Outagamie County Land & Water Resource Management Plan

2018

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2018

Prepared under the jurisdiction of

the Outagamie County Land Conservation Committee

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ACKNOWLEDGMENTS

The development of Outagamie County's Land and Water Resource Management Plan involved a diverse group of individuals with a wide range of expertise. Their input was crucial for plan development, and will continue to play an integral role in addressing the issues and achieving the goals set forth in the following document.

Thanks to everyone who helped out with this process.

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Preface

In the past few years "Locally Led Conservation" has become the buzz word among conservationists and landowners. The legislature used this term as the central theme in landmark state legislation signed into law in October 1997, as part of the budget bill (Wisconsin Act 27). Since the protection of this nation's soil and water resources began in earnest in the 1930's, programs were developed and administered "top-down" from the federal and state governments.

The basic concepts of this legislation include:

- state agencies establish minimum statewide performance standards and prohibitions for nonpoint pollution and soil erosion control,
- state standards are used as a basis for distributing local grants, and
- each county develops a Land and Water Resource Management Plan, which explains how they will meet the state standards and address other local resource management concerns. With state and federal grant assistance counties will lead local program implementation efforts.
- Guiding principles include:
    - Rely on a locally driven process for plan development and implementation,
    - maximize flexibility in how program funds are used,
    - encourage comprehensive watershed-based efforts without excessive planning,
    - support innovation and cost effectiveness toward achieving objectives,
    - require the "seamless" integration of programs and funding sources, and
    - ensure meaningful program evaluation and accountability.

Since 1948, Outagamie County has provided landowners with the highest level of professional service and assistance in an ongoing effort to enhance and protect local natural resources. Cooperative, trusting relationships, between the County, landowners, and other agencies, has been the corner stone upon which successful programs have been built. The result has been the installation of thousands of conservation practices over the years.

In the past, the County has developed short and long-term plans that have guided the delivery of conservation onto the landscape. In some instances these plans have centered on specific programs that provided financial aid to the County and helped it to carry out its natural resource mission. The Outagamie County Land and Water Resource Management Plan (LWRM) addresses soil and water quality concerns using local, state and federal programs. It is a ten (10) year action and implementation plan that emphasizes cooperation with conservation partners in Outagamie County. The LWRM Plan is intended to complement and coordinate with existing

plans rather than replace them. By focusing on the Outagamie County Land Conservation Committee (LCC) and Land Conservation Department's (LCD) strengths of conservation, planning, information and education, technical assistance, and program administration, diverse interests act together in effective protection and enhancement of Outagamie County's resources.

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EXECUTIVE SUMMARY

Background

The Outagamie County Land and Water Resource Management Plan (LWRM) represents the next generation of resource management strategies. Enabling legislation in 1997 allowed for the development and recognition of the County Resource Management Plans. This is a process that provides for a comprehensive analysis of countywide land and water resource issues and needs. County Land Conservation Committees (LCC) and their Land Conservation Departments (LCD) are an integral part of this process. Outagamie County considers this an opportunity to strengthen landowner participation, improve program effectiveness and increase coordination with other 'partners' involved in natural resource management.

The Outagamie County LWRM Plan was written with the assistance of partner agencies, such as the Wisconsin Department of Agriculture, Trade and Consumer Protection, the Wisconsin Department of Natural Resources, Farm Service Agency, Natural Resources Conservation Service, Outagamie County Zoning and Planning, and the University of Wisconsin Cooperative Extension. Representatives from these organizations were included during the planning process.

The objective of the plan is to provide:

1. An assessment of the county's current conditions of land and water resources.
2. An overview and status report on various land and water conservation implementation programs.
3. Regulatory requirements relating to land conservation and water quality, including local zoning and NR 151 performance standards.
4. Monitoring and evaluation methods administered by the LCD and other agencies for the purpose of determining conservation needs, and documenting responses in natural resources.
5. Information and education initiatives to raise the awareness on the importance of maintaining and enhancing the natural resources of the County.
6. An implementation strategy to guide the LCC and LCD in carrying out the recommendations of the plan.

Performance Standards and Prohibitions

County land and water resource management plans are the local mechanism to implement the NR 151 runoff standards. Through Wisconsin Act 27, the Wisconsin Legislature amended state statutes to allow county Land Conservation Committees to develop implementation strategies for addressing local water quality priorities related to controlling erosion, sedimentation, and nonpoint source water pollution.

