LAND AND WATER RESOURCE MANAGEMENT PLAN

2022- 2031

Waupaca County
Est. 1851
Wisconsin

Land & Water Conservation Department

APPROVED BY THE WISCONSIN LAND AND WATER CONSERVATION BOARD ON:
August 3, 2021

APPROVED BY THE WAUPACA COUNTY BOARD ON:
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EXECUTIVE SUMMARY

Known for its diverse high quality and accessible natural resources, Waupaca County has always been a desirable place to live, work, and visit. Waupaca County is situated in an ideal location, within commuting distance to Appleton, Green Bay, Oshkosh, and Stevens Point, but it still preserves a rural community feel with a mix of developed, working lands, and large tracts of undeveloped places. Like many places throughout the state, Waupaca County's high quality land and water resources face challenges. Oftentimes local resources can be taken for granted as visitors and out of state residents can make it difficult to instill a land ethic of protection and a sense of place.

The Waupaca County Land and Water Resource Management Plan (LWRM) for 2022-2031 is an update of the 2012-2021 Plan. The plan represents a coordinated public and private effort to establish a framework to identify goals, objectives, and actions for the implementation of soil and water conservation. This coordinated effort is intended to align with federal, state, county, and local desired outcomes related to conservation of natural resources. Based on an assessment of the land and water resources in the county, this plan sets forth a strategic work plan for achieving goals toward the protection and enhancement of those resources.

The Waupaca County LWRM Plan (LWRM) fulfills the requirements of Wisconsin Department of Agriculture's (DATCP) Chapter 92.10. It is a long-range planning document intended to guide the activities of the Land and Water Conservation Department (LWCD) in its efforts to protect and improve land and water resources for the next 10 years. The Waupaca LWCD is dedicated to protecting, improving, and enhancing the health of natural resources in the county through engaging individual landowners, elected officials, businesses, other agencies, and residents. This plan represents the next generation of resource management strategies to address resource concerns and to build upon past conservation work in order to carry out the department's mission.

The Waupaca LWCD will implement this plan through various federal, state, and local programs and funding mechanisms. It is important to note that the implementation of the work plan is dependent upon receiving adequate funding to cover staff and various cost-sharing programs.

Pursuant of Wis. Stat. Chapter 92, this 10-year plan was created through the use of a local citizen advisory committee (CAC) and through support from the public. The Waupaca County LWRM plan incorporates inventory findings on land use, natural resource data, soil erosion, and water quality data. Additionally, the plan addresses primary land and water resource concerns and issues that were identified by the CAC. Through the public participation process, emerging resource concerns have been identified and a strategic plan of action has been laid out. The Waupaca LWRM plan describes how the County will help state agencies meet federal and state clean water

goals while implementing Agricultural Performance Standard and Prohibitions and addressing other local natural resources issues. The following goals were identified through this process:

Goal I: Protect and improve the water quality of surface water resources

Goal II: Protect and maintain the long-term viability of agricultural lands

Goal III: Protect and improve the quality of groundwater

Goal IV: Protect and enhance natural habitat areas

Goal V: Support and develop community stewardship and partnerships to improve natural resources

Each of these goals have a set of objectives and action items to work towards over the next ten years. They will be reviewed annually by staff and used as part of the yearly work planning process for DATCP. They will also provide the basis for funding activities from various federal, state, local, and private sources.

To address resource concerns, the Waupaca County Land and Water Resource Management Plan will continue to rely on established farm conservation programs and practices such as NR 151 Agricultural Performance Standards and Prohibitions, nutrient management, and soil health principles. This plan will also move towards new and innovative engagement and adoption strategies, such as 9 Key Element Watershed Planning to significantly increase the implementation of best management practices on croplands and riparian areas in order to meet applicable WI Department of Natural Resources Total Maximum Daily Load (TMDL) Plan goals.

Since the NR 151 Agricultural Performance Standards were passed in 2002, Waupaca County LWCD has been committed to provide financial assistance, technical assistance, and more recently, regulatory ordinances to successfully implement Wisconsin's NR 151 Administrative Rule where required. Compliance with the NR 151 agricultural performance standards and prohibitions will be achieved through a combination of voluntary and regulatory means identified in this plan.

Under the direction of Land & Water Conservation Committee, the implementation of NR 151 is a primary focus of the LWCD in terms of compliance monitoring of the Agricultural Performance Standards, County Agricultural Waste Management Ordinance and the Farmland Preservation Program. This approach will also be a primary strategy used by the department for implementing the 2020 Upper Fox/Wolf River TMDL reduction goals.

CHAPTER 1 – PLAN DEVELOPMENT

Plan Development Process

In 1998, legislation was passed requiring counties to develop a Land and Water Resource Management Plan to guide the efforts of Land and Water Conservation Departments to preserve and protect water resources. The idea behind the program is to have a locally-led process to enhance the decision-making process and to make better use of local, state, and federal funds. The 2022-2031 Waupaca LWRM plan revises the current 2012-2021 plan. It reflects an overall effort to connect conservation programs, available funding, and other resources to effectively address land and water resource issues facing the county from 2022-2031.

With oversight provided by the Waupaca County LWCD, the LWRM plan is a product of the collaborative efforts of Land & Water Conservation Staff and the Citizen's Advisory Committee (CAC), which comprised key individuals representing the diverse stakeholders in agriculture, lake management, soil health, and wildlife management. Technical advisory staff members from the Wisconsin Department of Natural Resources (WDNR), United States Department of Agriculture (USDA) – Natural Resources Conservation Service (NRCS), and an professional agronomist met with the CAC to review goals, objectives, strategic actions, and measureable outcomes. This LWRM Plan incorporates the most recent available data and maps from Waupaca County, WDNR, DACTP, NRCS, and the US Census Bureau.

This plan will incorporate existing and future programs in delivering the basis for conservation education, implementation, performance measurement, and long-term evaluation, while serving a diverse citizenship. This plan incorporates runoff guidelines and performance standards that were established through NR 151, which became effective on October 1, 2002 and modified in 2012, and again in 2018. It includes a comprehensive review of the accomplishments from the previous plan. In addition, conservation programs utilized by the Waupaca County LWCD to implement the goals and strategies outlined are discussed. These programs provide the necessary administrative and technical support for implementing conservation practices in Waupaca County.

A land and water resource management plan is a long-term strategic blueprint that includes an assessment of the current resource conditions and needs of the county. The process includes input from local stakeholders as well as from resource professionals to help direct conservation efforts. While the LWRM Plan is a ten-year document, it is used to develop annual work plans for the LWCD and provides supporting materials conservation grants and other funding sources.

Previous LWRM Plans

1999-2005

The first generation of this plan for Waupaca County was approved by DATCP in January 1999. That plan used figures extrapolated from DNR Priority Watershed inventories conducted in 1994 and 1996. The 1999 plan utilized information collected in a countywide survey conducted in part for the Waupaca County comprehensive planning effort and, more importantly, "Transect Survey" information collected each year from 1999 to 2005. The Transect Survey data was utilized to determine soil loss, by watershed, for both priority determination and actual sediment delivery. The LWCD had great confidence in the early Transect Survey data. A wide variety of agencies, citizens and committee members helped complete this plan.

2006-2011

The second plan (2006-2011) updated the first plan, but included public participation from the comprehensive land use survey developed by UWEX and Waupaca County. Transect surveys would continue from 2006 until 2010 since better methods were not available. It also included input from a Conservation Advisory Committee as well as the long standing data from the Priority Watershed inventories.

2012-2021

In 2012, DATCP modified the LWRM Plan process and began transitioning from five-year plans to ten-year plans. The third generation plan was more representative of an update or continuation of the previous plans rather than an attempt to build a new one, though it was the first official ten-year plan for the county and some new formatting was used at the request of DATCP. Public participation was once again through a Conservation Advisory Committee (CAC). An emphasis was placed on the use of geospatial data and Geographic Information Systems (GIS) not only in the addition of spatial information, but also to carry out the tasks identified by the plan. Additionally, Waupaca County's Comprehensive Land Use Plan was completed in the fall of 2007, and continues to help guide the Waupaca County Land and Water Conservation Department (LWCD) with several issues such as public opinion and farmland preservation.

2022 Plan Revision

In January of 2021, the LWCD began revising the LWRM Plan. The planning process once again involved cooperating agencies including: UW-Extension, WDNR, NRCS, and FSA as well as a diverse mix of citizens from the community. Input from individuals representing those stakeholder groups not only participated as members of the advisory committee, they helped ensure that local, regional, and state resource concerns were included in the plan. The first meeting of stakeholders, members were provided with relevant background information about plan requirements as well as information on current trends about demographics, resource inventories, and assessment information. Members discussed local resource issues and provided feedback on plan goals and objectives as well as prioritizing resource concerns. The CAC allows for local

stakeholders and interested members of the public to provide valuable insight and input for conservation needs and ultimately into conservation policy.

This fourth generation plan demonstrates a wide range of resource issues, assessments, and impacts. The resource concerns range from surface and groundwater quality protection to an overall increase in information and education efforts on the full scope of natural resource issues in Waupaca County. LWCD efforts will continue to focus on nonpoint source pollution, especially manure and agricultural runoff related issues as well as the resurgent interest in farmland preservation. Previous plans made the promise to move more into the compliance arena but have not fully arrived there due to staffing limitations and the general philosophy of the county through that period of time. This plan is now left with the task of keeping that promise to move further into the realm of conservation compliance while balancing the CAC's wish to achieve compliance through voluntary means. This plan must also reach out to those areas of the county that have historically not had much contact with the LWCD.

This plan will incorporate existing and future programs in delivering the basis for conservation, education, implementation, performance measurement, and longer-term evaluation while serving residents of the County. Through development of this plan, Waupaca County is assured the opportunity to continue a locally-driven conservation program. It provides flexibility to allocate staff and financial resources where they can have the greatest impact. Local citizens, government officials and state and federal agencies will work together to integrate natural resource management programs and funding sources.

Related Plans

Waupaca County 2030 Comprehensive Plan – 2007

The Waupaca County Board of Supervisors adopted the Comprehensive Plan in 2007. The plan will help guide the County decision makers on a wide variety of issues over the next 10 years in creating a preferred place to live, work, and visit. The overall goal of the Comprehensive Plan is to add a county-level perspective and planning direction that supplements and strengthens local planning efforts.

Waupaca County Aquatic Invasive Species Plan – 2012

In 2011, Waupaca County Land and Water Conservation Department collaborated with Portage, Marathon, Wood, and Waushara Counties and Golden Sands Resource Conservation & Development Council, Inc. (RC&D) to acquire grant funding from the Department of Natural Resources (DNR) to support a Regional AIS program. Through the Regional AIS Program, information was gathered about the status of AIS infestations in Waupaca County, volunteer activity levels, training and education needs, and other information regarding AIS in Waupaca County. The purpose of the AIS plan is to identify short-term and long-term goals toward establishing a coordinated, county-wide approach to protecting Waupaca County's lakes.

Waupaca County Farmland Preservation Plan – 2014

The Waupaca County Farmland Preservation Plan was adopted in 2014 with the purpose of guiding and managing growth and development in a manner that will preserve the rural character and protect the agricultural base and natural resources within the county. The plan is the primary policy document in directing the preservation of agricultural production, farmland preservation, and soil/water protection.

Upper Fox/Wolf River Total Maximum Daily Load – 2020

Section 303(d) of the Clean Water Act established the TMDL program. The TMDL program identifies and develops plans to restore polluted rivers, lakes, streams, and other surface water bodies by detailing in a quantitative assessment the water quality problems and contributing sources of pollution in a common watershed area. The TMDL determines how much a pollutant needs to be reduced to meet water quality standards, and provides the foundation for taking actions locally to restore a water body to fishable and swimmable standards. TMDLs must be developed for water bodies impaired by point sources and/or nonpoint sources.

The TMDL is one important tool required by the Clean Water Act and employed by Wisconsin DNR to quantitatively assess a stream's water quality and allocate allowable pollutant loads among sources that discharge and/or drain to an impaired stream, lake, and/or river. U.S. EPA approved the Fox-Wolf River TMDL on February 27, 2020. The plan provides specific pollutant allocation limits for all point and nonpoint sources in the watershed to achieve statewide water quality standards in local streams and downstream lakes and reservoirs- https://dnr.wisconsin.gov/topic/TMDLs/FoxWolf/index.html. The UFW TMDL study area spans Wisconsin's east-central corridor from the headwaters in Forest County and the city of Portage to Lake Winnebago, covering approximately 5,900 square miles and nearly 10 percent of the state.

Nine Key Element Watershed Plans

Since 2017, Waupaca County initiated planning projects in three HUC 12 watersheds (Bear Lake, Lake Weyauwega, and Shaw Creek). Each watershed now has an EPA/DNR approved Nine Key Element Watershed-Based plan- https://dnr.wisconsin.gov/topic/Nonpoint/9keyElement/planMap.html. The purposes of these plans are to help assess the contributing causes and sources of nonpoint source pollution, prioritize restoration and protection strategies to address water quality problems, and help implement the Upper Fox/Wolf River TMDL reduction goals.

Waupaca County Ordinances

Waupaca County adopted its first Manure Storage Ordinance in 1988 and was amended in 2005 to include the four agricultural waste prohibitions. In 2018 it was completely repealed and rewritten to include all applicable portions of NR 151. It is now known as Waupaca County Chapter 51: Agricultural Performance Standards and Agricultural Waste Management Ordinance. The purpose of this ordinance is to regulate the location, design, construction, installation, alteration, operation, maintenance, closure, use, and

application of agricultural waste from all waste storage facilities covered by this ordinance in order to protect the health and safety of Waupaca County residents and visitors. The ordinance is also intended empower the county to enforce the Agricultural Performance Standards to prevent the degradation of surface and groundwater thus improving the general welfare of the citizens of Waupaca County.

Public Participation

The revised Waupaca County LWRM plan was developed through a collective effort of agencies, residents, and organizations under the overall direction of the LWCD. A Conservation Advisory Committee (CAC) was once again comprised of individuals that have natural resource, nonpoint source, agricultural, or environmental backgrounds. The CAC included agency personnel from US Fish & Wildlife Service, the Natural Resources Conservation Service (NRCS), the Farm Service Agency, WDNR, and UW-Extension.

In June 2021, the Waupaca County Land and Water Conservation Committee and Department solicited local input from the (CAC). The CAC consisted of community leaders who were interested in the county's natural resources, specifically surface and groundwater resources, and the land use activities that affect them.

The 2012-2021 LWRM plan was reviewed to determine accomplishments, continued needs, and activities that were implemented by other entities. This review was helpful in setting future goals, objectives, and action items for the 2022-2031 plan. The committee also reviewed the draft plan and provided comments and recommendations, which were incorporated in the final plan. The group met on June 23, 2022 to list concerns and establish priorities in regard to resource management in the county. The top four things identified by the committee that the LWCD should continue to focus on were:

1. Increase outreach and education activities to promote participation in conservation programs and raise awareness of conservation issues to youth and younger farmers.

2. Designing and implementing Best Management Practices (BMP's) to control erosion, improve surface water and groundwater quality and most importantly to address animal waste runoff issues. The LWCD should continue to pursue any applicable funding sources or planning efforts to assist with this.

3. Continue engineering support and technical assistance to landowners, the Natural Resource Conservation Service (NRCS), other county departments and municipalities within Waupaca County for both grant funded and non-grant funded environmental projects.

4. Continue to promote or expand the Farmland Preservation Program and nutrient management planning throughout the county.

Agricultural Trends

Over the last several decades, agriculture in Waupaca and beyond has undergone vast changes. While change has been a constant for the agricultural sector throughout history, the pace of change has accelerated recently. Rapid technological advancements, growing populations, economics, support services, and state and national policies are a few of the reasons for this shift. While there has been a slight decrease in farmland, the number of farms operations declined significantly. Similar to other regions across Wisconsin, farm operations have tended become larger, with more acres per farm. In response to high crop prices over the last decade, the number of dairy operations continue to decline and with that a subsequent reduction in forage crops such as hay and alfalfa to a more annual cash crop rotation like corn and soybeans. The shift from perennial grasses and forage crops to row crops has increased soil erosion in the county, which has negatively affected soil health.

Agricultural Performance Standards and Prohibitions

In NR151, Sub-Chapter II, the DNR established agricultural and prohibitions to reduce runoff and protect water quality. In ATCP 50, the DATCP identified conservation practices that farmers must follow to meet the NR 151 standards. These rules and practices are the basic premise under which this plan will be implemented with respect to eliminating agricultural runoff and reducing phosphorous and nitrogen to surface and groundwater. Administrative Rule ATCP 50 is the Department of Agriculture, Trade and Consumer Protection's companion rule that sets guidance to implement Wisconsin's Soil and Water Resource Management program specified in state statute 92.14. The LWCD will utilize NR 151, ATCP 50 as well as the Waupaca County Code of Ordinances relating to Agriculture Performance Standards and Agricultural Waste Management to enforce prohibition standards. A multi-agency approach will be used for the enforcement of manure standards. The goal is to resolve all noncompliance issues without the use of the enforcement procedure.

Priority Farm Strategy

A priority farm strategy will be used to implement the performance standards and prohibitions in NR 151. There is a need to establish priorities because of limited time and financial resources. Farms that would be considered "priority farms" are those that are found to be noncompliant with the Agricultural Performance Standards and Prohibitions. Noncompliance will be determined by onsite evaluations, records review and geospatial data. Additionally, priority farms will be addressed from citizen complaints and inter-agency cooperation. The Agricultural Performance Standards and Prohibitions will be used to evaluate all farms as they are inventoried. Priority farms will be identified in the following order:

- Complaints/NOD/NOI

- Farmland Preservation Program (FPP)
- Targeted Watersheds (9KE Plans, impaired waters, and using TMDL derived reduction goals)
- Livestock operations in the WQMA
- All other livestock operations
- Wellhead protection areas or croplands with high groundwater contamination susceptibility

Inventory Tracking and Progress Evaluation

Monitoring and tracking will be an important aspect of this LWRM plan. Tracking of conservation compliance with NR 151 and of installed practices will be completed to show agencies and policymakers where progress in being made. Current tracking procedures utilize a database structure linked to GIS data management system to map FPP and NMP contracts at the tax parcel level, allowing for accurate tracking of compliance. GIS technology, SnapPlus planning software, remote sensing, and on-site evaluations are and will be used as tools to assess, tract, and monitor landowner compliance with the agricultural performance standards and prohibitions. The LWCD continues to expand the use of GIS to more efficiently manage and monitor conservation efforts.

Annual Review and Reports

The annual review will take place during the first month of each year. This review will be used to evaluate short-term, yearly progress. The LWCD will summarize financial data for funds appropriated in the implementation of the LWRM Plan.

Annual accomplishment and work plan reports will be submitted by March 15th and April 15th, respectively, each year to DATCP to fulfill the requirements of ATCP 50.18. This will include both the financial report and the annual accomplishment report of LWRM activities and to the degree possible, be reported by HUC 12 watershed. Annual reports to the county board will also be made that will include information from the annual DATCP reports. The county board report will also include analysis of cost share funds spent in the county versus staff money utilized.

Goals, Objectives and Actions

The goal, or more accurately mission, of the LWCD has always been to work with the citizens to improve the water quality and natural resources of Waupaca County. Specific goals, objectives and actions to achieve that mission have been mapped out in this plan in Chapter 5. The LWCD believes this is a very accurate depiction of the actions needed to implement this plan. Re-certification of the Waupaca County Farmland Preservation Plan is projected to increase the workload of the LWCD due to the increased interest in the preservation of prime farmland in this county. Although most compliance issues require cost share availability, farm income is still at the mercy of the markets. Landowner's best intentions to install timely or possibly mandatory conservation practices may sometimes be delayed due to low market prices. When dairy and/or

livestock prices are high, producers have both the financial ability and interest in conservation, but the opposite is true when prices are low. The result of this financial reality is that at times it produces a roller coaster affect in the workload of the LWCD.

Related Resource Management Plans

The following plans were especially instrumental in development of this plan:

- Upper Fox-Wolf Basin TMDL Report (2020)
- Bear Lake-Little Wolf River Watershed 9 Key Element Plan (2017)
- Weyauwega Lake-Waupaca River Watershed 9 Key Element Plan (2019)
- Shaw Creek-Little Wolf River Watershed 9 Key Element Plan (2019)
- Waupaca County Farmland Preservation Plan (2014)
- Waupaca County Aquatic Invasive Species Plan (2012)
- Waupaca County Land and Water Resource Management Plan (1999)
- Waupaca County Land and Water Resource Management Plan (2006)
- Waupaca County Land and Water Resource Management Plan (2012-2021)
- Waupaca County Comprehensive Management Plan (2007)
- Waupaca County Animal Waste Management Plan (1985)
- Winnebago Comprehensive Management Plan (1989)
- Tomorrow/Waupaca Priority Watershed Plan (1995)
- Lower Little Wolf Priority Watershed Plan (1997)
- Wolf River Basin Water Quality Management Plan (1996)
- USDA-EQIP Lower Little Wolf Priority Area Plan (1997)

It is important to recognize that these documents were developed with a great deal of public participation. Many of the concerns, ideas, and recommendations identified by those citizens are incorporated in this document.

Interagency Participation

Cooperating agency participation played a critical role in the development of the Waupaca County Land and Water Resource Management Plan. The "conservation team" in Waupaca County has an excellent track record of working together. The following agencies provided review and/or information for the plan:

- United States Department of Agriculture-Natural Resource Conservation Service (USDA-NRCS)
- University of Wisconsin Extension (UWEX)
- Wisconsin Department of Natural Resources (WDNR)
- United States Department of Agriculture-Farm Services Agency (USDA-FSA)

General Conclusion

The CAC has once again listed water quality and animal waste runoff issues as the top priority along with farmland protection. Animal waste itself is not actually the problem

but rather continued improper application, inadequate storage and runoff issues that contribute to surface and groundwater pollution. Excess phosphorus runoff from cropland and pastures to surface waters and excess nitrogen leaching to groundwater causes nuisance aquatic plant growth and nitrate polluted groundwater respectively. They also listed education and outreach as a priority objective going forward.

The Waupaca County Land and Water planning process will result in a 10-year working document that will serve multiple stakeholders simultaneously in a variety of capacities. The citizen engagement process allows for local stakeholders and interested members of the public to provide valuable insight and input for local conservation needs and ultimately into conservation policy. The resulting LWRM plan will serve as a valuable blueprint and guiding document for the LWCD staff. It will also provide a clear focus for the priorities and implementation of conservation needs of Waupaca County. Furthermore, this plan will present the intentional approach detailing interactions of how the county plans to utilize local, state, and federal programs to promote conservation awareness and land stewardship at the local level. Therefore, the Waupaca County Land and Water Conservation Department's LWRM Plan will meet the requirement set in Chapter 92.10.

In an effort to take the implementation of the 2022-2031 Waupaca County Land and Water Management Plan to a more effective level, the LWCD has already started to pursue and remedy some of the foremost concerns of the CAC and the department with respect to staff. In April of 2021 the LWCD hired a Watershed Technician to help further diversify our staff and strengthen our watershed specific outreach and programming needs. Furthermore, during the past LWRM Plan, the department now has added a CCA agronomist on staff to address Nutrient Management Planning issues. Additionally the Waupaca County LWCD continues to enter into a grant contract with Golden Sands RC&D to provide Aquatic Invasive Species (AIS) inventory and implementation assistance to the riparian owners and lake associations within Waupaca County. The LWCD will continue the implementation of its three approved 9 Key Element watershed management plans and partially fund their conservation activities through DNR TRM grants which will include funding for staff.

A public hearing was held for the 2022-2031 LWRM Plan on July 19, 2021 to allow the public to comment on the plan. The draft plan was available to the public for a 14 day review period.

CHAPTER 2- CHARACTERISTICS, NATURAL RESOURCES AND TRENDS

General Characteristics

Waupaca County is located in East Central Wisconsin with a total area of 761 square miles or 487,040 acres, of which 8,972 is water. Lakes account for 7,240 acres and rivers/streams 1,732 acres. Waupaca is a mostly rural county with an estimated 2020 population of 50,847 and is the 28th most populated county in the state. Since 2010, the population has stabilized and between 2017 and 2018, the population of Waupaca County actually declined slightly. However, the county's general proximity to Appleton and the Fox Valley metropolitan area continues to put increasing pressure on the eastern and southern portion of the county along the Highway 10 corridor. Within the county, the 22 civil townships are predominantly rural/agricultural in nature. The city of Waupaca is the county seat. Agriculture is the largest individual land use in the county, with dairy farming being the main agricultural enterprise on the glacial till soils of the eastern half of the county and cash cropping and irrigated vegetable production becoming more prevalent in the outwash plain of the western half. As parts of the county continue to grow and develop, more emphasis will need to be placed on protecting the natural resources. Proper land use planning and implementation of that planning will be critical for the future of Waupaca County and for sound resource management and conservation.

History

Waupaca County was established by legislative act on February 17, 1851. Prior to the European settlement, this area it was occupied by the Menominee Indian Tribe. Two popular ideas for the origin of the name Waupaca are from Chief Wa-puka, which means, "watching", and from the Indian words "Waubuck Seba", which means "pale or clear water."

Waupaca County is also located on the southern boundary of the great northern pine forests so in its early years, the lumber industry grew quite rapidly. Because the county is located in the "tension zone" between the northern forests and the southern oak savanna and prairies, biological diversity is significant. The big timber of the original forests was quickly harvested by loggers and subsequently eliminated from the landscape. The first sawmill was established in 1848, and the first furrow turned for agricultural purposes in 1849. Agriculture became important to the early economy, with the best farms located in the natural oak forest openings. Dairy cattle began to dominate the agricultural activities; however, during the late 1800's the Waupaca County Potato was known for its exceptional quality in the Chicago market.
Dams were placed on all the major streams as a source to power sawmills for lumber and later gristmills for livestock feed. The impoundments created by dams manifest the negative land use practices in the watersheds above. Sediment and nutrients delivered from the upstream areas are deposited in the impoundments when the water velocity is reduced.

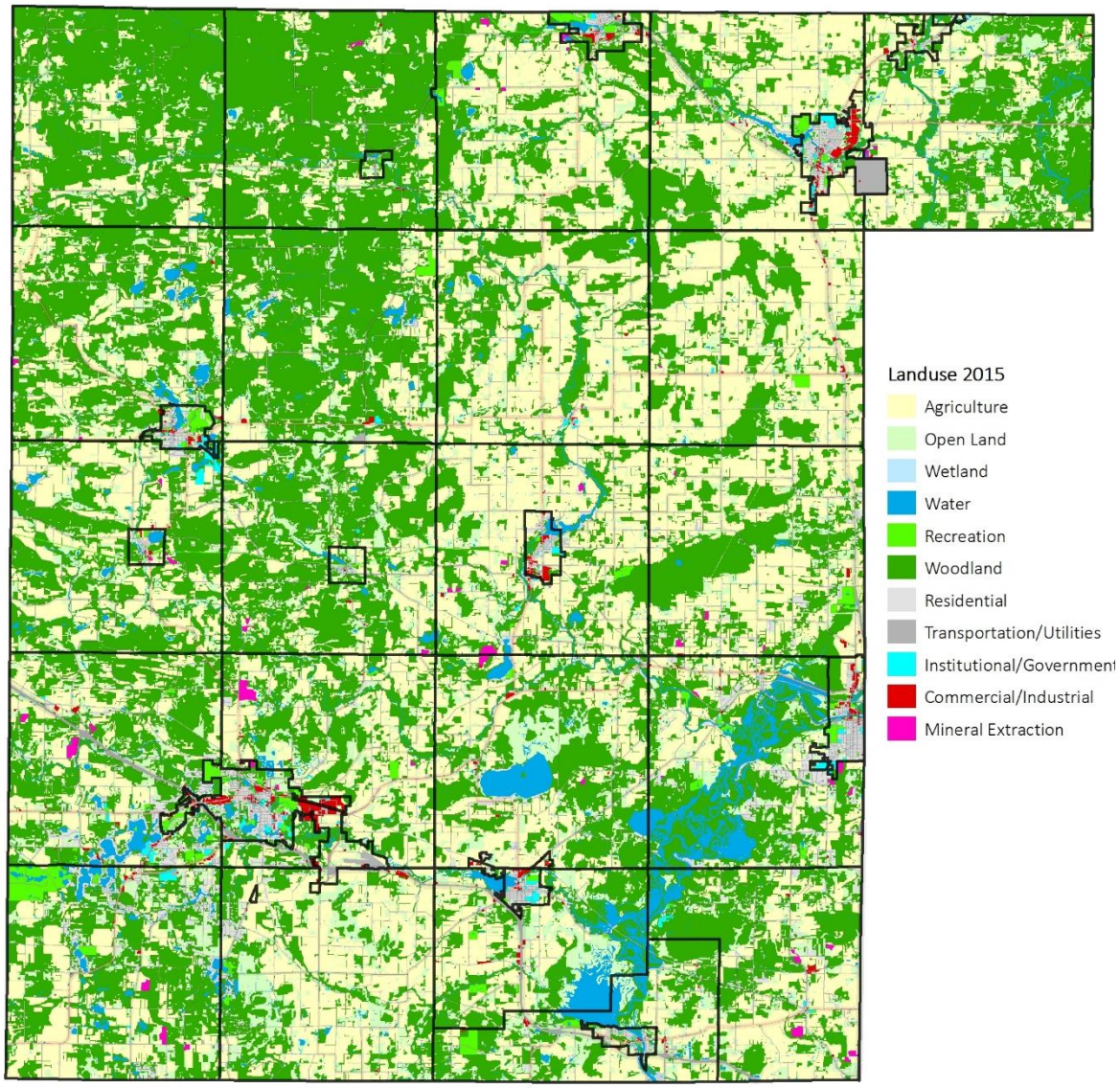
Land Use Trends

Agriculture, recreation and manufacturing are the driving forces in the economy of Waupaca County. These three entities also shape the land use trends. Agriculture continues to be the predominant land use in the county. Emphasis within the agricultural industry has changed as noted in the next section, "Agricultural Trends". Recreation and urban development are expected to put unrelenting and growing pressure on the county's natural resource base. Residential development has been primarily located in and around the cities and villages. However, development in the riparian zone of both streams and lakes has increased disproportionately when compared to other rural areas. Development in the near shore zone of public waterways results in increased impairment of natural resources due to the impacts associated with construction site erosion, increased volume of runoff, and polluted runoff.

