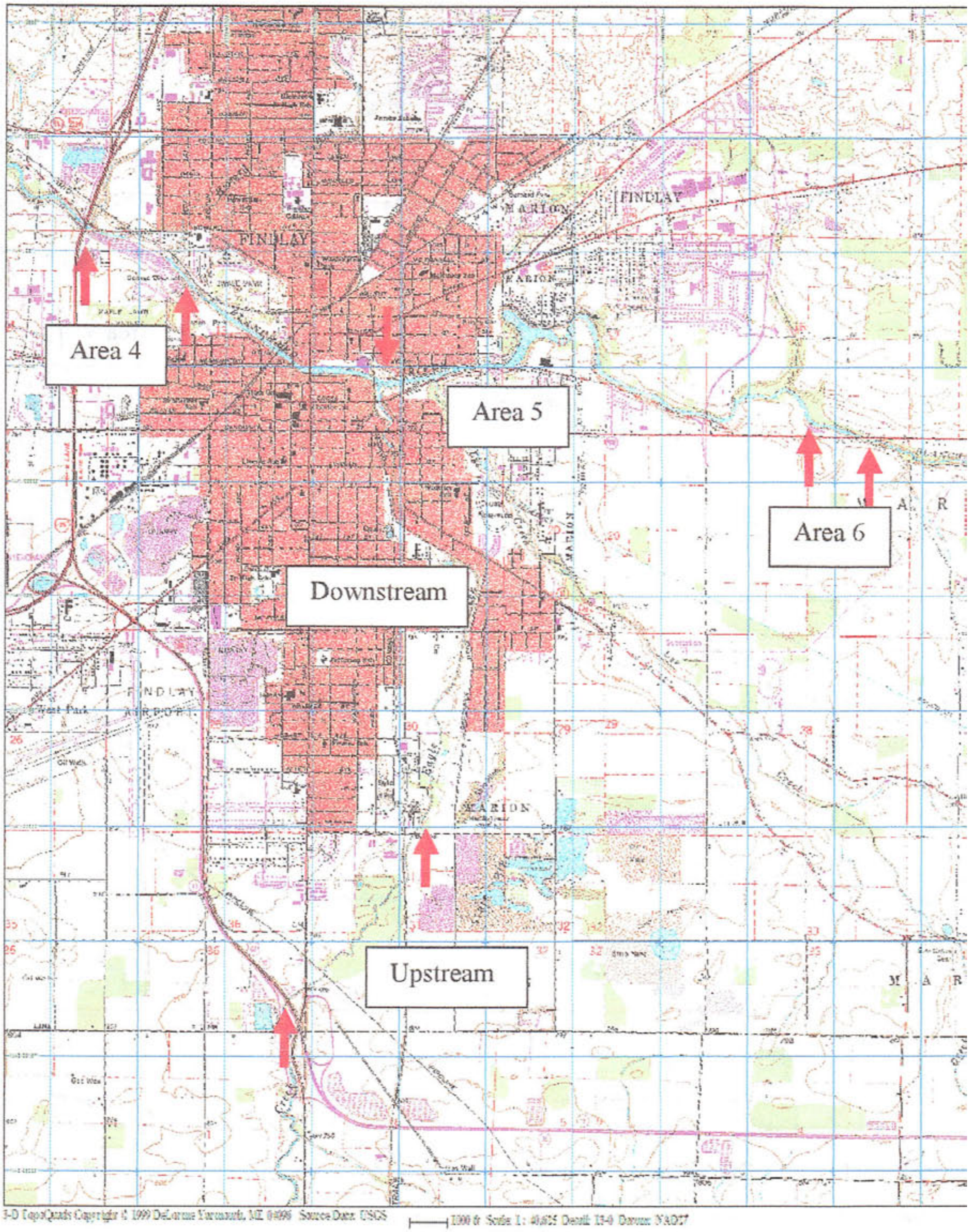


Figure 2. Map of the eastern half of the study area showing four reaches sampled from the Blanchard River (Areas 3 – 6) and the two reaches sampled from Eagle Creek.

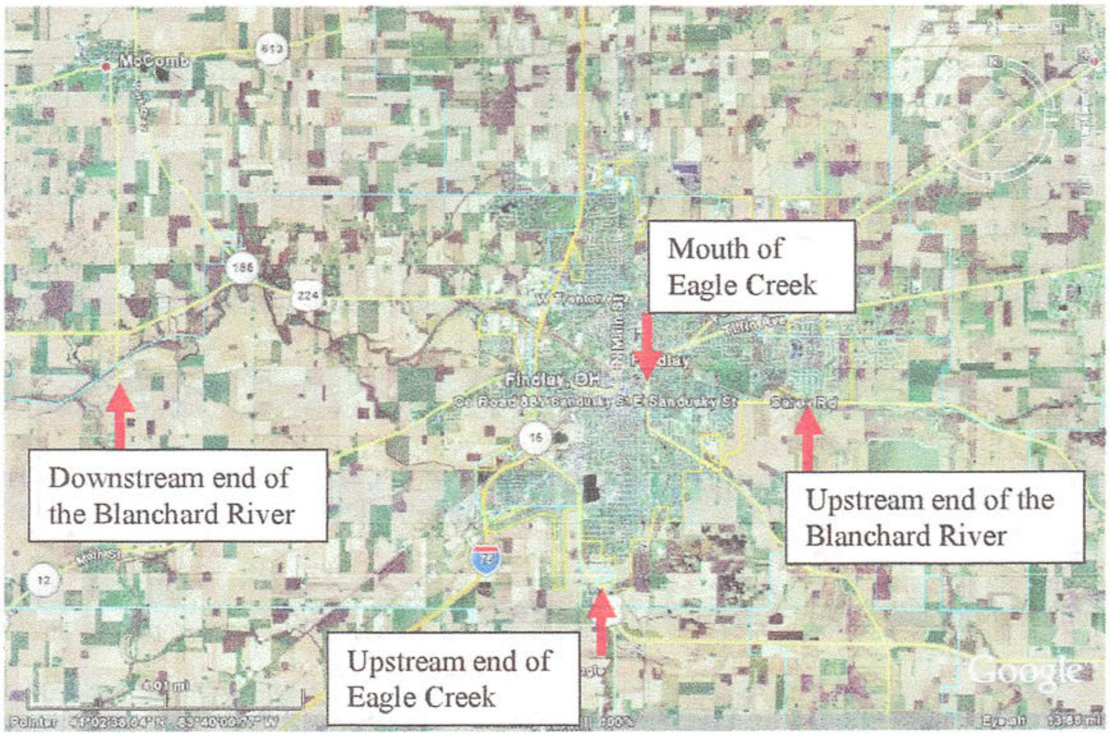


Figure 3. Aerial photograph of the Blanchard River and Eagle Creek in Findlay showing the reaches sampled during this study.

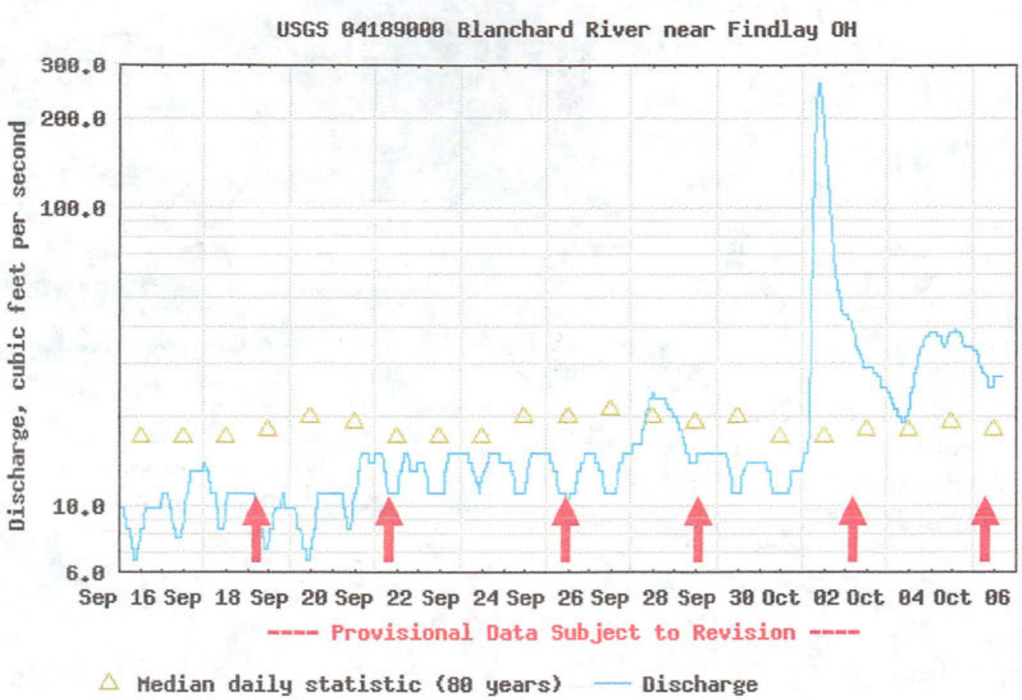


Figure 4. Stream gage data for the Blanchard River in Findlay during the time of this study; 19-22 September, 26-29 September, & 3-6 October.

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Appendix D

Soil Analysis, Soil Maps, Pictures, and Aerial Photos of the Problem Statement Areas

Soil Analysis

The Blanchard River Watershed Partnership, through the Environmental Defense Fund, had Ralph Heimlich, who works for the Agriculture Conservation Experienced Services (ACES), do a sediment and nutrient loading estimate based on the soil types in each 14-digit watershed. Mr. Heimlich's analysis follows.

Analysis of P Loss in Blanchard River HUCS
Using Hancock Tillage Survey Data for Initial C Factor

Background: You asked me to analyze phosphorus loss in four 14-digit HUCS of the Blanchard River. These four HUCS:

04100008-020-010 Blanchard River from below Potato Run to above The Outlet (2), except Brights Ditch
04100008-020-020 Brights Ditch, including the area of Stahls Ditch that has already been done.
04100008-020-030 The Outlet (2)
04100008-020-050 Lye Creek

Cover parts of Hancock, Wyandot, and Seneca Counties and total 75,019 acres of land. Of this, 55,098 acres or 73% is cultivated cropland. Cultivated cropland includes corn, soybeans, winter wheat, winter wheat/soybeans double crop, oats, sweet corn, pop corn, speltz, miscellaneous vegetables and fruits, and other crops and excludes all hays and pasture.

Table D.1

HUC_14	Total Acres, all uses	Cultivated Cropland Acres
04100008020010	14,581	10,637
04100008020020	18,178	13,731
04100008020030	24,418	17,585
04100008020050	17,843	13,144
Total	75,019	55,098

Hancock County Tillage Survey Data:

You provided the following data from Denny Tressel:

Crop and tillage summary from Hancock Tillage Survey 2008 CROP Year

Conventional tillage.	47%
Conservation tillage primarily NT	43%
Other (hay/pasture/crp/etc)	10%

Corn	24%
Beans	50%
Wheat	19%
Other	7%

Corn	>1%	NT
Beans	60%	NT/Min Till (primarily NT)
Wheat	81%	NT

Putting the various percentages in a matrix and making a few assumptions to force the cells results in the following:

Table D.2

2008 Hancock County Tillage Survey					
	Conv Till	Cons Till (mostly NT)	Other (hay/ pasture/crp) etc)	Row Total	check
Corn	23%	0.24%	1%	24%	24%
Beans	21%	28%	1%	50%	50%
Wheat	3%	15%	1%	19%	19%
Other	0%	0%	7%	7%	7%
Column Total	47%	43%	10%	100%	100%
check	47%	44%	10%	100%	

Assigning C-Factors to each crop in the matrix based on the MLRA 103B USLE guidance produces the following, which is much lower than the 0.36 C-Factor I was using before:

Table D.3

C-factors			
	Conv Till	Cons Till (mostly NT)	Other (hay/pasture/ crp) etc)
Corn	0.27	0.09	0.16
Beans	0.4	0.12	0.22
Wheat	0.14	0.06	0.09
Other	0.08	0.03	0.03
weighted C factor			0.061452

I developed a GIS analysis of the four HUCS that overlaid SSURGO soils and the NASS 2009 Cropland Data Layer (CDL) to calculate how much of each soil was in cropland in the watershed (maps 1 and 2). I used the parameters of each cropland soil to calculate the sheet and rill erosion (using USLE), the estimated sediment delivery (assuming a 50% delivery ratio), and the sediment-associated nitrogen and phosphorus (using the AGNPS equations from the EPA 319 manual). The results are Table D.5 on Page d-5 and Tables D.6 - D.9 on pages D-10 through D-18.

There are 55,098 acres of cultivated cropland in the watersheds. Based on the new C-Factor of .061452, sediment delivery is 12,312 tons per year, and sediment associated phosphorus is estimated at 24,409 pounds, or 12.2 tons per year.

Working from the 0.061542 C factor and 12.2 tons per year initial loading, and assuming 75 percent removal efficiency for filter strips, riparian buffers and wetlands (based on Pennsylvania State University. 1992. Nonpoint Source Database. page 2-15 In: U.S. EPA, Guidance Specifying Management Measures For Sources of Nonpoint Source Pollution in Coastal Waters), if all fields in the watershed were treated, sediment-associated phosphorus would be reduced 9.8 tons per year.

Sorting the soils in order of descending total initial phosphorus export, a reduction of 52.6% (12,839 pounds per year or 6.4 tons per year from the estimated 12.2 tons per year) would be reached when the first 36,548 acres are treated, or 66.4 percent of the cropland acres (green shading in tab "Big P Load" in Tables D.6 - D-9). This is shown in map D.3 on page D-8.

Alternatively, sorting by the soils with the highest rate of initial sediment-associated phosphorus loss per acre and cumulating until the required 6.4 tons are reached would require treating only 28,198 acres, 51.2 percent of the cropland acres (green shading in tab "Big P Rate" in associated Excel workbook). This requires treating more soil types, but fewer acres, to achieve the 52.6% reduction. This is shown in map D.4 on page D-9.

Table D.4

Alternative Strategies to Achieve a 52.6% Reduction in Estimated Sediment Associated Phosphorus Loss from Cropland, Four Blanchard HUC 14 Watersheds			
Strategy	P Reduction (lbs/yr)	Cropland Acres	Percent of Total Cropland
Highest P load (lbs/year = rate x acres) First	12,821.5	36,548	66.4%
Highest P rate (lbs/acre/year) First	12,813.7	28,198	51.2%

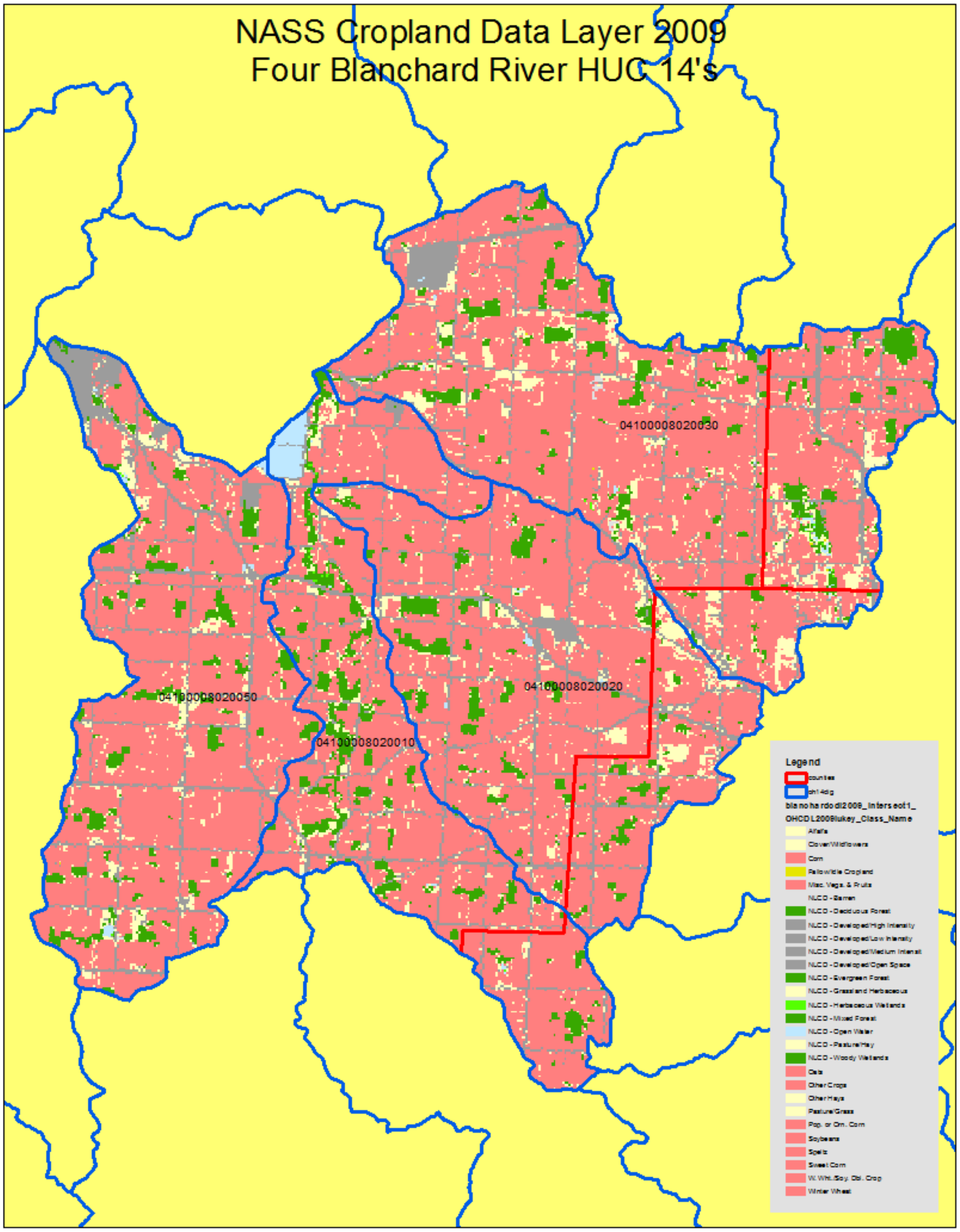
The results by HUC-14 watershed are displayed below (table D-5) for the two strategies.

Table D.5

Results by HUC-14, Alternative Strategies to Achieve a 52.6% Reduction in Estimated Sediment Associated Phosphorus Loss from Cropland, Four Blanchard HUC 14 Watersheds					
Variable	041000080 20010	041000080 20020	041000080 20030	041000080 20050	4 HUC Total
Highest P load (lbs/year = rate x acres) First					
Area/Acres	8,357.5	9,530.1	7,941.1	10,719.7	36,548.4
Base Phosphorus Associated with Sediment (lbs/year)	3,362.5	3,801.2	4,584.2	4,566.4	16,314.2
Wetlands--Phosphorus Reduction with BMPS2	2,521.8	2,850.9	4,023.9	3,424.8	12,821.5
Highest P rate (lbs/acre/year) First					
Area/Acres	5,623.3	7,433.8	7,726.1	7,414.6	28,197.7
Base Phosphorus Associated with Sediment (lbs/year)	3,053.1	4,418.8	5,572.0	3,819.2	16,863.1
Wetlands--Phosphorus Reduction with BMPS2	2,289.8	3,314.1	4,345.4	2,864.4	12,813.7

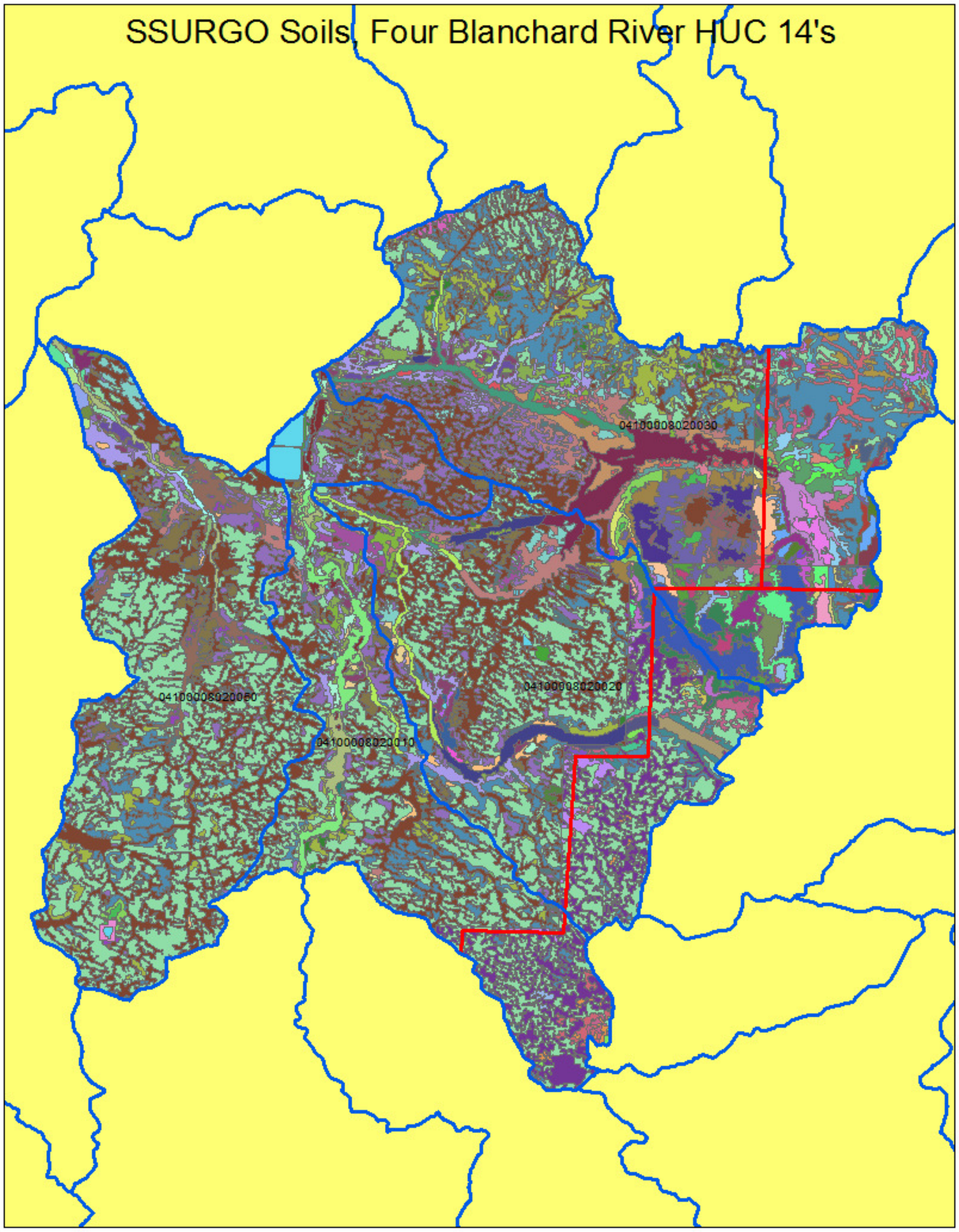
Caveat: There are some obvious boundary issues in maps D.3 and D.4, indicating that similar soil types are mapped somewhat differently in adjoining SSURGO soil maps. The only parameters that differ across boundaries in this analysis are the slope length (L), slope gradient (S), soil erodibility (K) factors and the soil textures for the soil mapping units in the three different SSURGO detailed soils maps used as base data. Some effort to reconcile any differences between series might be needed to ensure equal treatment for essentially equal soils being cropped in different counties.