In NR151 the Department of Natural Resources (DNR) established Agricultural and Non-Agricultural Performance Standards and Prohibitions to reduce runoff and protect water quality. In the revised ATCP 50, the Department of Agriculture, Trade and Consumer Protection (DATCP) identified conservation practices that farmers must follow to meet the DNR standards. These rule changes went into effect on October 1, 2002 and were revised in December of 2010. ATCP 50 codified specific standards for the approval of the LWRM Plans. These standards require counties to consult with DNR and identify how they will assist landowners to achieve compliance with performance standards and prohibitions. Chapter 5 contains the Agricultural Performance Standards Implementation Strategy for Outagamie County.

Both the Erosion Control Ordinance and the Storm Water Management Ordinance include the state performance standards which became effective on September 1, 2004. The state performances standards for runoff management were also included in Outagamie County's Agricultural Performance Standards and Livestock Waste Management Ordinance in 2007.

Basin Water Quality Management Plans

Three basins are located in Outagamie County, the Wolf River Basin, the Lower Fox River Basin and the Upper Green Bay Basin. The DNR's Basin Plans identify areas of water quality concern and propose management objectives for water resources of the basins. They focus on issues that require a comprehensive and collaborative management approach by the DNR, other public agencies, and private citizens and include background information and management recommendations for streams, rivers, creeks, wetlands, and groundwater. When developing the 10-year work plan, specific management objectives identified in each basin were considered.

Where more current data has been made available (as in the TMDL Watersheds), it has been used in the development of the 10 year plan. Only the Upper Green Bay Basin remains outside of a TMDL project in Outagamie County (which is <10% of the County).

Total Maximum Daily Load Plans

Impaired waters in Wisconsin are now largely addressed through an analysis, known as a Total Maximum Daily Load (TMDL). A TMDL is the amount of a pollutant a waterbody can receive and still meet water quality standards. A TMDL for the Lower Fox River Basin was approved in 2012 for phosphorus and sediment and a TMDL is currently under development for the Wolf River Basin that should be completed by the end of 2018. Outagamie County has worked with neighboring counties and agencies to develop an implementation strategy for the Lower Fox. This involves breaking the basin into smaller subwatersheds and developing more specific nine key element subwatershed plans for each of them. Several implementation plans have been approved and implementation has begun in the Lower Fox River Basin.

Conclusion

In developing this Land & Water Resource Management Plan it is important to review past goals and objectives identified through similar planning and implementation efforts. It is equally important to recognize that most of the resource issues and concerns that have been identified in the past are still with us. The magnitude and scope of those issues and concerns may have changed, but the hard fact is they still exist. As our population increases, so do the demands and pressures on our resources.

This Land & Water Resource Management Plan is an improved and updated guide that builds upon past work in order to help carry our overall conservation mission. It also provides a mechanism that will assist in reaching the plan objectives outlined in basin-wide natural resource management plans. This plan also describes the methodology that will be used to ensure that landowners are working towards meeting Wisconsin's Agricultural Performance Standards and Prohibitions as defined in NR 151. Successful implementation of this plan will be contingent on continued funding from all current sources.

1. County Setting, Background, and Trends

1.1 Introduction

Outagamie County is located in the Eastern Ridges of Wisconsin, bounded by Waupaca County on the west, Waupaca and Shawano counties to the north, Brown County on the east and on the south by Calumet and Winnebago counties. It covers approximately 640 square miles and is comprised of twenty civil towns and all or part of fourteen incorporated communities. Appleton, located along the Fox River in the southern portion of the County, is the largest city and county seat. The Fox River Valley is the focal point for much of the County's population, commerce and industry.

1.2 Outagamie County History

Outagamie County was once the hunting and fishing grounds of the Winnebago and Menominee Indian tribes. The Outagamie Indian tribe moved into the area after 1650 and it is from this tribe that the County derived its name. Most of the early French explorers, missionaries and fur traders who came to eastern Wisconsin, passed through this area as it is located on the Fox River-Lake Winnebago waterway. The earliest of these was Jean Nicolet, who traveled through in 1634 on his way to visit the Native Americans at Lake Winnebago.

In 1821, a delegation of Oneida Indians from New York met with representatives of the Menominee and Ho-Chunk (Winnebago) Nations to negotiate the sale of fertile open lands along the western Great Lakes. As a result, the Oneidas purchased a large section of land in a territory that would soon become Wisconsin. Led by Eleazor Williams and Chief Daniel Bread, the first movement of Oneidas to Wisconsin settled in what is now the Grand Chute and Kaukauna area. One year later a second group arrived and settled along the southern area of the Duck Creek. The present boundaries of the Oneida Reservation were established by treaty with the federal government in 1838.