Waupaca County completed its comprehensive land use plan in 2007. The plan was developed on a countywide basis with 33 of 34 municipalities collaborating. Land use plans are designed to help control the type and direction of growth. Waupaca County resource managers will continue to develop and attempt to implement land use plans. Planning efforts will address the following resource management issues:

- Preservation of farmland
- Open spaces
- Wetlands
- Wooded areas
- Green belts between ecosystems

Waupaca County Land Use



Data Source: Waupaca County (2015)

Agricultural Trends

Waupaca is a rural county with more than two-thirds (32,000) of the total population living in the country or in communities of less than 2,500 residents. Approximately 3,200 (10%) of these rural residents live on farms. Agriculture accounts for nearly 15% (3,757) of all jobs in the county. Waupaca County farmers generate over $152 million dollars of income each year, with dairy and livestock accounting for 75% of all farm revenue.

Agriculture and farming in Waupaca County is changing. While change has been constant for these sectors over time, the pace of change over the last two decades has undoubtedly increased. Constant technological transformations, emerging world

markets, growing populations, and rural sprawl are among some of the many factors that are impacting Waupaca's agriculture. According to the USDA-NASS agricultural statistics, the following changes have impacted Waupaca County agriculture from 2002 to 2017:

- There are 215 fewer dairy farms (-63%) today compared to 2002 (340 to 125)
- Dairy cattle numbers, however, only decreased by 3.6% in the same time period
- The average farm size continues to increase (177 acres in 2002, 196 acres in 2017)
- The acreage devoted to row crops (corn and soybeans) has increased approximately 15%;
- Acreage devoted to hay crops has decreased by 33%;
- Total cropland has decreased 10% since 2002.

Farm numbers in Waupaca County are on the decline, but remaining farms are increasing in land base. Despite the shrinking number of dairy farms, animal numbers remain steady. Economic, political and social factors will exert a greater influence on farmland in the future. It is expected that the number of farms in the county will continue to decline, while the size of the remaining farms will increase. Cattle numbers may decline; however, they will be more concentrated.

Waupaca County has 1,031 total farm operations with an average size of 196 acres. There are 125 dairy farms and more than 250 beef, sheep, hog, and goat farms along with 120 farms with poultry. These livestock facilities produce manure that can be used as an organic nutrient source for growing crops and improving soil health by following a nutrient management plan. Waupaca County is also home to large cash grain operations of 500+ acres as well as 5-10 acre fresh market vegetable growers. In all, farmers own and manage 201,603 acres of land. Farmers in Waupaca County produce $95.8 million in milk, $37.7 million in grain, $17.6 million in cattle and calves, $3.1 million in vegetables and $3.1 million in hay and other crops.

A combination of an increasing rural nonfarm population, larger concentrations of livestock, and increasing awareness of natural resource concerns pose a serious challenge to all stakeholders. Land use planning that addresses agricultural stability and diversifying farm operations, while protecting natural resources, must be adopted in the near future. The Comprehensive Plan has addressed several of these issues.

The 10% decrease in cropland during the past 20 years is a positive trend. In many cases this acreage is environmentally sensitive land that is being converted to grassland, woodland, and wetlands. A variety of federal, state, county, and private programs provide monetary and technical assistance to landowners desiring to retire cropland from production.

Waupaca County currently has six WDNR WPDES permitted farms with structural facilities located within the county. These are large farms with more than 1,000 animal units.

- Egan Brothers Partnership (1,360 AU)
- Friendship Valley (3,234 AU)
- Quantum Dairy (3,603 AU)
- Brook Farms (1,050 AU)
- Rohan Dairy (1,650 AU)
- Sugar Creek (2,038 AU)

The rural economy in Waupaca County undoubtedly revolves around agriculture, with dairy being the most significant. It has an overall $1.0 billion annual economic impact 3,757 jobs throughout the county. Opportunities to buy products directly from farmers is also increasing. In fact, $708,000 of products are directly sold to consumers every year through farmer's markets, pick-your-own farms, on farm stores and community-supported agricultural arrangements. This means that those who market goods directly to consumers are more likely to remain in business than those who only market through traditional channels.

Like in many parts of the state, the trend has been that circumstances eliminate smaller dairy farms from the landscape as older farmers retire with no heirs willing to take over the operation. Larger dairy farms and grain operations tend to bring up or rent acres from some of these smaller farms. However, family farms are still the norm in Waupaca County with the vast majority (97%) of that farms are still family owned. Amish farmers are beginning to make a more significant portion of the small dairy farms in the county.

Natural Resources

The natural resources of Waupaca County continues to have significant influence on the prosperity of the county. An abundance of high quality water resources, both surface and groundwater attracts visitors and people seeking to relocate to Waupaca County. The recreation industry totals over 90 million dollars each year. There is a healthy balance of agriculture, industry, commerce and recreation coupled with a progressive attitude in protecting the county's history, natural resources and quality of life. Protecting these precious natural resources is the key to maintaining the quality of life that sustains the county's desirability.

Topography

Waupaca County contains two major topographic regions: the moraine-outwash region in the western half and the glacial lake region in the eastern half.

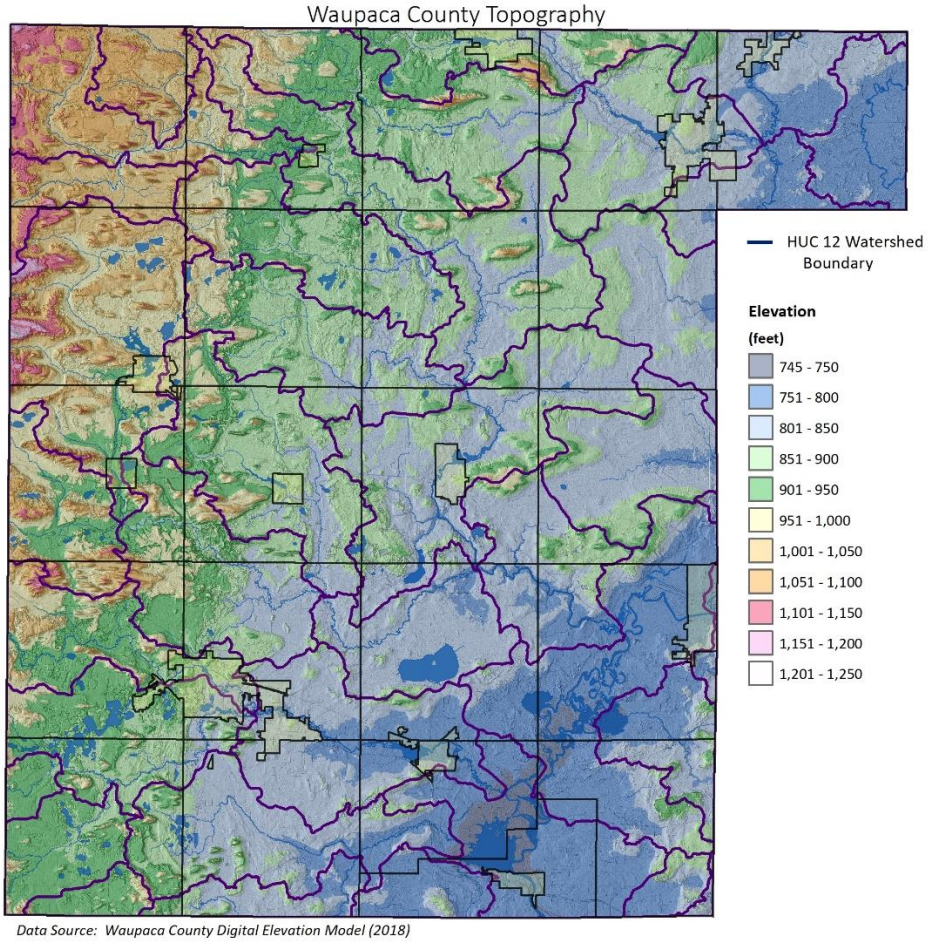
The moraine-outwash region in the western half of the county is characterized by hills and broad valleys formed by ice movement and stagnation from the Cary stage of the Wisconsin Glacier. The surface of this part of the county is irregular, containing many

drumlins and kettles. Many of the smaller lakes were formed when kettles filled with water. Most of the county's streams originate from springs and lakes in this region. Much of this part of the county is rolling, forested hills. Nearly all of the County's trout streams and clear lakes are in this area.

To the east of the Cary end and recessional moraines, the terrain is dominated by deposits laid down by the Valders and Mankato Glaciers. This region has a gently rolling terrain containing numerous marshes, wetlands and scattered lakes. The water bodies in the eastern part of the county tend to be shallow and more fertile than waters in the western portion of the county.

The southeastern corner of Waupaca lies within a glacial lake area of a flat marshy plain broken by drumlins and eskers. The Wolf River flows between New London and Fremont. Its bottomlands are characterized by extensive wetlands and a few large shallow lakes or bayous formed by former river channels. The three largest water bodies in the county, White Lake, Partridge Lake, and Partridge Crop Lake, are located in the former glacial lake area. Partridge Lake and Partridge Crop Lake are bayous of the Wolf River. Many of the rivers and streams in the eastern part of the county tend to be stained brown or light brown.

Waupaca County Topography

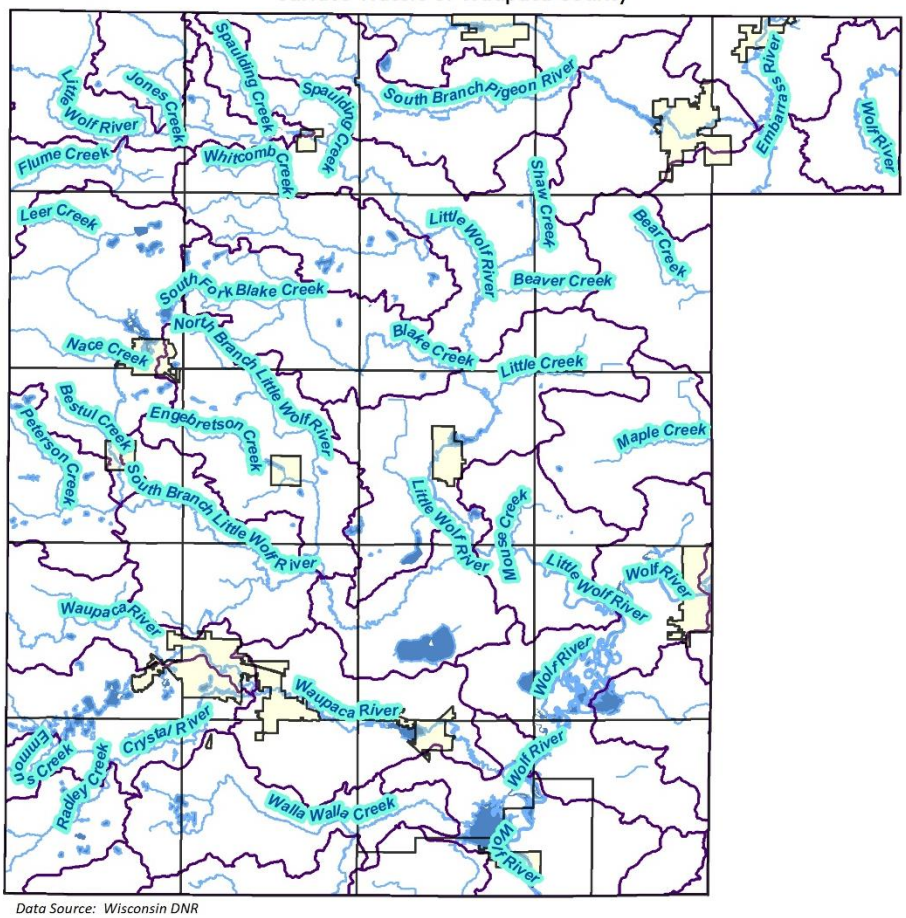


Data Source: Waupaca County Digital Elevation Model (2018)

Surface Water Resources

The county is entirely within the Wolf River basin or watershed. There is 7,240 acres of surface water in lakes along with 1,732 acres of rivers and streams. There are approximately 74 named rivers and streams along with numerous small unnamed and intermittent tributaries. The total length of named rivers and streams is 337 miles. The largest river is the Wolf, which accounts for 41% of the river and stream surface area. There are 275 lakes in the county, of which 145 are named lakes. Sandy soils found in western Waupaca County readily allow water from precipitation to percolate to groundwater rather than runoff to lakes and streams. This condition leads to continual recharge of groundwater supplies and accounts for both stable and high quality water in streams in the western half of the county. All of the trout streams are located in this region. In the eastern part of the county the opposite is true. Heavy soils are not conducive to infiltration and percolation. Stream flows more readily reflect seasonal runoff rates. As a result, there are fewer permanent streams and more dry runs and intermittent tributary streams. Higher runoff rates also result in more sediment and nutrient delivery to surface waters in this region.

Surface Waters of Waupaca County



Data Source: Wisconsin DNR

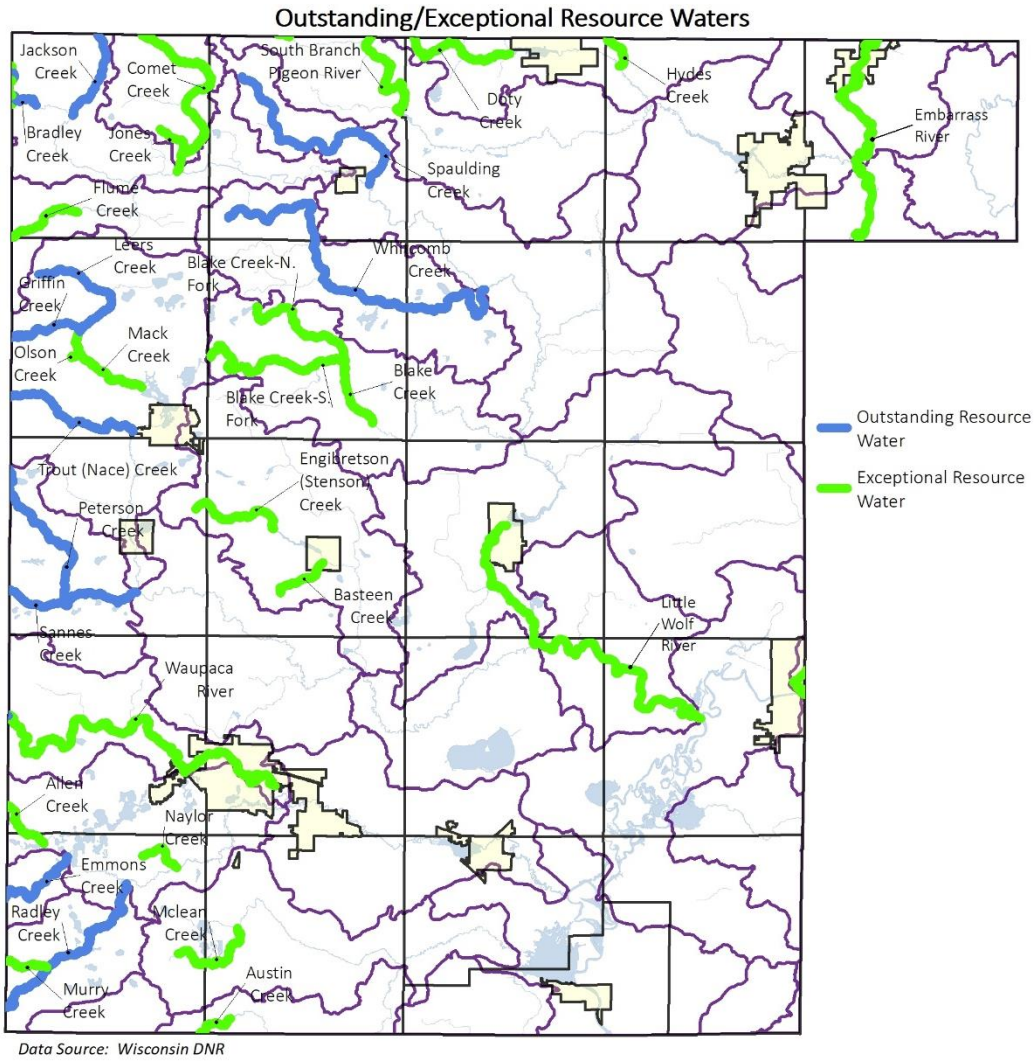
Outstanding/Exceptional Resource Waters

Wisconsin has designated many of the state's highest quality waters as Outstanding Resource Waters (ORWs) or Exceptional Resource Waters (ERWs). Waters designated as ORW or ERW are surface waters that provide outstanding recreational opportunities, support valuable fisheries and wildlife habitat, have good water quality and are not significantly impacted by human activities.

ORW and ERW status identifies waters that the State of Wisconsin has determined warrant additional protection from the effects of pollution. These designations are intended to meet federal Clean Water Act obligations requiring Wisconsin to adopt an "anti-degradation" policy that is designed to prevent any lowering of water quality – especially in those waters having significant ecological or cultural value.

Waupaca County has a total of 14 lakes and streams listed as Outstanding Resource Waters (ORWs). ORWs typically do not have any point sources discharging pollutants directly to the water (for instance, no industrial sources or municipal sewage treatment plants), though they may receive runoff from nonpoint sources. New discharges may be permitted only if their effluent quality is equal to or better than the background water quality of that waterway at all times. No increases in pollutant levels are allowed. This classification includes national and state wild and scenic rivers and the highest quality Class I trout streams.

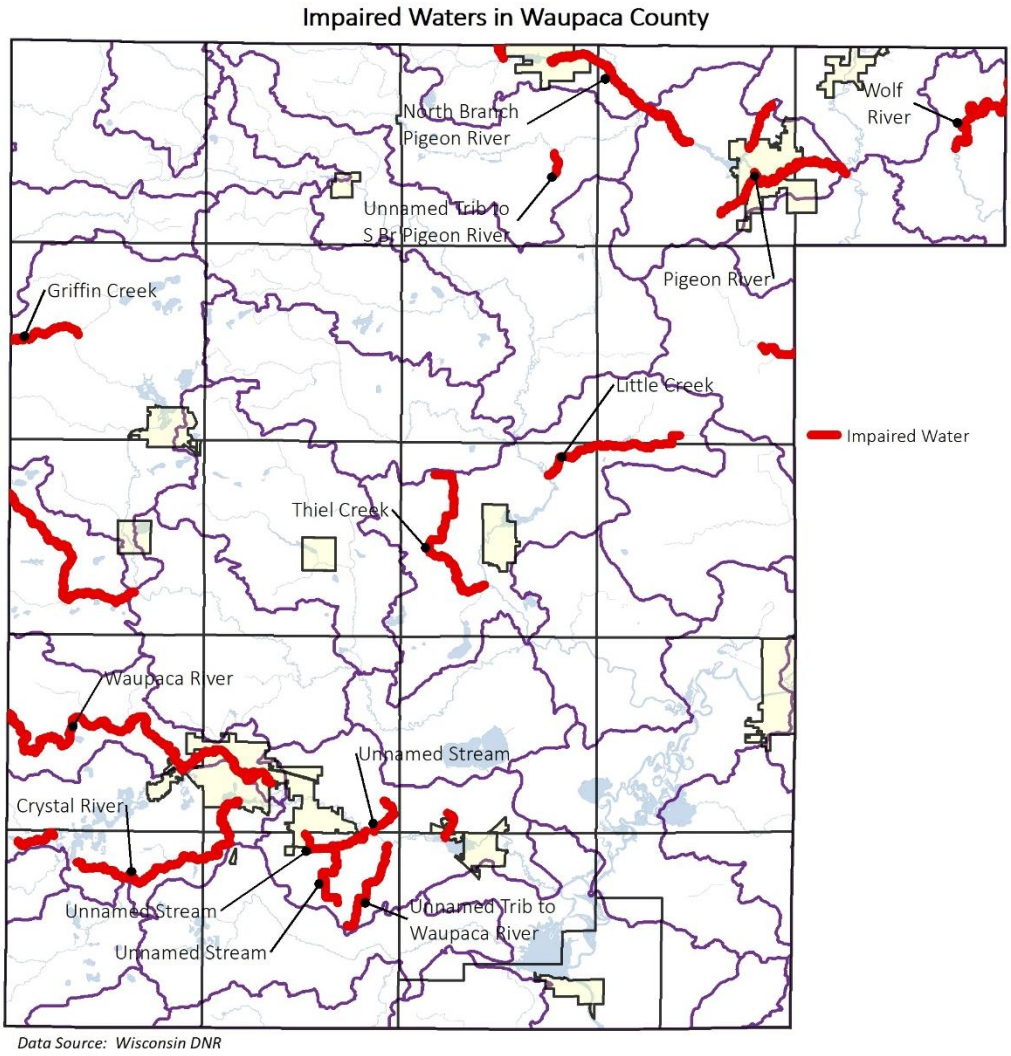
Like ORWs, dischargers to ERW waters are required to maintain background water quality levels. However, exceptions can be made for certain situations when an increase of pollutant loading to an ERW is warranted because human health would otherwise be compromised.



Impaired Waters (303d)

Impaired waters are on a list maintained by the DNR according to Section 303(d) of the federal Clean Water Act. If listed, this means they are considered too polluted or otherwise degraded to meet the water quality standards and meet beneficial uses such as fishable, swimmable or drinkable and are set by states. Under section 303(d) of the Clean Water Act, states are required to assess then develop lists of impaired waters every two years. The law requires the jurisdictions to establish priority rankings and develop Total Maximum Daily Loads (TMDL) for impaired waters. A TMDL is a calculation of the maximum amount of a pollutant that a water body can receive and still safely meet water quality standards. The Waupaca County LWCD often focuses conservation efforts on waters that do not meet the untended use. As of 2020, there were approximately 19 waterbodies in the county that are listed as impaired.

Official Name	Local Name	Water Type	Start Mile	End Mile	Total Size	Pollutant	Listings Status
Crystal River	Crystal River	RIVER	2.43	12.2	9.77	Unknown Pollutant	303d Listed
Hartman Creek	Hartman Creek	RIVER	0	1.61	1.61	Unknown Pollutant	303d Listed
North Branch Pigeon River	North Branch Pigeon River	RIVER	0	5.34	5.34	Unknown Pollutant	303d Listed
Peterson Creek	Peterson Creek	RIVER	0	8.18	8.18	Unknown Pollutant	303d Listed
Pope Lake	Pope Lake	LAKE			14.29	Total Phosphorus	Proposed for List
Thiel Creek	Thiel Creek	RIVER	0	6.7	6.7	Total Phosphorus	TMDL Development
Waupaca River	Waupaca River	RIVER	17.25	32.77	15.52	Unknown Pollutant	303d Listed
Little Creek	Little Creek	RIVER	0	5.89	5.89	Total Phosphorus	TMDL Approved
Old Taylor Lake	Old Taylor Lake	LAKE			42.47	Total Phosphorus	TMDL Approved
Pigeon River	Pigeon River	RIVER	0	5.23	5.23	Total Phosphorus	TMDL Approved
Pigeon River	Pigeon River	RIVER	7.71	10.7	2.99	Total Phosphorus	TMDL Approved
Unnamed	Unnamed Trib to Waupaca River	RIVER	0	3.37	3.37	Total Phosphorus	Proposed for List
Unnamed	Unnamed Stream	RIVER	0	2.88	2.88	Total Phosphorus	Proposed for List
Unnamed	Unnamed Stream	RIVER	0	2.6	2.6	Total Phosphorus	Proposed for List
Unnamed	Unnamed Stream	RIVER	0	1.61	1.61	Total Phosphorus	Proposed for List
Unnamed	Unnamed Stream	RIVER	0	0.95	0.95	Total Phosphorus	Proposed for List
Unnamed	Unnamed Trib to S Br Pigeon River	RIVER	0	0.72	0.72	Total Phosphorus	TMDL Approved
Unnamed	Unnamed Trib to Pigeon River	RIVER	0	1.85	1.85	Total Phosphorus	TMDL Approved
Unnamed	Unnamed Trib to Pigeon River	RIVER	0	1.8	1.8	Total Phosphorus	TMDL Approved



Groundwater Resources

Groundwater resources constitute another key element of the natural resources base of the County. Groundwater not only sustains lake levels, wetlands, and base flow for streams, but also provides the water supply for domestic, municipal, and industrial water users.

In Waupaca County, lake levels and base stream flows are directly related to local ground water supplies. In the western portion of the county, most of the ground water supply is found close to the surface as a result of a shallow mantle of bedrock. This region contains many spring seeps. Depending on the rate of discharge and topography of the immediate area, the ground water may discharge into a stream or accumulate in ponds or marshes. Groundwater seepage is largely responsible for the abundance of trout streams found in this part of the county.

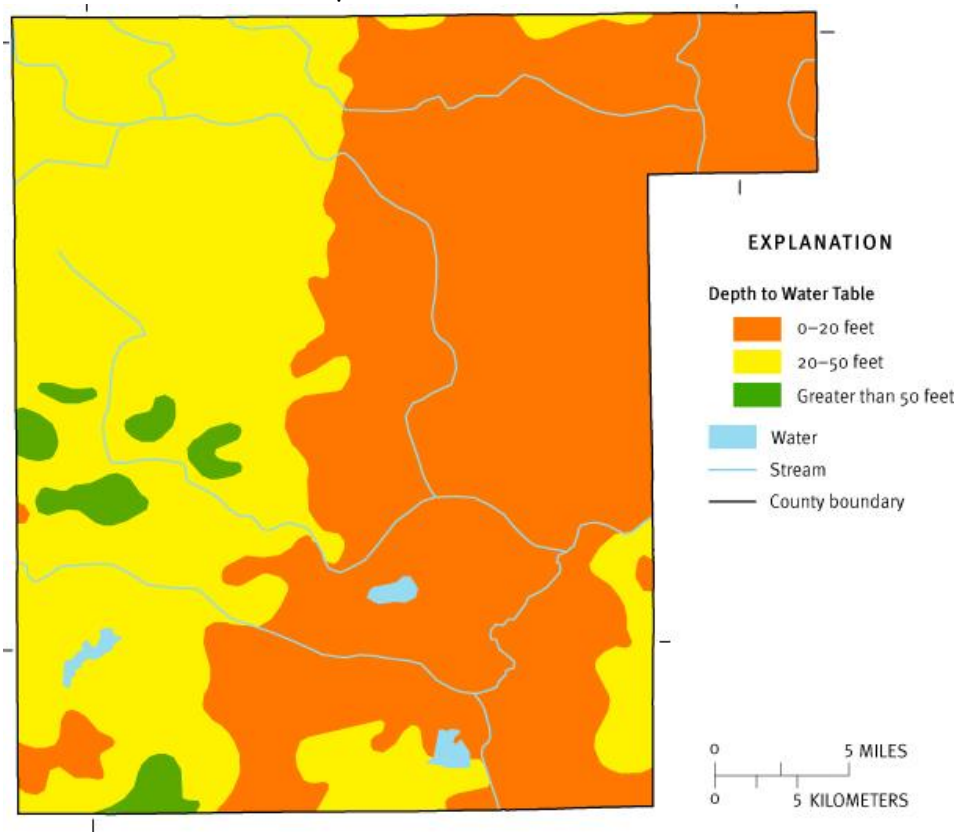
Waupaca County receives an average of 32 inches of precipitation annually. About 20 inches of this precipitation ends up back in the atmosphere by direct evaporation or

through transpiration. The remaining 12 inches either infiltrates into the ground past the root zone of plants or may runoff the ground and directly into lakes, streams, rivers, or wetlands. The rate at which water soaks into the ground is determined mostly by the uppermost layer of soil. Runoff is generated when rain falls or snow melts faster than water can soak into the soil.

Land to the east and especially along the west bank of the Wolf River contains many artesian wells. While not contributing significantly to the volume of surface water lakes and streams, these springs are valuable in maintaining the large number of marshes and wetlands present in this area.

Depth to groundwater in the eastern portion of the county is generally less available. Here, a larger percentage of the precipitation runs off so the ground water recharge is much slower.