Map D.1



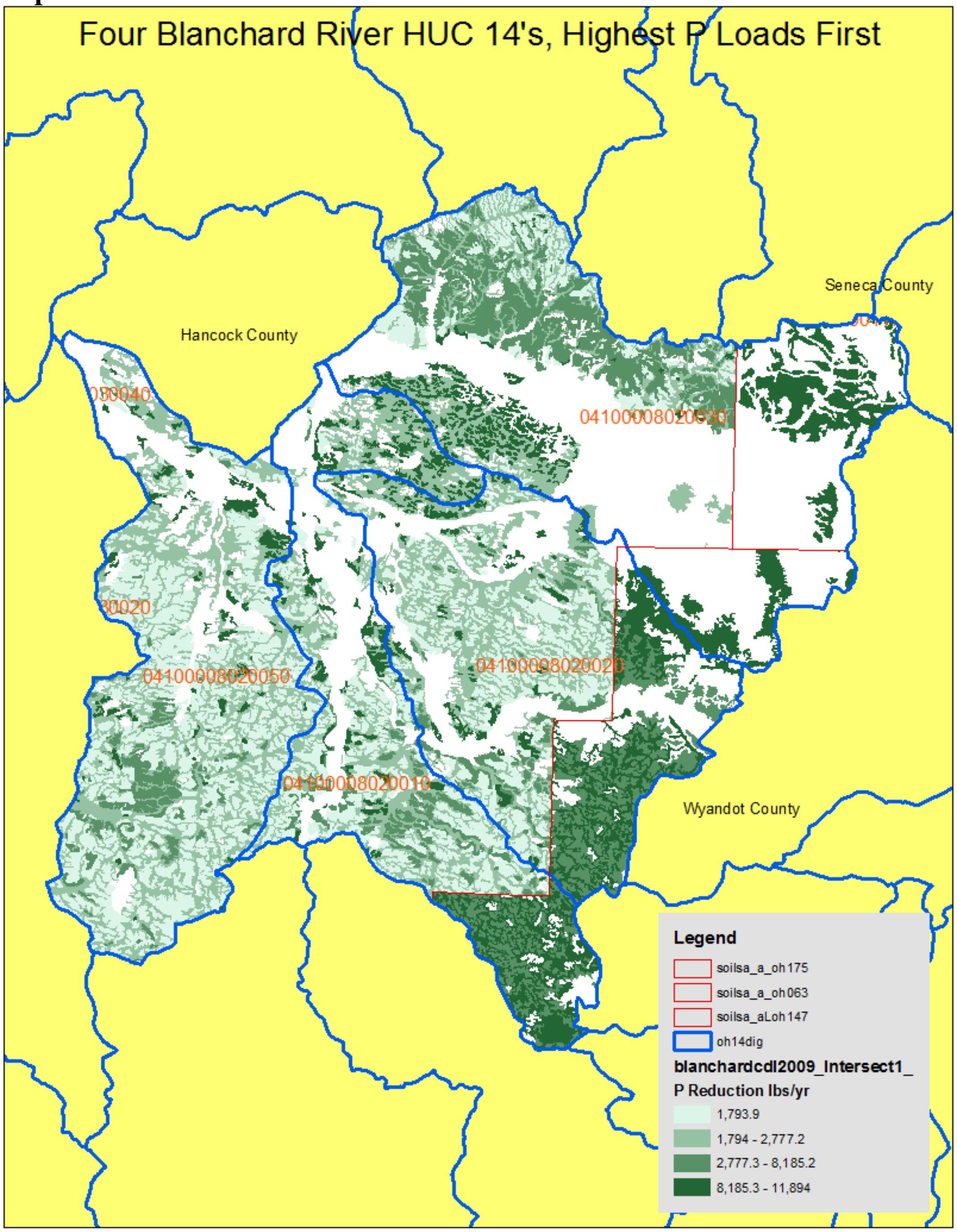
Cultivated cropland is in the orange shade, hay and pasture in light yellow, forest in green and developed in gray.

Map D.2



There are 55,098 acres of cultivated cropland in the watersheds. Based on the new C-Factor of .061452, sediment delivery is 12,312 tons per year, and sediment associated phosphorus is estimated at 24,409 pounds, or 12.2 tons per year.

Map D.3


Four Blanchard River HUC 14's, Highest P Loads First
Hancock County
Seneca County
Wyandot County
04100008020030
04100008020050
04100008020020
04100008020010
Legend
soilsa_a_oh175
soilsa_a_oh063
soilsa_aLoh147
oh14dig
blanchardcdl2009_Intersect1_
P Reduction lbs/yr
1,793.9
1,794 - 2,777.2
2,777.3 - 8,185.2
8,185.3 - 11,894

Map D.4

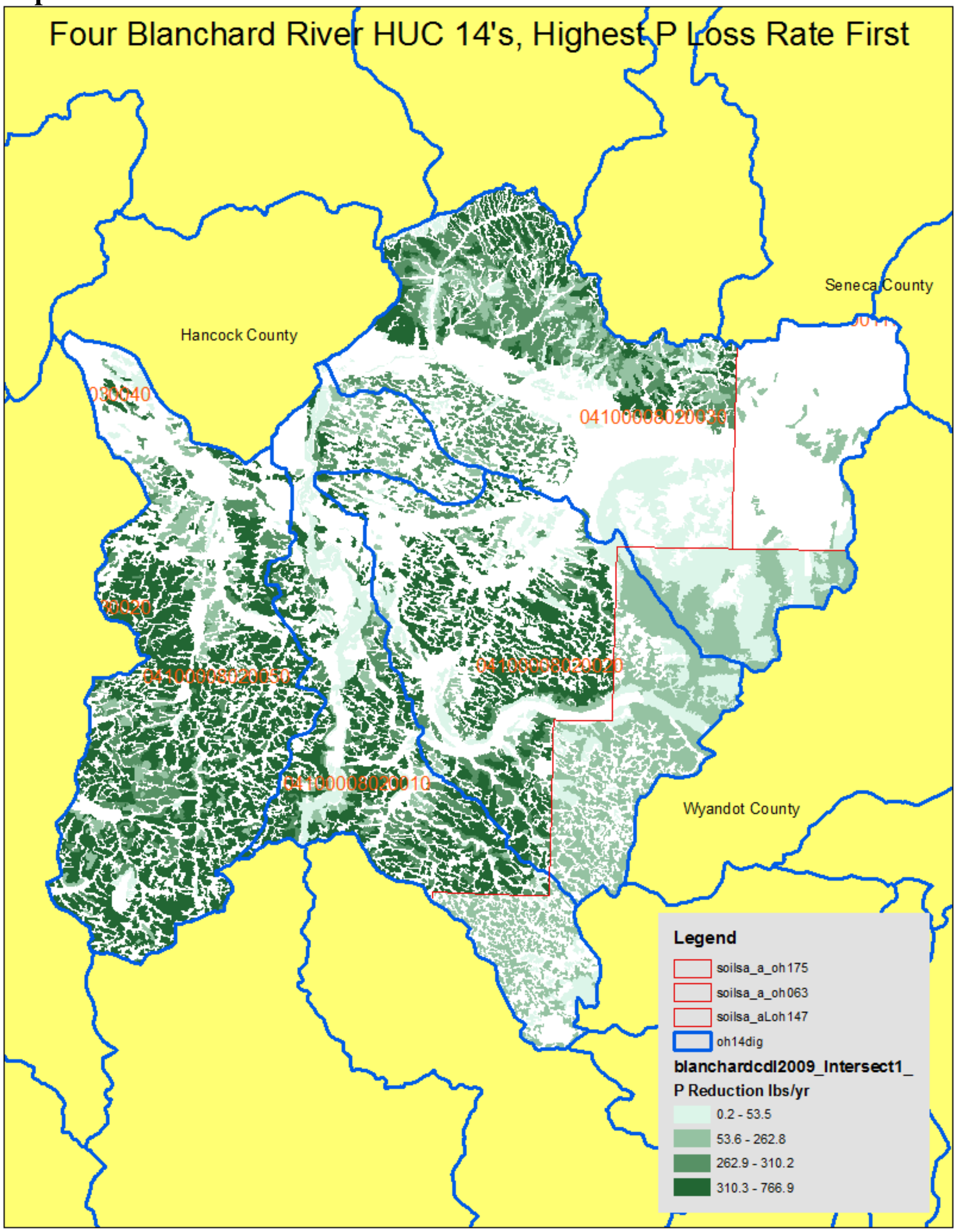

Four Blanchard River HUC 14's, Highest P Loss Rate First
Hancock County
Seneca County
Wyandot County
030040
041000080200030
00020
04100008020050
04100008020020
04100008020010
Legend
soilsa_a_oh175
soilsa_a_oh063
soilsa_aLoh147
oh14dig
blanchardcdl2009_Intersect1_
P Reduction lbs/yr
0.2 - 53.5
53.6 - 262.8
262.9 - 310.2
310.3 - 766.9

Table D.6 Loadings Blanchard River above Potato Run to below The Outlet (2), except Brights Ditch Watershed

Loadings HUC 04100008-020-010

						Sediment Reduction w/ BMPs			Nitrogen Reduction w/ BMPs			Phosphorus w/BMPs		
Soil Symbol	Area Acres	Base Sheet and rill erosion (tns/yr)	Base Sediment Delivery (tns/yr)	Nitrogen Associated w/Sediment (lbs/yr)	Phosphorus Associated w/Sediment (lbs/yr)	Filter Strips	Ripar-ian Buffer	Wetlands	Filter Strips	Riparian Buffer	Wetlands	Filter Strips	Riparian Buffer	Wetlands
BpA	799	367.5	183.7	845.3	402.9	119.4	119.4	119.4	591.7	591.7	591.7	302.2	302.2	302.2
BoA	847	303.7	151.9	737.7	350.5	98.7	98.7	98.7	516.4	516.4	516.4	262.8	262.8	262.8
PkA	1,125	265.1	132.6	706.1	333.6	86.2	86.2	86.2	494.3	494.3	494.3	250.2	250.2	250.2
GnB	195	221.7	110.9	418.2	201.7	72.1	72.1	72.1	292.7	292.7	292.7	151.3	151.3	151.3
BnA	278	108.9	54.4	259.4	123.4	35.4	35.4	35.4	181.6	181.6	181.6	92.5	92.5	92.5
BoB	79	91.9	46.0	172.7	83.3	29.9	29.9	29.9	120.9	120.9	120.9	62.5	62.5	62.5
HpB	86	74.0	37.0	148.5	71.4	24.0	24.0	24.0	104.0	104.0	104.0	53.5	53.5	53.5
FdA	136	63.7	31.8	91.9	45.0	20.7	20.7	20.7	64.3	64.3	64.3	33.8	33.8	33.8
AkA	233	61.5	30.8	142.1	67.7	20.0	20.0	20.0	99.5	99.5	99.5	50.8	50.8	50.8
Pa	96	47.0	23.5	129.6	61.1	15.3	15.3	15.3	90.7	90.7	90.7	45.8	45.8	45.8
GpC2	16	43.5	21.8	100.5	47.9	14.1	14.1	14.1	70.3	70.3	70.3	35.9	35.9	35.9
LbA	146	42.8	21.4	37.2	18.8	13.9	13.9	13.9	26.1	26.1	26.1	14.1	14.1	14.1
SpA	123	34.5	17.2	65.0	31.3	11.2	11.2	11.2	45.5	45.5	45.5	23.5	23.5	23.5
MeA	119	34.0	17.0	68.2	32.8	11.0	11.0	11.0	47.8	47.8	47.8	24.6	24.6	24.6
RhA	116	29.9	14.9	82.1	38.7	9.7	9.7	9.7	57.5	57.5	57.5	29.0	29.0	29.0
SeB	40	28.9	14.5	77.0	36.4	9.4	9.4	9.4	53.9	53.9	53.9	27.3	27.3	27.3
GpB2	30	28.1	14.0	74.8	35.3	9.1	9.1	9.1	52.3	52.3	52.3	26.5	26.5	26.5
ThA	77	27.5	13.7	73.1	34.5	8.9	8.9	8.9	51.2	51.2	51.2	25.9	25.9	25.9
KcA	55	22.3	11.2	56.8	26.9	7.3	7.3	7.3	39.8	39.8	39.8	20.2	20.2	20.2
SeA	67	21.0	10.5	36.8	17.3	6.8	6.8	6.8	25.7	25.7	25.7	12.9	12.9	12.9
LyE	1	19.7	9.8	47.8	22.7	6.4	6.4	6.4	33.5	33.5	33.5	17.0	17.0	17.0
McA	45	19.0	9.5	26.3	13.2	6.2	6.2	6.2	18.4	18.4	18.4	9.9	9.9	9.9
TkA	69	17.0	8.5	44.4	21.0	5.5	5.5	5.5	31.1	31.1	31.1	15.8	15.8	15.8
OsB	29	15.5	7.8	38.1	18.1	5.0	5.0	5.0	26.7	26.7	26.7	13.6	13.6	13.6
SoA	48	13.4	6.7	26.1	12.6	4.3	4.3	4.3	18.3	18.3	18.3	9.4	9.4	9.4
TrA	30	13.3	6.6	37.0	17.4	4.3	4.3	4.3	25.9	25.9	25.9	13.1	13.1	13.1
ArA	33	13.1	6.5	23.0	10.8	4.3	4.3	4.3	16.1	16.1	16.1	8.1	8.1	8.1
BnB	14	11.3	5.7	30.1	14.2	3.7	3.7	3.7	21.1	21.1	21.1	10.7	10.7	10.7
KcB	18	11.3	5.7	27.8	13.2	3.7	3.7	3.7	19.4	19.4	19.4	9.9	9.9	9.9
Pm	27	9.2	4.6	22.5	10.7	3.0	3.0	3.0	15.8	15.8	15.8	8.0	8.0	8.0
BrA	29	6.3	3.1	11.0	5.3	2.0	2.0	2.0	7.7	7.7	7.7	4.0	4.0	4.0

Table D.6 Loadings Blanchard River above Potato Run to below The Outlet (2), except Brights Ditch Watershed pg. 2

		Totals (Rate x Acres)				Sediment Reduction w/BMPs			Nitrogen Reduction w/BMPs			Phosphorus w/BMPs		
Soil Symbol	Area Acres	Base Sheet and rill erosion (tns/yr)	Base Sediment Delivery (tns/yr)	Nitrogen Associated w/Sediment (lbs/yr)	Phosphorus Associated w/Sediment (lbs/yr)	Filter Strips	Riparian Buffer	Wetlands	Filter Strips	Riparian Buffer	Wetlands	Filter Strips	Riparian Buffer	Wetlands
HpA	18	6.2	3.1	14.1	6.5	2.0	2.0	2.0	9.9	9.9	9.9	4.9	4.9	4.9
GwB	4	4.6	2.3	12.0	5.7	1.5	1.5	1.5	8.4	8.4	8.4	4.3	4.3	4.3
OrB	2	1.7	0.9	3.1	1.4	0.6	0.6	0.6	2.1	2.1	2.1	1.1	1.1	1.1
OrA	4	0.8	0.4	1.8	0.8	0.3	0.3	0.3	1.2	1.2	1.2	0.6	0.6	0.6
Br	2	0.8	0.4	1.1	0.5	0.3	0.3	0.3	0.8	0.8	0.8	0.4	0.4	0.4
JeB	2	0.7	0.4	1.4	0.6	0.2	0.2	0.2	1.0	1.0	1.0	0.5	0.5	0.5
OrC	0	0.5	0.2	1.3	0.7	0.2	0.2	0.2	0.9	0.9	0.9	0.5	0.5	0.5
BpA	2	0.5	0.2	1.1	0.5	0.2	0.2	0.2	0.8	0.8	0.8	0.4	0.4	0.4
OwB	1	0.3	0.1	0.7	0.3	0.1	0.1	0.1	0.5	0.5	0.5	0.2	0.2	0.2
AnA	1	0.1	0.1	0.3	0.2	0.0	0.0	0.0	0.2	0.2	0.2	0.1	0.1	0.1
SnA	0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total	5,042	2,082.7	1,041.4	4,694.3	2,237.0	676.9	676.9	676.9	3,286.0	3,286.0	3,286.0	1,677.8	1,677.8	1,677.8

Table D.7 Loadings Brights Ditch Watershed

Loadings HUC 04100008-020-020

	Totals (Rate x Acres)					Sediment Reduction w/ BMPs			Nitrogen Reduction w/ BMPs			Phosphorus w/BMPs		
Soil Symbol	Area Acres	Base Sheet and rill erosion (tns/yr)	Base Sediment Delivery (tns/yr)	Nitrogen Associated w/Sediment (lbs/yr)	Phosphorus Associated w/Sediment (lbs/yr)	Filter Strips	Riparian Buffer	Wetlands	Filter Strips	Riparian Buffer	Wetlands	Filter Strips	Riparian Buffer	Wetlands
BoA	2,613	1,023.1	511.6	2,438.0	1,159.6	332.5	332.5	332.5	1,706.6	1,706.6	1,706.6	869.7	869.7	869.7
PmA	3,126	736.7	368.4	1,961.9	927.0	239.4	239.4	239.4	1,373.3	1,373.3	1,373.3	695.2	695.2	695.2
BoA	1,514	543.2	271.6	1,319.4	626.8	176.5	176.5	176.5	923.6	923.6	923.6	470.1	470.1	470.1
BoB	484	470.7	235.3	919.0	442.3	153.0	153.0	153.0	643.3	643.3	643.3	331.7	331.7	331.7
BpA	547	251.8	125.9	579.3	276.1	81.8	81.8	81.8	405.5	405.5	405.5	207.1	207.1	207.1
GwB2	166	273.9	137.0	476.4	230.9	89.0	89.0	89.0	333.5	333.5	333.5	173.1	173.1	173.1
BoB	163	188.9	94.4	354.8	171.2	61.4	61.4	61.4	248.4	248.4	248.4	128.4	128.4	128.4
BnB	175	170.1	85.0	332.1	159.8	55.3	55.3	55.3	232.5	232.5	232.5	119.9	119.9	119.9
RhB	128	171.8	85.9	312.6	151.1	55.8	55.8	55.8	218.8	218.8	218.8	113.3	113.3	113.3
HpB	176	151.0	75.5	303.2	145.7	49.1	49.1	49.1	212.2	212.2	212.2	109.3	109.3	109.3
WeA	412	97.2	48.6	258.8	122.3	31.6	31.6	31.6	181.2	181.2	181.2	91.7	91.7	91.7
RhA	374	88.2	44.1	234.9	111.0	28.7	28.7	28.7	164.4	164.4	164.4	83.2	83.2	83.2
MoB	87	108.2	54.1	200.3	96.7	35.2	35.2	35.2	140.2	140.2	140.2	72.5	72.5	72.5
GnB	92	104.7	52.3	197.4	95.2	34.0	34.0	34.0	138.2	138.2	138.2	71.4	71.4	71.4
BnA	206	80.6	40.3	192.0	91.3	26.2	26.2	26.2	134.4	134.4	134.4	68.5	68.5	68.5
RhC	33	124.5	62.3	181.0	88.7	40.5	40.5	40.5	126.7	126.7	126.7	66.5	66.5	66.5
GwC2	27	127.8	63.9	176.1	86.5	41.5	41.5	41.5	123.2	123.2	123.2	64.9	64.9	64.9
Pm	206	70.4	35.2	172.8	82.0	22.9	22.9	22.9	121.0	121.0	121.0	61.5	61.5	61.5
SeB	94	80.2	40.1	161.1	77.4	26.1	26.1	26.1	112.8	112.8	112.8	58.1	58.1	58.1
AkA	237	47.9	24.0	132.0	62.2	15.6	15.6	15.6	92.4	92.4	92.4	46.7	46.7	46.7
SoA	185	43.6	21.8	116.2	54.9	14.2	14.2	14.2	81.3	81.3	81.3	41.2	41.2	41.2
ArA	134	45.8	22.9	112.4	53.4	14.9	14.9	14.9	78.7	78.7	78.7	40.0	40.0	40.0
MsB	54	53.0	26.5	103.3	49.7	17.2	17.2	17.2	72.3	72.3	72.3	37.3	37.3	37.3
FoB	43	48.7	24.4	92.0	44.4	15.8	15.8	15.8	64.4	64.4	64.4	33.3	33.3	33.3
GxB2	38	42.8	21.4	80.7	38.9	13.9	13.9	13.9	56.5	56.5	56.5	29.2	29.2	29.2
So	96	32.8	16.4	80.5	38.2	10.7	10.7	10.7	56.4	56.4	56.4	28.7	28.7	28.7
ThA	109	31.5	15.8	80.3	38.0	10.3	10.3	10.3	56.2	56.2	56.2	28.5	28.5	28.5
TkA	143	27.4	13.7	76.4	36.0	8.9	8.9	8.9	53.5	53.5	53.5	27.0	27.0	27.0
AdA	115	14.5	7.3	60.4	30.3	4.7	4.7	4.7	42.3	42.3	42.3	22.7	22.7	22.7
MeA	95	22.4	11.2	59.5	28.1	7.3	7.3	7.3	41.7	41.7	41.7	21.1	21.1	21.1
FoC2	13	36.3	18.2	56.6	27.6	11.8	11.8	11.8	39.6	39.6	39.6	20.7	20.7	20.7
OsB	36	26.5	13.2	46.4	21.8	8.6	8.6	8.6	32.5	32.5	32.5	16.3	16.3	16.3

Table D.7 Loadings Brights Ditch Watershed pg. 2

		Totals (Rate x Acres)				Sediment Reduction w/BMPs			Nitrogen Reduction w/BMPs			Phosphorus w/BMPs		
Soil Symbol	Area Acres	Base Sheet and erosion (tns/yr)	Base Sediment Delivery (tns/yr)	Nitrogen Associated w/Sediment (lbs/yr)	Phosphorus Associated w/Sediment (lbs/yr)	Filter Strips	Riparian Buffer	Wetlands	Filter Strips	Riparian Buffer	Wetlands	Filter Strips	Riparian Buffer	Wetlands
JeB	27	11.5	5.7	22.5	10.5	3.7	3.7	3.7	15.8	15.8	15.8	7.9	7.9	7.9
RaA	15	9.8	4.9	20.8	10.0	3.2	3.2	3.2	14.6	14.6	14.6	7.5	7.5	7.5
BgB	11	10.1	5.1	20.0	9.6	3.3	3.3	3.3	14.0	14.0	14.0	7.2	7.2	7.2
KcB	15	11.0	5.5	19.4	9.1	3.6	3.6	3.6	13.5	13.5	13.5	6.8	6.8	6.8
SnA	29	6.8	3.4	18.2	8.6	2.2	2.2	2.2	12.7	12.7	12.7	6.5	6.5	6.5
MtB	8	8.0	4.0	15.5	7.5	2.6	2.6	2.6	10.9	10.9	10.9	5.6	5.6	5.6
KcA	16	5.8	2.9	14.2	6.7	1.9	1.9	1.9	9.9	9.9	9.9	5.1	5.1	5.1
LbA	25	5.0	2.5	13.8	6.5	1.6	1.6	1.6	9.7	9.7	9.7	4.9	4.9	4.9
KbB	11	7.7	3.8	13.5	6.3	2.5	2.5	2.5	9.4	9.4	9.4	4.7	4.7	4.7
GpB2	6	6.3	3.1	11.9	5.7	2.0	2.0	2.0	8.3	8.3	8.3	4.3	4.3	4.3
RcA	14	4.3	2.2	10.8	5.1	1.4	1.4	1.4	7.6	7.6	7.6	3.8	3.8	3.8
LzB	5	5.7	2.9	10.6	5.1	1.9	1.9	1.9	7.4	7.4	7.4	3.8	3.8	3.8
Pa	9	4.3	2.1	9.9	4.7	1.4	1.4	1.4	6.9	6.9	6.9	3.5	3.5	3.5
TrA	8	3.3	1.6	7.8	3.7	1.1	1.1	1.1	5.5	5.5	5.5	2.8	2.8	2.8
FoA	8	2.8	1.4	7.0	3.3	0.9	0.9	0.9	4.9	4.9	4.9	2.5	2.5	2.5
MnA	8	2.4	1.2	6.0	2.9	0.8	0.8	0.8	4.2	4.2	4.2	2.1	2.1	2.1
On	3	0.9	0.5	3.4	1.7	0.3	0.3	0.3	2.4	2.4	2.4	1.3	1.3	1.3
Mg	4	1.4	0.7	3.4	1.6	0.5	0.5	0.5	2.4	2.4	2.4	1.2	1.2	1.2
SeA	5	1.3	0.6	3.3	1.6	0.4	0.4	0.4	2.3	2.3	2.3	1.2	1.2	1.2
JeA	8	1.2	0.6	3.1	1.4	0.4	0.4	0.4	2.1	2.1	2.1	1.0	1.0	1.0
Mm	4	1.0	0.5	2.6	1.2	0.3	0.3	0.3	1.8	1.8	1.8	0.9	0.9	0.9
BpA	3	0.7	0.3	1.5	0.7	0.2	0.2	0.2	1.1	1.1	1.1	0.5	0.5	0.5
RoA	3	0.4	0.2	1.0	0.5	0.1	0.1	0.1	0.7	0.7	0.7	0.3	0.3	0.3
OrB	1	0.4	0.2	0.7	0.3	0.1	0.1	0.1	0.5	0.5	0.5	0.2	0.2	0.2
ChC	0	0.4	0.2	0.6	0.3	0.1	0.1	0.1	0.4	0.4	0.4	0.2	0.2	0.2
OrA	1	0.2	0.1	0.4	0.2	0.1	0.1	0.1	0.3	0.3	0.3	0.1	0.1	0.1
FdA	0	0.1	0.0	0.2	0.1	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1
	12,167	5,449.2	2,724.6	12,109.8	5,779.8	1,771.0	1,771.0	1,771.0	8,476.9	8,476.9	8,476.9	4,334.9	4,334.9	4,334.9

Table D.8 Loadings The Outlet Watershed (HUC 04100008-020-030)