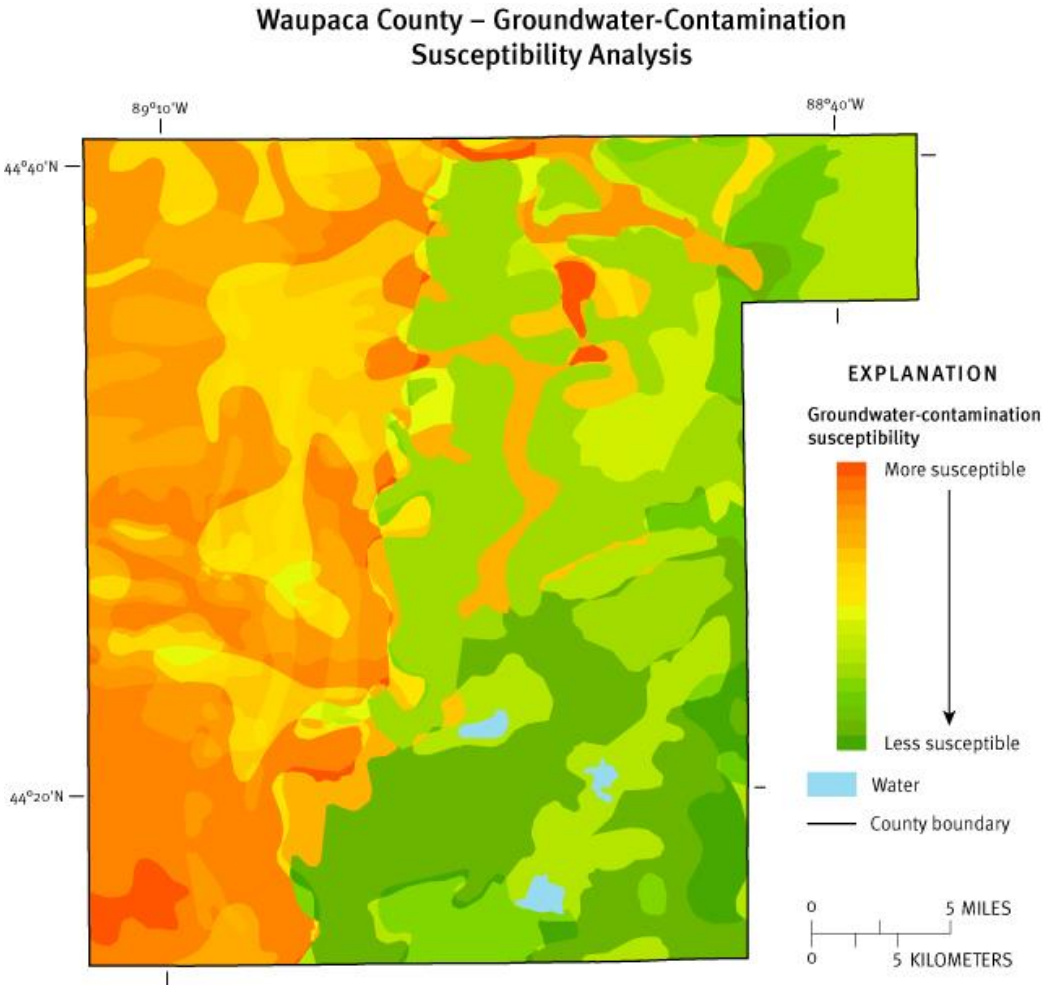
Depth to Groundwater

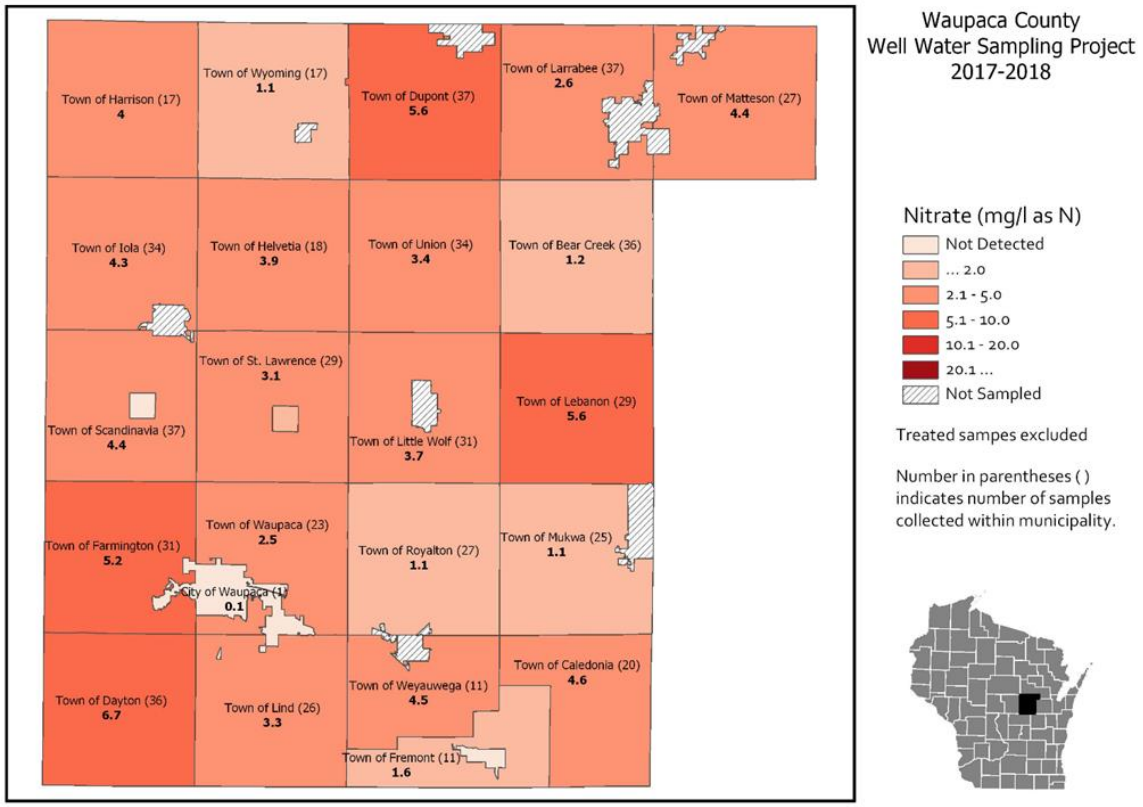


All of the ground water in the county is from local precipitation that infiltrates through the soil to recharge the aquifers. Contamination risks from land use practices are the greatest threat to ground water resources. Potential point source contamination originates from old unregulated landfills, underground fuel storage tanks, private septic systems, livestock manure handling and storage, septic disposal and excessive

agricultural fertilization. These risks are again most prevalent in the western portion of the county where infiltration is greatest. Vegetable crops are grown on approximately 5% of the cropland in this region. Vegetable crops require large amounts of fertilizer and irrigation water, which results in the potential for ground water contamination.

The susceptibility of groundwater to pollutants is the ease with which contaminants can be conveyed from the surface of the land downward through the soil to groundwater. Various materials that overlay the groundwater table provide protection from pollutants that might be transported by infiltrating waters. The amount of protection varies depending on these materials. Five physical resource characteristics are used to determine how easily a contaminant can be carried through the overlying materials to the groundwater. This include depth to bedrock, type of bedrock, soil characteristics, depth to water table, and characteristics of surficial deposits. The Groundwater Contamination Susceptibility map below shows a composite of all five factors for Waupaca County and the degree of groundwater contamination.





Nitrate data collected for the 2017-2018 Waupaca County Well Water inventory was compared to data collected in the 1990s in Waupaca County. From 1990 to 1997, Waupaca County conducted voluntary well testing once in each town in Waupaca County. A total of 854 wells were tested through those efforts. The earlier testing resulted in a mean nitrate concentration of 3.1 mg/L (1990-1997) compared to 3.6 mg/L (2017-2018). The differences between sampling periods is not considered significant.

The percent of samples above the 10 mg/L drinking water standard is slightly higher at 11.1% for the 2017-2018 sampling period compared to 8.8% for the period from 1990-1997 however the change is not statistically significant. Depending on funding resources and staffing, the LWCD may repeat the same or similar study to determine trends.

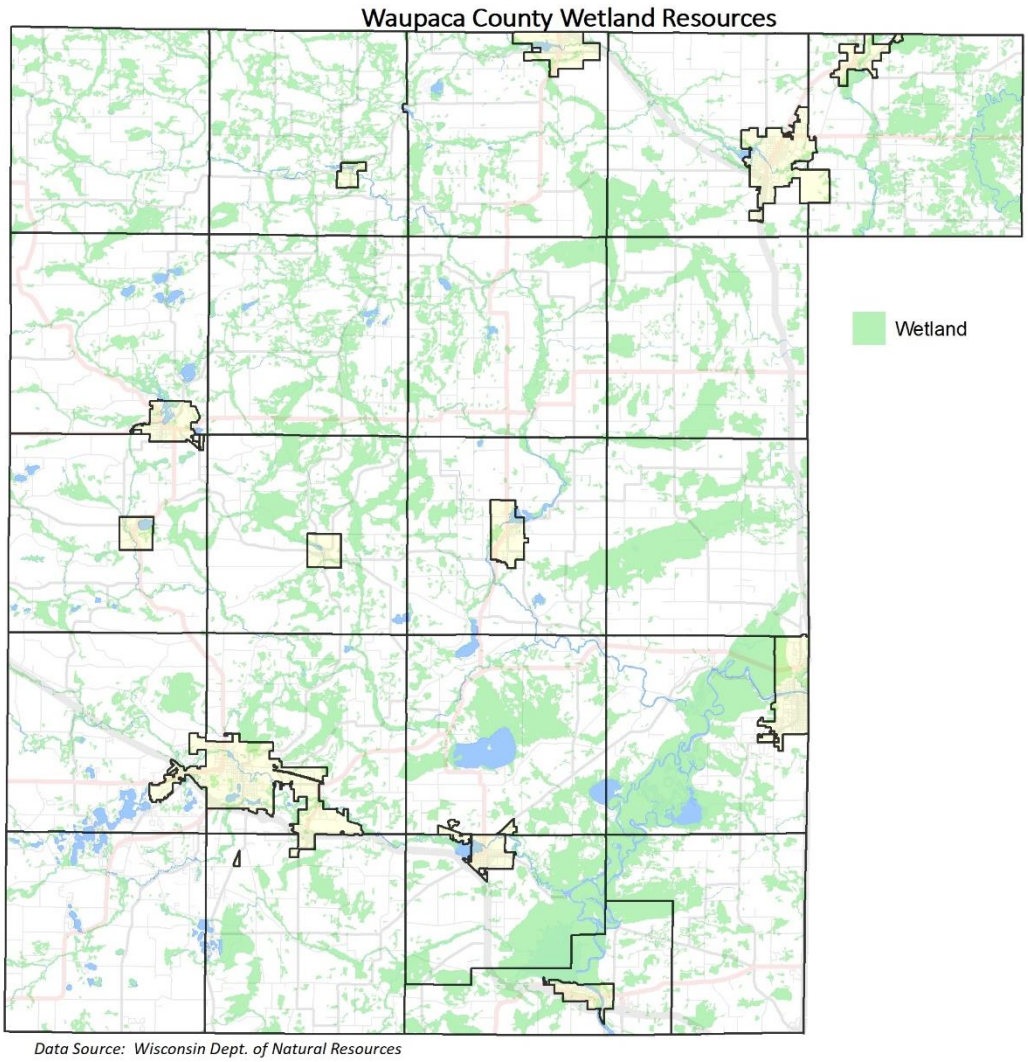
Wetland Resources

Approximately 124,473 acres of wetland exist in Waupaca County. There has been an estimated net loss of approximately 25% of the original wetlands since settlement began manipulating the land for agricultural purposes. The primary disturbance to wetlands has been through the artificial ditching and draining so the land can be cultivated. Wetlands are located throughout the county. All indigenous wetland types are represented in Waupaca County. Each of these represents a unique ecosystem based on hydrologic conditions, vegetation, and location in relationship to other wetlands, drier upland areas, or adjacent water bodies.

Several large wetland complexes are connected with river and stream systems. These include the Wolf River, Little Wolf River, Waupaca River, Pigeon River, and the Embarrass River. In addition to providing habitat for fish, waterfowl, and other wildlife species, wetlands are important for the recharge of aquifers and the protection of ground water quality. They are extremely efficient at trapping and filtering out nutrients and sediments contained in runoff and provide highly effective flood storage areas.

Several invasive plant species threaten wetland habitats. Purple loosestrife, non-native phragmites, yellow iris, and narrow-leaved cattail are aggressive plants that are becoming more pervasive in the region and are oftentimes dominant. The expansion of invasive species has caused the decline of many native plants and their associated habitats.

All natural resource programs administered by Waupaca County strive to protect wetlands from further destruction. The protection of wetlands adjacent to lakes and rivers are particularly important for protecting water quality. Every effort will be made to protect these areas. Promoting a better understanding and appreciation of wetlands by the general public is an important part in protecting and enhancing these significant resources.



Data Source: Wisconsin Dept. of Natural Resources

Woodland Resources

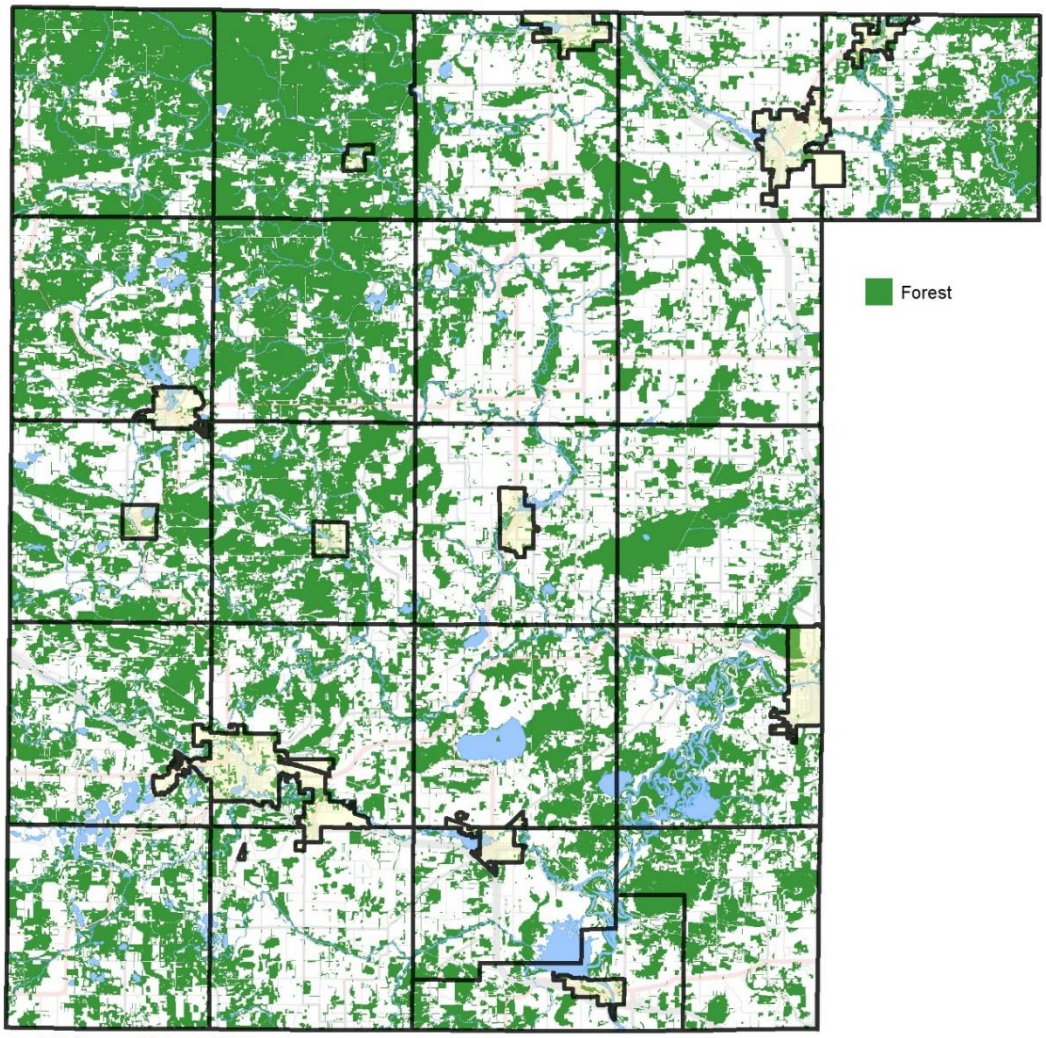
Prior to settlement, forests covered all of Waupaca County. Approximately 170,000 acres remain in commercial forest. Most of this acreage is privately owned. The most important commercial forest area is located in the northwest towns of Harrison, Wyoming, Iola, and Helvetia. The dominant tree species are northern red oak, aspen, and birch, with sugar maple, white ash, and other common hardwoods. Pine plantations are prevalent in the sandy soils of the outwash plain areas of western Waupaca County.

The forest industry has a tremendous impact on the economy and other related natural resources. The woodlands are also very important in terms of wildlife habitat. Forestry practices can have a dramatic effect on water quality especially in close proximity to water bodies. Waupaca County's Shoreland Zoning Ordinance requires that best management practices for water quality be implemented near shore areas of streams and lakes.

The demands on woodlands continue to increase. Development for housing, recreation, and the parcelization of larger tracts into smaller lots are adding to the pressure on the remaining woodlands. Insect pests and tree diseases are also threatening forests. Oak wilt and Emerald Ash Borer continues to spread and cause stress and mortality in parts of the County.

Perhaps the greatest threat to woodlands throughout Waupaca County are the spread of invasive plants and shrubs. Invasive species are unwanted plants that can easily invade forests and outcompete and displace native species. Over time, they can significantly change and reduce a forest's health. Honeysuckle, garlic mustard, Buckthorn, and reed canary grass are the most common invasive species found in Waupaca County. Preventing invasive species from becoming established is the most effective means of control. Once established, eradication is usually not feasible. Grant programs are offered through State and Federal programs for landowners to control invasive species.

Waupaca County Forestland



Data Source: Waupaca County

Mineral Resources

The glacial history of the county is reflected in its mineral resources. The glacier deposited large volumes of sand and gravel. The outwash area of western Waupaca is for the most part underlain by this sand and gravel. A number of large nonmetallic mines (sand and gravel pits) are located in this region and is mostly utilized for road and building construction. The southeastern portion of the county has a topography that was determined by the underlying dolomite. There is an escarpment of exposed dolomite along nearly all the western edge of this area. Several large pits, supplying specific rock and crushed rock materials are located in this region. There are 45 permitted and 10 exempt NR135 nonmetallic mines on 474 acres throughout the county.

Soils

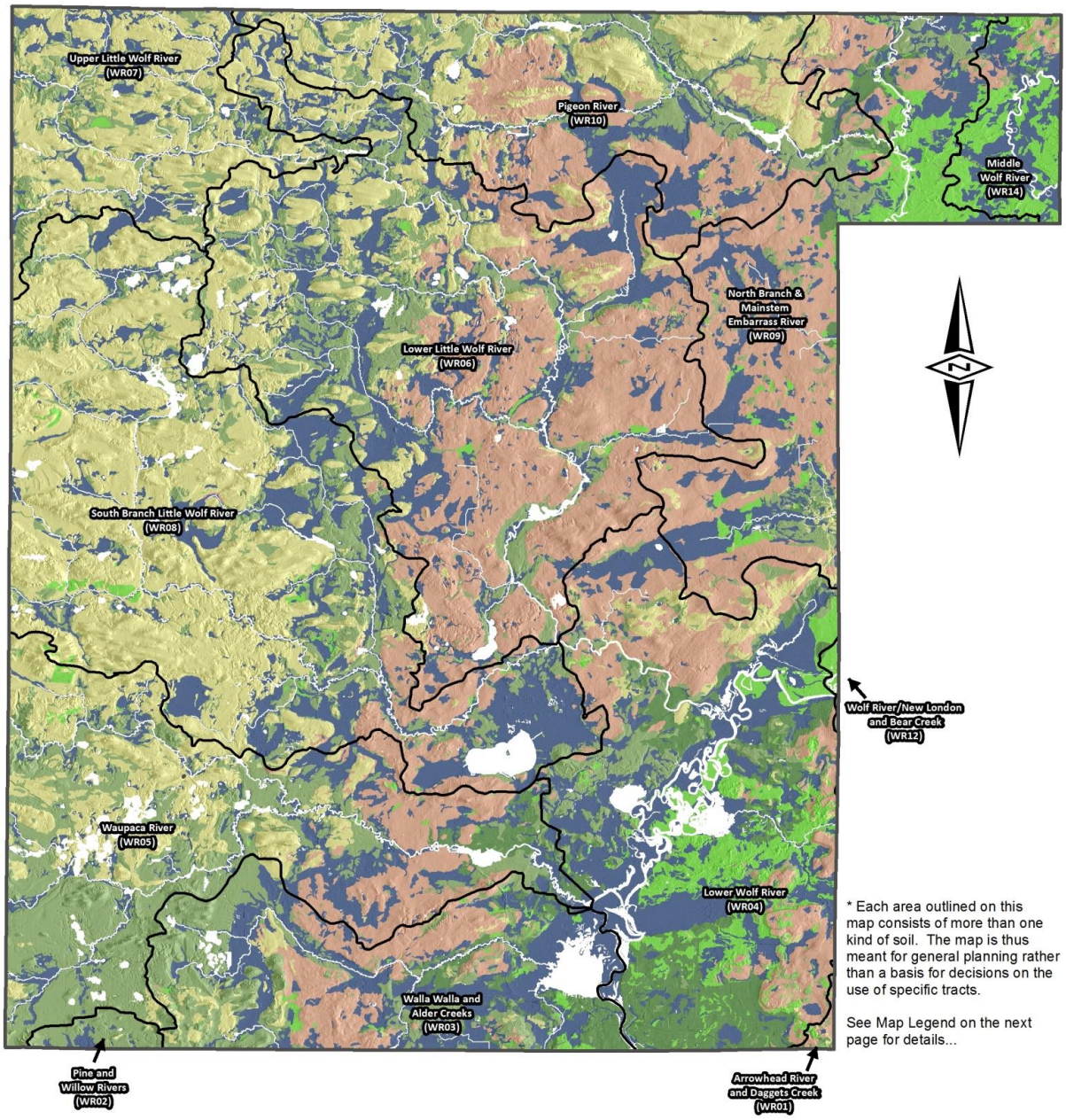
Soil is formed by the interaction of outside processes on deposited geologic materials. The characteristics of a soil are determined by the physical and mineralogical composition of the parent material, the climate in the area, the plant and animal life in and on the soil, the relief, and the length of time the processes of soil development have acted on the soil material.

The parent material in Waupaca County consists of windblown sand, water-laid deposits, organic material, and glacial drift. Glacial drift can be further divided into till and outwash. Till is unsorted glacial debris composed of clay, silt, sand, gravel and boulders. The eastern half of the county is either glacial till or water-laid deposits in former glacial lakes. The western portion of the county was formed by the melt waters of the receding ice masses depositing sand and gravel in the form of stream terraces, eskers, kames, and outwash plains.

There are 61 different soil types found throughout Waupaca County. These are grouped into six major soil associations that have distinctive soil patterns, relief, and drainage features. The Waupaca County Soil Survey contains detailed descriptions of each soil type, including information on suitability and limitations for various types of land use and land management. The Waupaca County Land and Water Conservation Department extensively uses soil information and related data in determining cropland erosion estimates and sediment load calculations.

General Soil Map

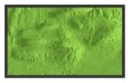
Waupaca County, Wisconsin



* Each area outlined on this map consists of more than one kind of soil. The map is thus meant for general planning rather than a basis for decisions on the use of specific tracts.

See Map Legend on the next page for details...

*Generalized Soil Classes



Primary Soils: *Plainfield-Richford-Kranski*

Description: Nearly level to steep, excessively drained to moderately well drained sandy soils; on uplands and stream terraces.

Secondary Soils: *Minocqua (Ms)*

Primary Soils: *Kennan-Rosholt*

Description: Nearly level to steep, well drained loamy soils; on uplands and stream terraces.

Secondary Soils: *Elderon (EcC/EcD), Oesterle (OeA), and Tilleda (TIB/TIC2)*

Primary Soils: *Hortonville-Symco*

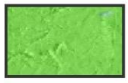
Description: Nearly level to moderately steep, well drained and somewhat poorly drained loamy soils; on uplands.

Secondary Soils: *Angelica (Ax), Military (MrB), Whalan (WhB, WhC2), and Whalan Variant (WvB)*

Primary Soils: *Borth-Poy*

Description: Nearly level and gently sloping, moderately well drained and poorly drained silty and loamy soils, in glacial lake basins.

Secondary Soils: *Nebago (Ne), Neenah (NhA), Oshkosh (OsB), and Tustin (TuB)*



Primary Soils: *Waupaca-Wega-Zurich*

Description: Nearly level and gently sloping, moderately well drained to poorly drained silty soils; in glacial lake basins.

Secondary Soils: *Rousseau (RsA), Shawano (SfB/SfC/SfD), Udipsamments (UdC), and Wainola (Wa)*

Primary Soils: *Cathro-Markey-Seelyeville*

Description: Nearly level, very poorly drained mucky soils; in upland depressions and on flood plains.

Secondary Soils: *Fordum (Fa), Loxley (Lx), Meehan (Mh/MIA), Menasha (Mp), and Roscommon (Rm)*

* Generalized soils classes were developed using the NRCS Soil Survey Data for Waupaca County.

CHAPTER 3- NONPOINT SOURCE POLLUTANT LOADING AND RESOURCE CONDITIONS

Pollutant Loading

Sediments (soil) contained in runoff from rural/agricultural land use and nutrients entering both surface and groundwater are the most significant forms of nonpoint pollution impacting water resources in Waupaca County and the Wolf Basin in general. These pollutants degrade drinking water quality and impair recreational and biological uses of surface water. Excessive nutrients, like phosphorus, as well as sediment can lead to nuisance algae growth in lakes, oxygen depletion, fish kills, reduced aquatic vegetation, water clarity problems, degraded habitat and reduced property values. These water quality impairments adversely affect fish and aquatic life, drinking water supplies, recreation, and potentially navigation. The principal rural nonpoint sources of pollution in Waupaca County are:

- Polluted runoff from land that was spread with manure
- Sediment delivery from cropland and construction sites
- Polluted runoff from barnyards, livestock feeding areas and pasturing areas
- Sediment eroded from shorelines, streambanks and drainage ditches
- Excess nutrients and pesticides infiltrating groundwater

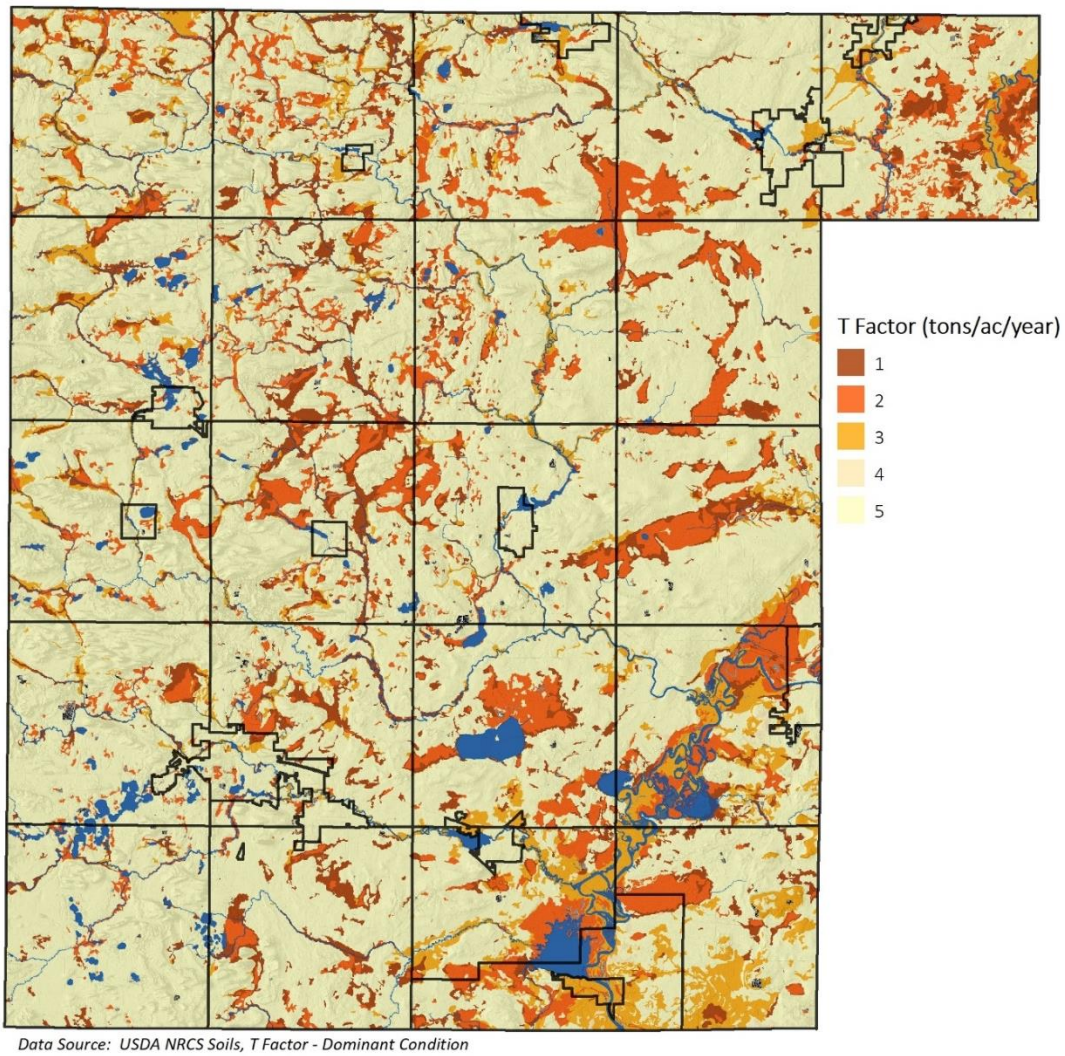
Soil Loss, Sediment Delivery and "T"

Many of Waupaca County's soils are productive when it comes to growing crops. However, the soils in this part of the state present a unique set of challenges for producers to overcome. Tolerable Soil Loss, or "T", is an estimate of the amount of soil that can be lost from an acre of cropped land on a continual basis and still retain an adequate level of productivity. This value is strictly based on soil type and T values are updated by NRCS.

Soil loss is the estimated amount of soil that is moving from one place to another on the landscape. Erosion, whether by water, wind, or tillage, involves three distinct actions – soil detachment, movement, and deposition. Topsoil, which is high in organic matter and fertility, is relocated elsewhere where it builds up over time or is carried offsite. Soil loss reduces cropland productivity and contributes to the pollution of adjacent and downstream watercourses, wetlands, and lake. Waupaca County uses the Revised Universal Soil Loss Equation 2 (RUSLE2) that is embedded in Snap Plus to calculate soil loss. It provides a value that can be compared to "T".

Sediment delivery is the estimated amount of soil (sediment) that is actually being delivered to surface water, therefore it is the most relevant in terms of water quality. Sediment delivery will be referred to numerous times throughout this plan.

The pollutant modeling work conducted for the Upper Fox/Wolf River TMDL provides a solid foundation for prioritizing geographic areas that have excessive TSS rates and TP loading, which typically come from soil erosion and runoff (see appendices G and J from the TMDL report- https://dnr.wisconsin.gov/topic/TMDLs/FoxWolf/index.html). We will use these TMDL results to identify geographic areas and watersheds for large scale, multiyear projects which include the following approved USEPA 9 Element watershed-based plans: Bear Lake-Little Wolf, Weyawega Lake-Waupaca River and Shaw Creek-Little Wolf (see Appendix A and B). As projects in these areas are planned and implemented, the LWCD will utilize additional modeling tools, such as EVAAL, ACPF, and Snap Plus to further prioritize areas or fields for soil conservation practices.