		Totals (Rate x Acres)				Sediment Reduction w/BMPs			Nitrogen Reduction w/			Phosphorus w/BMPs		
	Area	Base Sheet & rill	Base Sediment	Nitrogen Associated	Phosphorus Associated	Filter	Riparian		Filter	Riparian		Filter	Riparian	
Soil	Acres	erosion (tns/yr)	Delivery (tns/yr)	w/Sediment (lbs/yr)	w/Sediment (lbs/yr)	Strips	Buffer	Wetlands	Strips	Buffer	Wetlands	Strips	Buffer	Wetlands
Symbol	1,338	1,301.9	651.0	2,542.0	1,223.4	423.1	423.1	423.1	1,779.4	1,779.4	1,779.4	1,793.9	1,793.9	1,793.9
BoB	751	856.2	428.1	1,614.9	778.8	278.3	278.3	278.3	1,130.4	1,130.4	1,130.4	695.2	695.2	695.2
GnB	2,135	503.3	251.6	1,340.2	633.2	163.6	163.6	163.6	938.2	938.2	938.2	629.5	629.5	629.5
PmA	1,325	518.9	259.4	1,236.5	588.1	168.6	168.6	168.6	865.5	865.5	865.5	474.9	474.9	474.9
BoA	447	600.1	300.1	1,092.1	527.8	195.0	195.0	195.0	764.5	764.5	764.5	441.1	441.1	441.1
RhB	1,158	1,343.9	671.9	2,524.7	436.8	436.8	436.8	436.8	1,767.3	1,767.3	1,767.3	395.9	395.9	395.9
BoB	785	361.3	180.6	831.1	396.1	117.4	117.4	117.4	581.7	581.7	581.7	310.2	310.2	310.2
BpA	221	275.1	137.5	509.0	245.8	89.4	89.4	89.4	356.3	356.3	356.3	207.4	207.4	207.4
MoB	225	220.5	110.2	429.8	206.9	71.7	71.7	71.7	300.8	300.8	300.8	161.0	161.0	161.0
MsB	311	200.8	100.4	429.0	205.3	65.3	65.3	65.3	300.3	300.3	300.3	157.8	157.8	157.8
RaA	72	279.5	139.7	403.4	197.6	90.8	90.8	90.8	282.4	282.4	282.4	154.0	154.0	154.0
GpC2	696	87.9	44.0	365.1	182.9	28.6	28.6	28.6	255.6	255.6	255.6	151.3	151.3	151.3
AdA	573	134.9	67.5	359.3	169.8	43.9	43.9	43.9	251.5	251.5	251.5	137.2	137.2	137.2
RhA	356	139.6	69.8	332.6	158.2	45.4	45.4	45.4	232.8	232.8	232.8	127.3	127.3	127.3
Mg	373	120.7	60.3	299.9	142.3	39.2	39.2	39.2	209.9	209.9	209.9	111.8	111.8	111.8
MnA	376	111.6	55.8	282.5	133.9	36.3	36.3	36.3	197.8	197.8	197.8	109.3	109.3	109.3
MrA	105	120.2	60.1	226.7	109.3	39.1	39.1	39.1	158.7	158.7	158.7	91.7	91.7	91.7
GpB2	414	83.7	41.8	230.5	108.7	27.2	27.2	27.2	161.4	161.4	161.4	83.2	83.2	83.2
AkA	457	38.5	19.2	173.3	86.8	12.5	12.5	12.5	121.3	121.3	121.3	68.5	68.5	68.5
GfA	276	65.0	32.5	173.2	81.8	21.1	21.1	21.1	121.2	121.2	121.2	62.5	62.5	62.5
SnA	22	81.9	41.0	119.1	58.3	26.6	26.6	26.6	83.4	83.4	83.4	46.7	46.7	46.7
RhC	70	60.0	30.0	120.5	57.9	19.5	19.5	19.5	84.3	84.3	84.3	45.8	45.8	45.8
HpB	139	47.5	23.7	116.6	55.4	15.4	15.4	15.4	81.6	81.6	81.6	43.7	43.7	43.7
ArA	166	39.0	19.5	103.9	49.1	12.7	12.7	12.7	72.7	72.7	72.7	40.0	40.0	40.0
MgA	44	51.5	25.7	96.7	46.7	16.7	16.7	16.7	67.7	67.7	67.7	35.1	35.1	35.1
BoB	385	142.0	71.0	342.9	46.1	46.1	46.1	46.1	240.0	240.0	240.0	35.0	35.0	35.0
Pa	106	39.8	19.9	95.8	45.5	12.9	12.9	12.9	67.0	67.0	67.0	35.0	35.0	35.0
GmA	101	39.5	19.8	94.2	44.8	12.8	12.8	12.8	65.9	65.9	65.9	34.1	34.1	34.1
TrA	129	36.1	18.1	92.7	43.9	11.7	11.7	11.7	64.9	64.9	64.9	33.6	33.6	33.6
Mm	118	134.9	67.4	254.1	43.8	43.8	43.8	43.8	177.9	177.9	177.9	33.3	33.3	33.3
HmB	165	33.6	16.8	92.4	43.6	10.9	10.9	10.9	64.7	64.7	64.7	32.9	32.9	32.9
LbA	99	132.2	66.1	240.9	43.0	43.0	43.0	43.0	168.6	168.6	168.6	91.9	91.9	91.9
GwB	49	44.8	22.4	88.5	42.6	14.6	14.6	14.6	62.0	62.0	62.0	32.7	32.7	32.7
BgB	66	40.2	20.1	87.0	41.6	13.1	13.1	13.1	60.9	60.9	60.9	87.3	87.3	87.3
DfA	93	34.1	17.1	82.5	39.2	11.1	11.1	11.1	57.7	57.7	57.7	31.9	31.9	31.9
LyA	83	32.4	16.2	77.2	36.7	10.5	10.5	10.5	54.0	54.0	54.0	28.7	28.7	28.7

Table D.8 Loadings The Outlet Watershed (HUC 04100008-020-030) pg. 2

Totals (Rate x Acres)						Sediment Reduction w/BMPs			Nitrogen Reduction w/BMPs			Phosphorus Reduction w/BMPs		
Soil Symbol	Area Acres	Base Sheet & erosion (tns/yr)	Base Sediment Delivery (tns/yr)	Nitrogen Associated w/Sediment (lbs/yr)	Phosphorus Associated w/Sediment (lbs/yr)	Filter Strips	Riparian Buffer	Wetlands	Filter Strips	Riparian Buffer	Wetlands	Filter Strips	Riparian Buffer	Wetlands
MoA	83	32.4	16.2	77.2	36.7	10.5	10.5	10.5	54.0	54.0	54.0	28.7	28.7	28.7
BnA	82	32.3	16.1	76.9	36.6	10.5	10.5	10.5	53.9	53.9	53.9	28.5	28.5	28.5
OwB	148	35.2	17.6	78.6	36.1	11.5	11.5	11.5	55.0	55.0	55.0	27.4	27.4	27.4
ThA	98	28.4	14.2	72.2	34.2	9.2	9.2	9.2	50.5	50.5	50.5	26.5	26.5	26.5
GxB2	79	103.7	51.8	189.6	33.7	33.7	33.7	33.7	132.7	132.7	132.7	25.9	25.9	25.9
BoA	282	101.2	50.6	245.9	32.9	32.9	32.9	32.9	172.1	172.1	172.1	25.7	25.7	25.7
MnB	69	92.4	46.2	168.2	30.0	30.0	30.0	30.0	117.7	117.7	117.7	22.7	22.7	22.7
HkB	80	91.5	45.7	172.3	29.7	29.7	29.7	29.7	120.6	120.6	120.6	22.7	22.7	22.7
Co	234	80.1	40.0	196.6	26.0	26.0	26.0	26.0	137.6	137.6	137.6	20.3	20.3	20.3
CnB	66	76.2	38.1	143.1	24.8	24.8	24.8	24.8	100.2	100.2	100.2	20.2	20.2	20.2
DuB	69	23.9	11.9	49.1	22.7	7.8	7.8	7.8	34.3	34.3	34.3	51.8	51.8	51.8
TrB	19	23.8	11.9	44.0	21.2	7.7	7.7	7.7	30.8	30.8	30.8	17.0	17.0	17.0
BgA	55	17.1	8.5	42.8	20.3	5.6	5.6	5.6	29.9	29.9	29.9	15.8	15.8	15.8
ChC	9	25.1	12.5	38.6	18.9	8.2	8.2	8.2	27.0	27.0	27.0	14.9	14.9	14.9
Ck	50	9.9	4.9	37.5	18.8	3.2	3.2	3.2	26.3	26.3	26.3	14.1	14.1	14.1
BrA	81	17.4	8.7	39.7	18.2	5.7	5.7	5.7	27.8	27.8	27.8	14.1	14.1	14.1
MpA	51	15.1	7.6	38.3	18.2	4.9	4.9	4.9	26.8	26.8	26.8	14.1	14.1	14.1
RpB	37	49.6	24.8	90.2	16.1	16.1	16.1	16.1	63.2	63.2	63.2	12.1	12.1	12.1
TkA	63	12.1	6.1	33.8	15.9	3.9	3.9	3.9	23.7	23.7	23.7	12.1	12.1	12.1
OrB	26	19.4	9.7	33.9	15.9	6.3	6.3	6.3	23.7	23.7	23.7	32.7	32.7	32.7
Le	153	48.0	24.0	119.9	15.6	15.6	15.6	15.6	84.0	84.0	84.0	11.9	11.9	11.9
On	25	7.0	3.5	24.8	12.4	2.3	2.3	2.3	17.4	17.4	17.4	9.7	9.7	9.7
MpA	122	36.3	18.1	91.9	11.8	11.8	11.8	11.8	64.3	64.3	64.3	9.4	9.4	9.4
HkA	99	36.3	18.1	87.8	11.8	11.8	11.8	11.8	61.4	61.4	61.4	9.3	9.3	9.3
Pm	129	35.8	17.9	92.0	11.6	11.6	11.6	11.6	64.4	64.4	64.4	32.7	32.7	32.7
OrA	50	10.9	5.5	24.8	11.4	3.6	3.6	3.6	17.4	17.4	17.4	31.3	31.3	31.3
MnA	36	8.4	4.2	22.4	10.6	2.7	2.7	2.7	15.7	15.7	15.7	8.1	8.1	8.1
Mf	134	31.9	16.0	84.8	10.4	10.4	10.4	10.4	59.4	59.4	59.4	8.0	8.0	8.0
BkB	13	10.6	5.3	21.6	10.4	3.4	3.4	3.4	15.1	15.1	15.1	7.9	7.9	7.9
OrB	17	12.5	6.3	21.9	10.3	4.1	4.1	4.1	15.4	15.4	15.4	30.1	30.1	30.1
Lw	127	30.2	15.1	110.6	9.8	9.8	9.8	9.8	77.4	77.4	77.4	7.7	7.7	7.7
Pm	23	8.0	4.0	19.7	9.3	2.6	2.6	2.6	13.8	13.8	13.8	7.2	7.2	7.2
MsB	29	28.3	14.2	55.2	9.2	9.2	9.2	9.2	38.6	38.6	38.6	7.1	7.1	7.1
SeA	29	7.4	3.7	19.4	9.2	2.4	2.4	2.4	13.6	13.6	13.6	7.0	7.0	7.0
RcA	24	7.6	3.8	19.0	9.0	2.5	2.5	2.5	13.3	13.3	13.3	6.9	6.9	6.9
JeA	53	7.9	4.0	19.6	8.9	2.6	2.6	2.6	13.7	13.7	13.7	6.8	6.8	6.8

Table D.8 Loadings The Outlet Watershed (HUC 04100008-020-030) pg. 3

	Totals (Rate x Acres)					Sediment Reduction w/BMPs			Nitrogen Reduction w/BMPs			Phosphorus Reduction w/BMPs		
Soil Symbol	Area Acres	Base Sheet & rill erosion (tns/yr)	Base Sediment Delivery (tns/yr)	Nitrogen Associated w/Sediment (lbs/yr)	Phosphorus Associated w/Sediment (lbs/yr)	Filter Strips	Riparian Buffer	Wetlands	Filter Strips	Riparian Buffer	Wetlands	Filter Strips	Riparian Buffer	Wetlands
RmB	27	26.4	13.2	51.4	8.6	8.6	8.6	8.6	36.0	36.0	36.0	6.7	6.7	6.7
Lm	18	4.3	2.1	15.6	7.8	1.4	1.4	1.4	10.9	10.9	10.9	6.5	6.5	6.5
GsB	9	7.0	3.5	15.5	7.8	2.3	2.3	2.3	10.8	10.8	10.8	18.6	18.6	18.6
TrB	16	21.2	10.6	38.7	6.9	6.9	6.9	6.9	27.1	27.1	27.1	5.6	5.6	5.6
OsB	10	8.4	4.2	14.3	6.7	2.7	2.7	2.7	10.0	10.0	10.0	14.0	14.0	14.0
BkB	19	18.9	9.5	37.0	6.2	6.2	6.2	6.2	25.9	25.9	25.9	4.7	4.7	4.7
JoA	26	4.6	2.3	13.0	6.1	1.5	1.5	1.5	9.1	9.1	9.1	4.6	4.6	4.6
RoA	110	18.7	9.3	44.8	6.1	6.1	6.1	6.1	31.3	31.3	31.3	13.4	13.4	13.4
WeA	20	4.6	2.3	12.4	5.8	1.5	1.5	1.5	8.7	8.7	8.7	4.6	4.6	4.6
GmA	13	4.9	2.5	11.9	5.6	1.6	1.6	1.6	8.3	8.3	8.3	4.3	4.3	4.3
JeB	14	6.1	3.0	11.9	5.6	2.0	2.0	2.0	8.4	8.4	8.4	4.3	4.3	4.3
SeB	6	5.4	2.7	10.9	5.2	1.8	1.8	1.8	7.6	7.6	7.6	4.0	4.0	4.0
Mm	56	15.7	7.9	40.4	5.1	5.1	5.1	5.1	28.2	28.2	28.2	3.9	3.9	3.9
MfA	11	3.3	1.6	8.7	4.4	1.1	1.1	1.1	6.1	6.1	6.1	3.8	3.8	3.8
SoA	14	3.4	1.7	9.0	4.3	1.1	1.1	1.1	6.3	6.3	6.3	3.5	3.5	3.5
MnA	31	11.6	5.8	28.0	3.8	3.8	3.8	3.8	19.6	19.6	19.6	3.3	3.3	3.3
KbB	6	4.5	2.3	7.9	3.7	1.5	1.5	1.5	5.5	5.5	5.5	3.2	3.2	3.2
Bp	38	10.6	5.3	28.8	3.4	3.4	3.4	3.4	20.2	20.2	20.2	2.8	2.8	2.8
HpA	10	2.6	1.3	6.9	3.3	0.9	0.9	0.9	4.8	4.8	4.8	10.9	10.9	10.9
Co	8	2.8	1.4	6.8	3.2	0.9	0.9	0.9	4.7	4.7	4.7	2.5	2.5	2.5
RbA	27	9.8	4.9	23.6	3.2	3.2	3.2	3.2	16.5	16.5	16.5	2.4	2.4	2.4
DmA	16	9.6	4.8	20.8	3.1	3.1	3.1	3.1	14.5	14.5	14.5	2.4	2.4	2.4
GmA	20	7.7	3.8	18.5	2.5	2.5	2.5	2.5	12.9	12.9	12.9	2.2	2.2	2.2
GwA	15	6.7	3.4	15.5	2.2	2.2	2.2	2.2	10.8	10.8	10.8	6.6	6.6	6.6
LzB	2	2.1	1.1	4.0	1.9	0.7	0.7	0.7	2.8	2.8	2.8	5.5	5.5	5.5
Ca	19	4.6	2.3	16.9	1.5	1.5	1.5	1.5	11.8	11.8	11.8	1.2	1.2	1.2
AdA	36	4.5	2.3	18.7	1.5	1.5	1.5	1.5	13.1	13.1	13.1	1.2	1.2	1.2
SdA	26	4.4	2.2	10.5	1.4	1.4	1.4	1.4	7.4	7.4	7.4	7.0	7.0	7.0
SkB	2	1.4	0.7	2.9	1.4	0.5	0.5	0.5	2.1	2.1	2.1	1.1	1.1	1.1
HkB	1	1.5	0.8	2.8	1.4	0.5	0.5	0.5	2.0	2.0	2.0	1.1	1.1	1.1
OsB	2	1.6	0.8	2.9	1.4	0.5	0.5	0.5	2.0	2.0	2.0	1.0	1.0	1.0
GfA	43	3.7	1.8	16.5	1.2	1.2	1.2	1.2	11.5	11.5	11.5	1.0	1.0	1.0
PnA	14	3.3	1.7	8.9	1.1	1.1	1.1	1.1	6.2	6.2	6.2	6.2	6.2	6.2
HaB	3	2.9	1.5	5.7	1.0	1.0	1.0	1.0	4.0	4.0	4.0	3.2	3.2	3.2
SdB	4	2.7	1.3	4.8	0.9	0.9	0.9	0.9	3.3	3.3	3.3	2.1	2.1	2.1
DpB	7	2.3	1.1	4.7	0.7	0.7	0.7	0.7	3.3	3.3	3.3	1.7	1.7	1.7

Table D.8 Loadings The Outlet Watershed (HUC 04100008-020-030) pg. 4

	Totals (Rate x Acres)					Sediment Reduction w/BMPs			Nitrogen Reduction w/BMPs			Phosphorus Reduction w/BMPs		
Soil Symbol	Area Acres	Base Sheet & rill erosion (tns/yr)	Base Sediment Delivery (tns/yr)	Nitrogen Associated w/Sediment (lbs/yr)	Phosphorus Associated w/Sediment (lbs/yr)	Filter Strips	Riparian Buffer	Wetlands	Filter Strips	Riparian Buffer	Wetlands	Filter Strips	Riparian Buffer	Wetlands
Me	5	1.6	0.8	4.1	0.5	0.5	0.5	0.5	2.9	2.9	2.9	0.5	0.5	0.5
Sb	4	1.5	0.8	3.7	0.5	0.5	0.5	0.5	2.6	2.6	2.6	0.4	0.4	0.4
Mj	1	0.3	0.1	0.8	0.4	0.1	0.1	0.1	0.5	0.5	0.5	0.4	0.4	0.4
BrA	2	0.9	0.4	2.0	0.3	0.3	0.3	0.3	1.4	1.4	1.4	0.2	0.2	0.2
ToB	0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1
Total	17,608	9,793	4,896	20,729	8,131	3,183	3,183	3,183	14,511	14,511	14,511	7,844	7,844	7,844

Table D.9 Loadings Lye Creek Watershed (HUC 04100008-020-050)

Loadings HUC 04100008-020-050

		Totals (Rate x Acres)				Sediment Reduction w/BMPs			Nitrogen Reduction w/BMPs			Phosphorus Reduction w/BMPs		
Soil Symbol	Area Acres	Base Sheet and rill erosion (tns/yr)	Base Sediment Delivery (tns/yr)	Nitrogen Associated w/Sediment (lbs/yr)	Phosphorus Associated w/Sediment (lbs/yr)	Filter Strips	Riparian Buffer	Wetlands	Filter Strips	Riparian Buffer	Wetlands	Filter Strips	Riparian Buffer	Wetlands
BoA	5,390	2,110.4	1,055.2	5,029.0	2,391.8	685.9	685.9	685.9	3,520.3	3,520.3	3,520.3	1,793.9	1,793.9	1,793.9
PmA	4,421	1,042.0	521.0	2,774.8	1,311.0	338.6	338.6	338.6	1,942.3	1,942.3	1,942.3	983.3	983.3	983.3
BoB	642	624.7	312.4	1,219.8	587.1	203.0	203.0	203.0	853.8	853.8	853.8	440.3	440.3	440.3
GnB	267	304.0	152.0	573.4	276.5	98.8	98.8	98.8	401.4	401.4	401.4	207.4	207.4	207.4
BnA	484	189.4	94.7	451.2	214.6	61.5	61.5	61.5	315.9	315.9	315.9	161.0	161.0	161.0
BpA	417	191.9	96.0	441.5	210.4	62.4	62.4	62.4	309.0	309.0	309.0	157.8	157.8	157.8
MgA	503	118.5	59.2	315.5	149.1	38.5	38.5	38.5	220.9	220.9	220.9	111.8	111.8	111.8
AkA	287	58.0	29.0	159.7	75.3	18.8	18.8	18.8	111.8	111.8	111.8	56.5	56.5	56.5
HpB	57	48.5	24.3	97.4	46.8	15.8	15.8	15.8	68.2	68.2	68.2	35.1	35.1	35.1
RhA	158	37.1	18.6	98.8	46.7	12.1	12.1	12.1	69.2	69.2	69.2	35.0	35.0	35.0
ArA	76	26.0	13.0	63.9	30.3	8.5	8.5	8.5	44.7	44.7	44.7	22.7	22.7	22.7
LbA	109	22.2	11.1	61.1	28.8	7.2	7.2	7.2	42.8	42.8	42.8	21.6	21.6	21.6
RcA	73	22.8	11.4	57.1	27.1	7.4	7.4	7.4	40.0	40.0	40.0	20.3	20.3	20.3
BgB	23	20.9	10.4	41.2	19.8	6.8	6.8	6.8	28.8	28.8	28.8	14.9	14.9	14.9
SeB	24	20.2	10.1	40.6	19.5	6.6	6.6	6.6	28.4	28.4	28.4	14.6	14.6	14.6
OrB	26	19.4	9.7	33.9	15.9	6.3	6.3	6.3	23.7	23.7	23.7	11.9	11.9	11.9
SpA	52	12.3	6.2	32.8	15.5	4.0	4.0	4.0	23.0	23.0	23.0	11.6	11.6	11.6
ThA	27	7.8	3.9	19.9	9.4	2.5	2.5	2.5	13.9	13.9	13.9	7.1	7.1	7.1
OrA	33	7.1	3.6	16.2	7.4	2.3	2.3	2.3	11.3	11.3	11.3	5.6	5.6	5.6
HaA	21	4.9	2.5	13.1	6.2	1.6	1.6	1.6	9.2	9.2	9.2	4.6	4.6	4.6
BrA	24	5.1	2.5	11.6	5.3	1.7	1.7	1.7	8.1	8.1	8.1	4.0	4.0	4.0
MsB	3	3.1	1.5	6.0	2.9	1.0	1.0	1.0	4.2	4.2	4.2	2.2	2.2	2.2
OsB	4	2.9	1.5	5.1	2.4	0.9	0.9	0.9	3.6	3.6	3.6	1.8	1.8	1.8
SeA	6	1.6	0.8	4.2	2.0	0.5	0.5	0.5	3.0	3.0	3.0	1.5	1.5	1.5
JeB	3	1.2	0.6	2.4	1.1	0.4	0.4	0.4	1.7	1.7	1.7	0.8	0.8	0.8
BgA	3	0.9	0.5	2.3	1.1	0.3	0.3	0.3	1.6	1.6	1.6	0.8	0.8	0.8
AsA	4	0.7	0.4	2.0	0.9	0.2	0.2	0.2	1.4	1.4	1.4	0.7	0.7	0.7
DuB	2	0.7	0.4	1.4	0.7	0.2	0.2	0.2	1.0	1.0	1.0	0.5	0.5	0.5
RoA	2	0.3	0.1	0.7	0.3	0.1	0.1	0.1	0.5	0.5	0.5	0.2	0.2	0.2
TkA	1	0.2	0.1	0.6	0.3	0.1	0.1	0.1	0.4	0.4	0.4	0.2	0.2	0.2
AnA	0	0.1	0.0	0.2	0.1	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1
PnA	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total	13,140	4,905.0	2,452.5	11,577.4	5,506.5	1,594.1	1,594.1	1,594.1	8,104.2	8,104.2	8,104.2	4,129.8	4,129.8	4,129.8

Problem Area 2: Problem Statement 2.4 & 2.5 Stahls Ditch at TR 199 located in the Brights Ditch watershed (HUC 04100008-020-020)