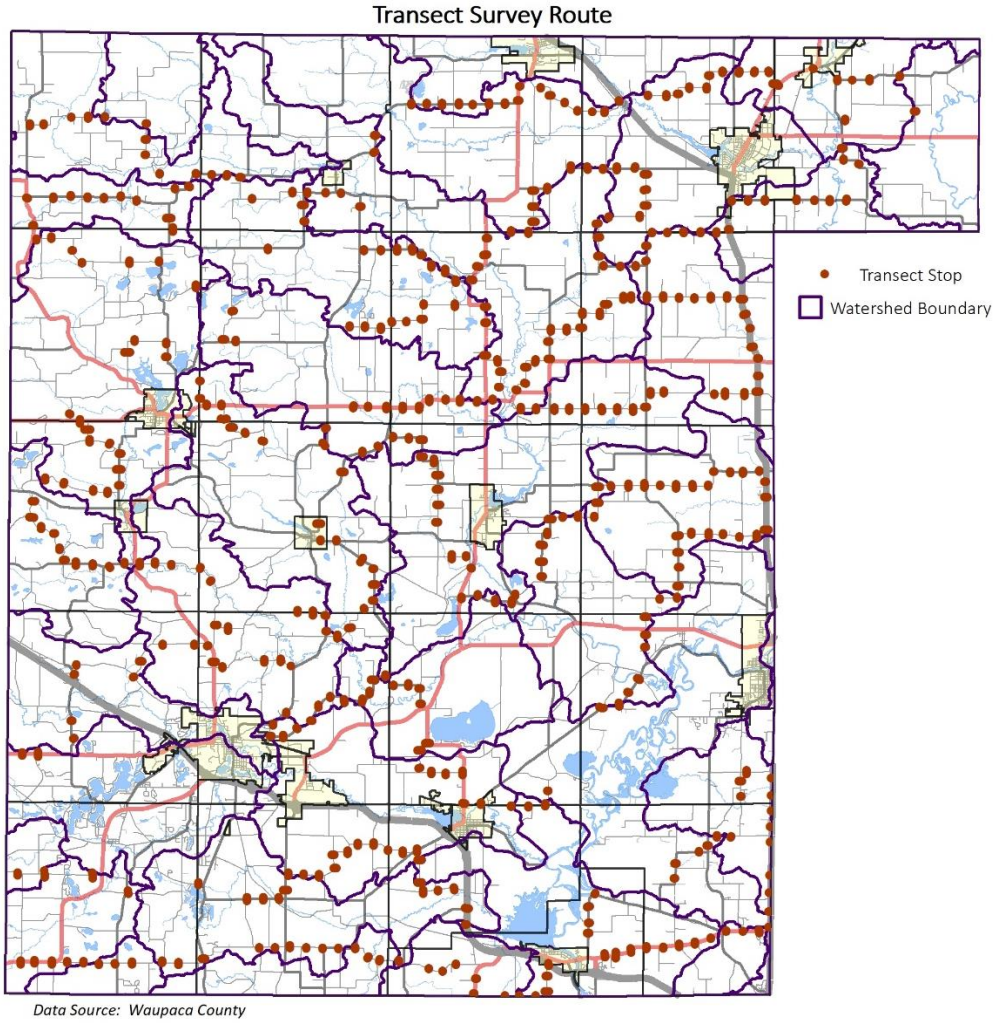


Data Source: USDA NRCS Soils, T Factor - Dominant Condition

Transect Survey

Beginning in 1998, the LWCD began tracking soil loss by completing a Transect Survey. The survey evaluates changes in crop rotation and crop residue and covers 332 miles and includes 1,146 data points. The survey was repeated every year from 1998 to 2018. Over the past few years, LWCD has switched to tracking tolerable soil loss and average

annual soil loss spatially through nutrient management plans submitted for various program requirements and through available data from the Upper Fox/Wolf TMDL modeling. The 2018 estimated average cropland soil erosion rate for Waupaca County is 2.1 tons/acre/year, which is an upward trend from the estimated 1.2 tons/acre/year in 1998. It is important to note that soil loss calculations and acceptable "T" are performance values based on maintaining soil productivity, not water quality protection, which creates an inherent conflict between local, state, and federal partners in terms of achieving water quality goals in the Upper Fox-Wolf TMDL. However, the Upper Fox Wolf River report also contains some edge of field TP reduction targets for Waupaca County, generated by the Wisconsin DNR using SNAP Plus. This information, used in tandem with soil transect data, can further help to prioritize areas or fields in the county for soil conservation practices.



Phosphorus Loading

Nutrient loading can adversely affect water quality by promoting excessive plant growth (macrophytes and algae) primarily in rivers and lakes. Phosphorus is the most significant

nutrient that promotes macrophyte and algae growth. Excessive macrophyte growth causes severe oxygen fluctuation in streams and lakes. Plants produce oxygen as they photosynthesize in the daylight, but at night, this oxygen is used for plant respiration. Large swings in the daily level of dissolved oxygen can stress fish and other aquatic life. In addition, excessive plant growth in streams can restrict water flow and increase sedimentation rates. This problem is especially evident in the 9 impoundments in the county and was, in part, the basis for development of the Upper Fox/Wolf River TMDL report. The watershed size for impoundments (millponds) is generally more than 10 times the size of the watersheds for natural lakes. This indicates that phosphorus and sediment delivery to these lakes can be ten-fold also. As a general rule one pound of phosphorus can produce about 500 pounds of plant matter in the form of aquatic plants or algae. Taking that one step further, more than 20,000 tons of nuisance aquatic plants are produced in Waupaca County lakes and streams from runoff and soil erosion each year.

Phosphorus Loading from Cropland Sediment

Phosphorus is an essential element needed for crop growth. Farmers apply commercial phosphorus fertilizer or manure to supplement the usually low quantities available in the soil. Over-application can lead to the buildup of phosphorus in the soil and as a result, the potential for soluble phosphorus increases. Erosion of soil particles from cropland will transport excess phosphorus from the field in both soluble form or attached to individual soil particles.

Phosphorus Loading from Feedlots and Manure Spreading

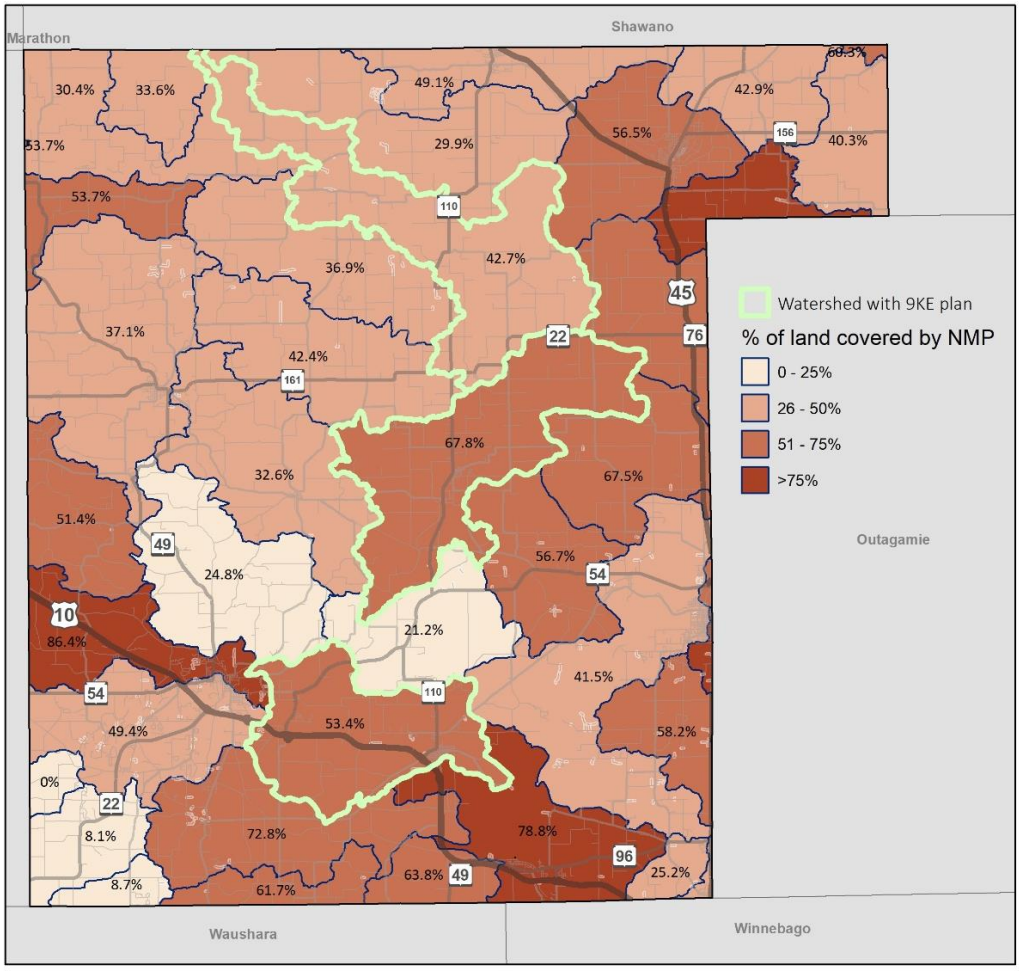
Runoff quality from the feedlot surface is important when adapting best management practices for minimizing environmental concerns, especially surface water and ground water pollution. Feedlot runoff can end up in surface water streams, which may be detrimental to fish and aquatic life and may cause eutrophication (a process by which a water body becomes abundant in plant nutrients and low in oxygen). Runoff is likely to occur from open feedlot pen surfaces when rainfall or snowmelt occurs. A rainfall event following land application of manure, overapplying manure or misapplying manure also may cause runoff. Under NR 151 agricultural performance standards and prohibitions, runoff from feedlot surfaces must be controlled and prevented from entering surface and ground waters. Runoff management practices may include settling basins, roofs, gutters, or vegetative filter systems to reduce solid and nutrient loads.

Feedlot inventories have been completed recently for three 9 Key Element Planning Watersheds as well as two Priority Watershed projects in the mid 1990s. The BARNY model had been used to determine pollution potential from each feedlot and to prioritize runoff problems. Phosphorus runoff from manure spreading in the spring, summer, or fall can be difficult to predict because of the manure variables involved, such as timing, rate of delivery, and placement of the application. With that said, land application of liquid manure to frozen and snow covered ground continues to be a problem in the county.

Nutrient Management Planning

Nutrient Management Planning (NMP) is defined as managing the amount, form, placement, and timing of animal waste applications and commercial fertilizer to provide essential plant nutrients. Its purpose is to confirm a proper supply of plant nutrients for crop production while minimizing the loss of nutrients to surface and groundwater. NMP must also minimize soil erosion and phosphorus loss from cropland to surface waters of the state. Under NR 151.007, all farms that apply nutrients to cropland or pastures are required to have and implement a NMP. Waupaca County requires NMP for landowners constructing and operating waste storage facilities, as well as for other programs such as Farmland Preservation. Accordingly, Waupaca County has set an implementation threshold for this plan of 70% NMP coverage on agricultural fields for each HUC 12 wastershed. Current NMP coverage of Waupaca County's agricultural lands is estimated at 52%. The LWCD will continue to utilize the FPP as one method of NR151 implementation and a targeted mailing strategy to select landowners that meet our priority farm criteria. Further implementation will be conducted following watershed-based approach, placing more weight on the HUC 12 basins that have an approved 9 Key Element plan.

Percent of tillage land covered by a NMP in HUC 12 watersheds

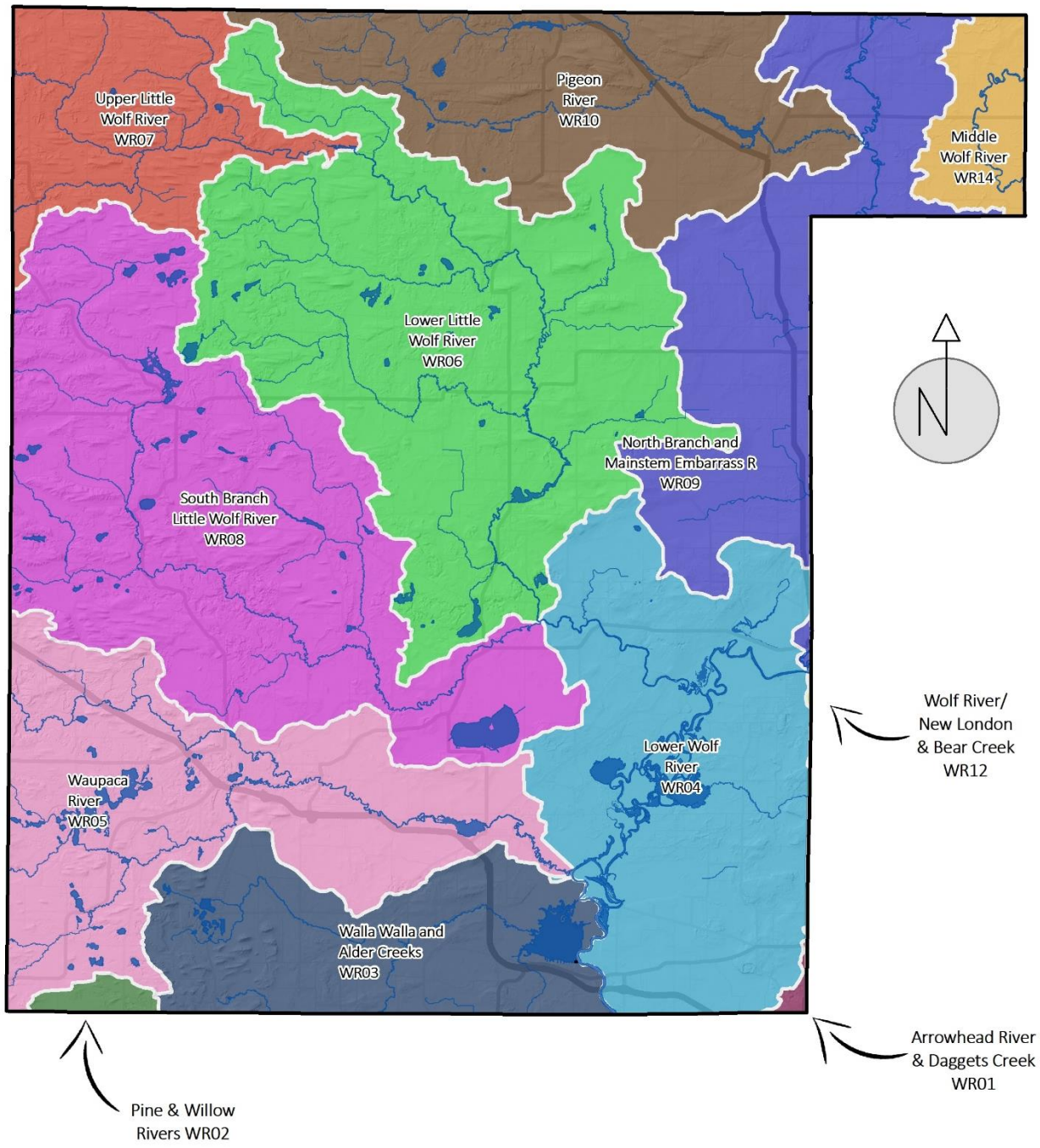


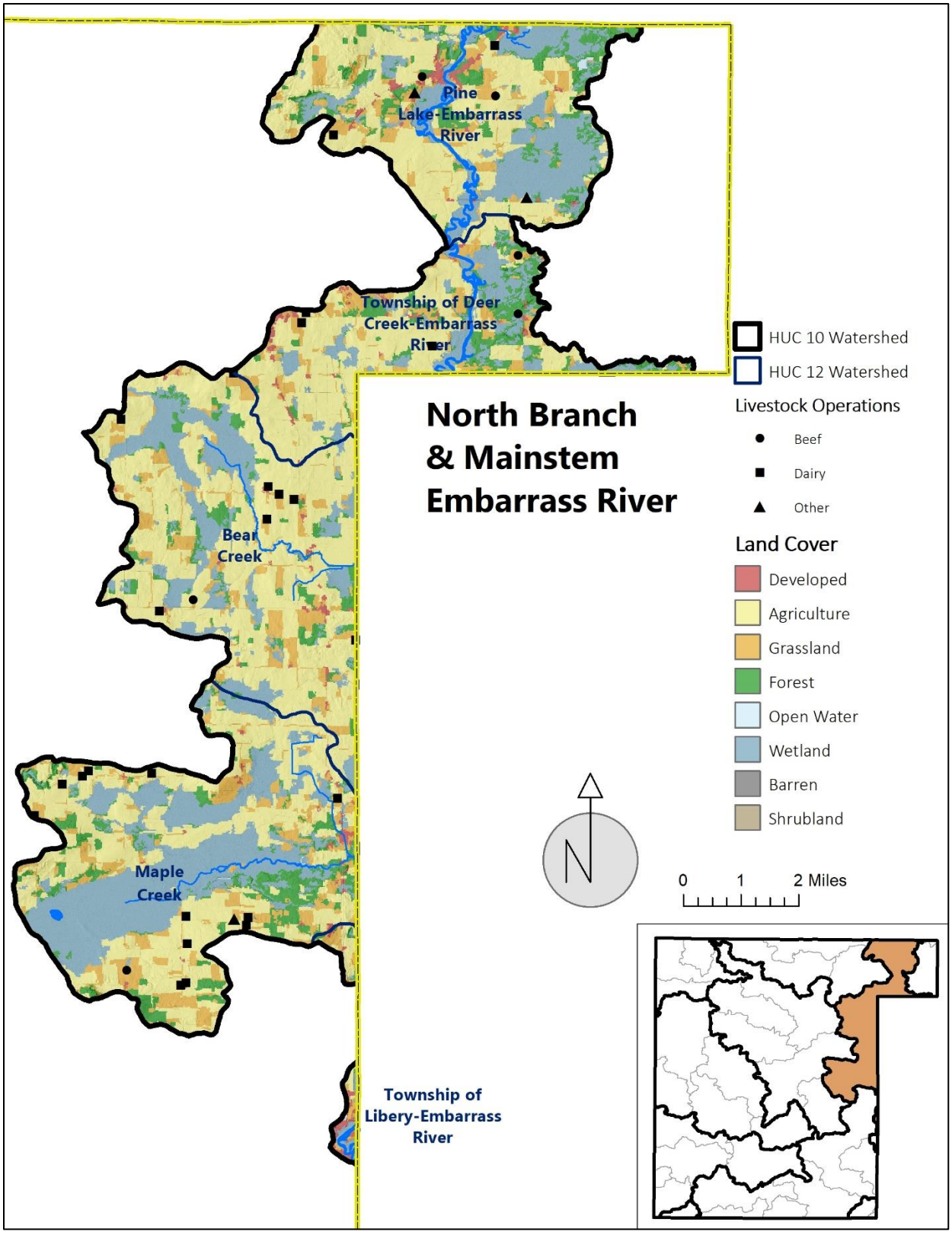
Watershed Summaries

A watershed is an area of land that drains all the streams and rainfall to a common outlet. Watersheds are important because the streamflow and the water quality of a river, lake, or stream, are affected by things happening in the land area above the outflow point. Digital watershed boundaries exist for the state which contain nested regions, known as hydrologic units, which delineate progressively smaller watersheds. Each hydrologic unit has a code associated with it, known as a hydrologic unit code or HUC.

At an 8 digit HUC level, all of Waupaca County falls within the Wolf River Basin and eventually drains to Green Bay. Major tributaries to the Wolf River in Waupaca County include the Little Wolf, Embarrass, Pigeon, and Waupaca Rivers. At a HUC 10 level, there are 12 watersheds that fall fully or partially within Waupaca County. The HUC 10 watersheds can be further divided in HUC 12 watersheds, which average approximately 36 square miles.

Waupaca County Watersheds




Pine Lake-Embarrass River
Township of Deer Creek-Embarrass River
North Branch & Mainstem Embarrass River
Bear Creek
Maple Creek
Township of Libery-Embarrass River
HUC 10 Watershed
HUC 12 Watershed
Livestock Operations
Beef
Dairy
Other
Land Cover
Developed
Agriculture
Grassland
Forest
Open Water
Wetland
Barren
Shrubland
N
0 1 2 Miles

North Branch and Mainstem Embarrass River (WR09)

General Watershed Characteristics

The North Branch and Mainstem Embarrass River Watershed drainage area is 175 square miles within Waupaca and Shawano Counties. Approximately 55 square miles are located in northeastern Waupaca County. The mainstem Embarrass River extends through the watershed from Caroline in Shawano County, east and southward through Waupaca and Outagamie Counties to New London where it connects to the Wolf River. Dairy farming remains the dominant land use activity in the watershed. The Upper Fox/Wolf River TMDL has also identified that the subwatersheds continue to have high soil erosion rates, with animal waste runoff as a significant problem. With heavy soil losses, impaired fisheries, excess vegetation, and dissolved oxygen violations, the LWCD will continue to focus its attention in these subwatersheds and seek available funds necessary to implement Best Management Practices. The watershed can be broken down into smaller subwatersheds (HUC 12) based on tributaries to the Embarrass River and include Bear Creek, Deer Creek, and Maple Creek.

Bear Creek

The Bear Creek Watershed is an agricultural watershed with clay soils and moderate erosion rates. Bear Creek itself is an 9-mile long tributary to the Embarrass River and the stream's main fishery value is as a spawning area for the Wolf River fishery Bear Creek was recently evaluated during the ten-year period of 2009 through 2018 for results that were reported to the USEPA for the 2020 Clean Water Act condition report. The waterbody is considered impaired, or in poor condition for designated uses which include the quality of fish and aquatic life, recreational use, and public health and welfare (fish consumption and related). Assessment results during the 2020 listing cycle show total phosphorus levels too high for healthy aquatic communities, like plants, fish, and bugs, according to 2020 WisCALM standards. Based on the most updated information, this water was proposed for the impaired waters list in 2020.

Deer Creek

The Township of Deer Creek Watershed in Waupaca County is mostly agricultural with elevated erosion rates. Low-lying areas consist of peat soils and are effectively drained by ditches. The perimeter of the watershed has gently rolling uplands with fine and very fine sandy soils.

Maple Creek

Maple Creek is a naturally warm water stream that typically does not support a fishery. Intense agricultural activities in this watershed as well as a high density of livestock facilities have degraded the stream. Biotic indices of Maple Creek indicate fair to poor water quality. Several large marshes, including the "Lebanon swamp" creates open water ideal for waterfowl. The surrounding area is mostly agricultural with scattered woodlots and low density residential development.

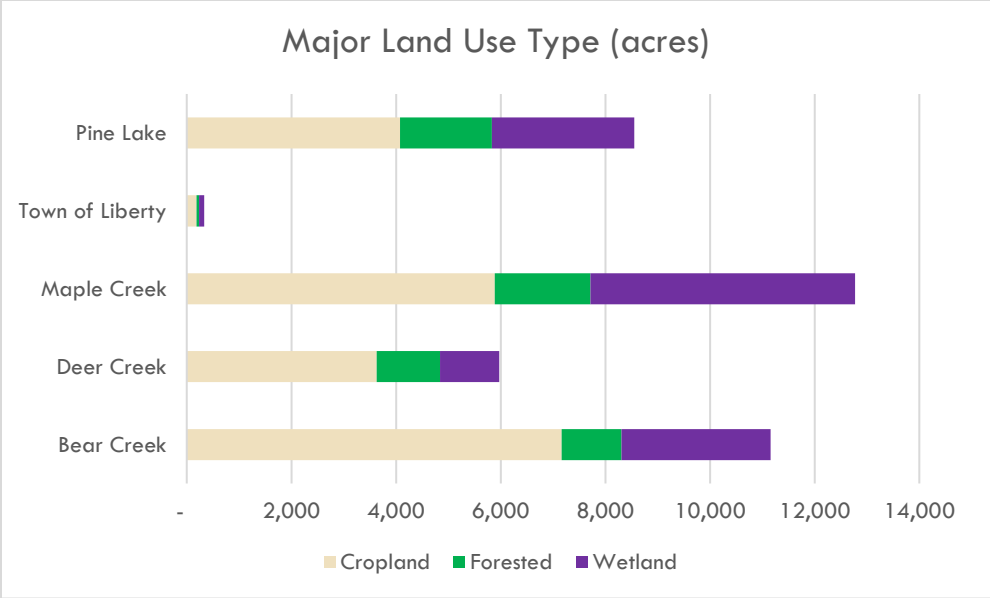
Town of Liberty

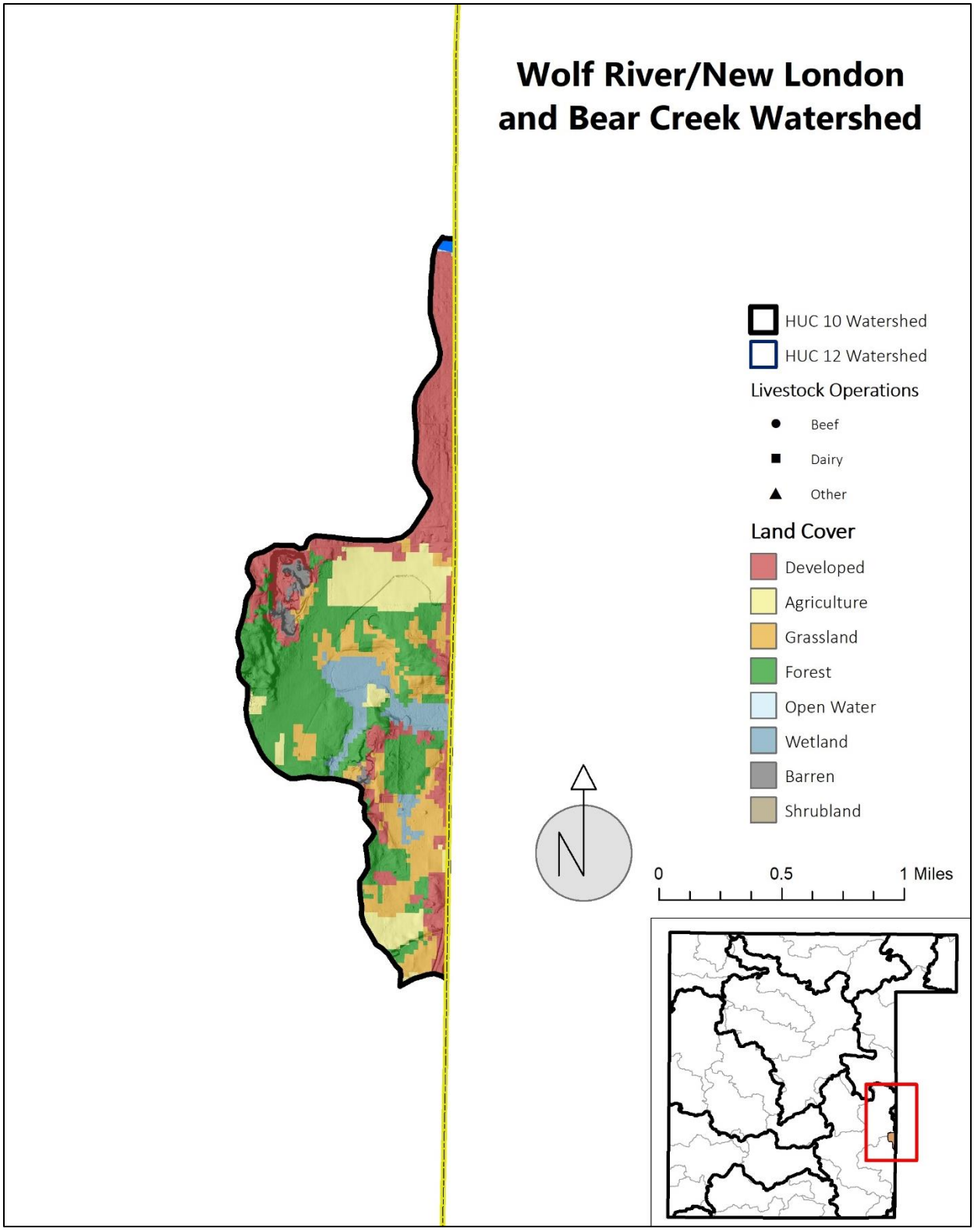
The majority of this watershed is located in Outagamie County. The small portion in Waupaca County is within the New London city limits, so the LWCD does not prioritize work here.

Pine Lake

The total drainage area in Waupaca County is 16 square miles and is located in the far northeast region of the County. TMDL modeling of this subwatershed indicates that polluted runoff problems still exist, with significant soil losses, impaired fisheries, excess vegetation, and dissolved oxygen problems. In Waupaca County, the predominant land use is agriculture and there are six animal livestock facilities.

North Branch and Mainstem Embarrass River					
	HUC 12 Watershed Land Use				
	Bear Creek	Deer Creek	Maple Creek	Town of Liberty	Pine Lake
Cropland	7,164	3,627	5,886	185	4,074
Forested	1,142	1,211	1,830	49	1,759
Wetland	2,849	1,136	5,059	100	2,718
Watershed Total	**12,863**	**492**	**14,412**	**596**	**10,409**
Estimated TP loading and (TMDL Target) lbs/ac/yr	1.76 (0.3)	1.76 (0.3)	2.07 (0.35)	1.83 (0.31)	1.51 (0.26)
Estimated TSS and (TMDL Target) tons/ac/yr	1.29 (0.53)	1.45 (0.69)	1.39 (0.74)	1.21 (0.67)	1.65 (0.35)
Animal Facilities	9	5	14	0	6

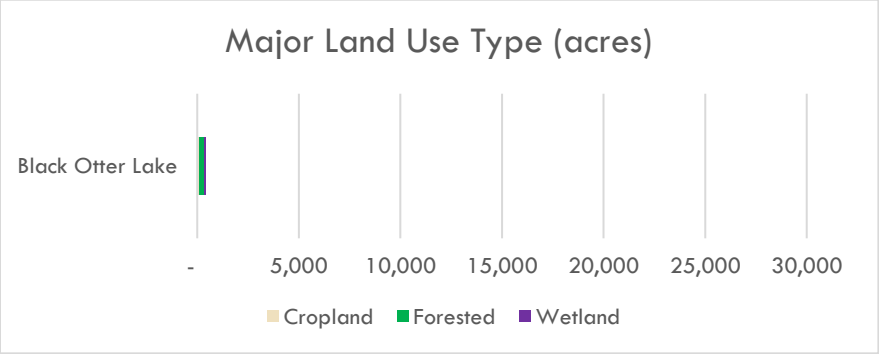

Major Land Use Type (acres)
Pine Lake
Town of Liberty
Maple Creek
Deer Creek
Bear Creek
-
2,000
4,000
6,000
8,000
10,000
12,000
14,000
Cropland
Forested
Wetland

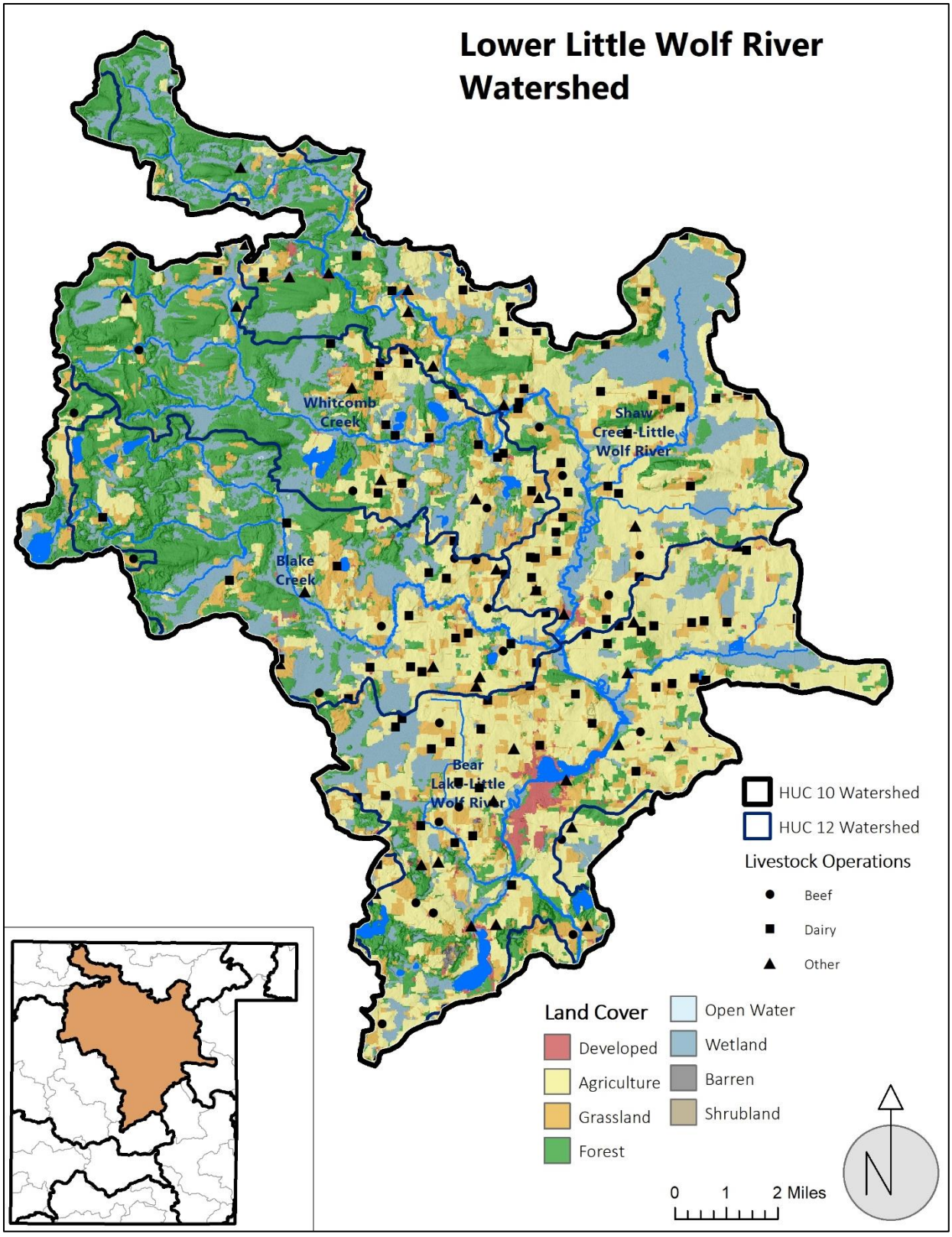

Wolf River/New London
and Bear Creek Watershed
HUC 10 Watershed
HUC 12 Watershed
Livestock Operations
Beef
Dairy
Other
Land Cover
Developed
Agriculture
Grassland
Forest
Open Water
Wetland
Barren
Shrubland
N
0
0.5
1 Miles

Wolf River/New London and Bear Creek (WR12)

The 142 square-mile Bear Creek – Wolf River Watershed is located in eastern Waupaca County and extends eastward into Outagamie County. The watershed includes the mainstem Wolf River from the convergence with the Shiocton River to the City of New London. Only a small portion, approximately 780 acres, is located in Waupaca County and consists entirely of the Black Otter Lake subwatershed. While this watershed is ranked as a high priority for nonpoint source pollution in Outagamie County, the Waupaca County LWCD does not prioritize work here due to the small percentage of land within the county.