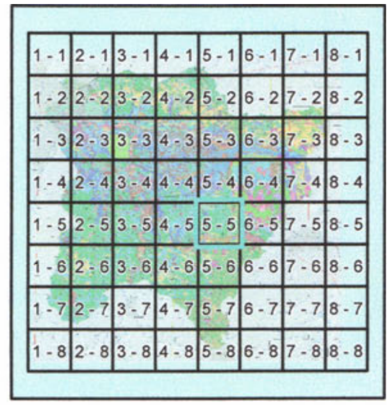
TR 199 downstream

TR 199 upstream

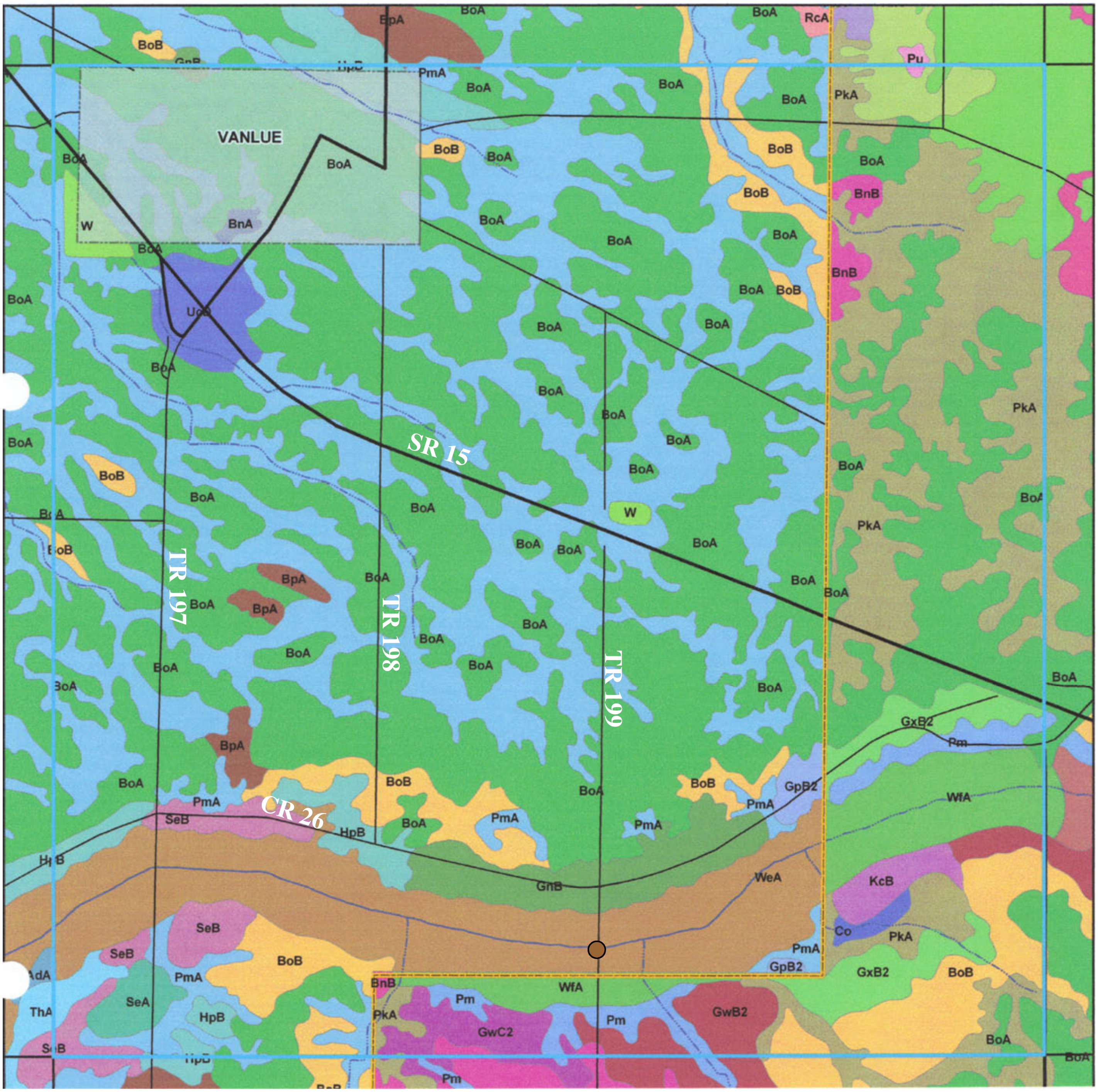
Erosion along TR 199
just north of Stahl's Ditch
and west of TR 199

Problem Area 2: Problem Statement 2.4 & 2.5 Stahls Ditch at TR 199 located in the Brights Ditch watershed (HUC 04100008-020-020)

Soil Maps Grid 5-5 of Appendix B

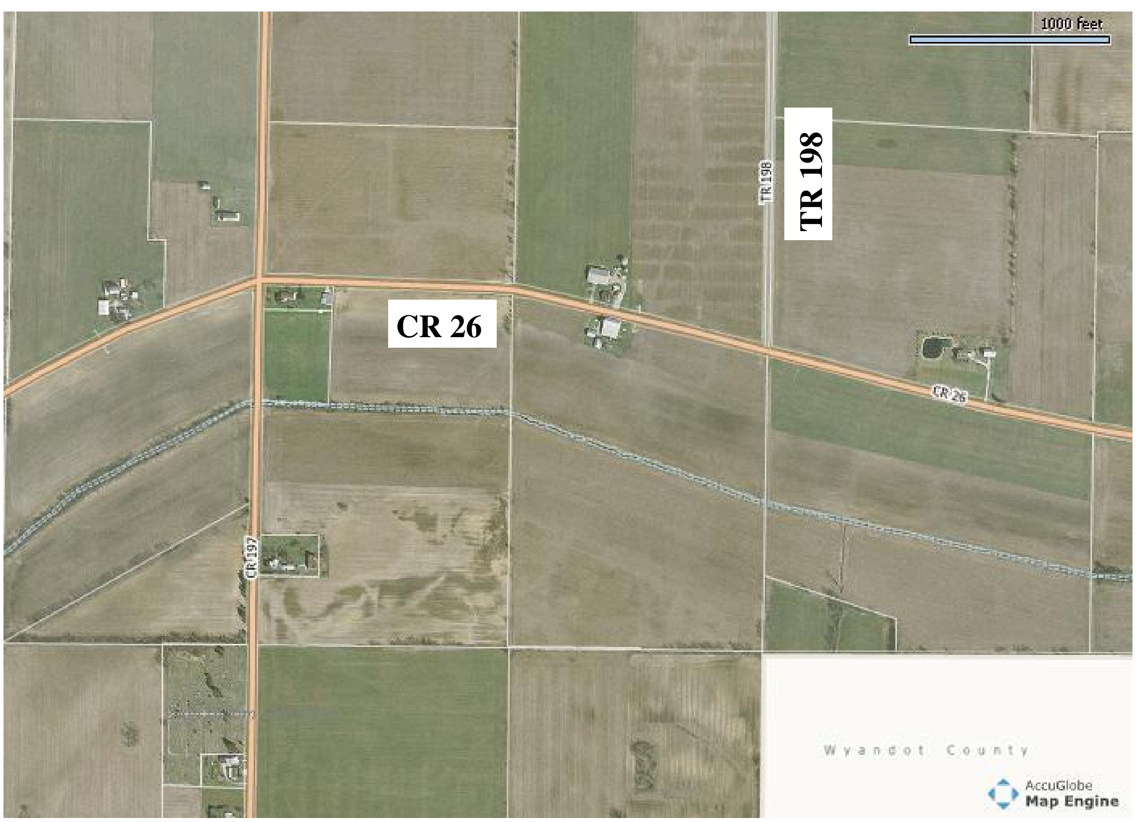


● Non Attainment TDML Sites



Aerial picture of the problem statement area 2.4 & 2.5 south of Vanlue on TR 199

Aerial picture Stahls Ditch downstream - south of Vanlue on TR 199



Problem Area 2: Problem Statement 2.6 area on TR 197 west of Vanlue:

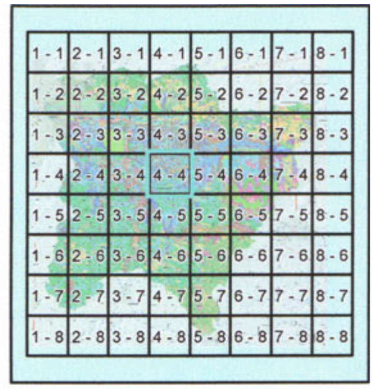
Facing downstream from deck of TR 197 bridge

Facing upstream from deck of TR 197 bridge

Problem Area 2: Aerial view of Problem Statement 2.6 area on TR 197 west of Vanlue:

Aerial picture of the problem area 6 west of Vanlue on TR 197

Problem Area 2: Soil Map



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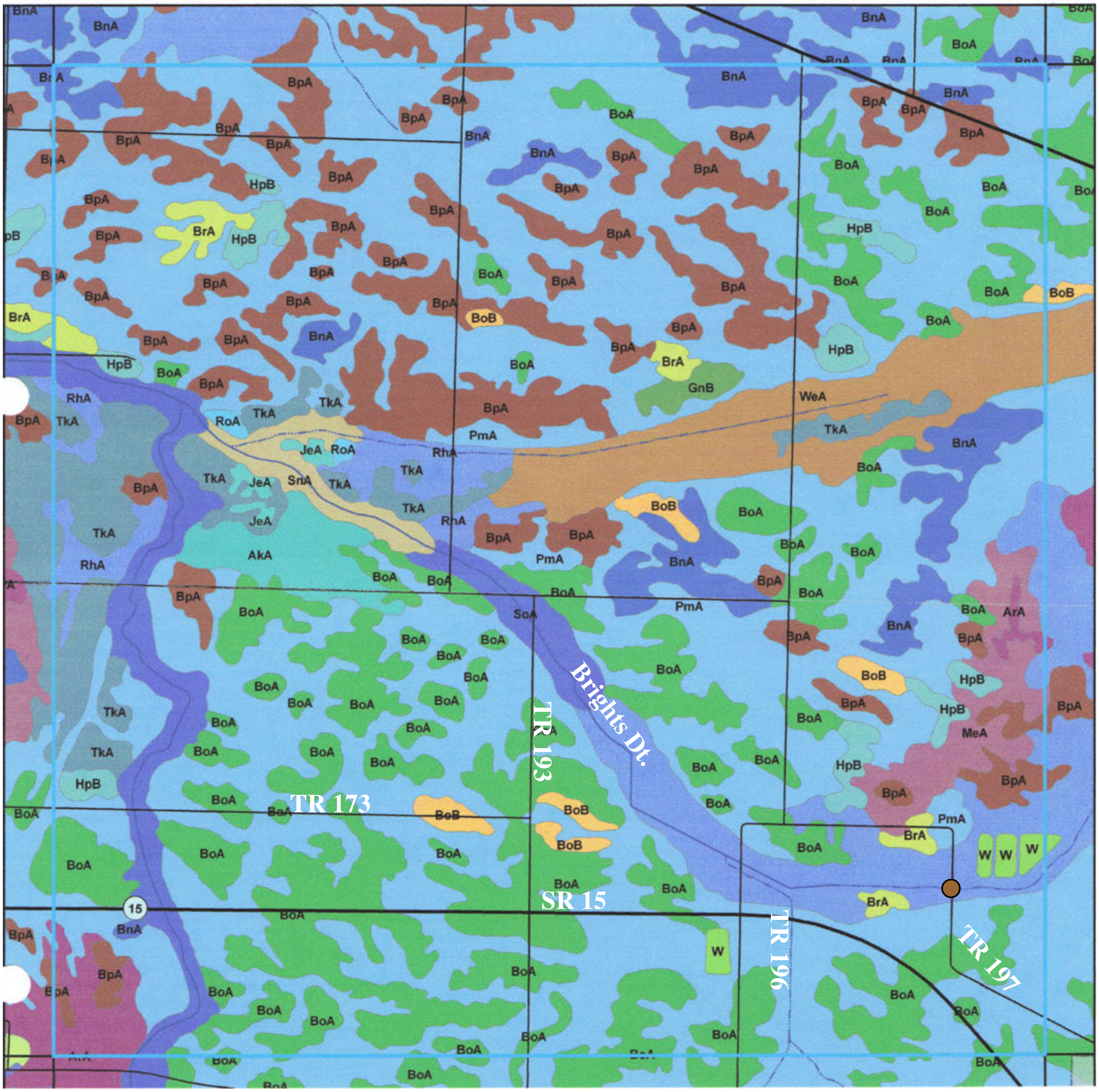
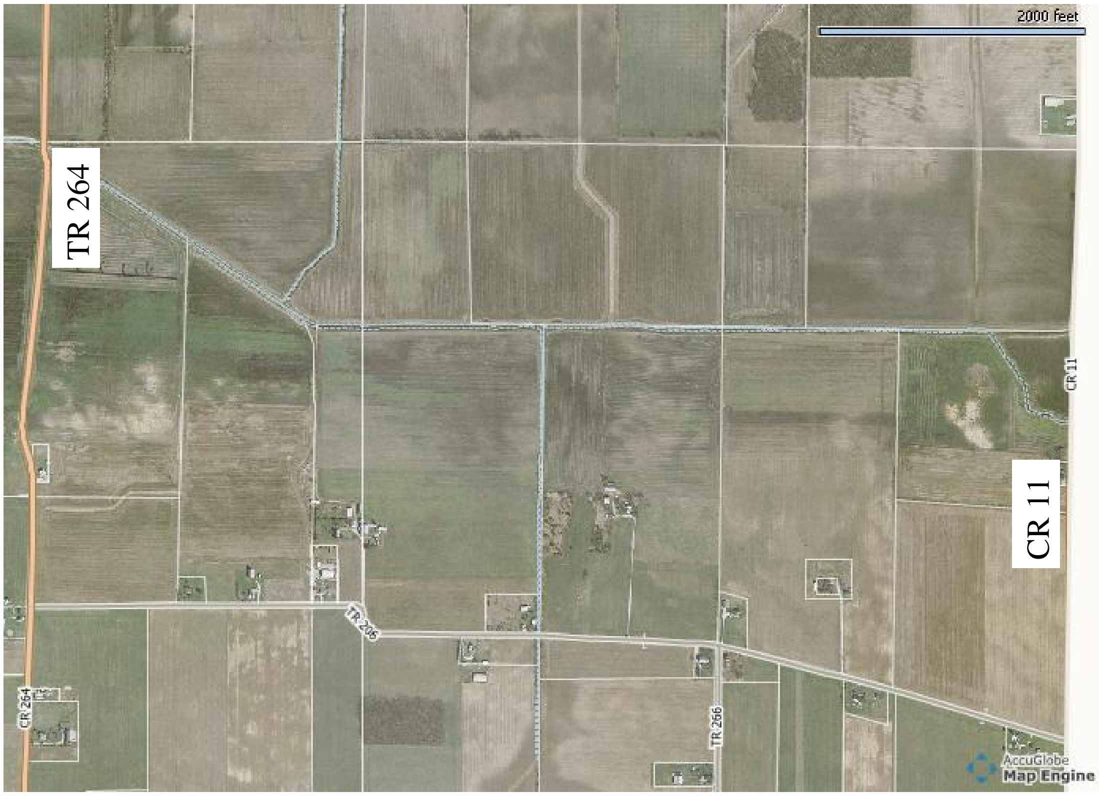


Problem Area 3: Aerial Photos of The Outlet:

CR 11 west to TR 264



TR 264 west to SR 330

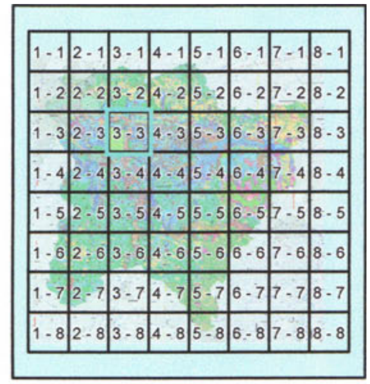
Problem Area 3: Aerial Photos of The Outlet

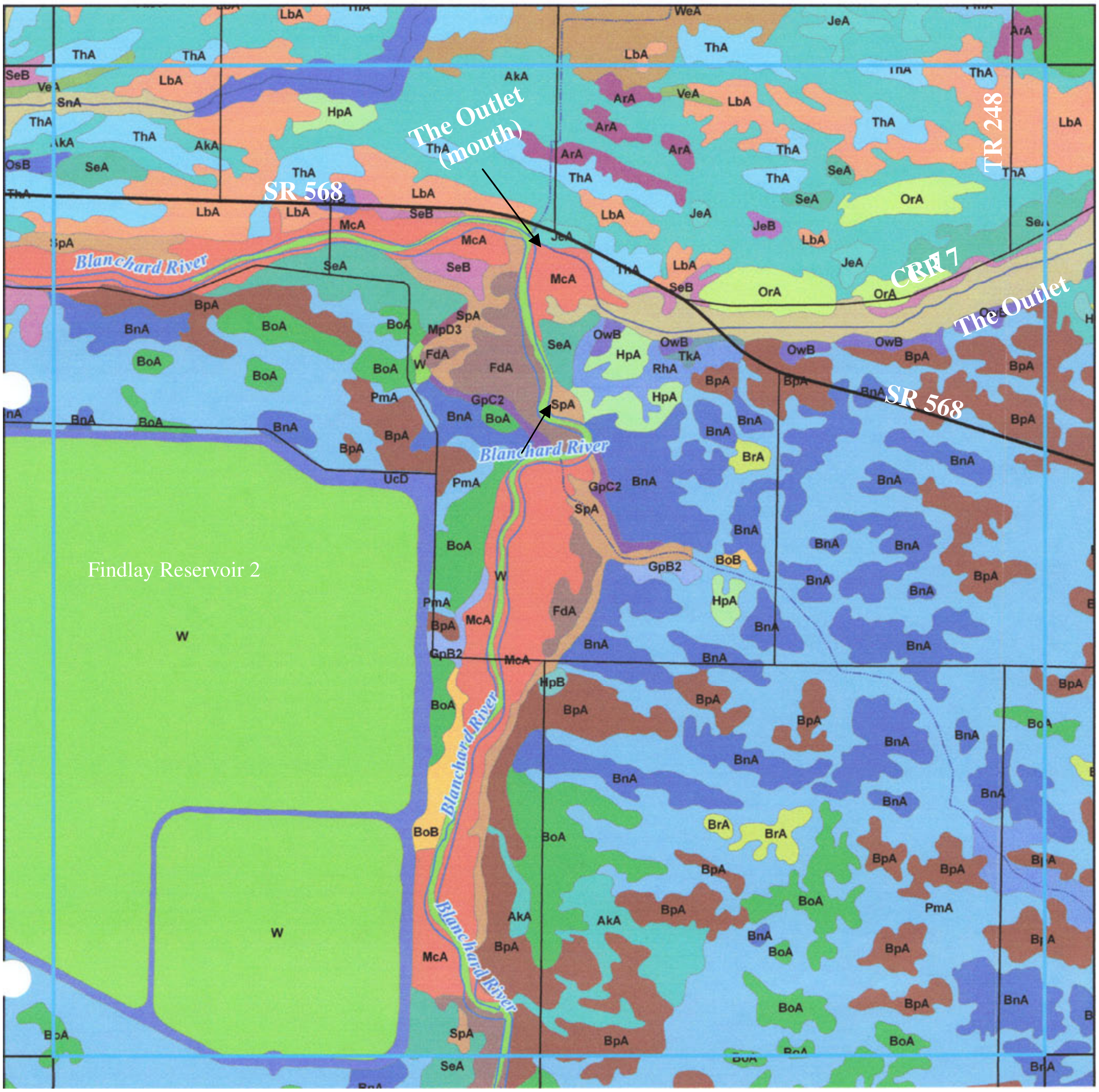
CR 330 to CR 248

CR 248 to mouth of The Outlet

Appendix D - Problem Area 3: Soil Maps (starting at mouth)

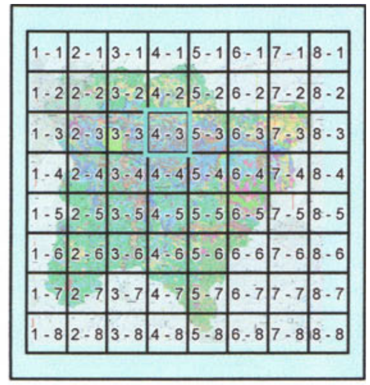
Grid 3-3 of Appendix B

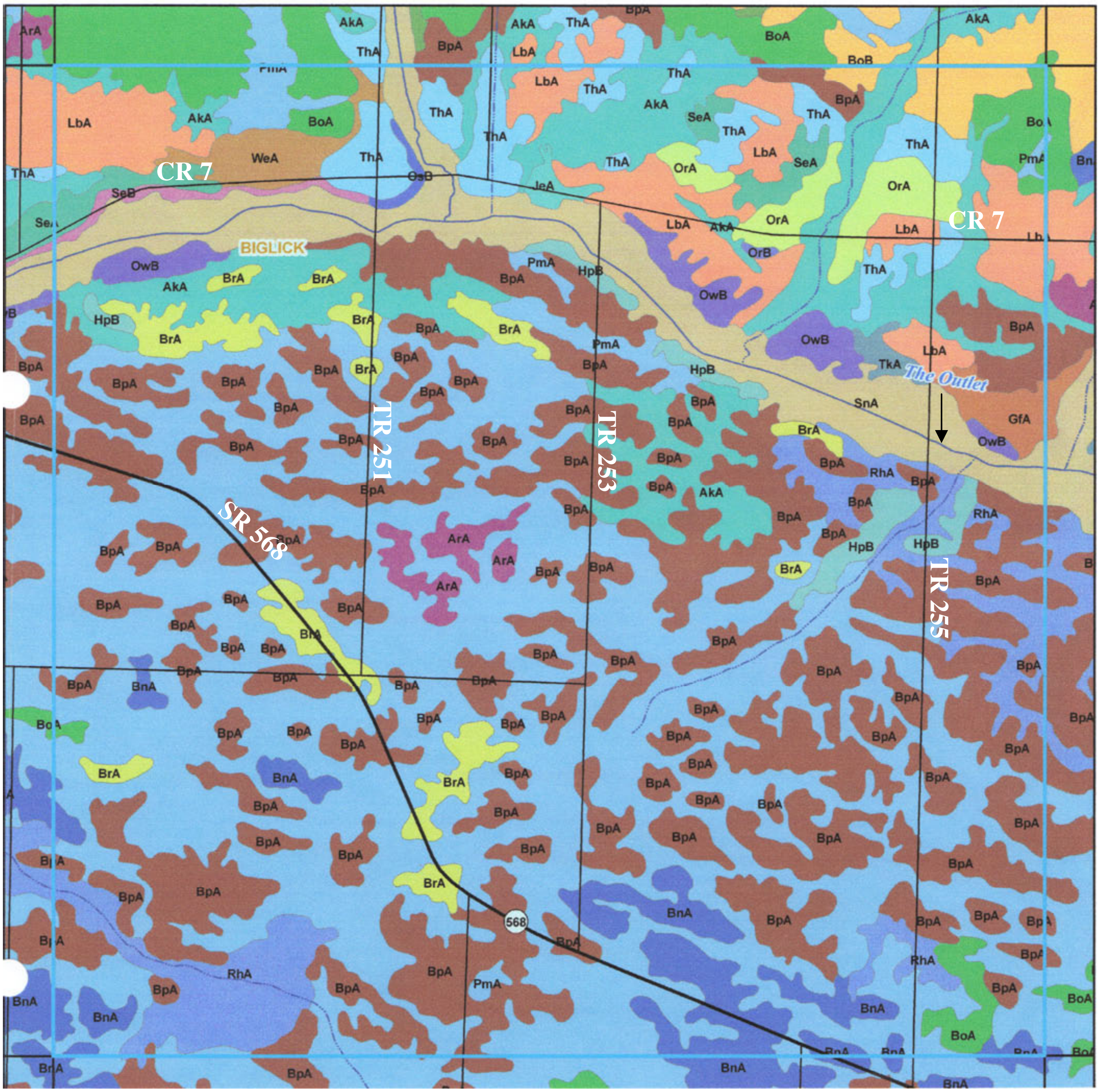




Appendix D - Problem Area 3: Soil Maps

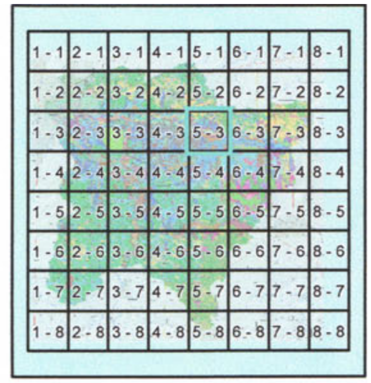
Grid 4-3 of Appendix B



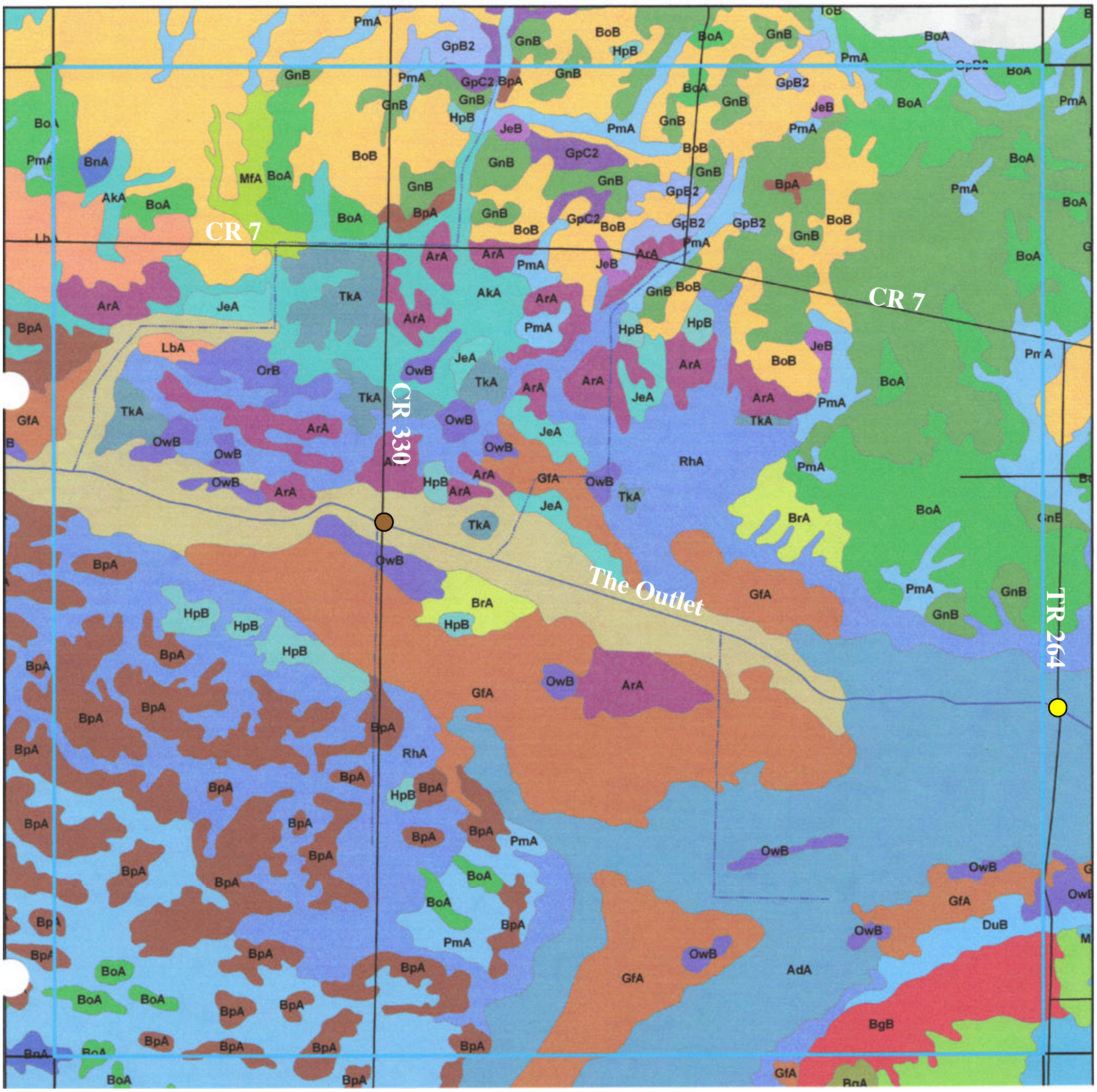


Appendix D - Problem Area 3: Soil Maps

Grid 5-3 of Appendix B

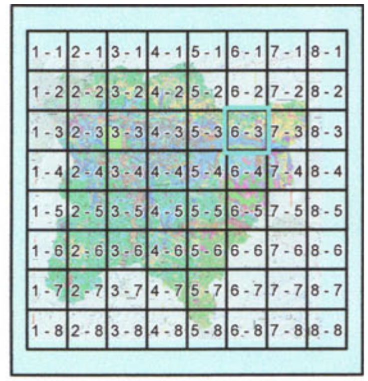


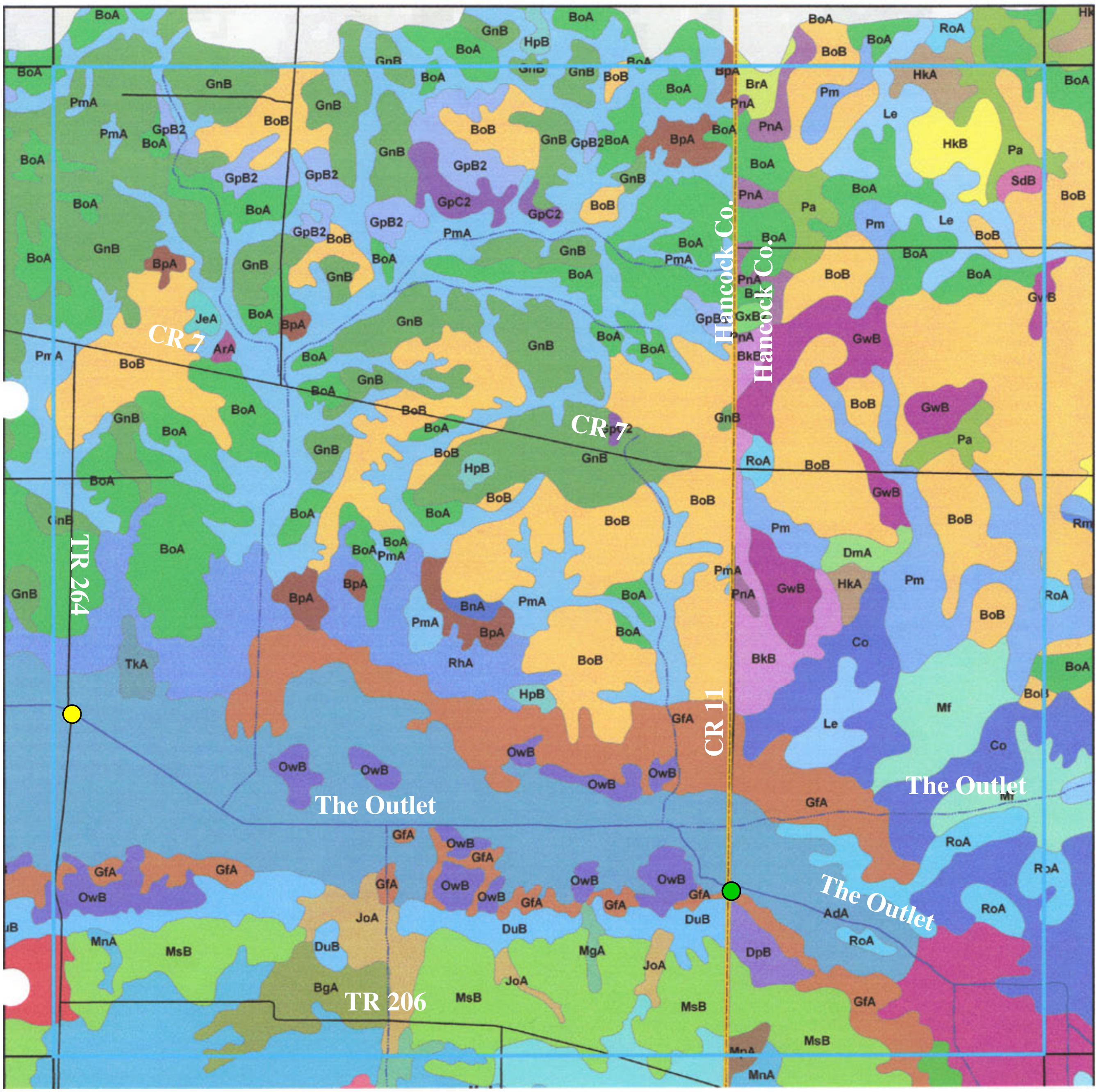
- Partial Attainment TDML Sites
- Non Attainment TDML Sites



Appendix D - Problem Area 3: Soil Maps

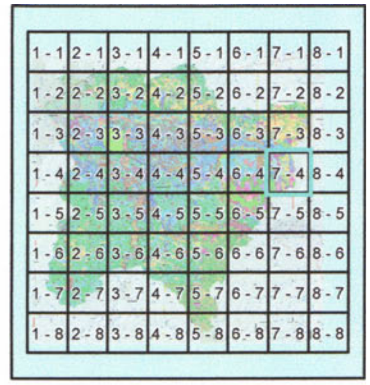
Grid 6-3 of Appendix B

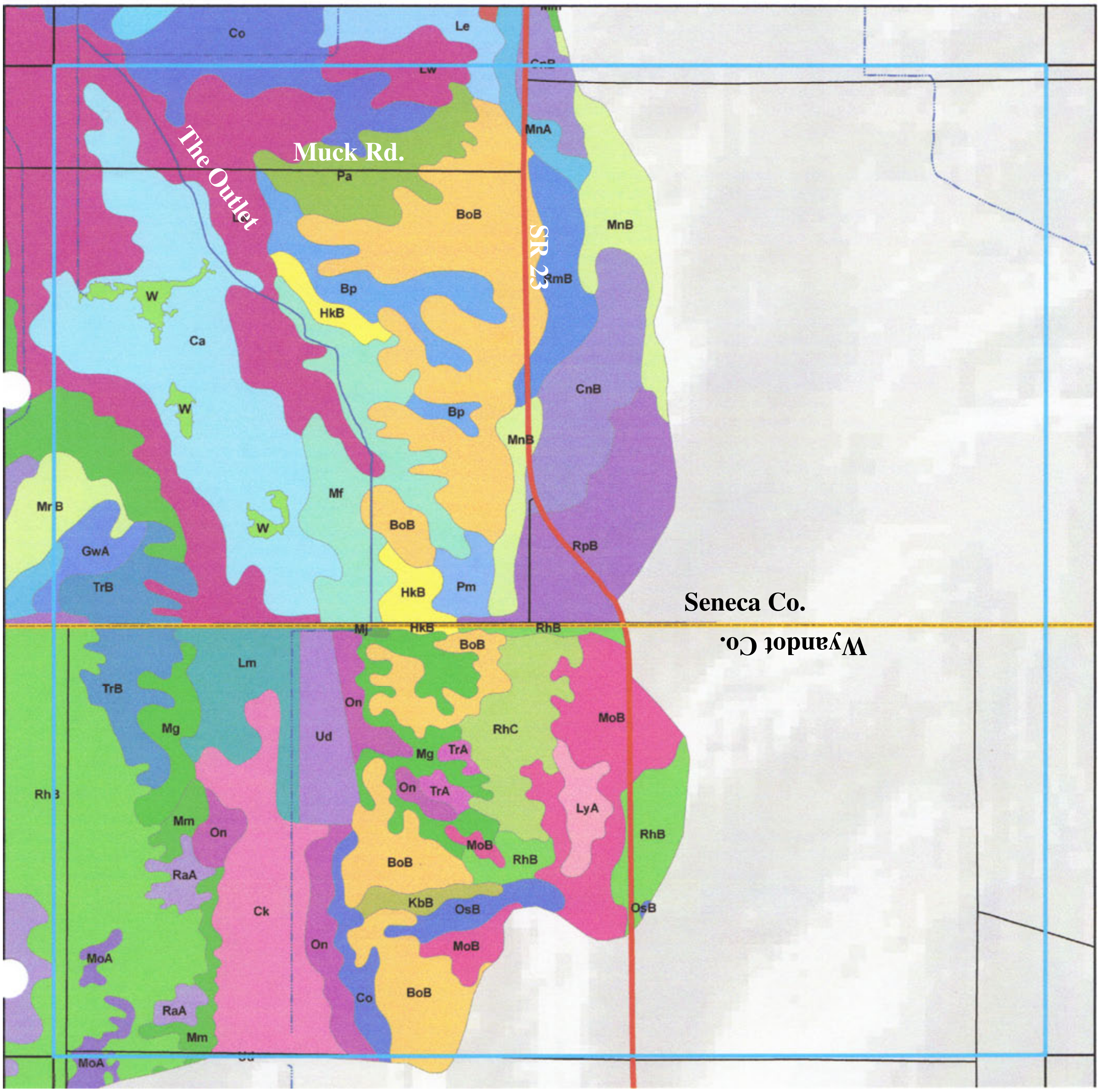




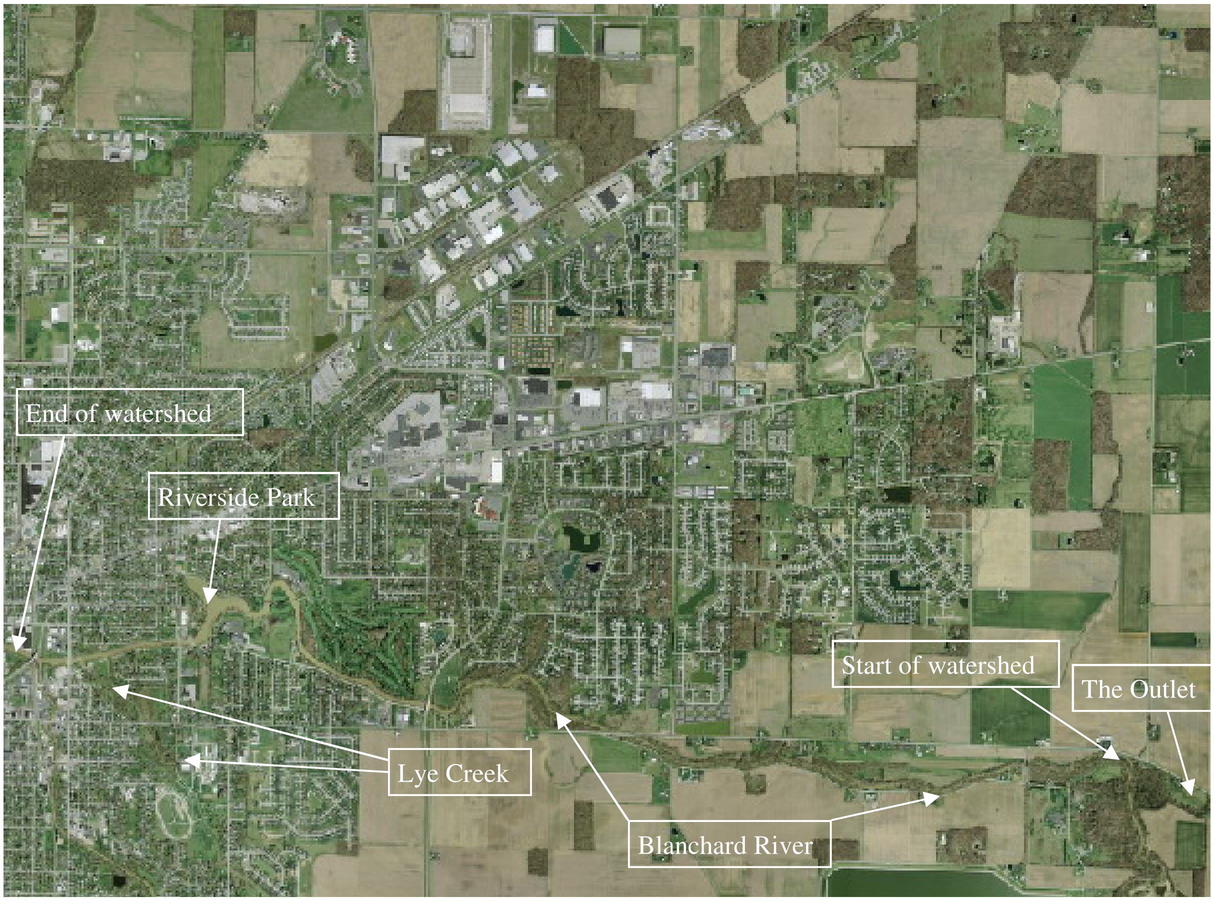
Appendix D - Problem Area 3: Soil Maps

Grid 7-4 of Appendix B





Problem Area 4: Aerial view of Problem Area 4 - Blanchard River above The Outlet (2) to below Eagle Creek.



Picture D. Problem Area 4 downstream from The Outlet.

Martin

Problem Area 4: Aerial view of Riverside Park showing Problem Areas 4.3 and 4.4

Problem Area 4: Upstream view of the City of Findlay's water intake area behind the dam along TR 208.

Problem Area 5: Aerial view Problem Areas 5.1, 5.2 and 5.3 started south (upstream) of Houcktown CR 26.

Problem Area 5:

CR 26 just east of the village of Houcktown

Facing south (upstream)

Facing north (downstream)

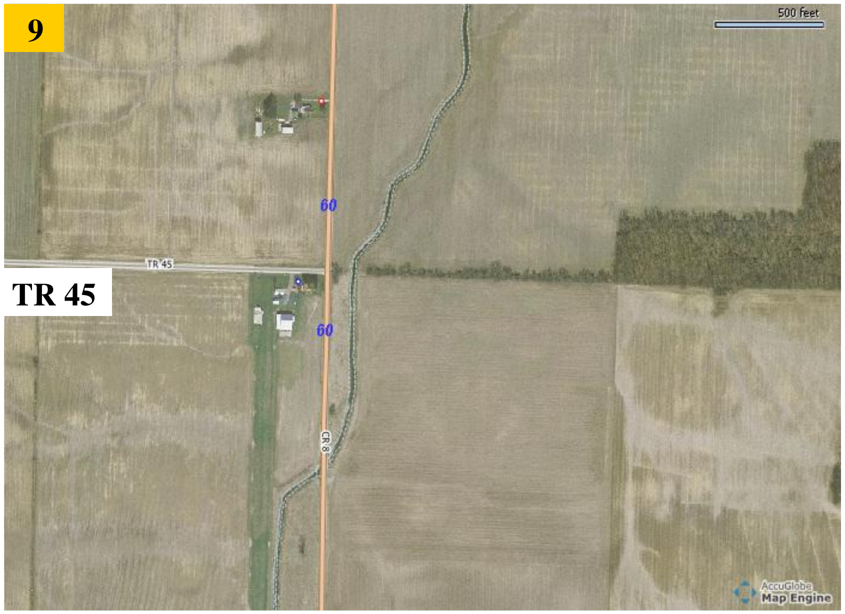
TR 37 Facing south (upstream)

TR 37 Facing north (downstream)

TR 168 Facing south (upstream)

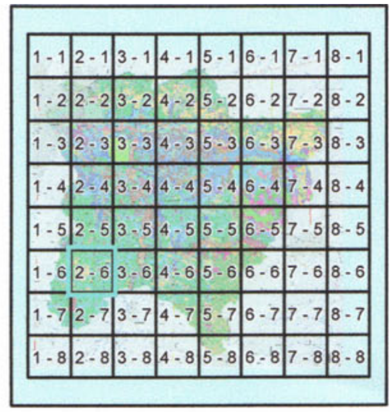
TR 168 Facing north (downstream)

Problem Area 5: Aerial view Problem Areas 5.1, 5.2 and 5.3 started south (upstream) of Houcktown CR 26.