Wolf River/New London and Bear Creek	
	HUC 12 Watershed Land Use
	Black Otter Lake
Cropland	89
Forested	271
Wetland	53
Watershed Total	**780**
Estimated TP loading and (TMDL Target) lbs/ac/yr	2.59 (0.57)
Estimated TSS and (TMDL Target) tons/ac/yr	2.1 (0.52)
Animal Facilities	0




Lower Little Wolf River Watershed
Whitcomb Creek
Shaw Creek-Little Wolf River
Blake Creek
Bear Lake-Little Wolf River
HUC 10 Watershed
HUC 12 Watershed
Livestock Operations
Beef
Dairy
Other
Land Cover
Developed
Agriculture
Grassland
Forest
Open Water
Wetland
Barren
Shrubland
0 1 2 Miles
N

Lower Little Wolf River (WR06)

General Watershed Characteristics

The Blake Creek- Lower Little Wolf Watershed is 154 square miles and lies in central Waupaca County and is the largest watershed in the county. This region is a flat to gently rolling area with sandy loam soils and constitutes the county's major agricultural district. Approximately 27 miles of the Little Wolf River are in this watershed, from the confluence of the South Branch Little Wolf River to the dam at Big Falls. There are 189 named and unnamed stream miles in the watershed. The watershed that drains into the Lower Little Wolf River from the west is more of a mix of forest, wetlands, and agriculture. The watershed that drains from the east of the Lower Little Wolf River is dominated by agriculture with a lower percentage of wetland and forested landscape.

The soils, geology and other physical resources of the western and central 20 percent of this watershed indicate the area is highly susceptible to groundwater contamination by poor land use practices (WDNR and WGNHS, 1987). The remaining 80 percent of the watershed lies in an area of medium susceptibility.

The Lower Little Wolf was a DNR Priority Watershed from 1996 to 2008. The Lower Little Wolf River Priority Watershed plan was prepared cooperatively by the WDNR, the Wisconsin Department of Agriculture, Trade and Consumer Protection (DATCP), and the Waupaca Land and Water Conservation Department, with assistance from the University of Wisconsin-Extension and the USDA Natural Resources Conservation Service (NRCS). The approved watershed plan is considered an amendment to this plan.

A 2015 targeted watershed study conducted by the DNR revealed that some water quality improvements were made by installing best management practices between 1997 and 2008 as part of the Priority Watershed Program. However, some declines were also exposed. Thiel and Shaw Creeks demonstrated high nutrient and sedimentation loads. Therefore, the need for watershed improvement remains throughout much of this watershed. The major sources of nonpoint pollution are nutrient and sediment loads caused by agricultural practices.

Bear Lake

This watershed has an approved 9 Key Element watershed-based plan, is centrally located in Waupaca County, and has seven named lakes and four tributary creeks to the Little Wolf River. Agriculture dominates this watershed and farming is conducted near many of the streambanks and artificial drainage districts. Erosion and sedimentation are common and nutrients, suspended solids, and low dissolved oxygen affect water quality in some of the tributaries. Overall TMDL modeling indicates that polluted agricultural runoff still exist for the Bear Lake watershed. This area was selected as a NRCS NWQI watershed in 2017 and the LWCD received a DNR Large Scale TRM grant in 2020 to implement practices aimed at improving water quality over a 3-4 year period. After year one of the grant, over $148,000 was paid to landowners to implement conservation

practices. This includes 2,514 acres of cover crops, 68 acres of harvestable buffers, and 300 acres of no-till planting.

Blake Creek

The Blake Creek watershed contains the 14-mile long tributary to the North Branch of the Little Wolf River. The upper stretches of the creek, north of Hwy 161 is classified as Class II trout waters and a warm water sport fishery below Hwy 161. This stream has problems with sedimentation due to field and pasture erosion, but overall recent monitoring indicates good to excellent water quality. There are nonpoint source pollution problems in the lower end of the watershed where agriculture is the predominant land use activity.

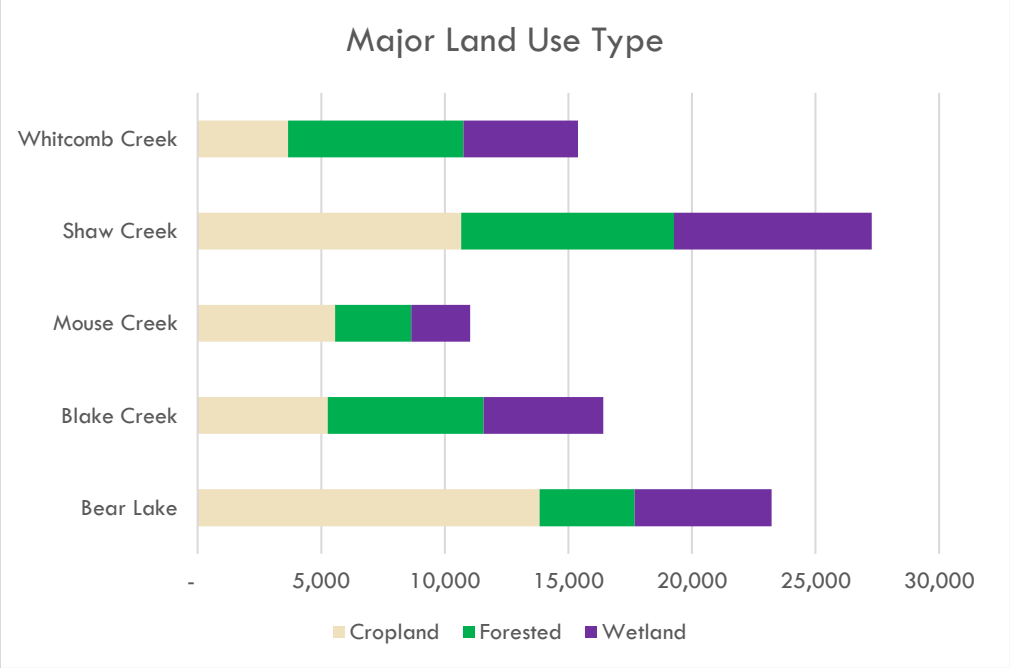
Shaw Creek

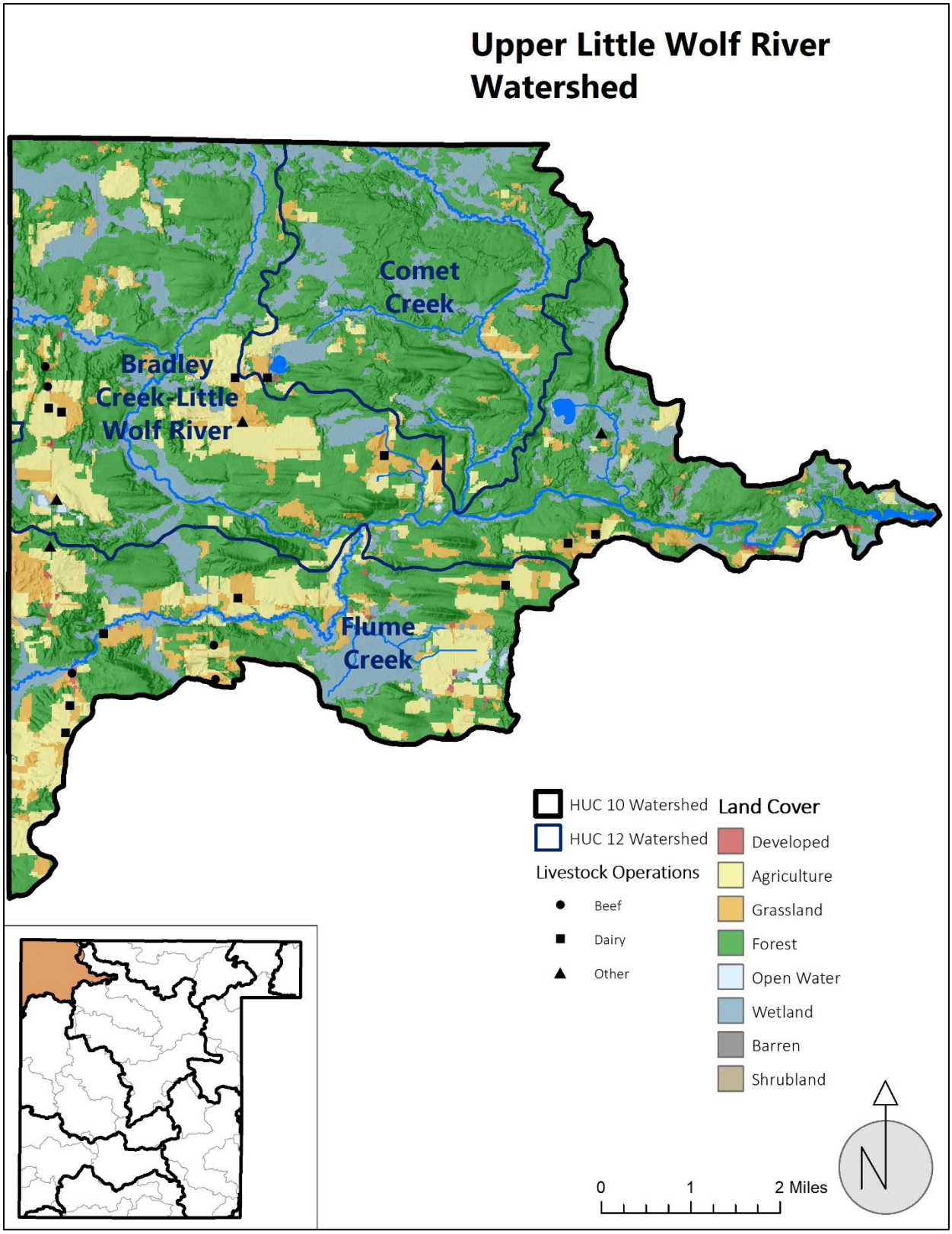
Shaw Creek, in the Lower Little Wolf River Watershed, is a 7.95-mile stream that falls in Waupaca County. The stream's watershed has an approved 9 Key Element plan. The stream is managed for fishing and swimming and is currently not considered impaired. Recent surveys indicate fair to poor water quality. Intensive agricultural practices as well as a high density of livestock facilities have caused considerable amount of nonpoint source pollution throughout this watershed. Cropland runoff accounts for 95% of the upland sediment load to Shaw Creek. Extensive cultivation and non-sustainable land management practices are widespread. An intensive nonpoint source management effort is needed to improve the condition of the stream. In 2021, a DNR Large Scale TRM grant was awarded for this watershed to help implement the 9 Key Element plan.

Whitcomb Creek

The Class I trout portion of Whitcomb Creek is listed as an Outstanding Resource Water in NR 102. The water quality of this stream is threatened by nonpoint sources in the watershed, mostly in the lower reaches where farming is more prevalent. Recent surveys indicate fair to excellent water quality in Whitcomb Creek. The Whitcomb Creek subwatershed has the lowest pollutant loading within the Blake Creek Watershed. The dominant land cover type is forestland.

Lower Little Wolf River				
	HUC 12 Watershed Land Use			
	Bear Lake	Blake Creek	Shaw Creek	Whitcomb Creek
Cropland	13,838	5,271	10,670	3,653
Forested	3,847	6,305	8,598	7,102
Wetland	5,532	4,835	8,003	4,638
Watershed Total	**28,262**	**19,162**	**30,618**	**17,816**
Estimated TP loading (lbs/ac/yr)	2.05 (0.35)	1.85 (0.32)	1.9 (0.33)	1.84 (0.39)
Estimated Erosion (tons/ac/yr)	1.47 (0.47)	1.36 (0.47)	1.37 (0.46)	1.45 (0.47)
Animal Facilities	28	18	33	10




Upper Little Wolf River Watershed
Comet Creek
Bradley Creek-Little Wolf River
Flume Creek
HUC 10 Watershed
HUC 12 Watershed
Livestock Operations
Beef
Dairy
Other
Land Cover
Developed
Agriculture
Grassland
Forest
Open Water
Wetland
Barren
Shrubland
0
1
2 Miles
N

Upper Little Wolf River (WR07)

General Watershed Characteristics

The Flume Creek watershed is in Marathon, Portage, Shawano, and Waupaca Counties and covers roughly 182 square miles. The Waupaca County portion of this watershed covers 45 square miles and is mostly forested, with a few smaller farms and livestock facilities. Most of the sediment and nutrient delivery to surface was is attributed to natural streambank erosion. The soils, geology and other physical resources of the entire watershed indicate it is highly susceptible to groundwater contamination due to permeable soils. Poor land use practices and low-density development pressure are a concern in this watershed. However, the entire watershed contain numerous Exceptional Resource Waters (ERW) and Outstanding Resource Waters (ORW). Due to the small percentage of farmland and livestock facilities, the LWCD does not prioritize conservation work in this watershed.

Bradley Creek

Bradley Creek is a clear, hard-water and spring-fed trout stream the feeds the Little Wolf River. It's considered a Class I trout stream for its entire 6 mile length throughout this watershed. Instream habitat is good to excellent. Land use in the watershed is primarily forested and wetland. Only about 14% of the watershed in Waupaca County is a mix of agricultural or other uses.

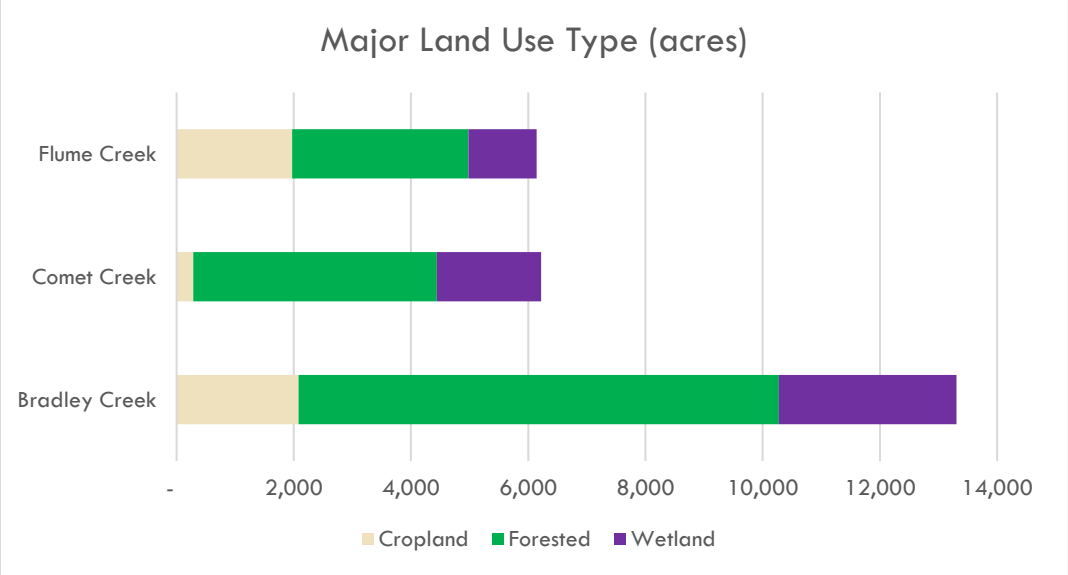
Comet Creek

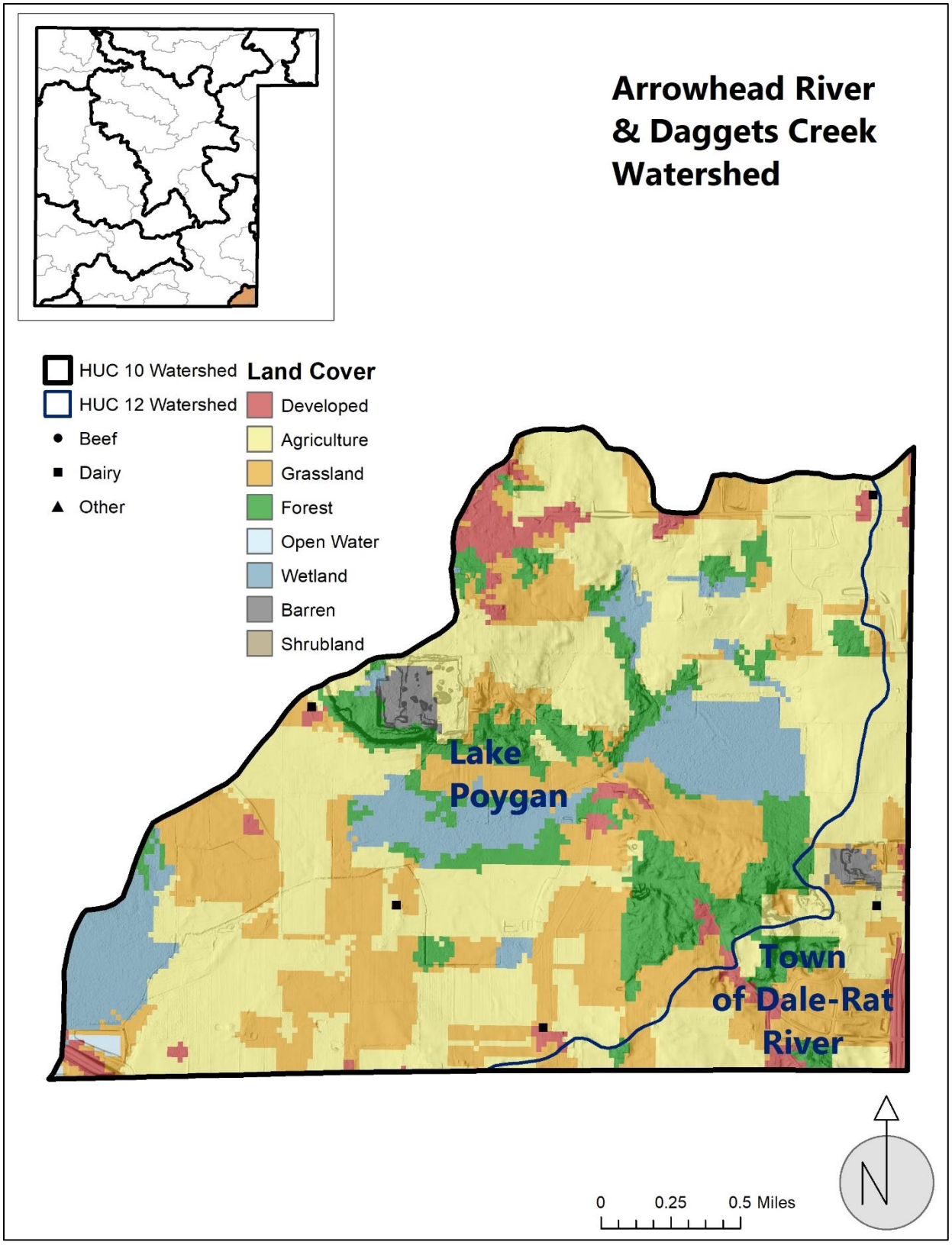
Comet Creek is a 26.6 mile stream with its entire length being Class I trout waters. Comet Creek originates in Marathon county, flows southeast through the southwest corner of Shawano County, and eventually continues into Waupaca County where it is a tributary to the Little Wolf River. Land use in the watershed is primarily forested and there is only one small livestock facility.

Flume Creek

About 20% of the Flume Creek watershed lies in Waupaca County. The remainder lies in Portage County, where it is subjected to heavy agriculture in certain locations. Flume Creek Cedars features a clear, hard-water trout stream with a moderate flow and high scenic value. Small springs are common. The majority of the habitat problems were due to streambank pasturing by cattle, particularly below Hemlock Road Crossing and upstream from Stoney Hill Road. Concern continues over the groundwater pollution potential from nearby irrigation practices.

Upper Little Wolf River			
	HUC 12 Watershed Land Use		
	Bradley Creek	Comet Creek	Flume Creek
Cropland	2,082	284	1,970
Forested	8,196	4,156	3,010
Wetland	3,028	1,781	1,163
Watershed Total	**14,954**	**6,683**	**7,221**
Estimated TP loading and (TMDL Target) lbs/ac/yr	2.09 (0.36)	2.38 (0.41)	2.53 (0.43)
Estimated TSS and (TMDL Target) tons/ac/yr	1.57 (0.47)	1.65 (0.46)	1.85 (0.47)
Animal Facilities	6	1	5




Arrowhead River
& Daggets Creek
Watershed
HUC 10 Watershed
HUC 12 Watershed
Beef
Dairy
Other
Land Cover
Developed
Agriculture
Grassland
Forest
Open Water
Wetland
Barren
Shrubland
Lake
Poygan
Town
of Dale-Rat
River
N
0
0.25
0.5 Miles

Arrowhead River and Daggets Creek (WR01)

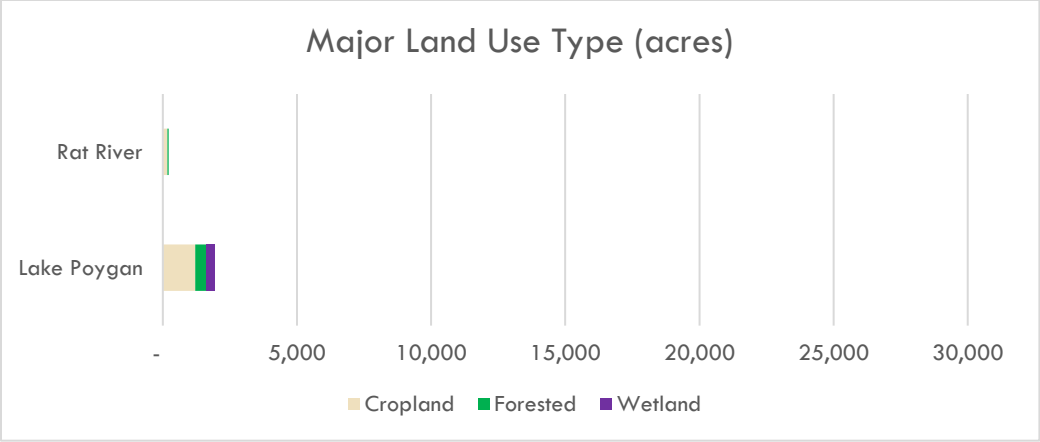
General Watershed Characteristics

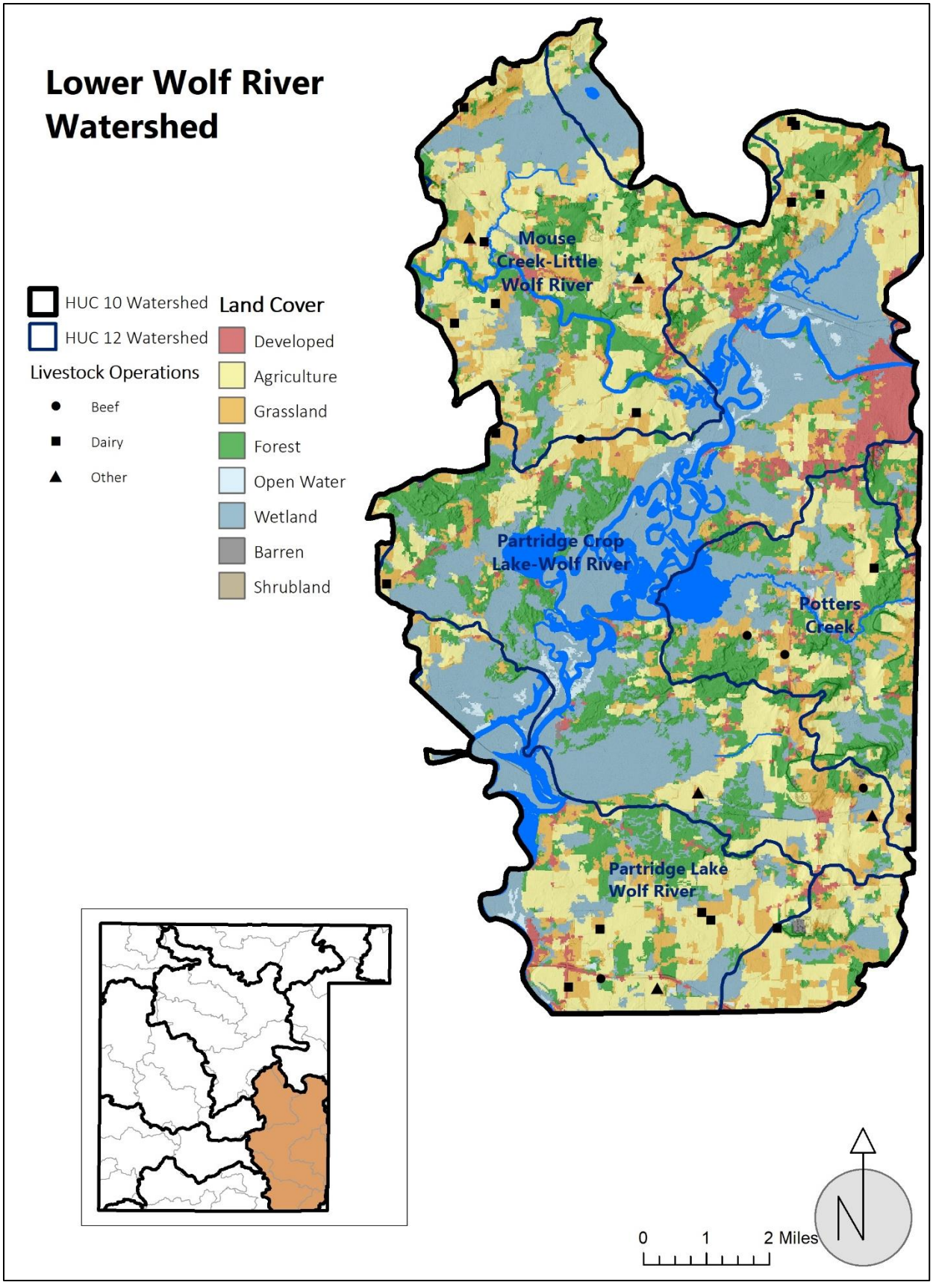
The Arrowhead River and Daggets Creek watershed covers approximately 219 square miles and lies within Waupaca, Outagamie, and Winnebago Counties. Only 5 square miles of this lies in Waupaca County. The watershed is predominately flat or gently sloping with land use being mostly agricultural. Dairy farming is the most common type of farming, though corn and soybean rotations are becoming more widespread.

Polluted runoff problems still exist in this watershed despite being part of a Priority Watershed Project (1993-2004). Major problems in this watershed include dissolved oxygen standard violations and critical levels of soil loss. An endangered species of fish, the striped shiner (Notropis chrysocephalus), has been found in the watershed. The creek chubsucker (Erimyzon oblongus), a species now believed to be extirpated in Wisconsin, was previously reported. This species is a candidate for federal endangered species listing.

Due to the small percentage (<1%) of this watershed within Waupaca County, the health of this watershed depends on downstream municipalities and the LWCD does not prioritize work in this watershed very highly.

Arrowhead River and Daggets Creek		
	HUC 12 Watershed Land Use	
	Lake Poygan	Rat River
Cropland	1,208	166
Forested	402	52
Wetland	340	-
Watershed Total	**2,789**	**492**
Estimated TP loading and (TMDL Target) lbs/ac/yr	1.67 (0.28)	1.89 (0.32)
Estimated TSS and (TMDL Target) tons/ac/yr	0.97 (0.05)	1.49 (0.19)
Animal Facilities	1	1


Major Land Use Type (acres)
Rat River
Lake Poygan
-
5,000
10,000
15,000
20,000
25,000
30,000
Cropland
Forested
Wetland


Lower Wolf River Watershed
HUC 10 Watershed
HUC 12 Watershed
Livestock Operations
Beef
Dairy
Other
Land Cover
Developed
Agriculture
Grassland
Forest
Open Water
Wetland
Barren
Shrubland
Mouse Creek-Little Wolf River
Partridge Crop Lake-Wolf River
Potters Creek
Partridge Lake Wolf River
0
1
2 Miles
N

Lower Wolf River (WR04)

General Watershed Characteristics

The Lower Wolf River Watershed is 120 square miles and covers portions of Outagamie, Waupaca, and Winnebago Counties. This includes a portion of the mainstem Wolf River, which flows within the watershed for about 19 miles and contains a diverse warm water sport fishery. Large wetland complexes adjacent to the river provide excellent spawning grounds for these fish. This area is degraded due to sediment and phosphorus runoff from agricultural lands. There is one industrial point discharger in this watershed, Hillshire Farm Co. in New London.

Mouse Creek

The Mouse Creek watershed is a 22 square miles in size and drains a mix of cropland, forestland, and wetlands. The Little Wolf River from the junction with the Wolf River upstream to Manawa Dam is designated an Exceptional Resource Water. The headwater wetlands of this creek provide a sink for runoff, but lands adjacent to Mouse Creek could benefit from better land management. There are only 7 animal facilities in the watershed. Because the watershed is generally flat, the area has excellent potential for wetland restoration to improve both water quality and wildlife habitat.

Partridge Crop Lake

The Partridge Crop Lake Watershed encompasses 29,244 acres in Waupaca County. Much of this watershed is marshland and wetland, with hardwood swamps surrounding the Wolf River. Though nonpoint source pollutant loading is relatively high in this watershed, much of that is due to bank erosion along the many meanders of the Wolf River.

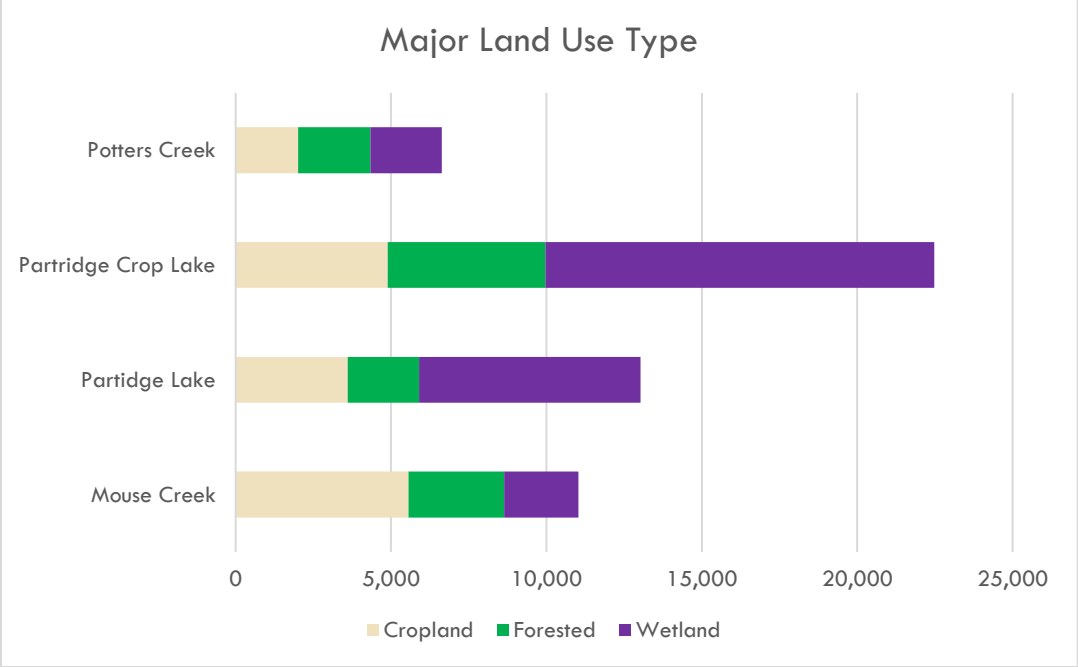
Partridge Lake

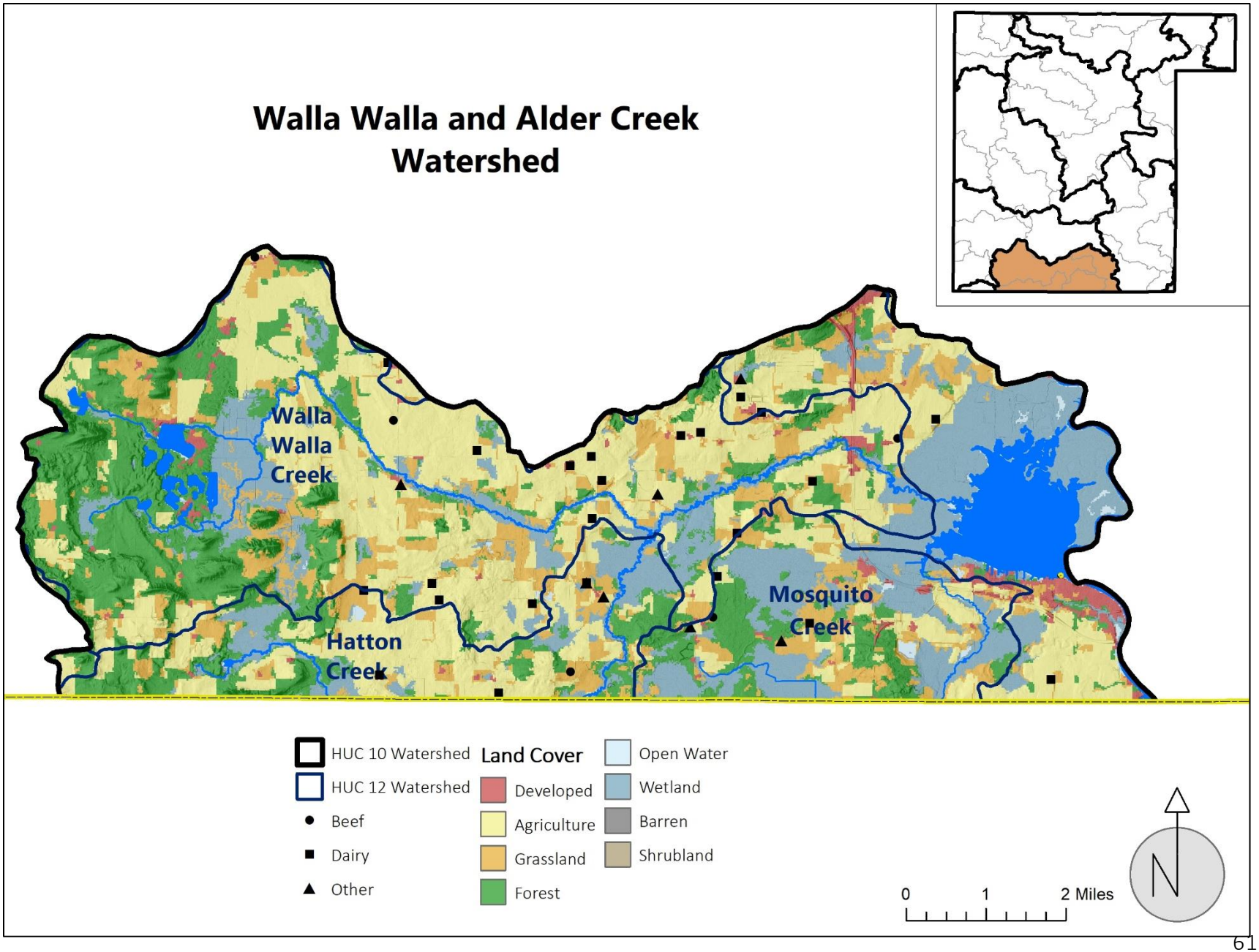
The main stem of the Wolf River flows within the Partridge Lake Watershed. Farming is more prevalent on the eastern half, where topography is flat, soils are dense, and the area is heavily ditched. Large wetlands adjacent to both the Wolf River and along Partridge Lake provide ideal habitat for fish and wildlife.

Potters Creek

The Potters Creek Watershed is small, only draining approximately 8,300 acres. About a quarter of the area is farmed on well drained soils. There are only 5 relatively small livestock operations in this watershed. Watercourses are generally well vegetated and protected from erosion and runoff events.

Lower Wolf River				
	HUC 12 Watershed Land Use			
	Mouse Creek	Partidge Lake	Partridge Crop Lake	Potters Creek
Cropland	5,558	3,602	4,890	2,007
Forested	3,087	2,304	5,082	2,328
Wetland	2,387	7,125	12,509	2,298
Watershed Total	**13,856**	**17,636**	**29,244**	**8,387**
Estimated TP loading (lbs/ac/yr)	2.05 (0.36)	1.46 (0.25)	1.64 (0.28)	2.08 (0.36)
Estimated Erosion (tons/ac/yr)	1.47 (1.07)	0.7 (0.35)	1.16 (0.38)	1.69 (0.36)
Animal Facilities	8	9	11	5




Walla Walla and Alder Creek Watershed
Walla Walla Creek
Hatton Creek
Mosquito Creek
HUC 10 Watershed
HUC 12 Watershed
Beef
Dairy
Other
Land Cover
Developed
Agriculture
Grassland
Forest
Open Water
Wetland
Barren
Shrubland
0
1
2 Miles
N

Walla Walla and Alder Creek Watershed (WR03)

General Watershed Characteristics

The Walla Walla and Alder Creek Watershed lies in portions of Waupaca, Waushara, and Winnebago Counties. The total drainage area is 112 square miles, with 57 square miles in Waupaca County. The targeted reductions for total phosphorus in the subwatersheds is 83%, while a 35% reduction goal is set for total suspended solids.

Walla Walla Creek

The Walla Walla Creek originates in Waupaca County as the outlet of Jenson Lake. It flows through Spencer Lake and eventually empties into Partridge Lake. The upper eight-mile reach of Walla Walla Creek is Class II trout water and the lower four miles is warm water sport fishery, flowing through Spencer Lake. Problems on this stream include cattle access and animal waste. Failing septic systems on Spencer and Jenson Lakes could be affecting the adjacent ground water quality and Walla Walla Creek. Approximately 44% of the tillable land is operated under a NR243 permit.

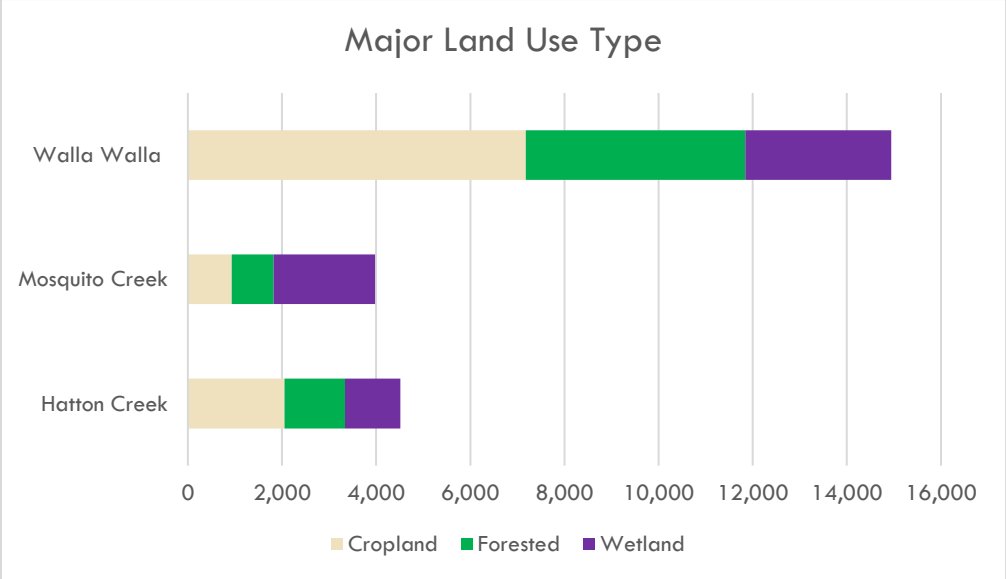
Hatton Creek

The Hatton Creek HUC 12 watershed lies in south central Waupaca County. Hatton Creek flows approximately 9.5 miles as is a feeder stream to Walla Walla Creek. Agriculture remains the dominate land use activity. The stream has suffered from nonpoint source pollution from streambank pasturing and cropland erosion. Agricultural ditching in parts of this watershed contribute to high levels of nutrient loading downstream.

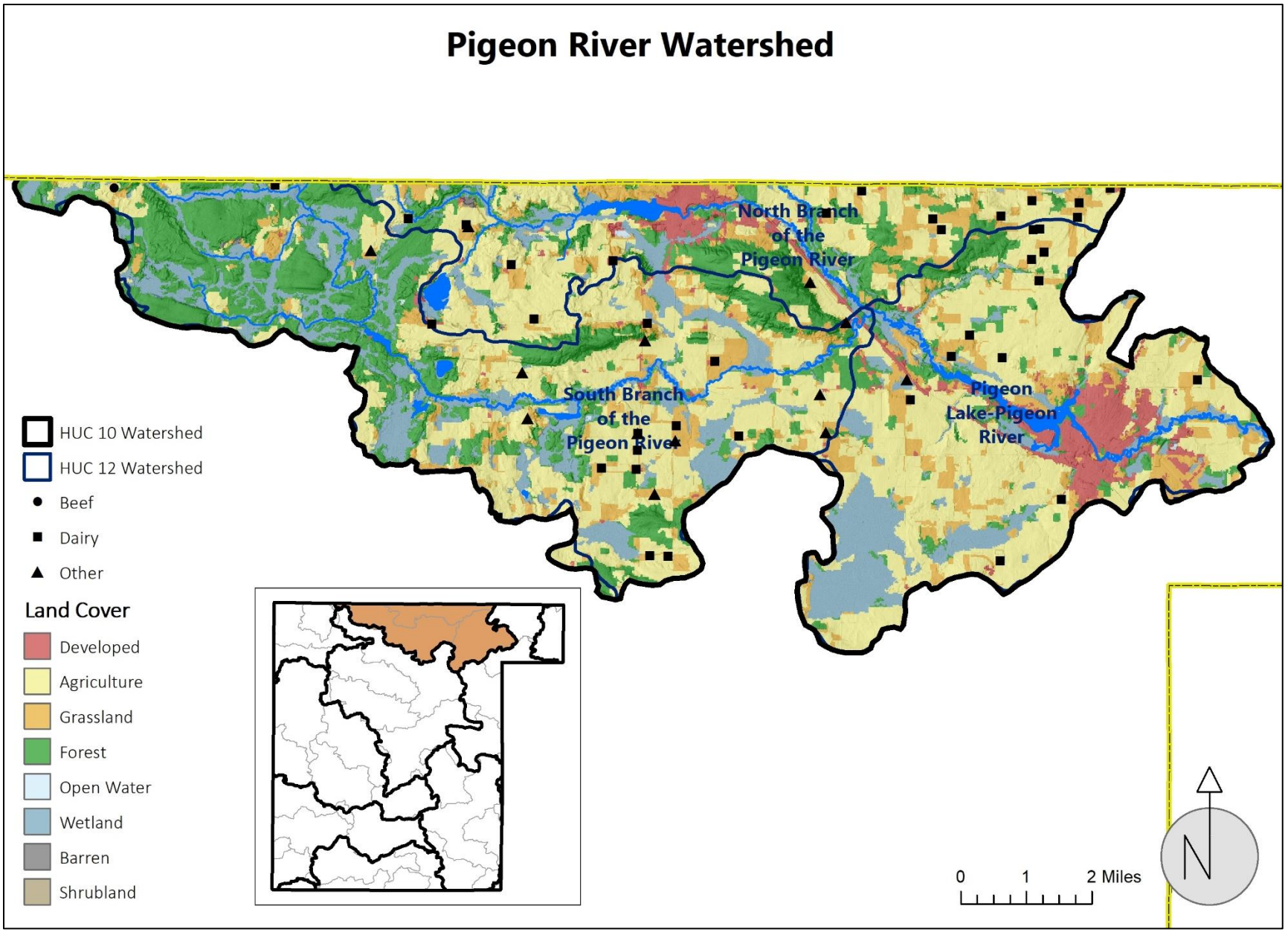
Mosquito Creek

Mosquito Creek flows 5.5 miles through both Waupaca and Waushara Counties enters Partridge Lake from the west. On its way to Partridge Lake, Mosquito Creek passes an abandoned landfill which served the village of Fremont. It is possible leachate is entering the creek. However, this was a small site and refuse was probably burned. The fishery in the upper portion of Mosquito Creek is forage minnows while the lower portion supports a warm water forage fishery.

Walla Walla			
	HUC 12 Watershed Land Use		
	Hatton Creek	Mosquito Creek	Walla Walla
Cropland	2,050	933	7,179
Forested	1,285	890	4,663
Wetland	1,176	2,157	3,102
Watershed Total	**5,381**	**5,213**	**18,808**
Estimated TP loading (lbs/ac/yr)	1.65 (0.28)	1.04 (0.18)	1.67 (0.28)
Estimated Erosion (tons/ac/yr)	1.31 (0.35)	0.62 (0.35)	1.26 (0.35)
Animal Facilities	8	6	20



Pigeon River Watershed



Pigeon River Watershed

General Watershed Characteristics

The Pigeon River Watershed drains a 116.3 square-mile watershed in Waupaca and Shawano Counties before discharging into the Embarrass River near Clintonville, Wisconsin. The North and South Branches of the Pigeon River flow generally easterly between 15 and 25 miles until they meet and form the Pigeon River Mainstem. A 116-acre impoundment of the North Branch of the Pigeon River forms Marion Millpond. The Pigeon River Mainstem flows roughly 11 miles east until its confluence with the Embarrass River. A 173-acre impoundment of the Pigeon River forms Pigeon Lake (locally known as Pigeon Pond) in the City of Clintonville. There are 146 named and unnamed stream miles in the watershed. The watershed is dominated by mixture of forested and agricultural land uses. Less than 10% is considered developed.

A DNR 2015 Targeted Watershed Assessment this watershed found that overall water quality of the Pigeon River has been negatively impacted over the years by land use practices such as, limited buffer protection, eroding streambanks, cropland erosion, and barnyard runoff.

Documentation of degraded stream health over the years (Nordin-Pedersen 1997, NRCS 1999, and WDNR 2015-2016) and the potential for improved water quality indicate that the need for watershed improvements remains throughout the Pigeon River Watershed. A good effort has been made to decrease the pollutant loads during the NWQI implementation; however, there are more opportunities to install practices to lower the nutrients and sediment reaching the Pigeon River.

North Branch Pigeon River

The North Branch Pigeon River is a slightly stained, Class I trout stream and an Exceptional Resource Water. The river is dammed near Marion, forming the Marion Millpond. This shallow impoundment has a long history of nutrient enrichment leading to aquatic plant problems. The 2018 assessments of the North Branch Pigeon River showed impairment by temperature. Nearly 43% of the watershed is tillable, with smaller amounts of forestland, and grassland.

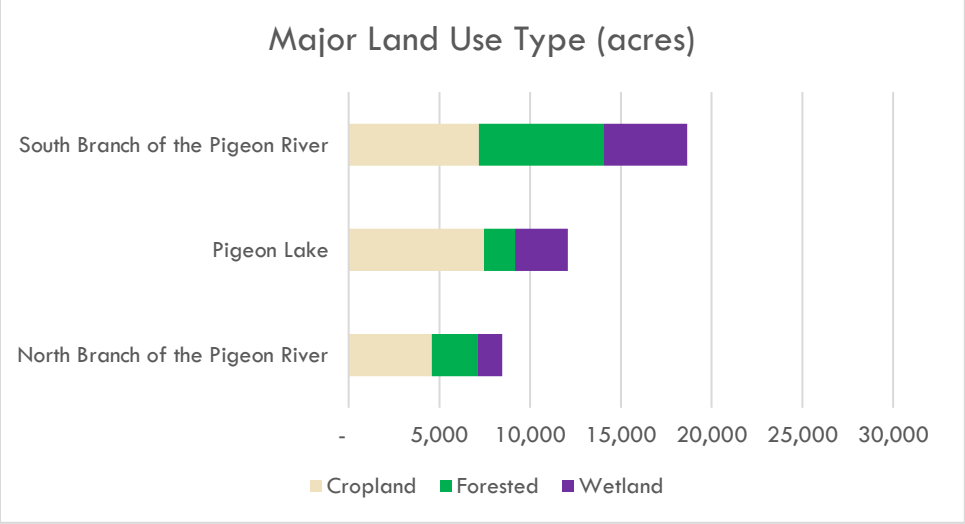
Pigeon Lake

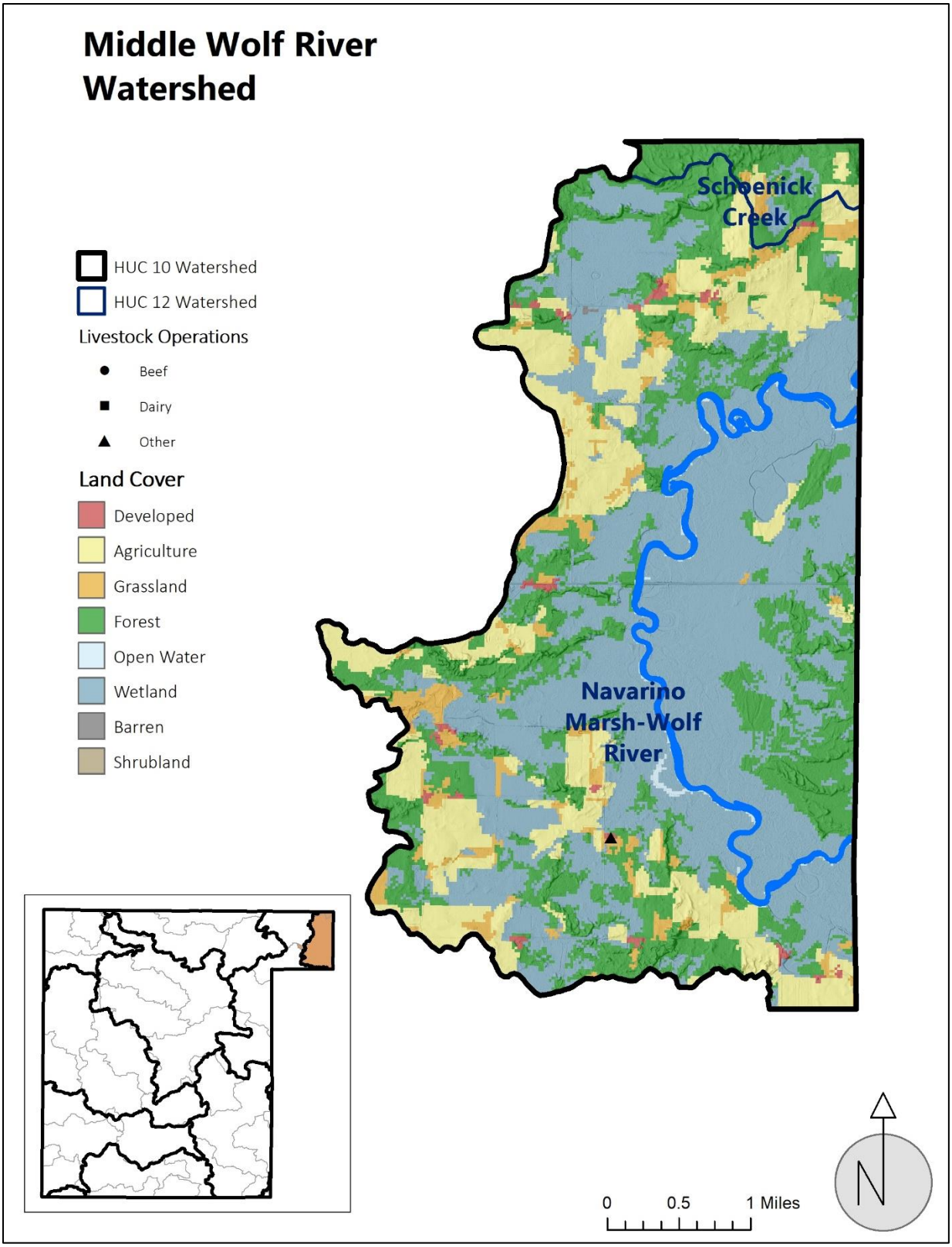
This 25 square mile watershed encompasses the Pigeon Lake flowage in Clintonville and extends eastward along the Pigeon River to the confluence of the Embarrass River. The watershed is primarily agricultural with heavy tillage being the major land management problem. Other nonpoint sources include bank erosion and feedlot runoff. House and industrial development around the City of Clintonville has remained steady over the last 5 years. This development contributes to increased stormwater volumes to the river. A significant amount of conservation effort aimed at addressing sediment and nutrient impacts to water quality was conducted in this watershed from 2013-2017 through a NWQI program.

South Branch Pigeon River

The South Branch Pigeon River has its origin in south central Shawano County. The river is dammed in Waupaca County, forming 20-acre Keller Lake. The watershed is principally wetland and forested above Keller Dam and agricultural below. The stream has habitat deterioration from streambank pasturing and cropland runoff, although the severity varies from year to year as crops are rotated.

Pigeon River			
	HUC 12 Watershed Land Use		
	North Branch of the Pigeon River	Pigeon Lake	South Branch of the Pigeon River
Cropland	4,577	7,450	7,183
Forested	2,509	1,724	6,895
Wetland	1,379	2,897	4,577
Watershed Total	**10,571**	**16,393**	**21,431**
Estimated TP loading and (TMDL Target) lbs/ac/yr	2.06 (0.35)	1.89 (0.32)	2.25 (0.38)
Estimated TSS and (TMDL Target) tons/ac/yr	1.79 (0.42)	1.32 (0.42)	1.7 (0.42)
Animal Facilities	17	13	24




Middle Wolf River Watershed
HUC 10 Watershed
HUC 12 Watershed
Livestock Operations
Beef
Dairy
Other
Land Cover
Developed
Agriculture
Grassland
Forest
Open Water
Wetland
Barren
Shrubland
Schoenick Creek
Navarino Marsh-Wolf River
0
0.5
1 Miles
N

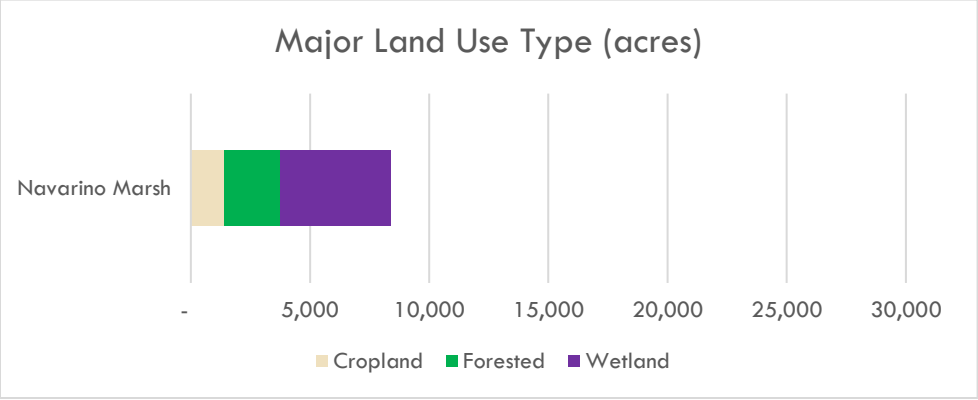
Middle Wolf River Watershed

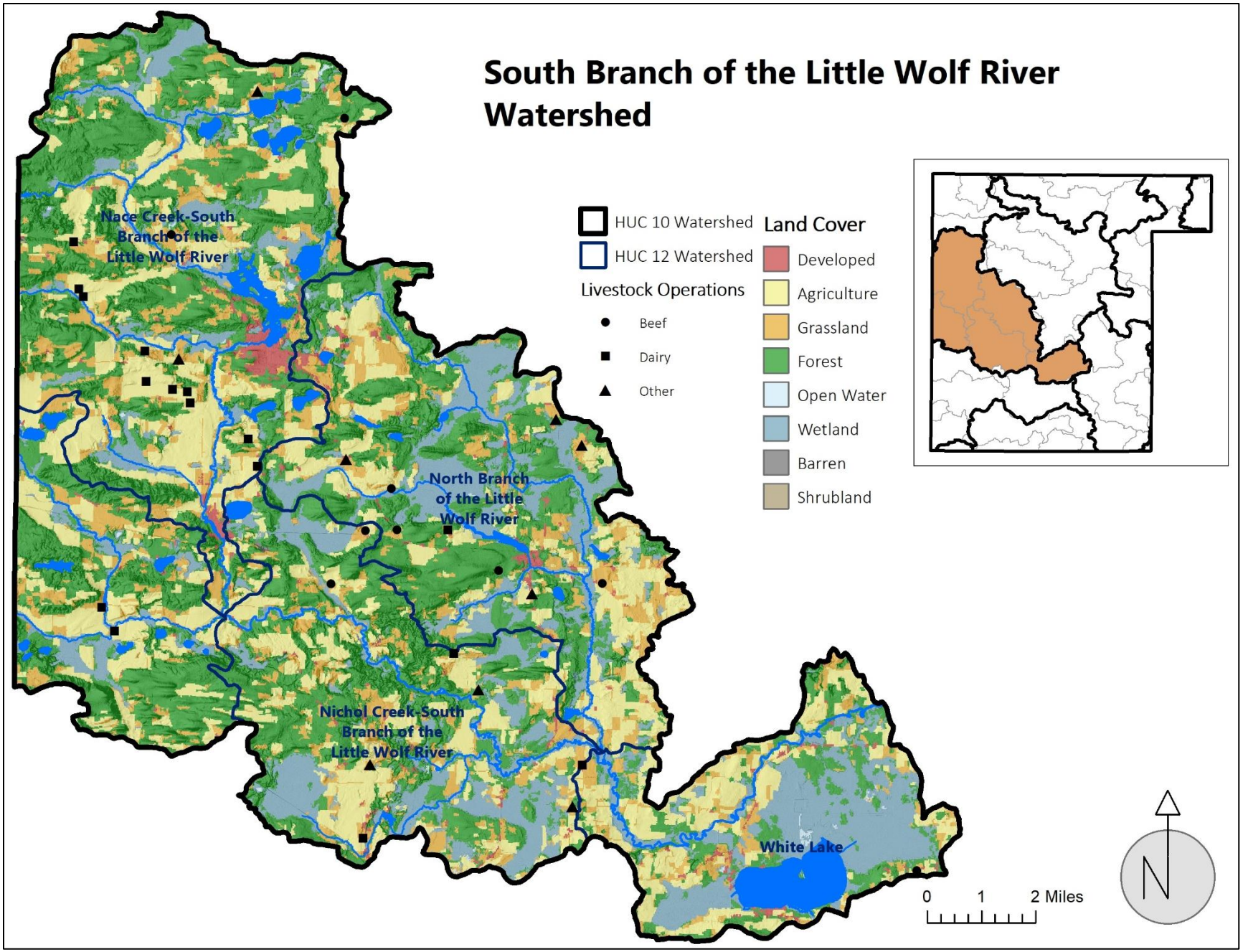
General Watershed Characteristics

The 133-square-mile School Section Creek watershed is in Shawano, Waupaca, and Outagamie Counties. The watershed extends from the Shawano Dam to where the Shioc River meets the Wolf River north of Shiocton and contains 47 miles of the Wolf River. The portion of watershed located in Waupaca County is about 16 square miles.