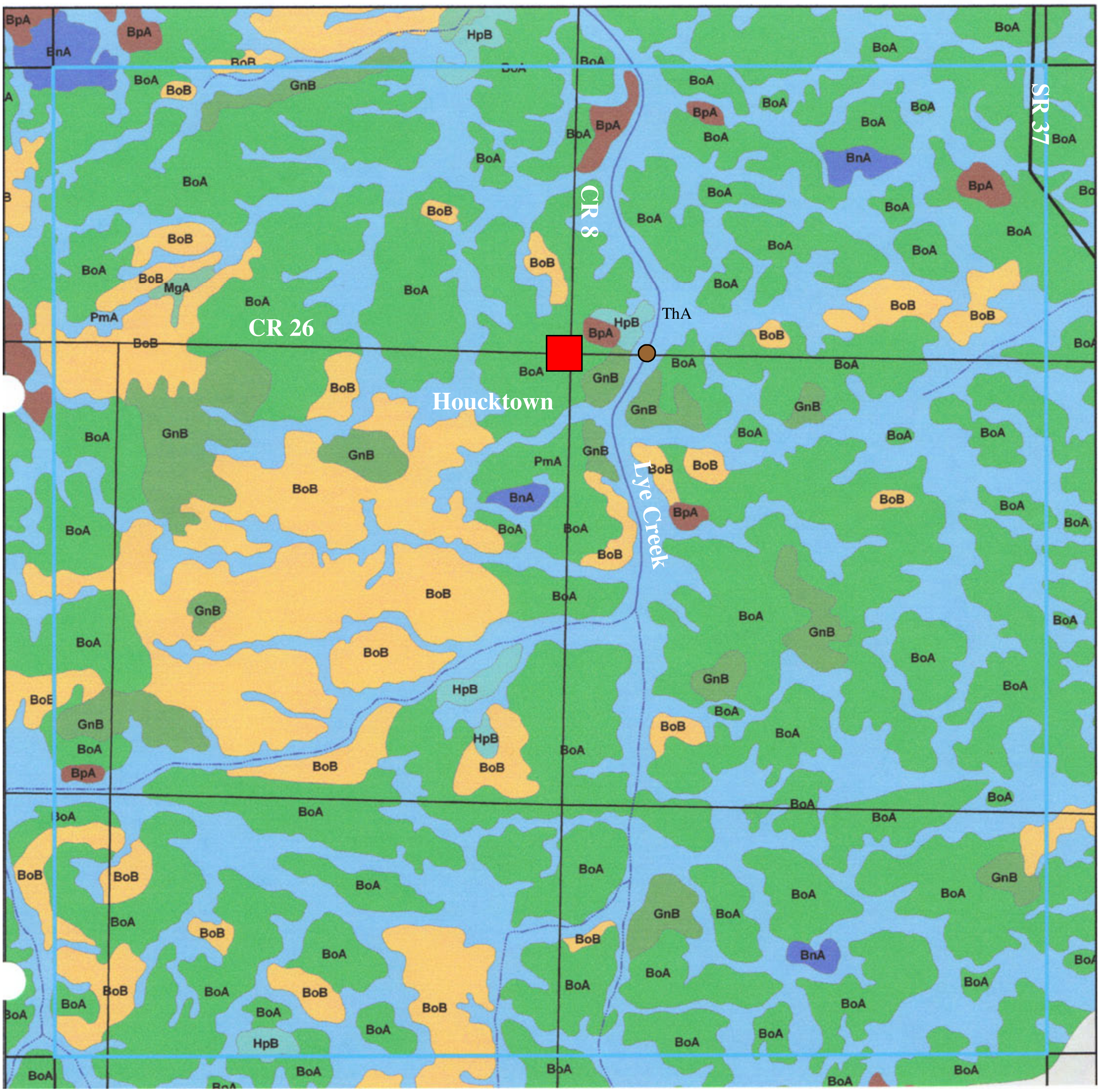


Problem Statement 5: Soil Maps

Grid 2-6 of Appendix B

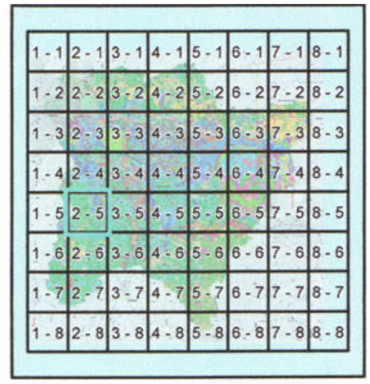


● Non Attainment TDML Sites

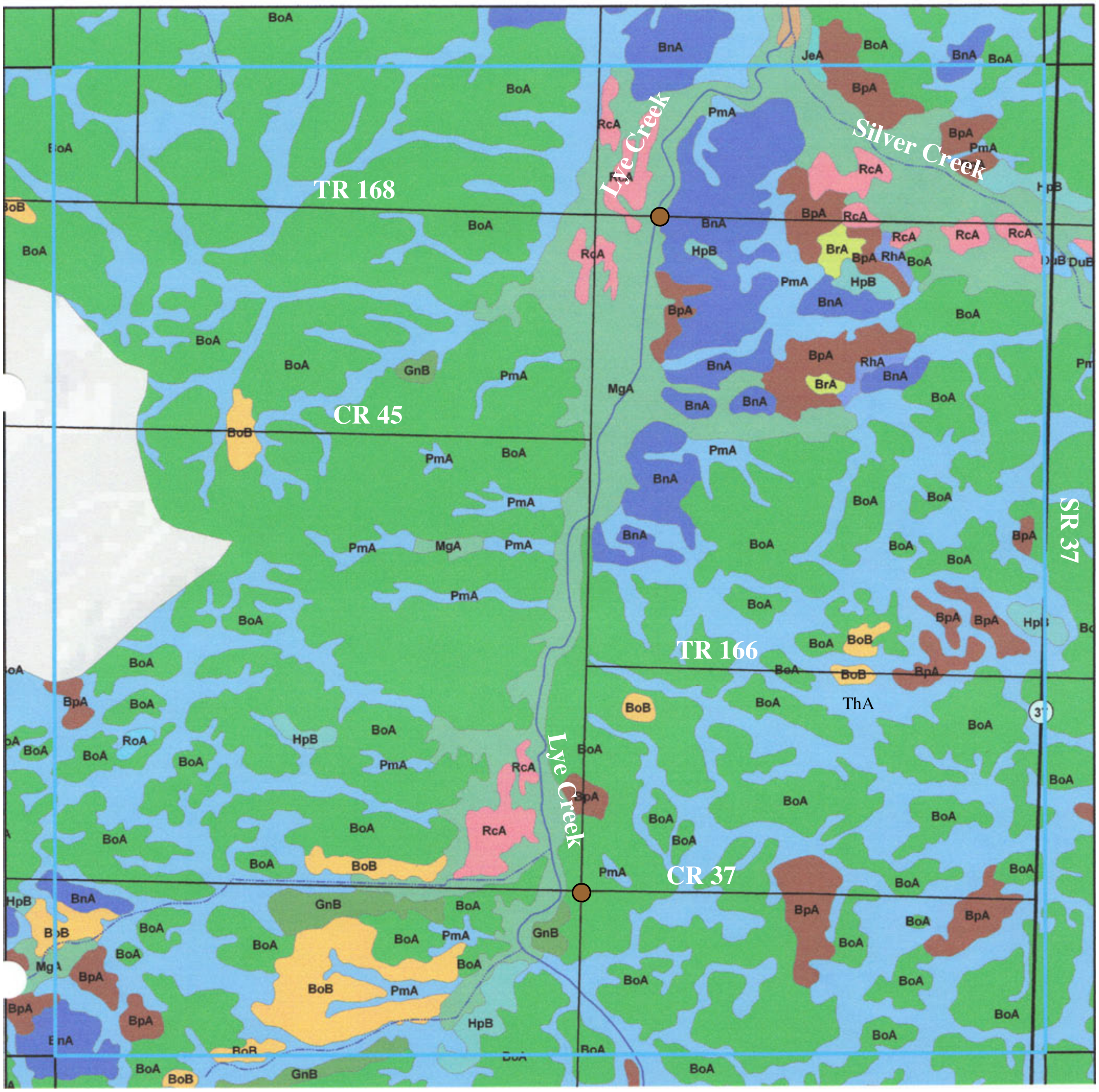


Appendix D - Problem Area 5: Soil Maps

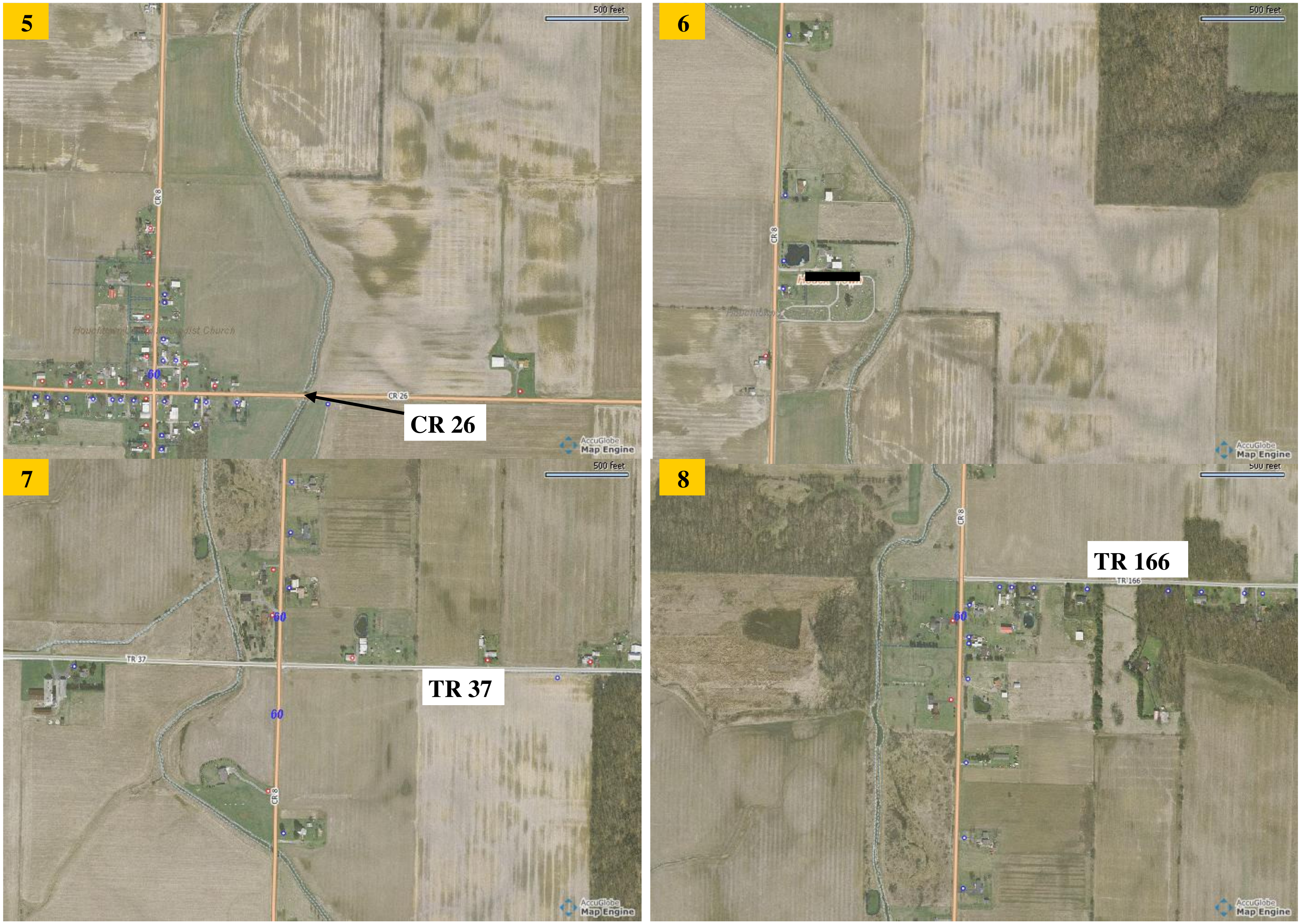
Grid 2-5 of Appendix B



● Non Attainment TDML Sites

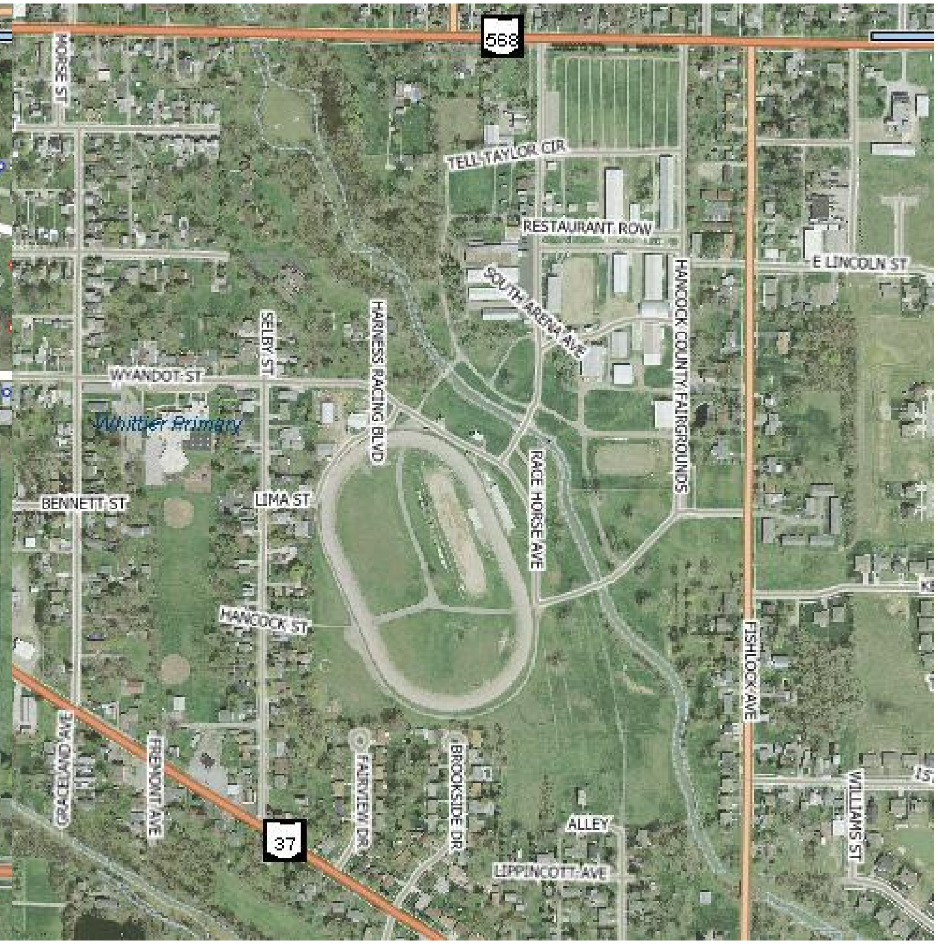


Aerial picture of the problem area 5 started south (upstream) of Houcktown CR 26.



Aerial picture of the Problem Area 5.4 starting from mouth to SR 15

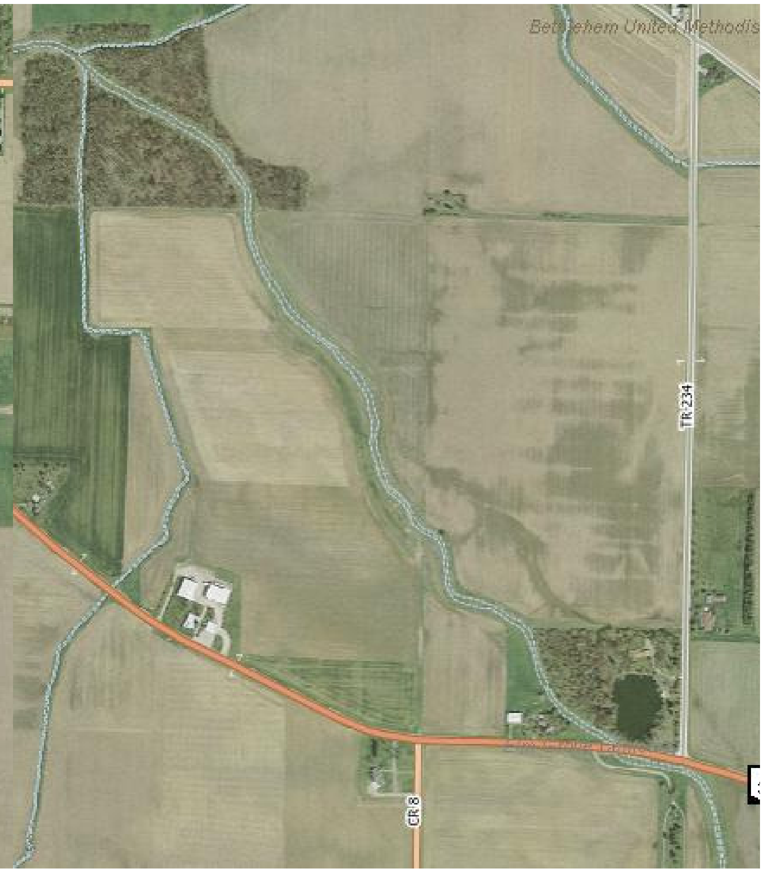
Mouth to Sandusky



Sandusky to Fishlock

Aerial picture of the problem area 5.4 starting from mouth to SR 15

CR 180 to W.B. Kring Dt.



W.B. Kring Dt. to TR 234

Aerial picture of the problem area 5.4 starting from mouth to SR 15

Fishlock to Strong Ave.

Strong Ave. to CR 180

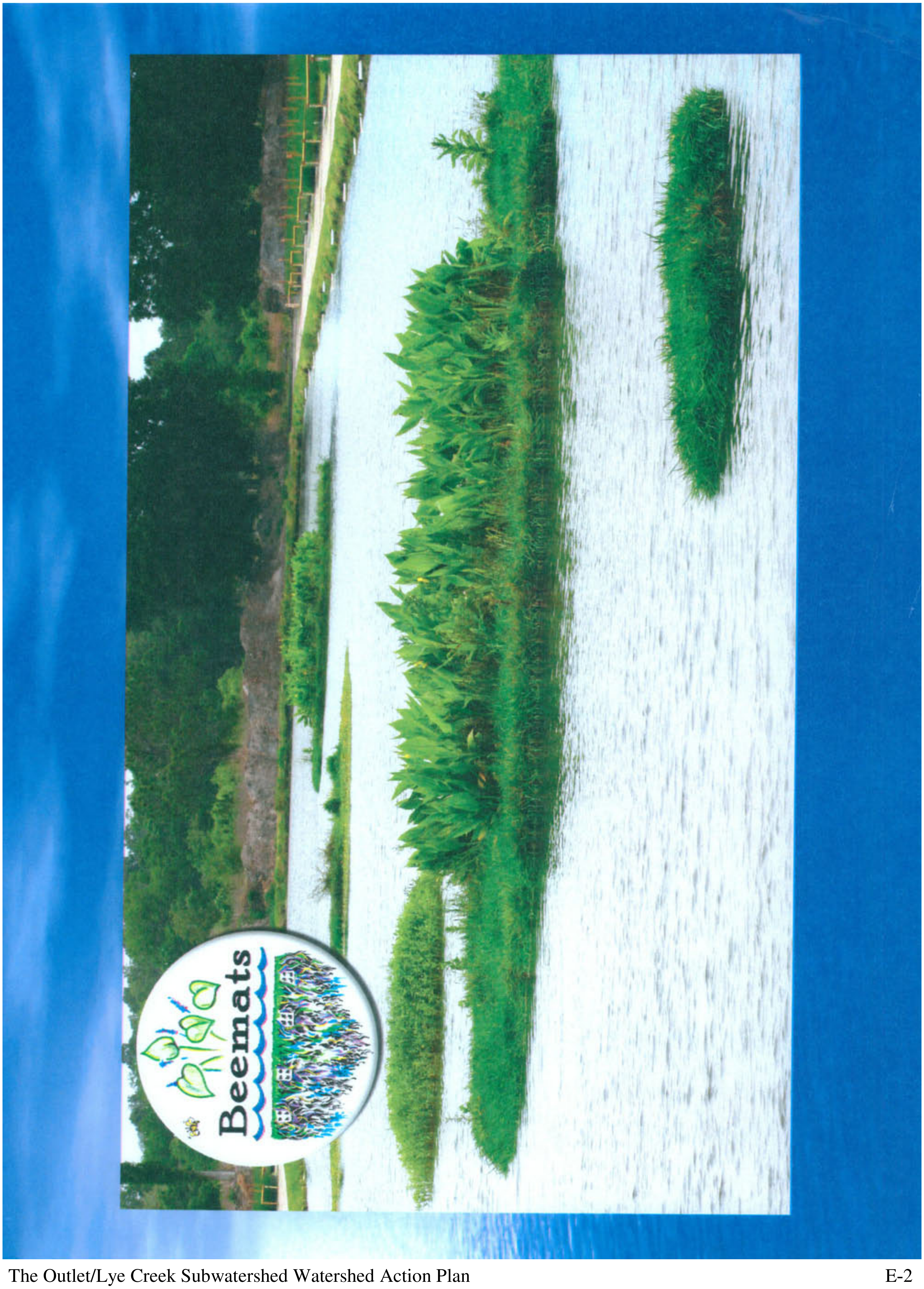
Aerial picture of the problem area 5 starting from mouth to SR 15

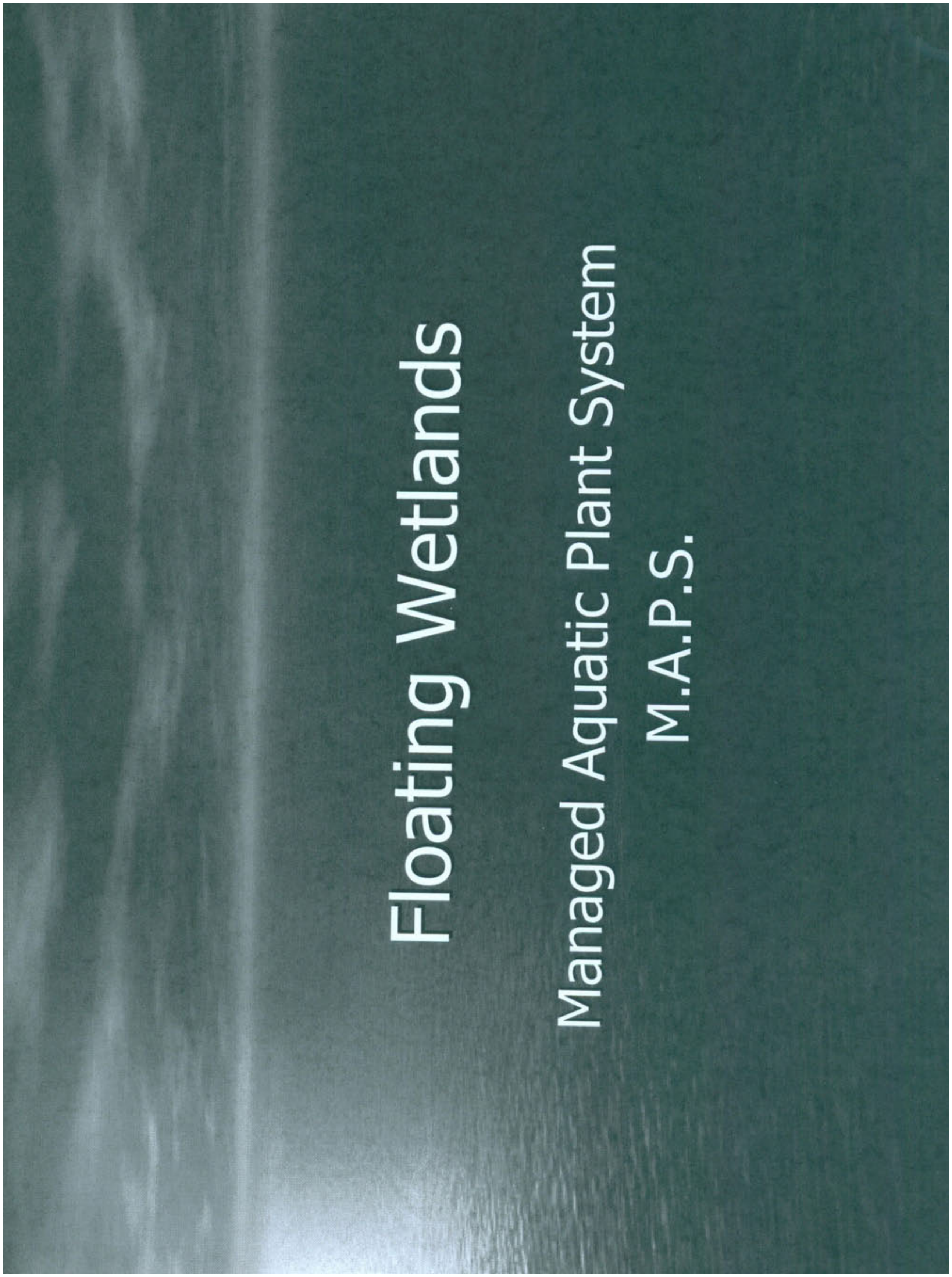
TR 234 to TR 173

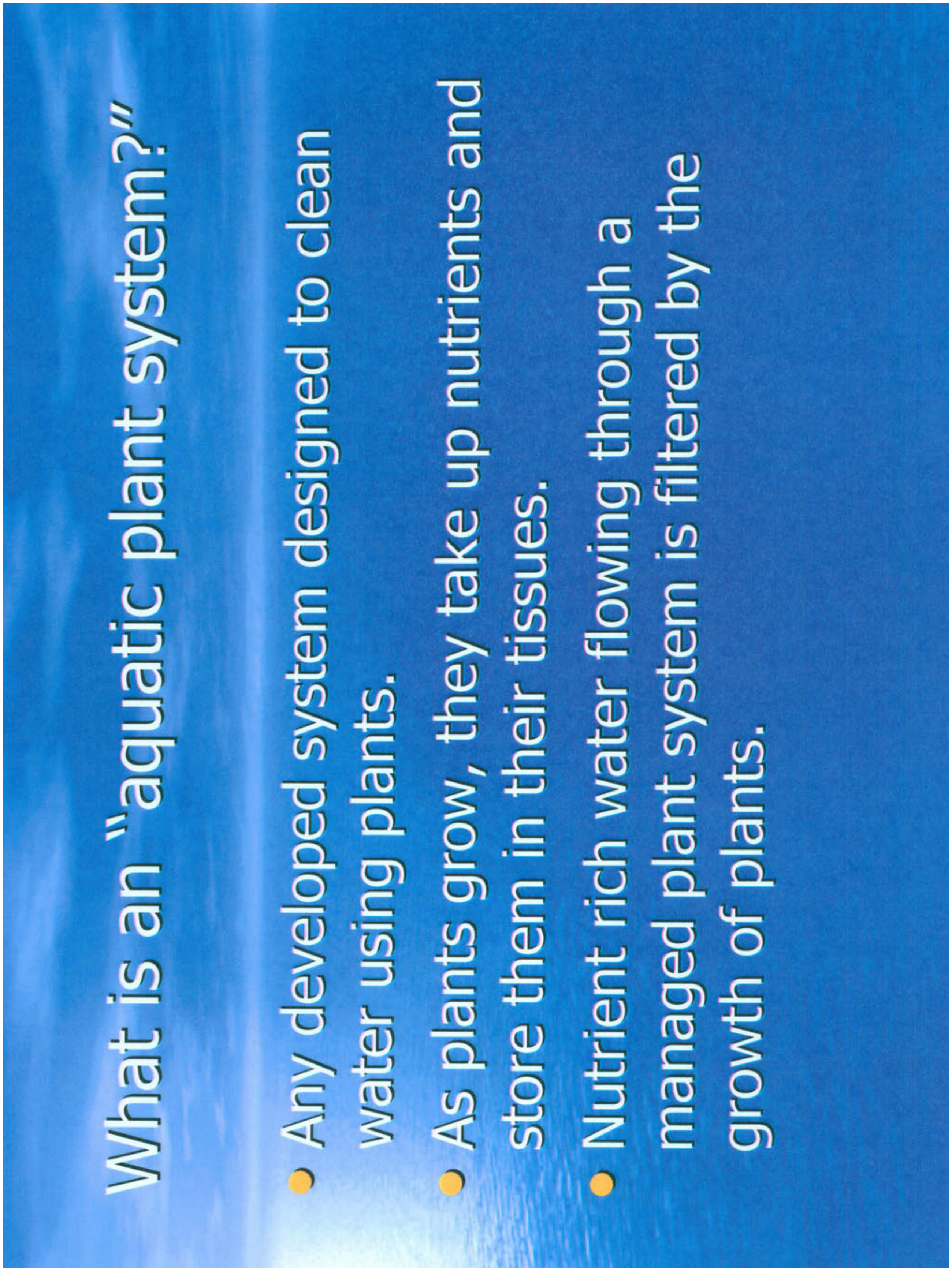
TR 173 to SR 15

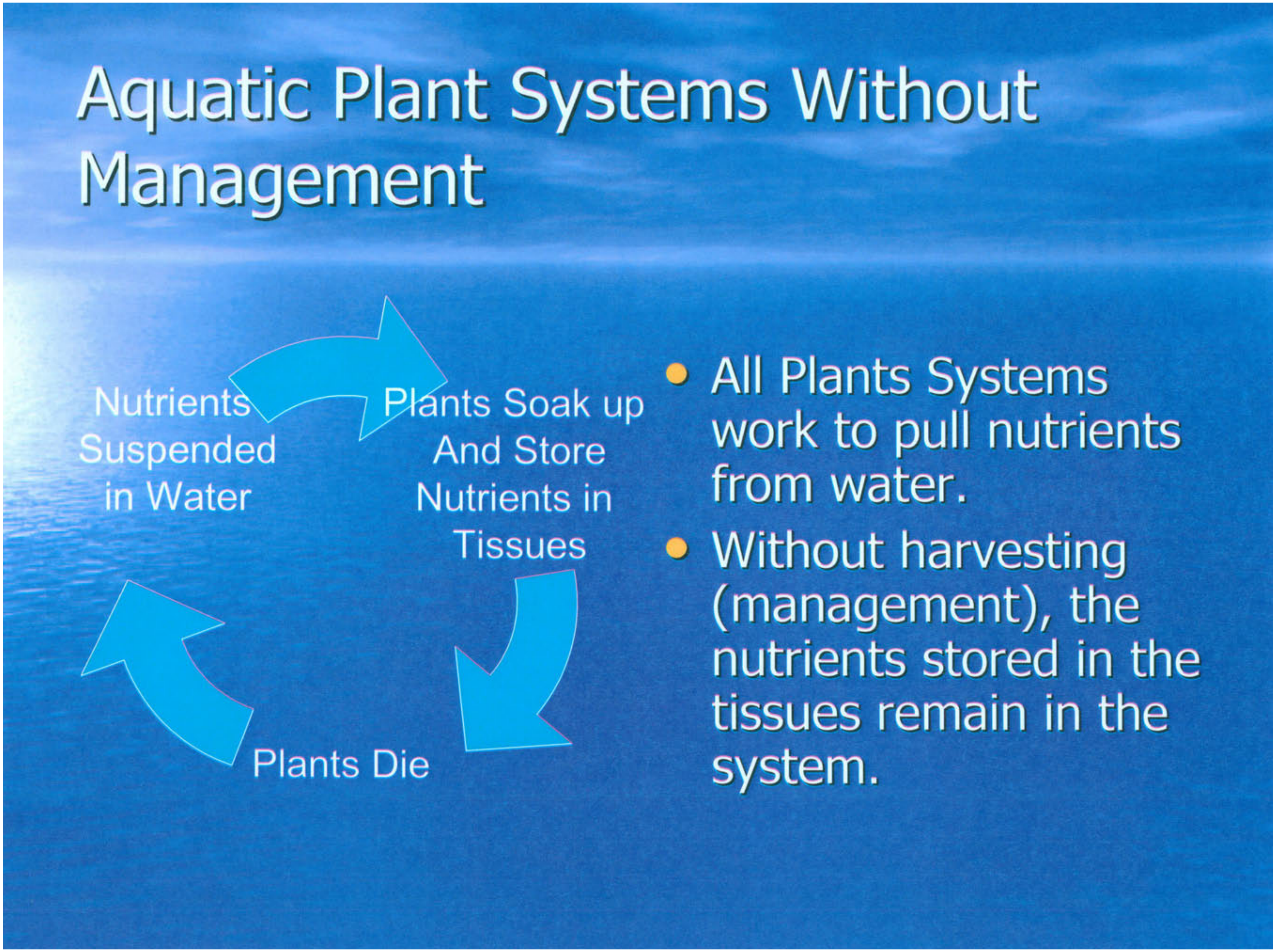
Appendix E

“Floating Wetlands”
“SWMP Plan”