Only a small portion of this watershed is located in Waupaca County. Bank erosion is identified as a moderate problem on the Wolf River. The Upper Fox/Wolf River TMDL found that 1.5 lbs/ac/yr of total phosphorus and 1.08 tons/ac/yr of total suspended solids are delivered from agricultural lands in this watershed. The Waupaca County LWCD does not prioritize work in this watershed due to the small percentage of farmland and only one livestock facility. Much of the watershed is in good condition and is primarily forested or wetland.

School Section - Wolf River	
	HUC 12 Watershed Land Use
	Navarino Marsh
Cropland	1,407
Forested	2,358
Wetland	4,621
Watershed Total	**9,641**
Estimated TP loading and (TMDL Target) lbs/ac/yr	
Estimated TSS and (TMDL Target) tons/ac/yr	1.5 (0.25)
Estimated TP loading and (TMDL Target) lbs/ac/yr	1.08 (0.36)
Animal Facilities	1




South Branch of the Little Wolf River Watershed
Nace Creek-South Branch of the Little Wolf River
North Branch of the Little Wolf River
Nichol Creek-South Branch of the Little Wolf River
White Lake
HUC 10 Watershed
HUC 12 Watershed
Livestock Operations
Beef
Dairy
Other
Land Cover
Developed
Agriculture
Grassland
Forest
Open Water
Wetland
Barren
Shrubland
0
1
2 Miles
N

South Branch of the Little Wolf River Watershed

General Watershed Characteristics

The South Branch Little Wolf River Watershed is approximately 160 square miles in Waupaca and Portage Counties. The drainage area within Waupaca County is 149 square miles. The South Branch Little Wolf River Watershed drains the area generally to the north and east of the city of Waupaca and contains 64 miles of the South Branch Little Wolf River as the major water feature. The South Branch drains to the Little Wolf River and eventually into the Wolf River and the Lake Winnebago/Fox River/Green Bay system.

Of the 149 square miles in Waupaca County, we estimate that 24% is utilized as cropland and 41% is woodland. The balance is considered marginal, transitional land lying at the downslope edge of cropland and drainage corridors. There are a total of 35 livestock operations within the South Branch of the Little Wolf River Watershed, representing beef, dairy, and heifer enterprises. South Branch region has experienced a significant decline in dairy farms over the past 20 years, yet the cattle numbers have remained nearly constant.

Nace Creek

Nace (Trout) Creek is listed as an Outstanding Resource Water. The water quality is generally very good, although some streambank pasturing and erosion exist. The creek originates in east central Portage County and flows easterly into west central Waupaca County to near the city of Iola where it joins the south branch of the Little Wolf River about a mile below the Iola Millpond. It contains clear, hard water and is rated as a class I trout stream. Estimated baseline agricultural TP and TSS values are high for this watershed relative to the amount of farmland present. Sources of nutrient runoff are likely from livestock manure and commercial fertilizers.

Nichol Creek

Nichols Creek flows through marshes and agricultural lands. This stream used to be considered trout water, but drainage ditches and agricultural runoff have lowered the water quality to a point where the stream supports only a forage fishery. The soils in the area provide the basis for productive agriculture. Manure and fertilizer applications typically occur in the fall and spring, which coincide with saturated soil conditions and groundwater recharge. This is likely the reason for 2.42 TP lbs/ac/yr estimated pollutant loading.

North Branch of the Little Wolf River

The North Branch Little Wolf River is a 12-mile stream with 9.2 mile of Class II trout water. The North Branch Little Wolf River originates east of Iola and flows south-southeast, eventually draining into the Little Wolf River. The North Branch watershed encompasses 34 square miles and it predominately forested and wetland. The topography in the watershed contains moraines with steep sides as well as flat and gently rolling areas with sandy loam soils. Of the 5,212 acres of tillable farmland, about 33% is covered under a nutrient management plan.

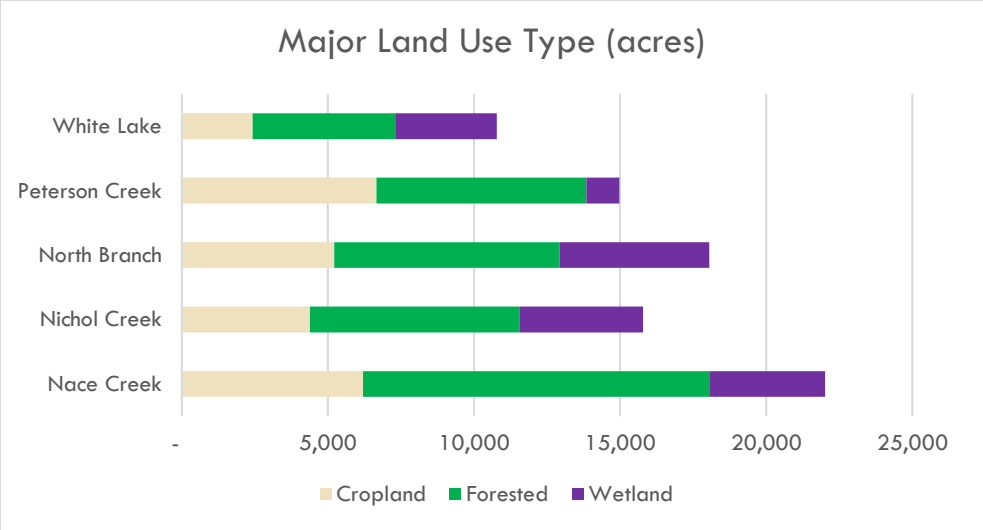
Peterson Creek

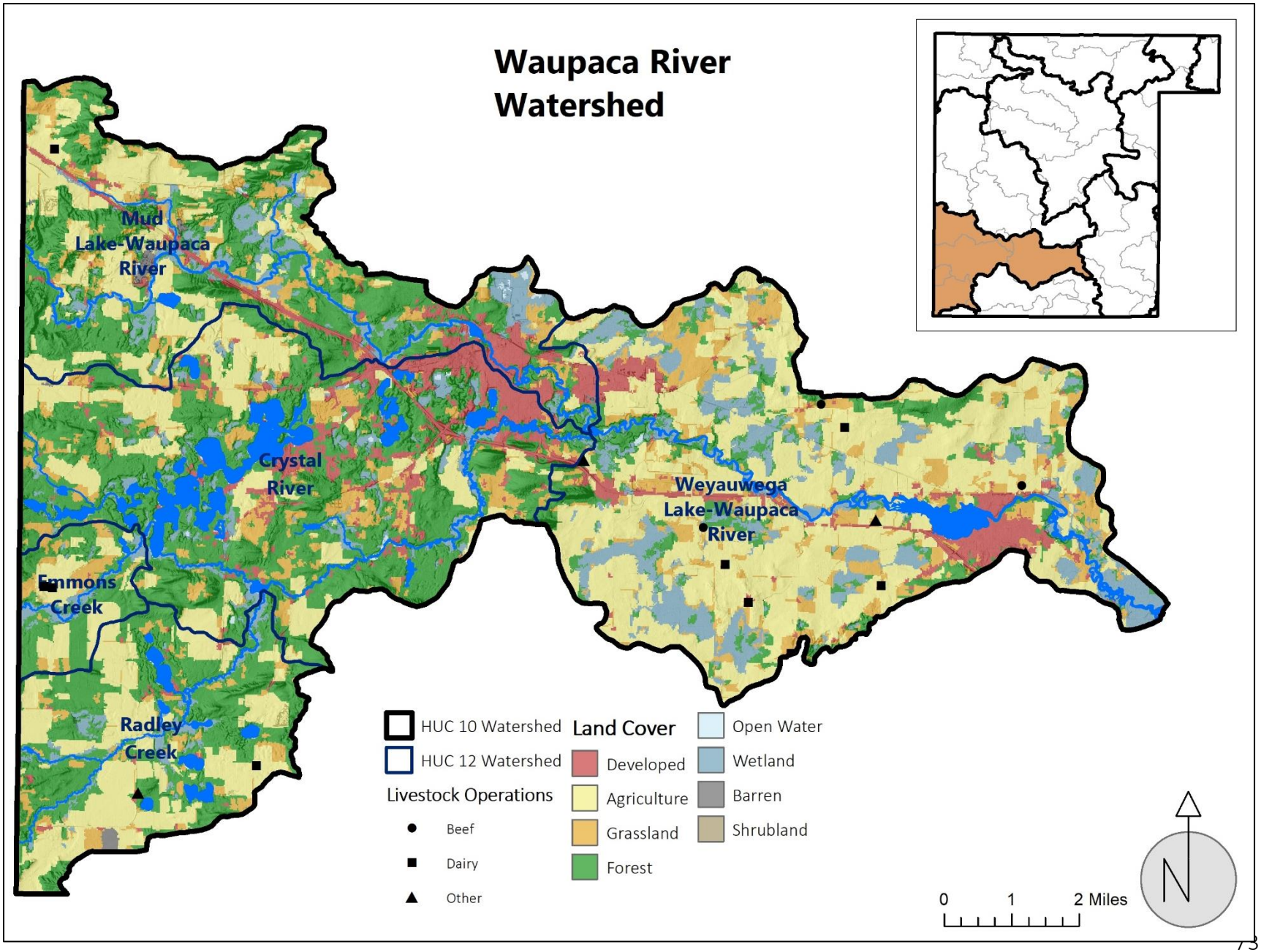
Peterson Creek is a 10-mile long Class I trout stream in western Waupaca County and is listed as an Outstanding Resource Water. The creek originates as the outflow from Rollofson Lake and has many spring seeps that add cold water to the stream. Peterson Creek flows into the south branch of the Little Wolf River in Waupaca County. Peterson Creek is dammed at one spot just upstream from Cty Hwy V where it forms the Peterson Mill Pond. Just over 50% of the cropland in the watershed is covered under a 590 nutrient management plan.

White Lake

White Lake, in the South Branch Little Wolf River Watershed, is a 1,064 acre lake that falls in Waupaca County. This lake is managed for fishing and swimming and is currently not considered impaired. The watershed of White Lake consists of rolling hills with gentle to steep slopes interspersed with flat, poorly drained basins. Areas with moderate relief form the boundaries of the surface water watershed.

South Branch of the Little Wolf River					
	HUC 12 Watershed Land Use				
	Nace Creek	Nichol Creek	North Branch	Peterson Creek	White Lake
Cropland	6,203	4,386	5,212	6,666	2,428
Forested	11,850	7,178	7,718	7,176	4,903
Wetland	3,960	4,218	5,117	1,136	3,448
Watershed Total	**29,259**	**19,800**	**21,994**	**10,991**	**13,172**
Estimated TP loading and (TMDL Target) lbs/ac/yr	2.25 (0.38)	2.42 (0.41)	1.97 (0.34)	2.4 (0.41)	1.67 (0.29)
Estimated TSS and (TMDL Target) tons/ac/yr	1.41 (0.47)	1.41 (0.47)	1.55 (0.47)	1.56 (0.46)	1.24 (0.47)
Animal Facilities	14	7	10	2	2


Major Land Use Type (acres)
White Lake
Peterson Creek
North Branch
Nichol Creek
Nace Creek
-
5,000
10,000
15,000
20,000
25,000
Cropland
Forested
Wetland


Waupaca River Watershed
Mud Lake-Waupaca River
Crystal River
Weyauwega Lake-Waupaca River
Emmons Creek
Radley Creek
HUC 10 Watershed
HUC 12 Watershed
Livestock Operations
Beef
Dairy
Other
Land Cover
Developed
Agriculture
Grassland
Forest
Open Water
Wetland
Barren
Shrubland
0
1
2 Miles
N

Waupaca River Watershed

General Watershed Characteristics

The Waupaca River watershed is 292 square miles and lies almost entirely in Portage and Waupaca counties. The watershed has mixed land uses which are dominated by agriculture, forests and some wetlands. In 1993, the Tomorrow/Waupaca watershed was selected by the State of Wisconsin as a "Priority Watershed Project" and a plan to reduce the amount of nutrients entering the surface water and groundwater from agricultural lands. Sections of the Waupaca River are recognized statewide for supporting native trout, wildlife, recreation, and economic development. Groundwater is the primary source of water to the river and results in a fishery that is home to 26 species include brook and brown trout, bluegill, walleye, and northern pike.

The name of the river changes from the Tomorrow River as it flows from Portage County to the Waupaca River in Waupaca County. The Tomorrow/Waupaca in its entirety runs approximately 63 miles. The Waupaca River's major tributary, the Crystal River, ties into the system from the south and is included within the planning area and is classified as Class II trout waters. The Crystal River is the outlet to the Chain O' Lakes (Long Lake) which is a very prominent recreational and residential area consisting of 22 interconnected lakes. These lakes comprise approximately 725 acres and are considered as part of the Tomorrow/Waupaca River Priority Watershed Project. Recent changes to the Waupaca County Shoreland Ordinance should improve this resource, from a development standpoint, in the future.

The greatest overall water quality threat in the watershed is excess nutrients (nitrates) entering groundwater. Sources of nitrate include livestock manure and agricultural fertilizers. Nitrate infiltrates into the groundwater due to the high permeability.

Crystal River

The Crystal River is the outlet to the Chain O'Lakes at Long Lake and extends for 13 miles. The entire stream above Cary Pond (near Waupaca) is classified as Class II trout stream. The river is known for both good fishing and canoeing. A five-mile reach of the river has improved due to a carp control project. There is some concern that heavy use by canoe-type boats could disturb the streambed and increase turbidity in the water. In addition to waters supplied by the lakes, several named tributaries feed into the river, including Emmons, Naylor, Hartman, Allen, and Radley creeks. The watershed is dominated by forests and there are no livestock operations.

Emmons Creek

Emmons Creek is a nine-mile, clear, hardwater, Class I brook and brown trout stream designated as an Outstanding Resource Water. The upper reaches are in the Emmons Creek State Fishery Area. Emmons Creek discharges to Long Lake in the Chain O' Lakes. Golden Sands RC&D Council, Inc. in cooperation with the UW Oshkosh Biology and Microbiology Department proposes to: 1) conduct routine nutrient monitoring in Emmons Creek to determine if nutrient concentrations in the stream are increasing,

decreasing, or remaining relatively stable through time, and 2) to establish a self-sustaining Friends of the Emmons Creek citizen-based conservation group. Runoff risks in this watershed are low, therefore the Waupaca LWCD does not prioritize work here.

Mud Lake

Mud Lake is a 10-acre lake with a depth of 5 feet and is located a few miles west of the City of Waupaca. The Mud Lake watershed extends from the confluence of the Waupaca and Crystal Rivers westward to Portage County. The majority of the watershed is forested. Farming in the watershed has shifted away from traditional dairy to more annual cash grain crops like corn and soybeans.

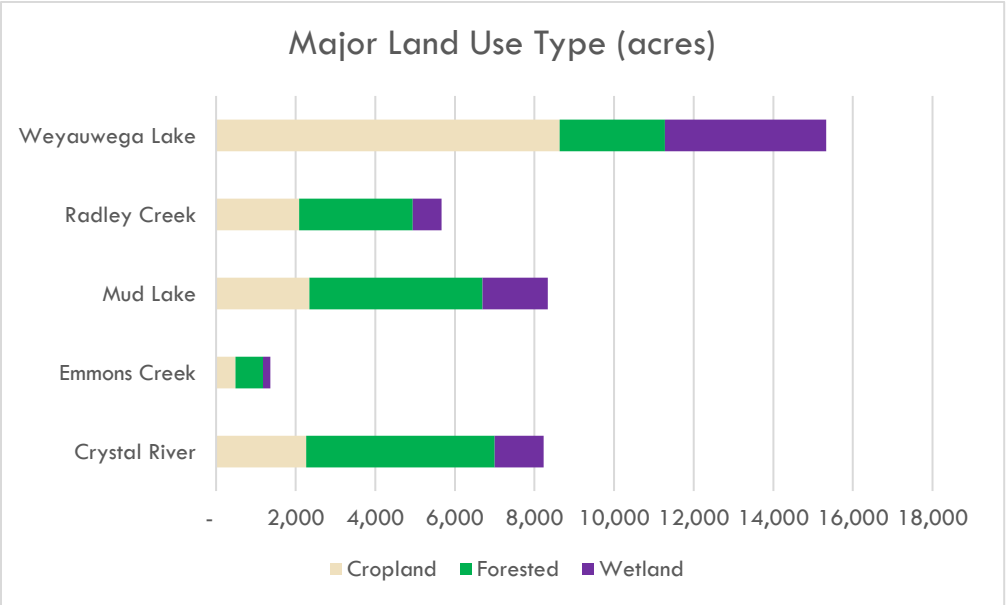
Radley Creek

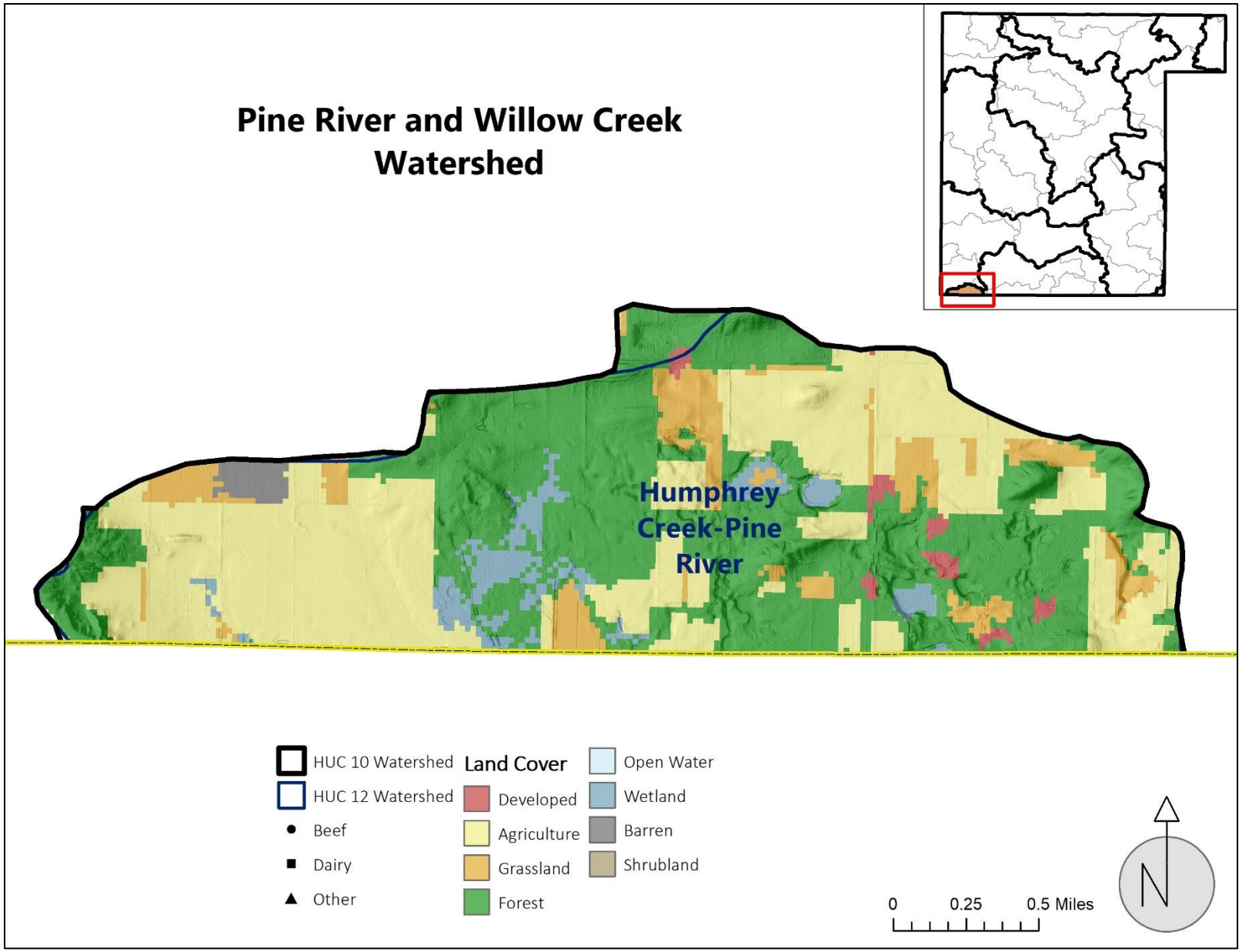
This premier trout stream in southwestern Waupaca County is in a fisheries stream improvement and acquisition project. Currently there are 2.5 miles of shoreline in public ownership. The Class I portion of Radley Creek is listed in NR 102 as an Outstanding Resource Water. This stream is tributary to the Crystal River. Irrigation near this stream may affect water quality.

Weyauwega Lake

The Weyauwega Lake watershed is a sub-watershed of Waupaca River basin. It's centrally located in southern Waupaca County and has several tributaries that flow to the Waupaca River and Lake Weyauwega. The watershed drains 32 square miles with the City of Waupaca on the west end and the City of Weyauwega on the east. In 2017, a Targeted Watershed Assessment of this watershed indicated that some of the highest nutrient concentrations and poorest water quality in the Waupaca River basin. Agriculture is the dominant land use, with a cash grain rotation of corn and soybeans with annual tillage leading the way. In 2019, a 9 Key Element Plan was developed for this watershed that identified sources and an implementation strategy to improve water quality. The following year, a 3-year Large Scale TRM grant was awarded by the DNR to help implement the 9 Key Element Plan.

Waupaca River					
	HUC 12 Watershed Land Use				
	Crystal River	Emmons Creek	Mud Lake	Radley Creek	Weyauwega Lake
Cropland	2,260	485	2,342	2,083	8,635
Forested	4,742	692	4,353	2,857	2,645
Wetland	1,227	183	1,640	727	4,052
Watershed Total	**5,381**	**2,103**	**12,711**	**7,906**	**20,743**
Estimated TP loading and (TMDL Target) lbs/ac/yr	1.82 (0.31)	1.57 (0.27)	2.41 (0.41)	1.19 (0.20)	1.77 (0.30)
Estimated TSS and (TMDL Target) tons/ac/yr	1.69 (0.35)	1.98 (0.35)	2.05 (0.36)	1.5 (0.35)	1.18 (0.35)
Animal Facilities	-	2	2	2	11




Pine River and Willow Creek Watershed
Humphrey Creek-Pine River
HUC 10 Watershed
HUC 12 Watershed
Beef
Dairy
Other
Land Cover
Developed
Agriculture
Grassland
Forest
Open Water
Wetland
Barren
Shrubland
0
0.25
0.5 Miles
N

Pine River and Willow Creek Watershed

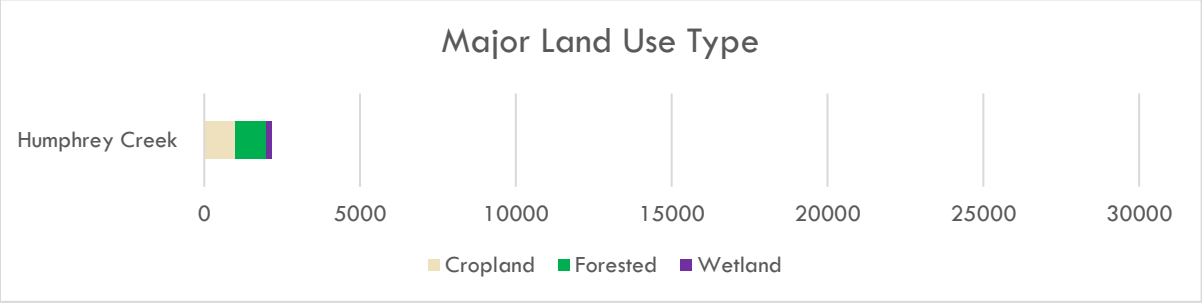
General Watershed Characteristics

The Pine River and Willow Creek Watershed is the southernmost watershed of the Wolf River Basin and is located in Waupaca, Waushara and Winnebago counties. This watershed covers 302 square miles of which 3.2 square miles are in Waupaca County. The entire watershed drains directly to Lake Poygan.

Pine River and Willow Creek are clear, hard water streams that drain the center two-thirds of Waushara County. Substantial critical animal waste problems affect the eastern half of this watershed. Soil erosion, at rates above 2 tons per acre per year, combined with local animal waste delivery and in-stream erosion accelerated the deterioration of the trophic status of millponds on the Pine River and Willow Creek. The Pine River Willow Creek Watershed was selected as a priority watershed in 1995, and expired at the end of 2009.

Due to the small percentage (1%) of this watershed within Waupaca County, the LWCD does not prioritize work in this watershed very highly.

Pine River and Willow Creek	
	HUC 12 Watershed Land use
	Humphrey Creek
Cropland	991
Forested	1,002
Wetland	169
Watershed Total	**2,880**
Estimated TP loading (lbs/ac/yr)	1.24 (0.21)
Estimated Erosion (tons/ac/yr)	1.37 (1.33)
Animal Facilities	0



CHAPTER 4- PRIORITY FARM EVALUATION AND NOTIFICATION STRATEGY

Identification of Priority Farms

For the purposes of this plan and its implementation strategy, a "Priority Farm" will be defined as a farm that meets one of the criteria below and having one or more issues of non-compliance with the Agriculture Performance Standards and Prohibitions as described in the most current version of WI Administrative Rule NR 151. The County's preference is that agricultural landowners and operators comply with state and local performance standards and prohibitions voluntarily, however, to most efficiently and effectively meet the demands for technical and financial assistance while addressing high resource concerns, the following criteria will provide a framework for prioritizing farms.

- Complaints/NOD/NOI: Priority farms include those operations that the county or WI DNR receives formal complaints about and have the potential to negatively impact surface waters or groundwater or violate the agricultural performance standards and prohibitions.

- Farmland Preservation Program (FPP): Farmland Preservation Participants - Status reviews for existing Farmland Preservation Program participants are completed on a four-year rotation for compliance with the applicable agricultural performance standards and prohibitions.

- Targeted Watersheds: Agricultural lands and livestock operations within a HUC 12 TMDL watershed with a high baseline of total phosphorus or total suspended sediment loading, impaired waters and/or approved nine key element watershed-based plans. These watersheds will include any in which the county has a current funding source available.

- Livestock operations in the WQMA: Priority farms will be those found to be noncompliant with agricultural performance standards and prohibitions. Noncompliance will be determined by onsite evaluations, records reviews, and geospatial data.

- All other livestock operations: Project, new priorities and funding opportunities may set new targets for implementation. These will be evaluated as they arise to determine where work associated with special projects will fit in with the prioritization workload.

- Wellhead protection areas: Priority farms will be those that fall within a wellhead protection area as defined by municipal wellhead plans or by the DNR.

Wisconsin Performance Agricultural Performance Standards

Standard	Description	Operation Type	Effective Date
Sheet, rill and wind erosion performance standard (NR 151.02)	All land where crops or feed are grown, including pastures, shall be managed to achieve a soil erosion rate equal to or less than the "tolerable" (T) rate established for that soil.	Crop Producers Pastures	10/1/2002 (cropland) 7/1/2012 (pastures)
Tillage setback performance standard (NR 151.03)	Prevent tillage operations from destroying stream banks and depositing soil directly in surface waters.	Crop producers Tillage operations	1/1/2011
Phosphorus index performance standard (NR 151.04)	Croplands, pastures and winter grazing areas shall have an average phosphorus index of 6 or less over the accounting period and not exceed a phosphorus index of 12 in any individual year within the accounting period.	Crop producers Livestock producers	1/1/2011 7/1/2012 (pastures)
Manure storage facilities performance standard (NR 151.05)	New or substantially altered manure storage facilities shall be designed, constructed and maintained to minimize the risk of structural failure and leakage. Manure storage facilities located where operations have ceased or manure has not been added or removed for a period of 24 months shall be closed to prevent future contamination of surface waters and groundwater. Existing manure storage facilities that pose an imminent threat to public health, fish and aquatic life or groundwater shall be upgraded, replaced or abandoned.	Livestock producers	10/1/2002 1/1/2011 (new or significantly altered facilities designed and operated to address additional runoff and precipitation from a 25-year, 24-hour storm event)
Process wastewater handling performance standard (NR 151.055)	No significant discharge of process wastewater to waters of the state.	Livestock producers	1/1/2011
Clean water diversion performance standard (NR 151.06)	Divert runoff away from feedlots, manure storage areas and barnyards within water quality management areas.	Livestock producers	10/1/2002
Nutrient management (NR 151.07)	All manure or other nutrients applied directly or through contract to agricultural fields shall follow a nutrient management plan.	Crop producers Livestock producers	10/1/2003 (new cropland) 1/1/2005 (existing cropland within identified water resource areas) 1/1/2008 (all other existing cropland)
*Silurian bedrock performance standard (NR 151.075)**	Manure applied to cropland or pastures in areas of Silurian bedrock (as defined) cannot cause fecal contamination of wells, not be applied on areas 24 inches or less to bedrock and follow a nutrient management plan.	Crop producers	7/1/2018

**does not apply to Waupaca County*

Compliance Process

The LWCD will take the lead role in the implementation of NR 151. Cooperation with the Wisconsin Department of Natural Resources and other agencies will continue towards a practical implementation process that includes tracking NR 151 compliance using spatial tools. Building relationships with landowners in conjunction with a strong outreach component will be the primary focus by the LWCD. For circumstances where compliance cannot be achieved using a voluntary approach or where the voluntary approach has failed to maintain compliance, the LWCD will utilize a stepped enforcement procedure for compliance issues associated with the agricultural performance standards and prohibitions.

Information/Education: Waupaca County recognizes that the implementation of the performance standards will require a substantial amount of outreach to landowners to increase understanding and cooperation. Providing information and education to landowners is the primary method utilized to increase awareness of the agricultural performance standards and prohibitions as well as conservation practices and systems.

Voluntary Compliance: Working with landowners through voluntary compliance is the primary method of implementation to work toward compliance with the agricultural performance standards and prohibitions.

Determination of Compliance: Ultimately, all agricultural producers in Waupaca County will be reviewed for compliance with the performance standards. Compliance determinations are conducted by LWCD staff and issued as necessary to document compliance status with the ordinance or performance standards based on available time and staff resources.

Notification of Noncompliance: Issuance of a notice of noncompliance provides a landowner notice that there is a noncompliance issue with regard to the ordinance or NR 151 agricultural performance standards and prohibitions. All notices of non-compliance will be copied to WI DNR. An offer of cost-share funding will be made as necessary. Any landowner that continues to be found out of compliance will be contacted and given the following information:

- A statement explaining the compliance issues (Notice of Noncompliance)
- The corrective measures needed to achieve compliance
- A timeline for achieving compliance (Schedule of Compliance)
- The status of eligibility for cost share assistance
- Available funding sources and technical assistance
- An explanation of technical standards and maintenance requirements.
- A signature page attached to the report indicating whether the landowner agrees or disagrees with the report.
- A copy of the Agricultural Performance Standards and Prohibitions.

- A notice of process and procedure for appeals stating: Any person aggrieved by a decision of the Waupaca County LWCD may file a written appeal of the decision with the Waupaca County LWCD within 30 days of the decision. A hearing with the Waupaca County Land and Water Conservation Committee will be scheduled within 60 days of the date of appeal.

Enforcement

A landowner that is out of compliance with the Agricultural Performance Standards and refuses technical and financial assistance from the Waupaca County LWCD will be referred to the Department of Natural Resources for enforcement action. They will receive a multi-agency communication from DNR and Waupaca County LWCD. A copy of that correspondence will be forwarded to the Department of Agriculture Trade and Consumer Protection. Upon approval of this plan, the LWCD will enter into a Memorandum of Understanding (MOU) with DNR to outline a formal process for assistance with enforcement action. For violations that the county can enforce, referrals may be made to the Waupaca County Corporation Counsel.

Inventory Tracking and Progress Evaluation

Geographic Information Systems (GIS) is the foundation of Waupaca County's inventory and compliance tracking system. It is the county's intention to maintain detailed farm inventory records that are mapped at the tax parcel level. Our GIS system organizes information into a series of layers that can be integrated using geographic location. It is our goal that within 2-4 years, records and data for the practices, contracts, and modeled reductions will eventually be maintained spatially using GIS as well as local databases. This growing GIS database allows us to spatially track compliance projects. The LWCD has also developed a Farmland Preservation Program relational database module that integrates with our GIS tracking system, allowing for thematic visualization as well as accurate tracking of compliance even after transfer of ownership or the subdivision of property.

Many metrics are tracked and can be used to aid in the other steps and phases of the implementation strategy. Some metrics include, but are not limited to:

- Number of landowners/operators contacted
- Number of cost-share agreements signed
- Planned and completed conservation practices
- Pollutant load reductions and percent of goal planned and achieved
- Numbers of verification checks to be completed
- Status of nutrient management planning
- Total amount of money on cost-share agreements
- Total amount of landowner reimbursements made

Reporting on the above metrics, load reductions, compliance with the agricultural performance standards and prohibitions, and general County implementation progress will occur on an annual basis. Given the many unknowns that are associated with

implementing conservation practices (i.e. willingness of landowner, commodity prices, weather, land tenure, etc.), this robust approach in measuring progress will ensure that decisions related to modifying the implementation plan will be vetted and appropriately adopted.

LWRM Plan Evaluation

To achieve successful implementation of this plan and its implementation strategies, an annual review of the progress and extent of goals being achieved by the LWCD will be necessary and will be reported to DATCP through the annual report. Through this process necessary revisions and adjustments to the plan goals, objectives and expected outcomes can be made. Evaluation of progress toward the goals and objectives set forth in this plan will involve the following:

Annual Review

The annual review will take place during the first month of each year. This review will be used to evaluate short-term, yearly progress. The LWCD will summarize financial data for funds appropriated in the implementation of the LWRM Plan. To the degree possible, DNR staff will be part of the LW plan review process. Items that will be reviewed will include but not be limited to:

- Evaluating benchmarked actions and anticipated outcomes
- Priority farm inventory progress
- BMP installation
- Sediment, phosphorus or nitrogen reduction
- Nutrient management plan acres
- Assessment of staffing hours spent on plan activities
- Total year end and cumulative payments for BMP installation
- Total funds encumbered in project cost share agreements
- Total of all other funds appropriated for the implementation of the Land and Water Resource Management Plan. This includes applicable staff and other related administrative support costs

Additionally, this information will be used by the LWCD and Land and Water Conservation Committee (LWCC) to set workload priorities for the coming year. Conservation staff and partners will continue to meet annually over the next 10 years following plan adoption to review tracking system, make goal adjustments, and to conduct LWRM plan evaluation. Staff will be responsible for demonstrating and assessing progress toward the stated goals. It is planned that the LWCD and partners will jointly revisit goals, objectives, and action steps described in this plan to annually determine necessary program adjustments.

Annual Reports

Annual accomplishment and work plan reports will be submitted by March 15th and April 15th, respectively, each year to DATCP to fulfill the requirements of ATCP 50.18. This will include both the financial report and the annual accomplishment report of LWRM activities. To the extent possible, annual reports will reflect HUC 12 based metrics and measurements. Annual reports to the county board will also be made that will include information from the annual DATCP reports. The county board report will also include analysis of cost share funds spent in the county versus staff money utilized.

Project Reports

Project reports required for such things as Targeted Runoff Management Grants, Nine Key Element Plans or Notice of Discharge (NOD's) will be completed as needed.

Long Term Evaluation

Long-term evaluation of land management changes may utilize several methods:

- The Transect Survey may be conducted annually. The Transect Survey can be a basis for measuring or comparing long-term reductions in soil loss and increased use of conservation tillage.

- Use satellite imagery to estimate crop residue across the county.

- Model crop rotations using Snap Plus to estimate reductions in soil loss and p loss from crop fields.

- Completion of the 5 year review process outlined by DATCP and the Land & Water Board in 2026. This review process will be necessary to outline the achievements of this plan and recognize the outcomes that are not being reached at the anticipated rate of this plan.

- Water Quality Monitoring – The county will primarily rely upon the DNR for their prescribed role in water quality monitoring within the county. In addition, it is the goal of the Waupaca County LWCD to develop a strong water quality-monitoring program for targeting watershed planning and to establish a long-term base of streamflow and water quality data. This will require monetary inputs and dedicated staff, which the LWCD currently has. Waupaca County also supports citizen-based efforts as needed.

CHAPTER 5 – GOALS, OBJECTIVES, AND ACTIONS OF PLAN IMPLEMENTATION

Developing and updating a LWRMP is a year-long process that incorporates a variety of steps. Input from citizens and resource professionals is important to the development and prioritization of goals and objectives that will be the foundation of annual work plans for the next ten years. Both agricultural and non-agricultural resource concerns will be addressed by this plan, although with limited staff time available, agricultural or non-point source pollution will be the focus. ATCP 50 and NR 151 set the Agricultural Performance Standards that will be used to address resource issues found during inventory of the priority farms. Non-agricultural resource concerns will be addressed as time permits and local ordinance requires.

Through the local advisory committee meetings and using data from previous land and water resource management plans, five primary goals have been established for this plan update. A goal is an observable and measureable result having one or more objectives to be achieved within a more or less fixed timeframe. Each goal has a series of objectives under them. An objective is a specific result to be achieved within a time frame and with available resources that is more specific and easier to measure than goals. Actions are listed for each of the objectives and are the specific tasks that will build the work plans to make progress towards meeting goals and objectives within certain timeframes.

Goal I: Protect and improve the quality of surface water resources

- Reduce sediment and nutrient delivery to surface sources
- Improve soil health to reduce erosion and nutrient losses from fields while improving infiltration
- Increase nutrient management planning coverage in Waupaca County
- Enhance implementation, enforcement, and administration of agricultural performance standards and waste management ordinance
- Monitor compliance of nutrient management plans to protect water quality

Goal II: Protect and maintain the long-term viability of agricultural lands

- Support the Farmland Preservation Program
- Expand Farmland Preservation to eligible Towns through zoning or AEA development
- Increase the use of cropland best management practices that utilize soil health principles
- Encourage the use of harvestable buffers on marginal lands or in critical areas
- Preserve prime farm soils that are at most vulnerable to conversion for non-farm uses

Goal III: Protect and improve the quality of groundwater

- Obtain relevant groundwater data to determine current conditions and trends
- Evaluate landscape susceptibility to groundwater impairment
- Administer programs that protect groundwater
- Assess and protect groundwater sources

Goal IV: Protect and enhance natural habitat areas

- Prevent, control, and eradicate both terrestrial and aquatic invasive species
- Support lake and river management planning efforts
- Promote conservation easements/programs that protect valuable habitats
- Encourage best management practices that support healthy soils

Goal V: Involve citizens on soil and water protection initiatives

- Develop and implement strategies to educate landowners to implement best management practices
- Inform and educate county, municipal, and town officials on the health and value of land and water resources
- Support individuals, watershed groups and organizations with education about resource improvement and pollution prevention
- Provide coordinated access to information and educational materials through various sources including websites, newsletters, videos, local newspapers, public service announcements and social media

These goals, objectives, and actions are used to develop annual work plans to be submitted to DATCP.

The following is a list of non-inclusive actions that were developed as part of the 2021 CAC participatory process. They represent examples that the LWCD can and will use to address priority resource concerns for the next ten years. Specific actions will be captured in the annual work plan submitted to DATCP as part of the SWRM grant process. Many of the items below will have overlapping relationships with other priority resource concerns.

- Implement conservation best management practices regarding NR 151 Runoff Management Performance Standards and Prohibitions

- Continue to apply for DNR TRM and MDV funding sources to access state cost sharing funds in order to bring landowners into compliance with NR 151 performance standards or to implement TMDL nutrient and sediment reduction goals

- Continue to administer the Waupaca County Agricultural Performance Standards and Ag Waste Management Ordinance

- Expand 590 NMP adoption through the utilization of cost sharing and Nutrient Management Farmer Education (NMFE) grants

- Continue to develop, integrate and enhance the County's FPP/NMP/BMP and NR 151 tracking database

- Continue to support the Upper Fox-Wolf Demonstration Farms Network and pursue the formation of new networks if applicable

- Encourage the use of cover crops, cropland residue, and soil health principles to agricultural producers through education and collaboration with federal and state partners

- Promote Harvestable Buffers as a valuable tool to protect vulnerable fields and aid in nutrient and sediment reduction goals

- Develop 9 Key Element Plans for high-loading watersheds

- Quantify runoff and pollution reductions and track practice location and effectiveness using BITS, the LWCD's GIS tracking database or other applicable software

- Utilize and expand local surface water monitoring program to better understand and demonstrate impacts and improvements associated with the implementation of NR 151 runoff standards

- Utilize computer models to assess erosion vulnerability, nutrient runoff reductions, and crop residue to prioritize best management practice implementation

- Facilitate the proper abandonment of wells by assisting landowners with properly filling and sealing unused wells

- Provide program opportunities and I/E to the public concerning the management of aquatic invasive species and continue to partner with Golden Sands RC&D to provide technical assistance

- Promote the re-establishment of native vegetation along lakes and rivers utilizing the Healthy Lakes Initiative program

- Continue to support lake and river organizations and the formation of new groups whenever possible

- Support other municipalities to achieve shared water quality goals

Implementation Strategy

Implementation of this plan will be to continue education and outreach efforts, provide adequate technical assistance, and seek additional revenue sources to fund this plan and to increase compliance levels of agricultural landowners that meet the state's performance standards and prohibitions. Over the next ten years, the plan will focus on achieving and meeting water quality standards and lowering nutrient and sediment loads in impaired watersheds as specified in the Upper Fox-Wolf Basin TMDL. The LWCD will utilize different methods to continue the implementation of NR 151. Nutrient Management Planning and its utilization is a requirement in NR 151. Their implementation can also help meet sheet, rill, and gully erosion as well as the phosphorus-index performance standards for cropland. Current NMP coverage of Waupaca County's agricultural lands is estimated at 52%. The LWCD will continue to utilize Farmland Preservation as one method of NR 151 implementation. Further implementation will be conducted following the priority farm or watershed approach. The phosphorus reduction goals of the Upper Fox-Wolf Basin TMDL Plan will be used to determine high priority watersheds.

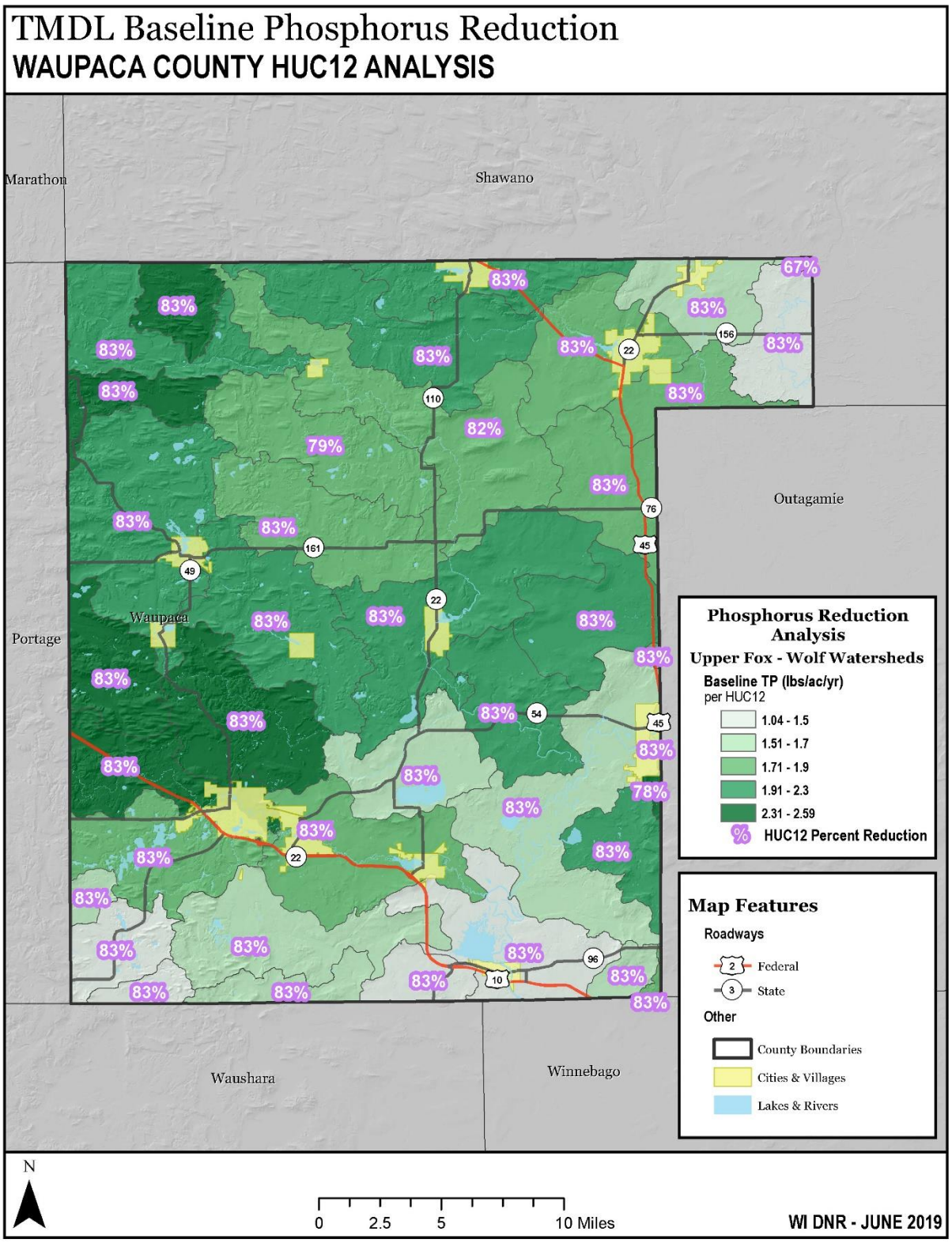
Because of the complexity of nonpoint source pollution, no one protective mechanism will solve the problem. Instead, a wide range of solutions along with a number of different entities and partnerships will be necessary. These agencies and groups include, the U.S. Environmental Protection Agency, U.S. Department of Agriculture-Natural Resource Conservation Service, WI Department of Agriculture Trade and Consumer Protection, WI Department of Natural Resources, U.S. Army Corp of Engineers, University of Wisconsin-Extension, U.S. Farm Service Agency, local municipalities, colleges and universities, and many other individuals and organizations.

The implementation of conservation practices by landowners may occur for a variety of reasons, from voluntarily addressing a resource concern to compliance with a performance standard. Either way, the LWCD will work with landowners to select the appropriate practice(s) for the identified conservation need. The Waupaca County LWCD will take an active role in the implementation of NR 151. Collaboration with the Department of Natural Resources and other agencies will continue towards a pragmatic implementation process.

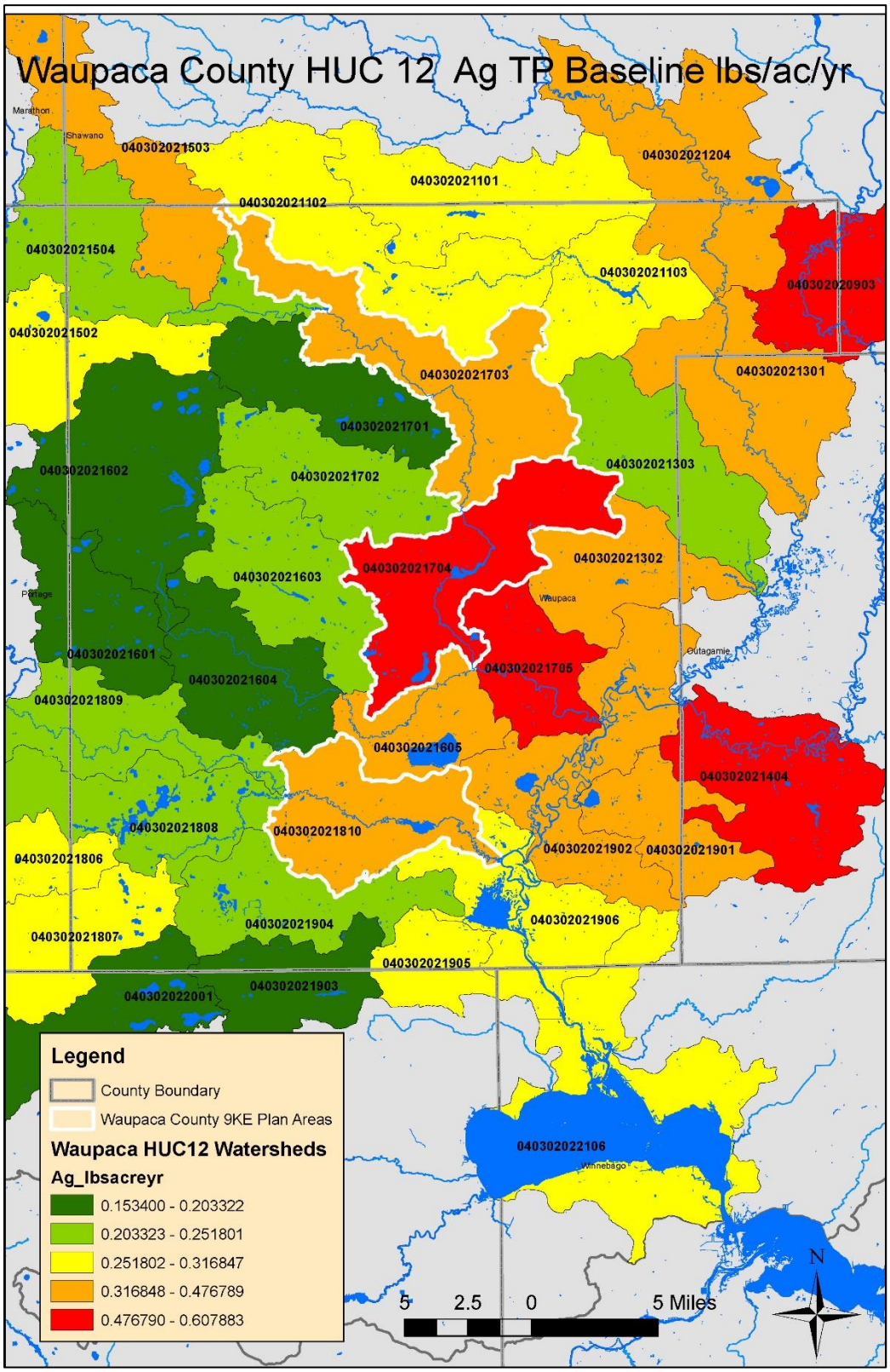
Information and Education Activities

Education and outreach was a consistent message that was identified at the citizen and advisory meeting. Whether related to nutrient management, groundwater quality/quantity, or other natural resources, the Waupaca County LWCD understands that a myriad of outreach and education topics will be required to achieve the goals set

forth in this plan. Every effort will be made to inform Waupaca County landowners about the required agricultural performance standards and prohibitions, county ordinances, applicable conservation practices, and any cost share grant opportunities. LWCD staff will provide landowners with an overview of the regulatory requirements including information and educational material from various sources such as WDNR, DATCP, and LWCD.


TMDL Baseline Phosphorus Reduction
WAUPACA COUNTY HUC12 ANALYSIS
Marathon
Shawano
Outagamie
Portage
Waupaca
Waushara
Winnebago
Phosphorus Reduction Analysis
Upper Fox - Wolf Watersheds
Baseline TP (lbs/ac/yr)
per HUC12
1.04 - 1.5
1.51 - 1.7
1.71 - 1.9
1.91 - 2.3
2.31 - 2.59
% HUC12 Percent Reduction
Map Features
Roadways
Federal
State
Other
County Boundaries
Cities & Villages
Lakes & Rivers
N
0 2.5 5 10 Miles
WI DNR - JUNE 2019

APPENDIX B – AG TP BASELINE LBS/AC/YR



APPENDIX C- BMP DEFINITIONS

Agricultural Sediment Basin. A structure designed to reduce the transport of sediment of other pollutants eroded from agricultural fields to surface waters and wetlands.

Barnyard Abandonment or Relocation. Relocation of an animal lot from a critical site such as a floodway to a suitable site to minimize the amount of pollutants from the lot to surface or groundwater.

Barnyard Runoff Management. Structural measures to redirect surface runoff around the barnyard and collect, convey or temporarily store runoff from the barnyard.

Buffers. Permanently vegetated areas immediately adjacent to lakes, streams, and wetlands, that filter pollutants from nonpoint sources.

Cattle Mounds. Earthen mounds used in conjunction with feeding and dry lot operations, providing a dry and stable surface area for cattle.

Contour Farming. Farming of sloped land so that all operations from seedbed preparation to harvest are done on the contour.

Contour Strip Cropping. Growing alternating strips of row crops and grasses or legumes on the contour.

Critical Area Stabilization. Planting of suitable vegetation on nonpoint source sites and other treatments necessary to stabilize eroding lands.

Cropland Protection Cover (Green Manure). Cropland protection cover includes close-growing grasses, legumes or small grain grown for seasonal soil erosion protection and soil improvement.

Easements. Easements are legally binding restrictions on land titles. Easements are purchased to provide permanent vegetative cover.

Field Diversions. Channels constructed across the slope with supporting ridges on the lower side, to divert excess water to safe outlet in other areas.

Grade Stabilization Structure. Structure used to reduce the grade in a channel to protect the channel from erosion or to prevent the formation or advance of gullies.

Grassed Waterways. A natural or constructed channel shaped, graded and established with suitable cover as needed to prevent erosion by runoff waters.

High Residue Management. A system, which leaves at least 30 percent of the ground covered with crop residue after crops are planted.

Intensive Grazing Management (Rotational Grazing). Intensive grazing management is the division of pastures into multiple cells that receive a short but intensive grazing period followed by a period of recovery of the vegetative cover. Rotational grazing systems can correct existing pasturing practices that result in degradation and should replace the practice of summer dry-lots when this practice results in water quality degradation.

Lake Sediment Treatment. Lake sediment treatment is a chemical, physical, or biological treatment of polluted lake sediments. Sources of pollution to the lake must be controlled prior to treatment of lake sediments. Treatment does not include dredging.

Land Acquisition. The purchase of land or the interest in land, which is contributing or will contribute nonpoint source pollution or for the construction of an urban structural practice.

Livestock Exclusion from Woodlots. The exclusion of livestock from woodlots to protect the woodlots from grazing by fencing or other means.

Manure Storage Facility. A structure for the storage of manure for a period of time that is needed to reduce the impact of manure as a nonpoint source of pollution. Livestock operations where this practice applies are those where manure is winter spread on fields that have a high potential for runoff to lakes, streams and groundwater. The facility is needed to store and properly spread manure according to a management plan.

Manure Storage Facility Abandonment. Manure storage system abandonment is the proper abandonment of leaking and improperly sited manure storage systems, including: a system with bottom at or below groundwater level; a system whose pit fills with groundwater; a system whose pit leads into the bedrock; a system which has documented reports of discharging manure into surface or groundwater due to structural failure; and a system where there is evidence of structural failure. The practice includes proper removal and disposal of wastes, liner materials, and saturated soil as well as shaping, filling, and seeding of the area.

Milking Center Waste Control Systems. A milking center waste control system is a piece of equipment, practice or combination of practices installed in a milking center for purposes of reducing the quantity or pollution potential of the wastes.

Nutrient Management. The management and crediting of nutrients from all sources, including legumes, manure, and soil reserves for the application of manure and commercial fertilizers. Management includes the rate, method and timing of the application of all sources of nutrients to minimize the amount of nutrients entering

surface and groundwater. This practice includes manure nutrient testing, routine soil testing, and residual nitrogen soil testing.

Pesticide Management. The management of the handling, disposal and application of pesticides including the rate, method and timing of application to minimize the amount of pesticides entering surface and groundwater. This practice includes integrated pest management scouting and planning.

Roofs for Barnyard Runoff Management and Manure Storage Facilities. Roofs for barnyard runoff management and manure storage facilities are a roof and supporting structure constructed specifically to prevent rain and snow from contacting manure.

Shoreline and Streambank Stabilization. The stabilization and protection of stream and lake banks against erosion and the protection of fish habitat and water quality from livestock access.

Shoreline Buffers. A permanently vegetated area immediately adjacent to lakes, streams, channels and wetlands designed and constructed to manage critical nonpoint sources or to filter pollutants from nonpoint sources.

Structural Urban Best Management Practices. These practices are source area measures, transport systems and end-of-pipe measures designed to control storm water runoff rates, volumes and discharge quality. These practices will reduce the amount of pollutants carried in runoff and flows destructive to stream habitat. These measures include such practices as infiltration trenches, porous pavement, oil water separators, sediment chambers, sand filtration units, grassed swales, infiltration basins and detention/retention basins.

Terraces. A system of ridges and channels with suitable spacing and constructed on the contour with a suitable grade to prevent erosion in the channel.

Wetland Restoration. The construction of berms or destruction of the function of tile lines or drainage ditches to create conditions suitable for wetland vegetation

APPENDIX B- ACRONYM GLOSSARY

BMP Best Management Practice. Practices or combination of practices that are most effective for reducing nonpoint source pollution to acceptable levels.

CREP Conservation Reserve Enhancement Program. A program for landowners to set aside cropland (or pasture that is adjacent to surface waters) with annual rental payments through the contract period.

CRP Conservation Reserve Program. A program (provision of the 1985 and 1990 federal Farm Bills) that takes eligible cropland out of production and puts it into grass or tree cover for a specified number of years.

DATCP Department of Agriculture, Trade and Consumer Protection.
Central state agency that sets and implements statewide soil and water conservation policies and administers the state's soil and water conservation programs. It also administers state cost-sharing funds for a variety of LCC operations, including staff, materials and conservation practices.

DNR Department of Natural Resources. State agency responsible for managing state owned lands and for the protection of public waters. DNR also assists LCCs, LCDs and individual land users in managing land, water, fish and wildlife through various programs.

FPP Farmland Preservation Program. This is a DATCP program providing income tax credits to farmers whose land is enrolled in the program. Farmers agree to keep their land in farming and meet soil conservation standards on the enrolled cropland.

EQIP Environmental Quality Incentives Program. This program focuses on assistance to locally identified conservation priority areas or areas where agriculture improvements will help meet water quality goals. Technical assistance and cost sharing on conservation practices are paid with EQIP funds, and fifty percent of the funds are dedicated to conservation associated with livestock operations.

FSA Farm Service Agency. This agency is part of the USDA and administers a variety of agricultural assistance programs including production controls, price supports and conservation cost sharing.

GIS Geographic Information System. Maps and layers of data about land including soils, land cover, topography, field boundaries, roads and streams are on a computerized system.

LWCC Land & Water Conservation Committee. Empowered by Chapter 92 of the Wisconsin Statutes, this county government committee conserves and protects the county's soil, water and related natural resources.

LWCD Land & Water Conservation Department. This county government department is responsible for administering the conservation programs and policies of the county.

NRCS Natural Resources Conservation Service. The Federal Agency that is primarily concerned with technical resources for soil conservation and water quality; and also provides conservation planning, technical, and financial assistance to local participants in federal programs.

RC&D Resource Conservation and Development. This is a USDA program that focuses on utilizing and conserving natural resources for economic development.

T Soil Loss Tolerance. The erosion rate in tons per acre per year at which a soil could maintain productivity.

TP Total Phosphorus. A measure of all forms of phosphorus in a sample (orthophosphate, condensed phosphate, and organic phosphate).

TSS Total Suspended Solids. The dry-weight of suspended particles, that are not dissolved, in a sample of water that can be trapped by a filter.

TMDL Total Maximum Daily Load. A Total Maximum Daily Load, or TMDL, is a calculation of the maximum amount of a pollutant that a waterbody can receive and still safely meet water quality standards.

SWRM Soil and Water Resource Management Program. This is a DATCP program that provides counties with funds to hire and support Land Conservation Department staff and assists land users in implementing DATCP conservation programs.

UWEX University of Wisconsin Extension. UWEX establishes important learning connections with people in all walks of life, extending the boundaries of the university to the boundaries of the state.

WRP Wetlands Reserve Program. Landowners can chose either permanent, 30-year easements or cost share agreements to restore wetlands through this program.