Beemats

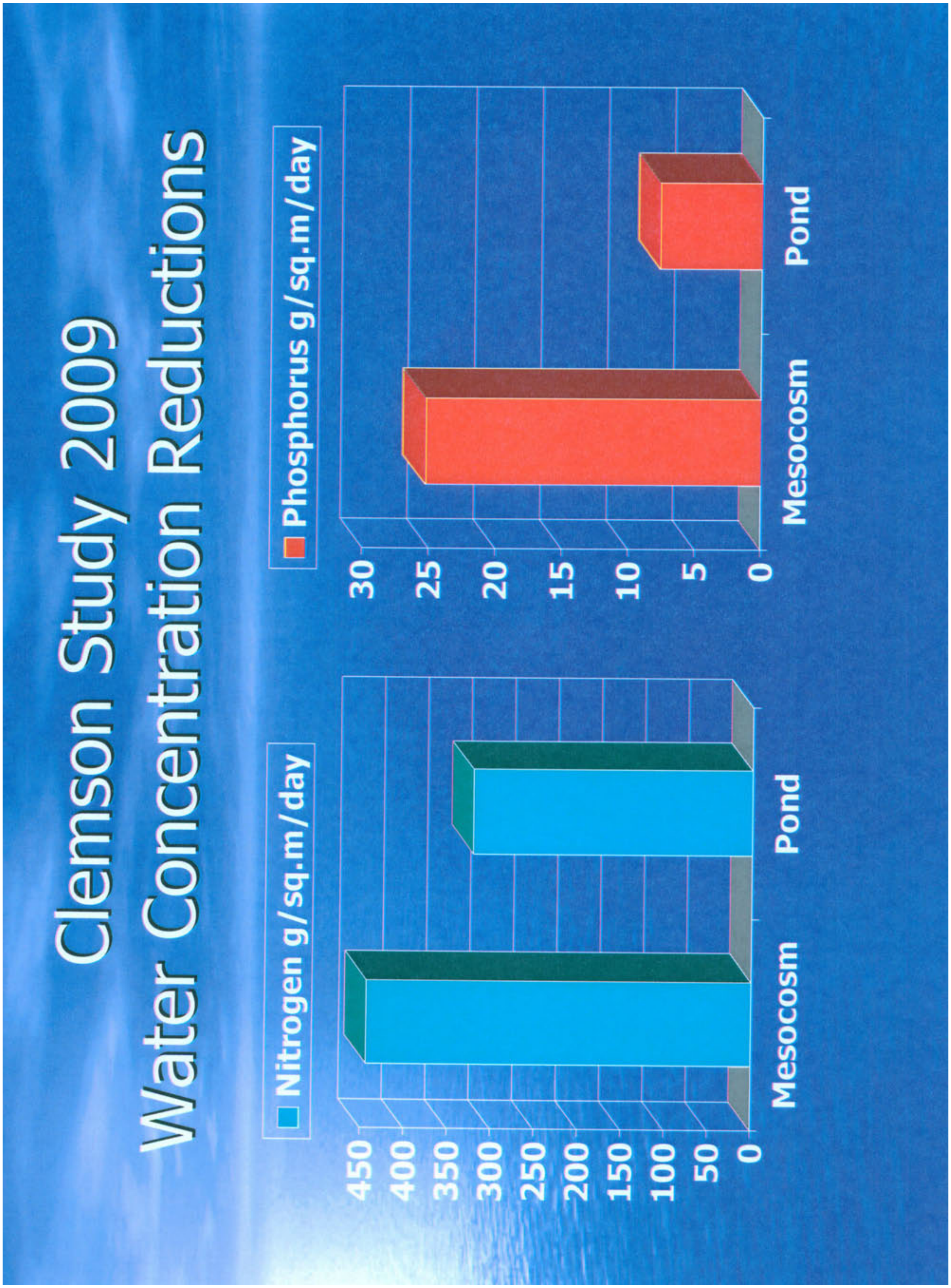

Floating Wetlands
Managed Aquatic Plant System
M.A.P.S.

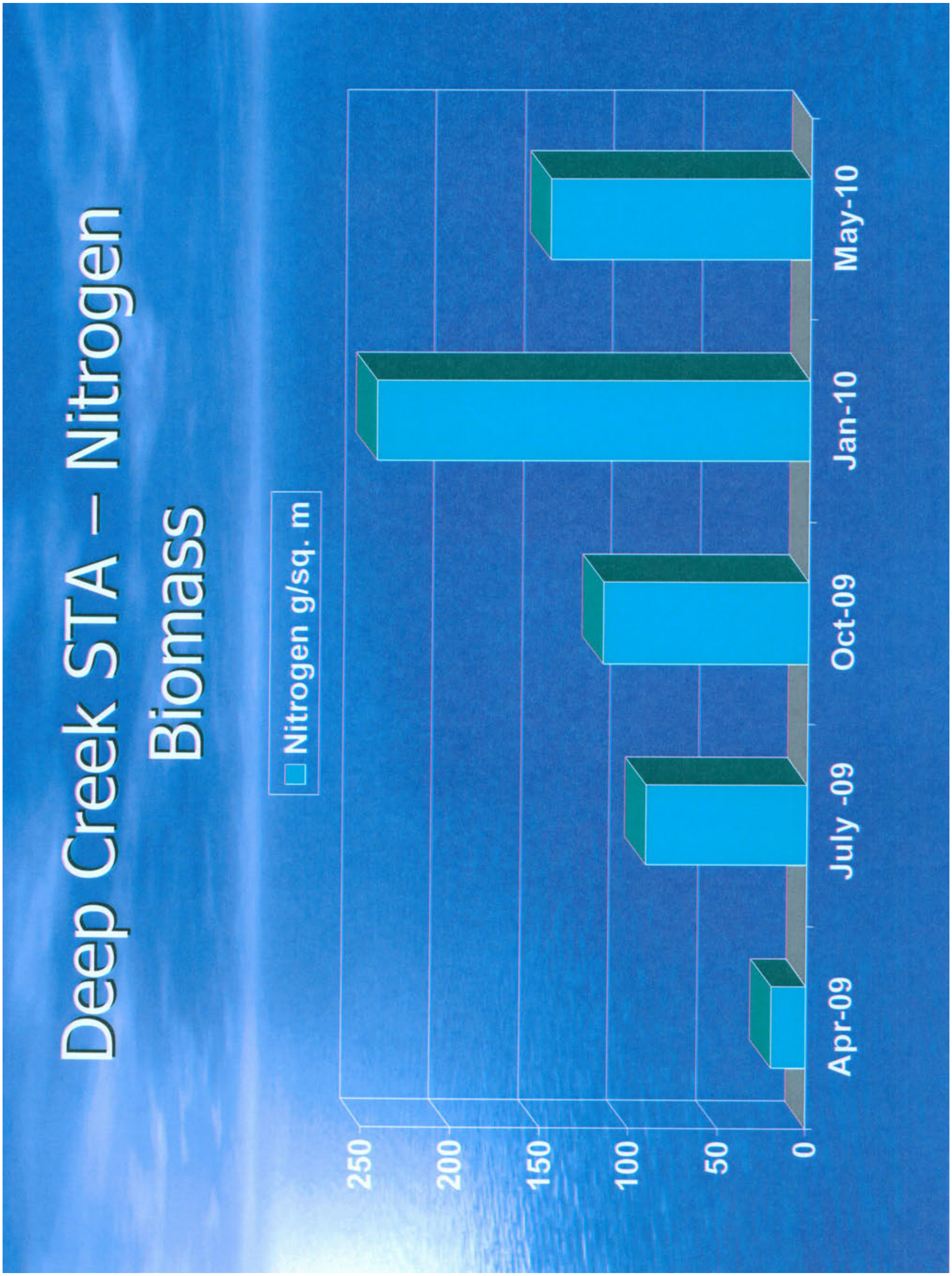

What is an "aquatic plant system?"
Any developed system designed to clean water using plants.
As plants grow, they take up nutrients and store them in their tissues.
Nutrient rich water flowing through a managed plant system is filtered by the growth of plants.

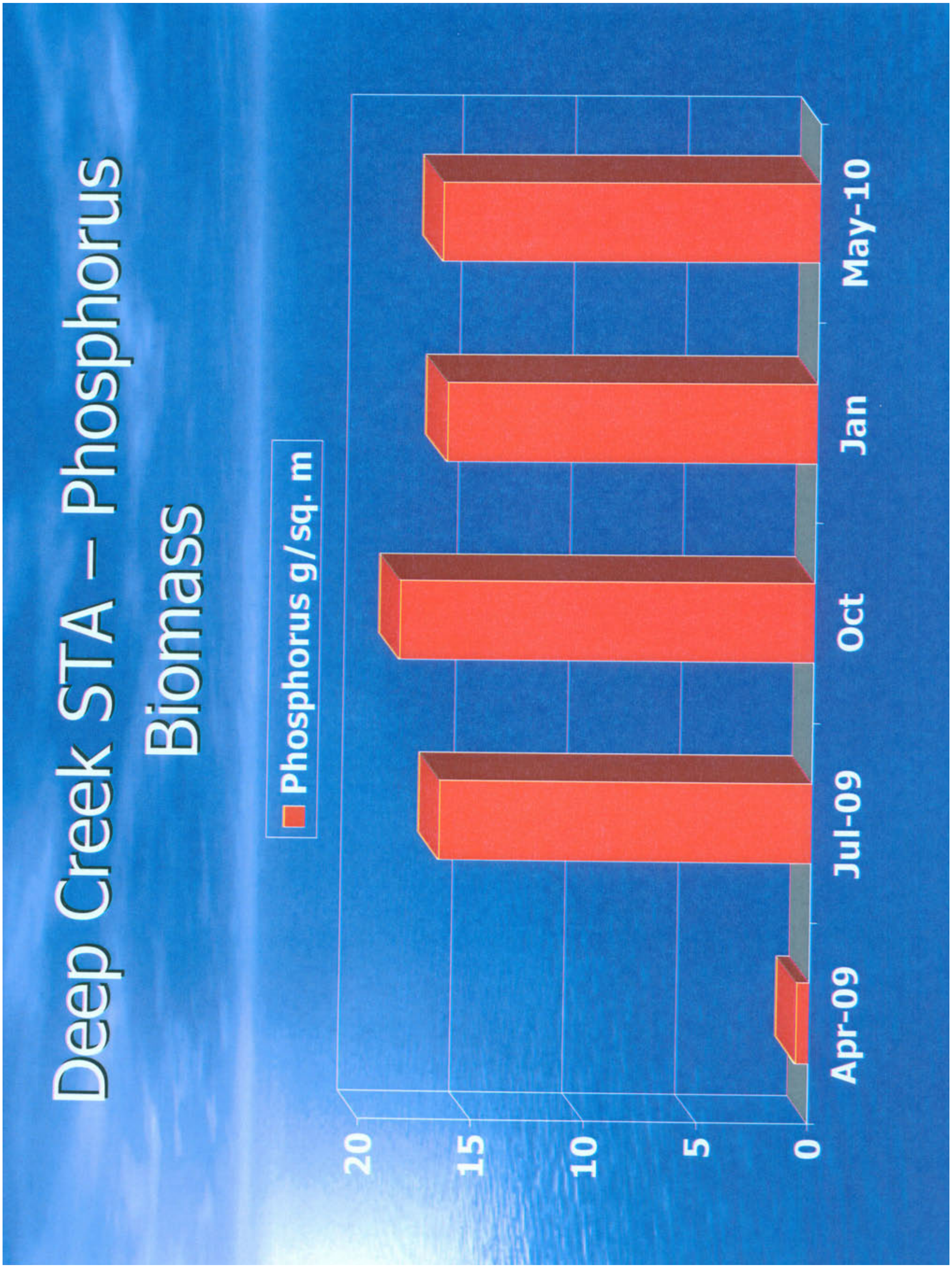

Aquatic Plant Systems Without Management
Nutrients Suspended in Water
Plants Soak up And Store Nutrients in Tissues
Plants Die
All Plants Systems work to pull nutrients from water.
Without harvesting (management), the nutrients stored in the tissues remain in the system.

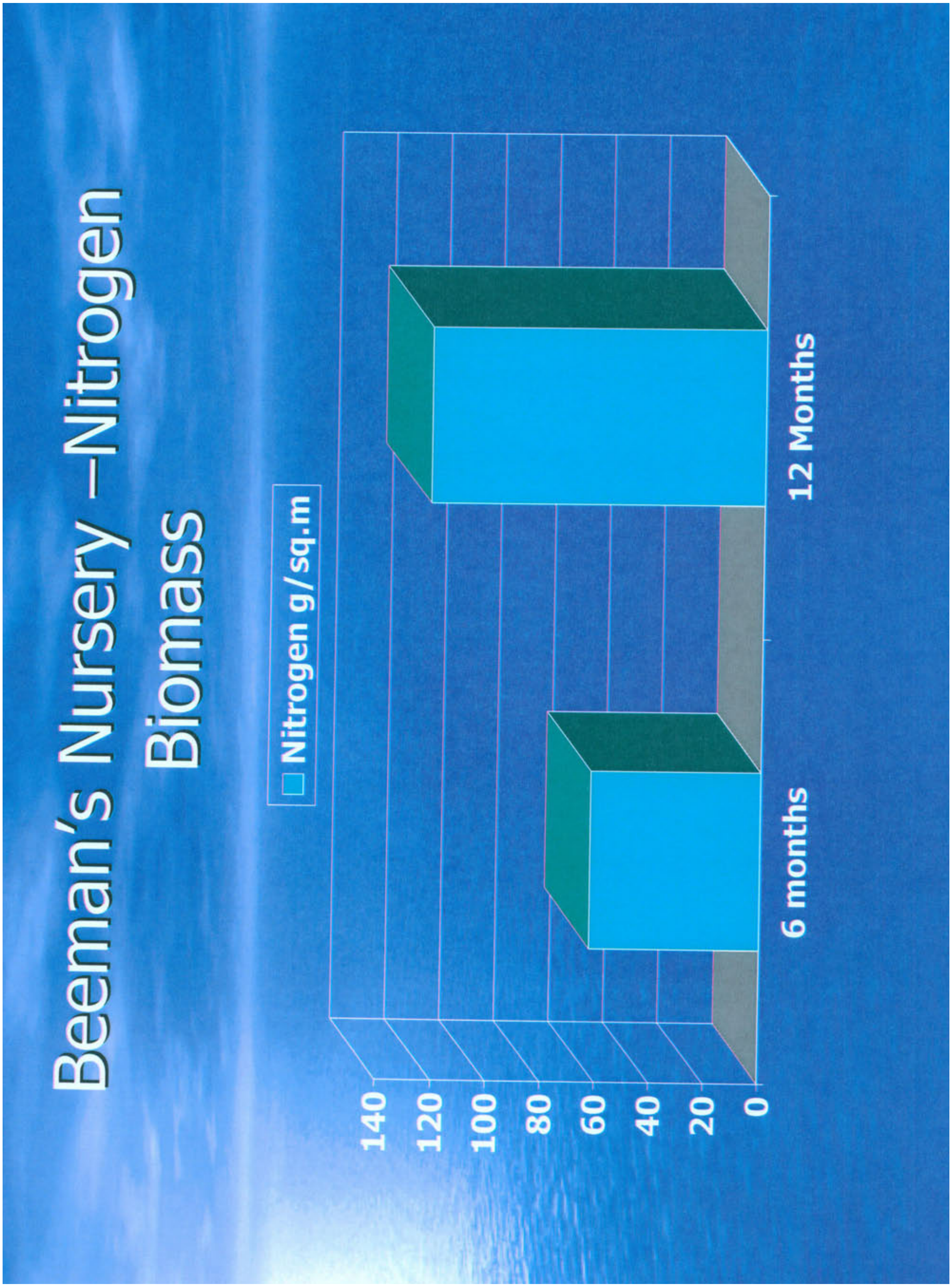

Beemats

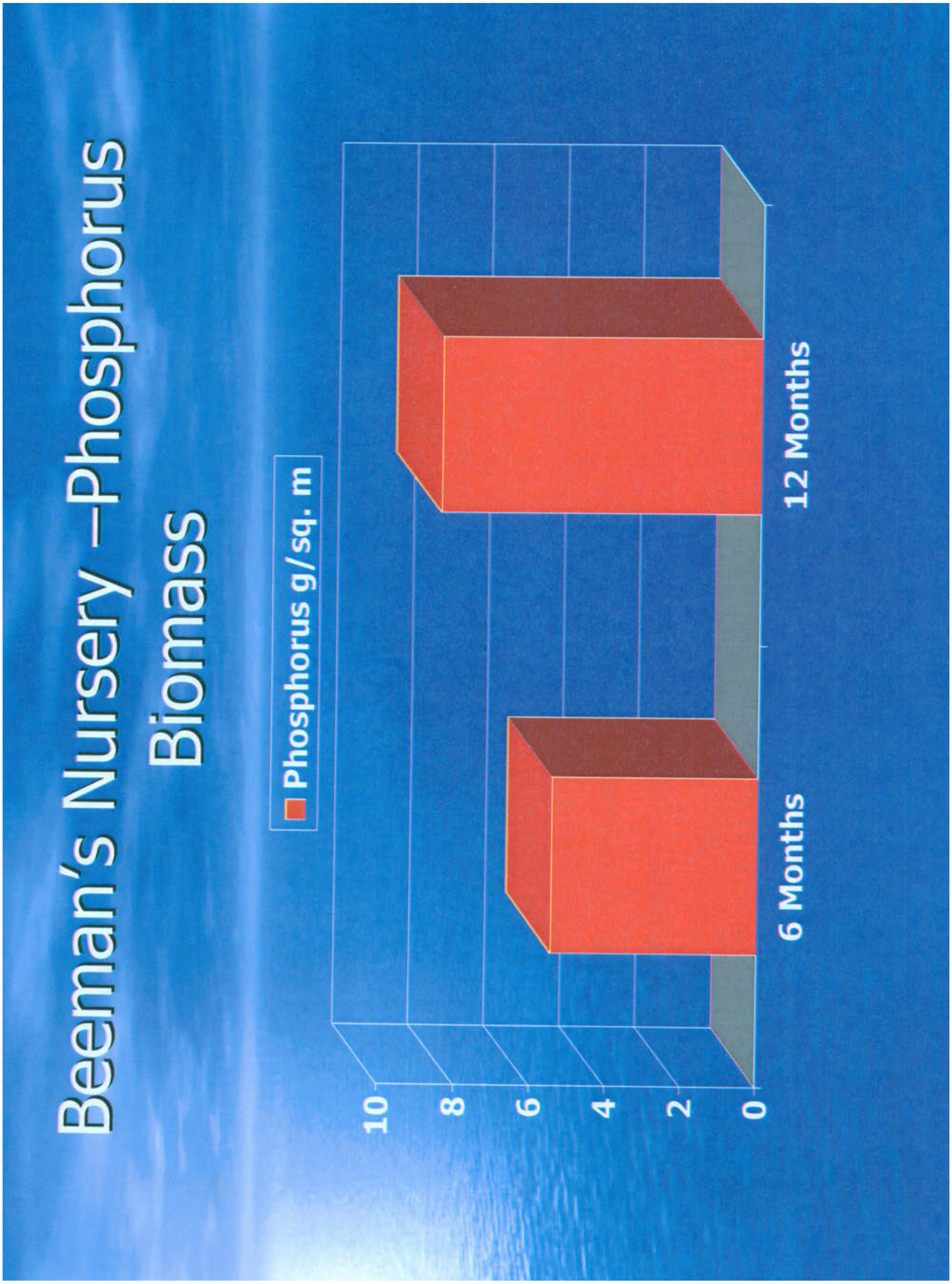

Management
Periodic Harvesting & Replanting
Over half of the nutrients are stored in the ROOTS.
Biomass is recycled for other agricultural uses.
Structural components are reused.

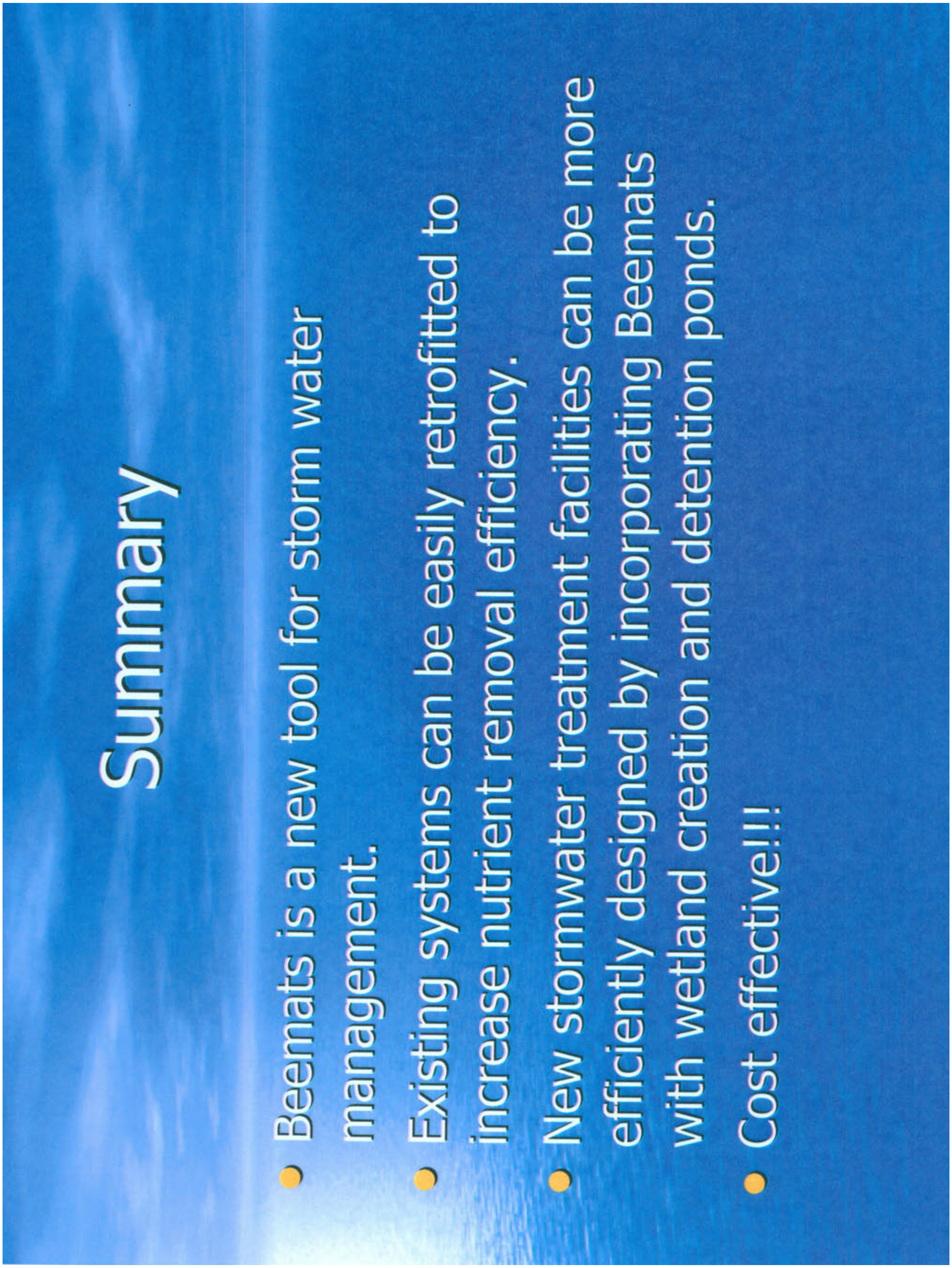

Clemson Study 2009
Water Concentration Reductions
Nitrogen g/sq.m/day
450
400
350
300
250
200
150
100
50
0
Mesocosm
Pond
Phosphorus g/sq.m/day
30
25
20
15
10
5
0
Mesocosm
Pond


Deep Creek STA – Nitrogen Biomass
Nitrogen g/sq. m
0
50
100
150
200
250
Apr-09
July -09
Oct-09
Jan-10
May-10


Deep Creek STA – Phosphorus
Biomass
Phosphorus g/sq. m
20
15
10
5
0
Apr-09
Jul-09
Oct
Jan
May-10


Beeman's Nursery –Nitrogen Biomass
Nitrogen g/sq.m
140
120
100
80
60
40
20
0
6 months
12 Months


Beeman's Nursery –Phosphorus Biomass
Phosphorus g/sq. m
10
8
6
4
2
0
6 Months
12 Months


Summary
Beemats is a new tool for storm water management.
Existing systems can be easily retrofitted to increase nutrient removal efficiency.
New stormwater treatment facilities can be more efficiently designed by incorporating Beemats with wetland creation and detention ponds.
Cost effective!!!

Problem Area 6: City of Findlay (COF) - Storm Water Management

Background: The U.S. EPA created the Storm Water Phase II Rule as the next step in the effort of the EPA to "preserve, protect, and improve the nation's water resources from polluted storm water runoff." Phase II covers small municipal separate storm sewer systems (MS4s) that are located in "urbanized areas." The goal of Phase II is to "reduce adverse water quality and aquatic habitat conditions by instituting the use of controls on the unregulated sources of storm water discharges that have the greatest likelihood of causing environmental degradation." The Phase II Rule defines a small MS4 storm water management program as comprised of six minimum control measures that, when administered in concert, are expected to result in reduction of the discharge of pollutants into receiving bodies. These six control measure are:

1. Public Outreach and Education
2. Public Participation/Involvement
3. Illicit Discharge Detection and Elimination
4. Construction Site Runoff Control
5. Post-Construction Runoff Control
6. Pollution Prevention/Good Housekeeping

(USEPA)

The most downstream portion of two of 14-digits watersheds located within The Outlet/Lye Creek watershed flow through the City of Findlay's Phase II MS4 area. These two 14-digit watersheds are Lye Creek (HUC #04100008-020-050) and the Blanchard River below The Outlet (2) to above the Eagle Creek (HUC # 04100008-020-040). See Map 7.5 on the next page.

Problem Statement 6.1: The City of Findlay will complete a Storm Water Management Plan (SWMP) that is endorsed by the EPA by 2013.

Goal 1 - To gather the necessary data and information needed to write the SWMP.

Objective 1: To gather data and information from all of the City of Findlay's departments that are involved in the SWMP.

Action 1: Each COF department will provide the Engineer's department with information and data regarding day-to-day operations, on-going programs and activities, and how they pertain to storm water quality activities.

Action 2: COF will incorporate existing storm water activities and identify new BMPs and activities needed to meet the intent of the Storm Water General Permit.

Goal 2 - To write the SWMP.

Objective 1: The City of Findlay will enter into a contract with a professional company to write the SWMP based on the data and information gathered.

Problem Statement 6.2 The City of Findlay will implement the Storm Water Management Plan (SWMP) that was endorsed by the EPA.

Goal 1 - The City of Findlay will develop and implement a Public Education and Outreach Plan to inform the citizens of Findlay concerning the BMPs and other activities being used to implement the SWMP.

Objective 1: To develop a plan to educate the general public and stakeholders.

Action 1: Appoint a Storm Water Advisory Committee (SWAC) made up of local of officials, developers, contractors, and citizens to help guide the implantation of the SWWP

Action 2: Modify the web site to include information about the SWMP and the Phase II MS4 permit.

Action 3: Meet with elected officials on the SWMP to keep them informed of implications and progress.

Objective 2: To develop educational materials to distribute to stakeholders.

Action 1: Inserts with information about the SWMP will be included in utility bills.

Action 2: Information will be provided to local media, such as local newspaper and radio stations.

Action 3: A stormwater information pamphlet will be developed for distribution to the public.

Objective 3: To develop other public outreach efforts.

Action 1: The COF will enter into a MOU with the Blanchard River Watershed Partnership.

Action 2: Provide materials and presentations to the University of Findlay and the Hancock County Leadership program for use in their courses.

Action 3: Storm water topics will be included in community presentations.

Goal 2 - To write the SWMP.

Objective 1: The City of Findlay will enter into a contract with a professional company to write the SWMP based on the data and information gathered.

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Action 1: COF will appoint a Storm Water Advisory Committee (SWAC) made up of local of officials, developers, contractors, and citizens to help guide the implantation of the SWMP.

Action 2: Modify the web site to include information about the SWMP and the Phase II MS4 permit.

Action 3: Meet with elected officials on the SWMP to keep them informed of implications and progress.

Objective 2: To develop educational materials to distribute to stakeholders.

Action 1: Inserts with information about the SWMP will be included in utility bills.

Action 2: Information will be provided to local media, such as local newspaper and radio stations.

Action 3: A stormwater information pamphlet will be developed for distribution to the public.

Objective 3: To develop other public outreach efforts.

Action 1: The COF will enter into a MOU with the Blanchard River Watershed Partnership.

Action 2: Provide materials and presentations to the University of Findlay and the Hancock County Leadership program for use in their courses.

Action 3: Storm water topics will be included in community presentations.

Goal 4 - The City of Findlay will develop and implement a Public Involvement and Participation Plan for the SWMP.

Objective 1: To develop a public involvement plan.

Action 1: Comply with state and local public notice requirements.

Action 2: Provide a box on the COF's web site where the general public can submit questions, concerns, and/or ideas for water quality issues.

Action 3: Enter into a MOU with the Blanchard River Watershed Partnership.

Action 4: Include SWMP materials in student tours at the Wastewater/Water treatment plants.

Action 5: Provide materials and presentations to the Hancock County Leadership program for use in their courses.

Action 6: Use volunteers to place placards on the catch basins that warn people about dumping anything down the basins.

Action 7: Hold SWAC meetings to review, update, and discuss sensitive issues of the community about the SWMP.

Action 8: Enter into a MOU with the Hancock County SWCD concerning the collection of Environmental Waste.

Goal 3 - The City of Findlay will develop and implement a plan for Illicit Discharge Detection and Elimination in the SWMP.

Objective 1: To prohibit non-storm water discharges into the MS4 and implement enforcement procedures and actions.

Action 1: Develop an ordinance making illicit discharges illegal.

Action 2: Review/modify existing ordinances to eliminate the dumping of trash and other debris into the MS4 area.

Action 3: Review/modify ordinance to eliminate the connection of integrated sump pumps (connected to washing machines) to MS4.

Action 4: Review/modify ordinance to include procedures for issuing (on-site) citations and/or enforcement mechanisms for illicit discharges and illegal dumping.

Objective 2: To identify MS4 Outfalls to the "Waters of the State."

Action 1: Develop a map identifying MS4 conveyance system (storm sewers, ditches, creeks, etc.) and outfalls.

Objective 3: To develop a plan to detect and eliminate illicit discharges.

Action 1: Provide information to employees and the general public about hazards associated with illegal discharges and improper waste disposal.

Action 2: Provide a means on the COF's web site that will allow the general public to report illegal dumping and illicit discharges.

Action 3: Perform dye and smoke testing and tile TV to identify areas of potential or probable illicit connections and discharges.

Action 4: Develop a Long Term Control Plan (LTCP) to identify and reduce/eliminate combined sewer overflows (CSOs).

Action 5: Conduct dry-weather field screening program from illicit connections and discharge.

Action 6: Identify failing HSTS. Health department will address all restoration and repair.

Action 7: Eliminate all illicit discharges and connections. (downspouts, etc.)

Action 8: Complete sanitary sewer lining of problem infiltration/ inflow areas.

Action 9: Develop an electronic tool (database, etc.) for tracking and eliminating illicit discharges and illegal dumping.

Action 10: Consider implementing citation and/or enforcement mechanisms penalizing people/entities responsible for illicit discharges and illegal dumping.

Action 11: Continue to support and/or sponsor all City and County Clean-up Day(s).

Goal 4 - The City of Findlay will develop and implement a plan to handle Construction Site Storm Water Runoff Control.

Objective 1: To develop a plan for addressing Regulatory Regulations that pertain to Construction Site Storm Water Runoff.

Action 1: Develop/modify an ordinance that states the requirements for construction site water quality issues including sanctions for non-compliance at sites of one or more acres.

Action 2: Develop/modify an ordinance that states the requirements for specifying BMPs to be used, how they are to be sized and implemented.

Action 3: Develop overall goals and objectives that refers to guidance materials that may be readily updated.

Objective 2: To develop a plan for addressing Erosion Prevention and Sediment Control Requirements.

Action 1: Develop an ordinance that sets the policy and requirements for erosion prevention and sediment controls (or BMPs).

Action 2: Develop a Guidance Manual of management practices for erosion prevention and sediment control. will be developed by the COF.

Objective 3: To develop the Requirements for handling Construction Site Waste.

Action 1: Develop a Guidance Manual of management practices for construction site pollution control of trash & debris, sanitary waste, vehicle & equipment, and materials.

Objective 4: To develop a Water Quality Plan Review

Action 1: Include ESPC measures on construction drawings.

Objective 5: To develop a plan for Inspection and Enforcement of Construction Site Storm Water Runoff Control.

Action 1: Develop/modify an ordinance that spells out the procedures for site inspection and enforcement control measures.

Action 2: Cross train zoning, sewer/water, and road inspectors in the regulations for Construction Site Storm Water Runoff.

Action 3: Develop a checklist for inspections.

Goal 5 - The City of Findlay will develop a plan for Post-Construction Storm Water Management.

Objective 1: To develop a plan for addressing Regulatory Regulations that pertain to Post-Construction Site Storm Water Management.

Action 1: Develop a section that addresses long-term water quality from sites of one acre or more.

Action 2: Develop/modify regulations to address post-construction runoff from new development or redevelopment projects.

Action 3: Develop a Guidance Manual of management practices for new and redevelopment projects to address long-term water quality.

Objective 2: To develop a list of Best Management Practices Strategies that address Post-Construction Storm Water Management.

Action 1: Develop and Implement structural and non-structural management strategies appropriate for Findlay.

Action 2: Develop a watershed plan that will be used as the basis for storm water management practices for new and redevelopment projects.

Action 3: Develop Fact Sheets to guide and direct selection and design of management practices.

Objective 3: To develop a Long-term Operation and Maintenance Plan.

Action 1: Develop a long-term schedule and program for storm water facilities that include catch basin cleaning and leaf & brush collection.

Action 2: Conduct a feasibility study of the need for long-term, post-construction inspections of detention basin facilities.

Action 3: Remove debris/sediment from culverts and channels along roadways under City jurisdiction.

Action 4: Develop an itemized checklist of requirements for inspection on private and public property to identify issues to be rectified.

Action 5: Set-up an electronic database to support maintenance program and site inspections.

Goal 6 - The City of Findlay will develop a Pollution Prevention/Good Housekeeping for Municipal Operations Plan for the SWMP.

Objective 1: The City of Findlay will review/update their Operations and Maintenance Program.

Action 1: Educate all employees and supervisors on the Phase II MS4 regulations that apply to automotive waste, deicing chemical storage and storage and use of herbicides, pesticides, and fertilizers.

Action 2: The COF will develop a regular culvert and street cleaning program.

Action 3: Develop/implement a chemical and sludge handling plan.

Action 4: Develop/implement a chemical and sludge handling plan.

Action 5: Conduct one department audit per year of standard operating and maintenance procedures to identify ways to reduce/eliminate water pollution from normal operations.

Objective 2: The City of Findlay will conduct employee training concerning the Storm Water Management Plan policy.

Action 1: Develop and use for new employees and refresher training a training program for storm water pollution from municipal activities.

Action 2: Educate employees using EPA, state, and other organizations relative materials.

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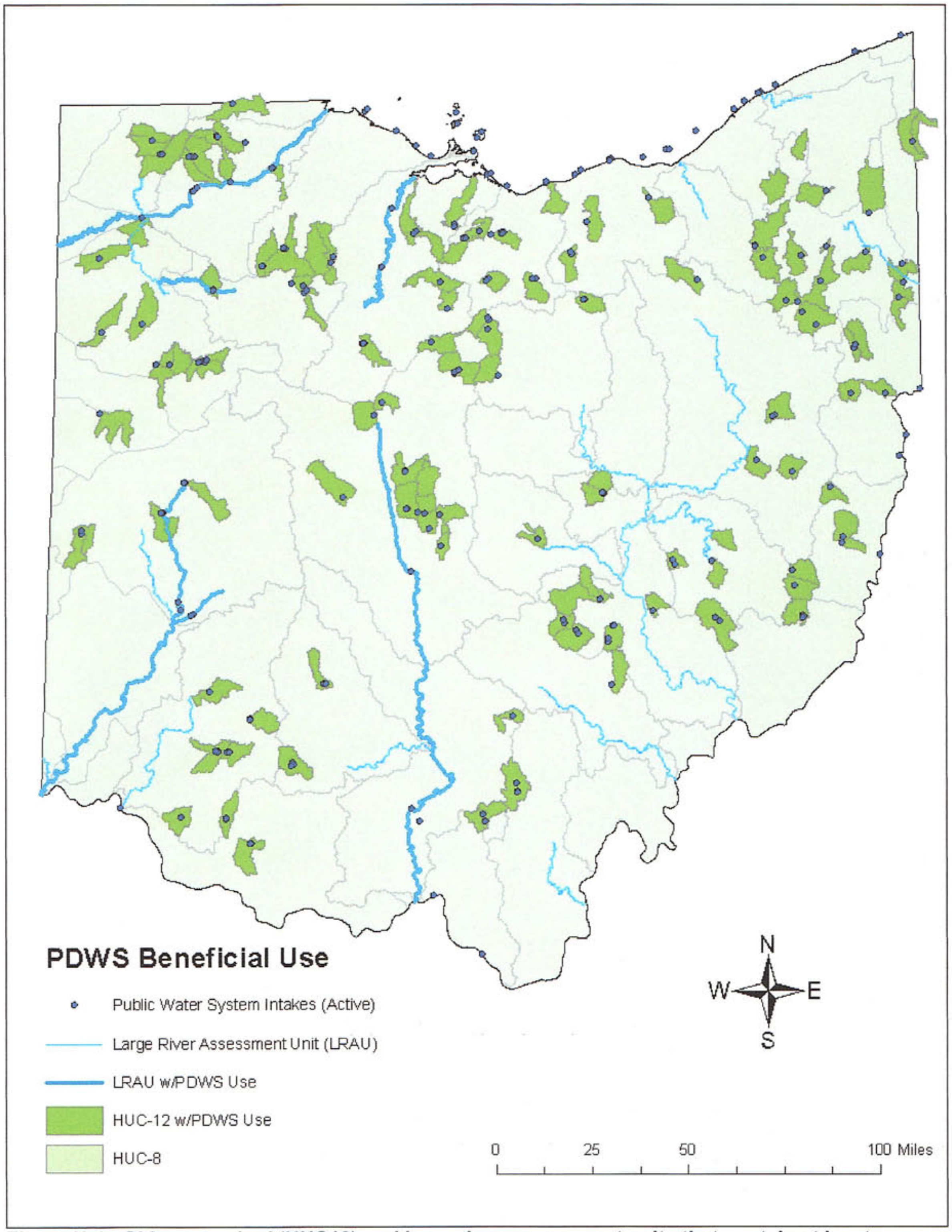


Figure H-1. Ohio watershed (HUC12) and large river assessment units that contain at least one active surface water drinking water intake.

Division of Surface Water Watershed Assessment Unit Summary

Overview Information

Click to view a glossary of terms

Assessment Unit Name: Findlay Upground Reservoirs-Blanchard River
Hydrologic Unit Code: 04100008 02 03
Assessment Unit Size: 22.5 square miles
Priority Points: 2
Monitoring Scheduled: 2020
TMDL Scheduled: 2023

Land Use Statistics:

Developed	Forest	Grass/Pasture	Row Crops	Other
6.1%	6.5%	3.7%	82.6%	1.1%

Aquatic Life Use Assessment

Reporting Category: 4A
Aquatic Life Uses: WWH,MWH-C
Sampling Years: 2005
Watershed Score: 50.0

Assessment Details:

Headwater Sites <20 sq. mi.	Wading Sites >20 & <50 sq. mi.	Principal Sites >50 & <500 sq. mi.
Sites Assessed: 0	Sites Assessed: 0	Sites Assessed: 2
Sites Attaining: 0	Sites Attaining: 0	Sites Attaining: 1

Most Recent Data:

Year Assessed	Station Name	River Mile	Drainage Area	Aquatic Life Use	Attainment Status
2005	BLANCHARD R @ SR 37 N OF MT. BLANCHARD	75.57	142.0	WWH	Partial
2005	BLANCHARD R @ TR 166	71.85	145.0	WWH	Full

Causes of Impairment:

- nitrate/nitrite (nitrite + nitrate as N)
- organic enrichment (sewage) biological indicators
- phosphorus (total)

http://wwwapp.epa.ohio.gov/dsw/ir2010/wau.php?hu=041000080203 2/11/2011

Sources of Impairment:

- crop production with subsurface drainage

Comments: TMDLs for pollutants impairing designated aquatic life uses in the Blanchard River basin were approved by the U.S. EPA on July 2, 2009.

Recreation Use Assessment

Reporting Category: 4A
Assessment Unit Score: Not calculated

Public Drinking Water Supply Assessment

Reporting Category: 3i
Cause of Impairment: None
Nitrate Watch List: No
Pesticide Watch List: No

Fish Tissue Assessment

Reporting Category: 5h
Causes of Impairment: None

Relevant TMDL Report

- Blanchard River

Division of Surface Water Watershed Assessment Unit Summary

Overview Information

Click to view a glossary of terms

Assessment Unit Name: Brights Ditch
Hydrologic Unit Code: 04100008 02 01
Assessment Unit Size: 28.4 square miles
Priority Points: 2
Monitoring Scheduled: 2020
TMDL Scheduled: 2023

Land Use Statistics:

Developed	Forest	Grass/Pasture	Row Crops	Other
7.2%	4.9%	3.7%	84.2%	0.0%

Aquatic Life Use Assessment

Reporting Category: 3i
Aquatic Life Uses: MWH-C
Sampling Years: 2005
Watershed Score: Not Calculated

Assessment Details:

Headwater Sites <20 sq. mi.	Wading Sites >20 & <50 sq. mi.	Principal Sites >50 & <500 sq. mi.
Sites Assessed:	Sites Assessed:	Sites Assessed:
Sites Attaining:	Sites Attaining:	Sites Attaining:

Most Recent Data:

Year Assessed	Station Name	River Mile	Drainage Area	Aquatic Life Use	Attainment Status
2005	STAHL DITCH @ HANCOCK CR 193	4.35	12.4	MWH-C	Full

Causes of Impairment:

- None listed

Sources of Impairment:

- None listed

Comments: None

http://wwwapp.epa.ohio.gov/dsw/ir2010/wau.php?hu=041000080201 2/11/2011

Recreation Use Assessment

Reporting Category: 4A
Assessment Unit Score: Not calculated

Public Drinking Water Supply Assessment

Reporting Category: Not applicable
Cause of Impairment: None
Nitrate Watch List: No
Pesticide Watch List: No

Fish Tissue Assessment

Reporting Category: 5h
Causes of Impairment: None

Relevant TMDL Report

- Blanchard River

Division of Surface Water Watershed Assessment Unit Summary

Overview Information

Click to view a glossary of terms

Assessment Unit Name: The Outlet
Hydrologic Unit Code: 04100008 02 02
Assessment Unit Size: 38.4 square miles
Priority Points: 2
Monitoring Scheduled: 2020
TMDL Scheduled: 2023

Land Use Statistics:

Developed	Forest	Grass/Pasture	Row Crops	Other
7.0%	5.5%	6.1%	81.0%	0.3%

Aquatic Life Use Assessment

Reporting Category: 1
Aquatic Life Uses: MWH-C
Sampling Years: 2005
Watershed Score: 100.0

Assessment Details:

Headwater Sites <20 sq. mi.	Wading Sites >20 & <50 sq. mi.	Principal Sites >50 & <500 sq. mi.
Sites Assessed: 2	Sites Assessed: 2	Sites Assessed: 0
Sites Attaining: 2	Sites Attaining: 2	Sites Attaining: 0

Most Recent Data:

Year Assessed	Station Name	River Mile	Drainage Area	Aquatic Life Use	Attainment Status
2005	THE OUTLET (LOWER) @ HANCOCK/SENECA CO LINE RD	7.68	7.0	MWH-C	Full
2005	THE OUTLET (LOWER) @ HANCOCK CR 264	6.05	16.4	MWH-C	Full
2005	THE OUTLET (LOWER) @ HANCOCK CR 330	4.47	24.0	MWH-C	Full
2005	THE OUTLET (LOWER) @ SR 568	0.51	38.0	MWH-C	Full

Causes of Impairment:

- None listed

http://wwwapp.epa.ohio.gov/dsw/ir2010/wau.php?hu=041000080202 2/11/2011

Sources of Impairment:

- None listed

Comments: None

Recreation Use Assessment

Reporting Category: 4A
Assessment Unit Score: Not calculated

Public Drinking Water Supply Assessment

Reporting Category: Not applicable
Cause of Impairment: None
Nitrate Watch List: No
Pesticide Watch List: No

Fish Tissue Assessment

Reporting Category: 5h
Causes of Impairment: None

Relevant TMDL Report

- Blanchard River

- crop production with subsurface drainage

Comments: TMDLs for pollutants impairing designated aquatic life uses in the Blanchard River basin were approved by the U.S. EPA on July 2, 2009.

Recreation Use Assessment

Reporting Category: 4A
Assessment Unit Score: Not calculated

Public Drinking Water Supply Assessment

Reporting Category: 3i
Cause of Impairment: None
Nitrate Watch List: No
Pesticide Watch List: No

Fish Tissue Assessment

Reporting Category: 1
Causes of Impairment: None

Relevant TMDL Report

- Blanchard River

Division of Surface Water Watershed Assessment Unit Summary

Overview Information

Click to view a glossary of terms

Assessment Unit Name: City of Findlay Riverside Park-Blanchard River
Hydrologic Unit Code: 04100008 02 05
Assessment Unit Size: 16.2 square miles
Priority Points: 0
Monitoring Scheduled: 2020
TMDL Scheduled: 2023

Land Use Statistics:

Developed	Forest	Grass/Pasture	Row Crops	Other
44.4%	5.8%	3.2%	45.9%	0.6%

Aquatic Life Use Assessment

Reporting Category: 4A
Aquatic Life Uses: WWH
Sampling Years: 2005
Watershed Score: 0.0

Assessment Details:

Headwater Sites <20 sq. mi.	Wading Sites >20 & <50 sq. mi.	Principal Sites >50 & <500 sq. mi.
Sites Assessed: 0	Sites Assessed: 0	Sites Assessed: 1
Sites Attaining: 0	Sites Attaining: 0	Sites Attaining: 0

Most Recent Data:

Year Assessed	Station Name	River Mile	Drainage Area	Aquatic Life Use	Attainment Status
2005	BLANCHARD R ADJ TR 208 UPST FINDLAY	61.90	238.0	WWH	Partial

Causes of Impairment:

- nutrient eutrophication biological indicators
- organic enrichment (sewage) biological indicators
- temperature, water

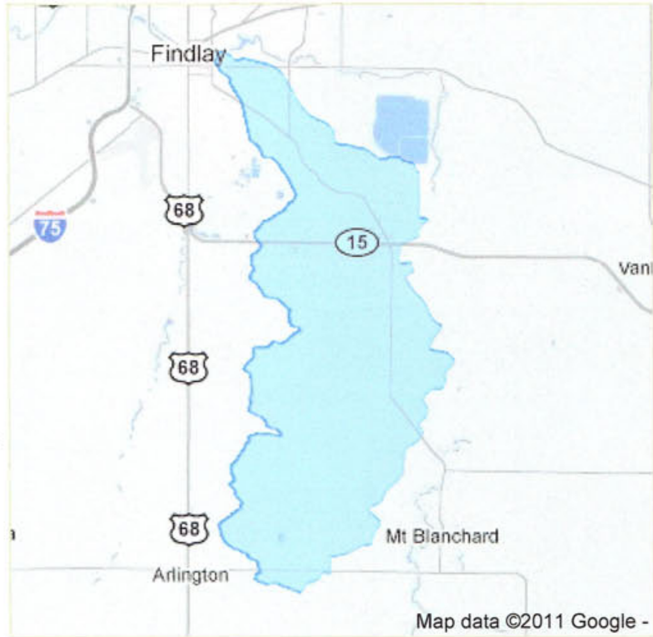
Sources of Impairment:

Division of Surface Water **Watershed Assessment Unit Summary**

Overview Information

Click to view a glossary of terms

Assessment Unit Name: Lye Creek
Hydrologic Unit Code: 04100008 02 04
Assessment Unit Size: 27.6 square miles
Priority Points: 2
Monitoring Scheduled: 2020
TMDL Scheduled: 2023



Land Use Statistics:

Developed	Forest	Grass/Pasture	Row Crops	Other
9.5%	5.0%	2.9%	82.6%	0.1%

Aquatic Life Use Assessment

Reporting Category: 4A
Aquatic Life Uses: MWH-C
Sampling Years: 2005
Watershed Score: 0.0

Assessment Details:

Headwater Sites <20 sq. mi.	Wading Sites >20 & <50 sq. mi.	Principal Sites >50 & <500 sq. mi.
Sites Assessed: 0	Sites Assessed: 1	Sites Assessed: 0
Sites Attaining: 0	Sites Attaining: 0	Sites Attaining: 0

Most Recent Data:

Year Assessed	Station Name	River Mile	Drainage Area	Aquatic Life Use	Attainment Status
2005	LYE CK @ HANCOCK CR 205	2.63	26.0	MWH-C	Partial

Causes of Impairment:

- direct habitat alterations
- organic enrichment (sewage) biological indicators
- phosphorus (total)

Sources of Impairment:

- channelization

- crop production with subsurface drainage

Comments: TMDLs for pollutants impairing designated aquatic life uses in the Blanchard River basin were approved by the U.S. EPA on July 2, 2009.

Recreation Use Assessment

Reporting Category: 4A
Assessment Unit Score: Not calculated

Public Drinking Water Supply Assessment

Reporting Category: Not applicable
Cause of Impairment: None
Nitrate Watch List: No
Pesticide Watch List: No

Fish Tissue Assessment

Reporting Category: 5h
Causes of Impairment: None

Relevant TMDL Report

- Blanchard River