The first settler was Dominique DuCharme. DuCharme established a trading post on the bank of the Fox River between 1760 and 1793. The first permanent settlement is credited to Augustin Grignon, who settled at Grand Kaukaulin (a.k.a. Kaukauna) in 1813. The permanent Grignon establishment included the DuCharme trading post. The early settlers primarily came directly from France, Germany, Holland and Ireland. Others migrated to this area after living in the New England area. Between 1840 and 1860, many new immigrants came to form new settlements and to farm. The present Outagamie County was detached from Brown County. It officially was recognized as a county on February 17, 1851. The population at that time was approximately 4,000.

Much of the County away from the Fox River was opened by the logging industry, with larger logging operations going into business in the early 1860's. The accessibility of rivers, such as the Wolf and Embarrass was extremely important to this industry. These water resources were utilized for both transportation (floating the logs downstream) and energy (operating the sawmills).

In 1855, Louis Perrot arrived in this new county. He is known as the father of the cheese-making industry, which was the forerunner of today's dairy industry. The agricultural development was significantly changed with the addition of dairying. The earliest reported farming activities in this area are credited to the Stockbridge and Munsee Indian tribes. Records indicate that they were raising potatoes, corn, and small grain in the 1830's.

Logging and farming were not the only activities taking place in the early development of Outagamie County. The rivers, especially the Fox River, were natural locations for the establishment of sawmills, flourmills and eventually paper mills. The Fox River has an elevation drop of 170 feet from Lake Winnebago to Green Bay, with 150 feet of that drop occurring in Outagamie County. This drop provided an excellent source of hydroelectric power. Augustin Grignon built a sawmill in 1818. A flourmill was built across the river from Grignon's mill in 1828. During the 1850s, the flour industry began to flourish and moved to Minneapolis. The local mills were converted to pulp and paper mills, with the first paper mill established in Appleton around 1853.

Early settlements, like Grignon's, were developed in and around the trading posts, lumber camps and missions. In 1853, the County had its first incorporated community, the Village of Appleton. Although the oldest settlement was in Kaukauna, it did not incorporate until 1885. The population of the County by this time was approximately 30,000. The incorporation of the remaining cities and villages in the County continued with the last occurring in 1967 (Nichols).

1.3 Geography and Geology

Outagamie County is located in the Eastern Ridges geographic province of Wisconsin. The topography is characterized as flat to gently rolling with several northeasterly trending escarpments as the dominant landscape feature.

The Wolf River and its tributaries, including the Embarrass and Shioc rivers along with several feeder streams, are the major water features and drain the northern and western two-thirds of the county. These waterways are characterized by low stream gradients and frequent flooding. The Duck, Apple, and Ashwaubenon Creeks and the Lower Fox River drain the easterly and southerly segments of the county and have much steeper gradients, though the dams on the Lower Fox temper stream flows.

The topography of Outagamie County was largely created by deposition of glacial drift from continental ice sheets, with the last glacial stage occurring some 11,000 years ago. The band of rolling landscape trending from the southwest of northeast of the county reflects the deposition of glacial till in ground and terminal moraines while the flatter areas reflect lacustrine deposits of glacial lake basins.

The land surface is underlain by sedimentary rocks, with the Cambrian Period sandstones in the northwest of the county representing the oldest rock unit. Moving southeasterly, progressively younger rocks of the Ordovician Period, consisting of dolomitic limestones and sandstones, appear as the uppermost layers.

1.4 Land Use Trends

The 1860 agricultural census reported that 1,131 farms had been established within Outagamie County. This number increased continually until 1935, when an all-time high of 3,903 was reached. Since then, the number of farms and farm acreage has steadily declined. Some loss has been due to farm consolidation; however, some is due to the conversion to urban uses. As of 1950, there were approximately 3,400 operating farms in the County encompassing 370,600 acres. By 1997, there were approximately 1,286 operating farms encompassing 252,471 acres and the most recent estimate from the 2012 Ag Census is 1,170 operating farms encompassing 250,748 acres.

From 2010 to 2014, the county's population grew by 5,311 to 182,006 people (US Census Bureau, 2015). With a 3% gain over the last recording period, the projected 2040 population is estimated at 215,290 (Eagan-Robertson, 2013).

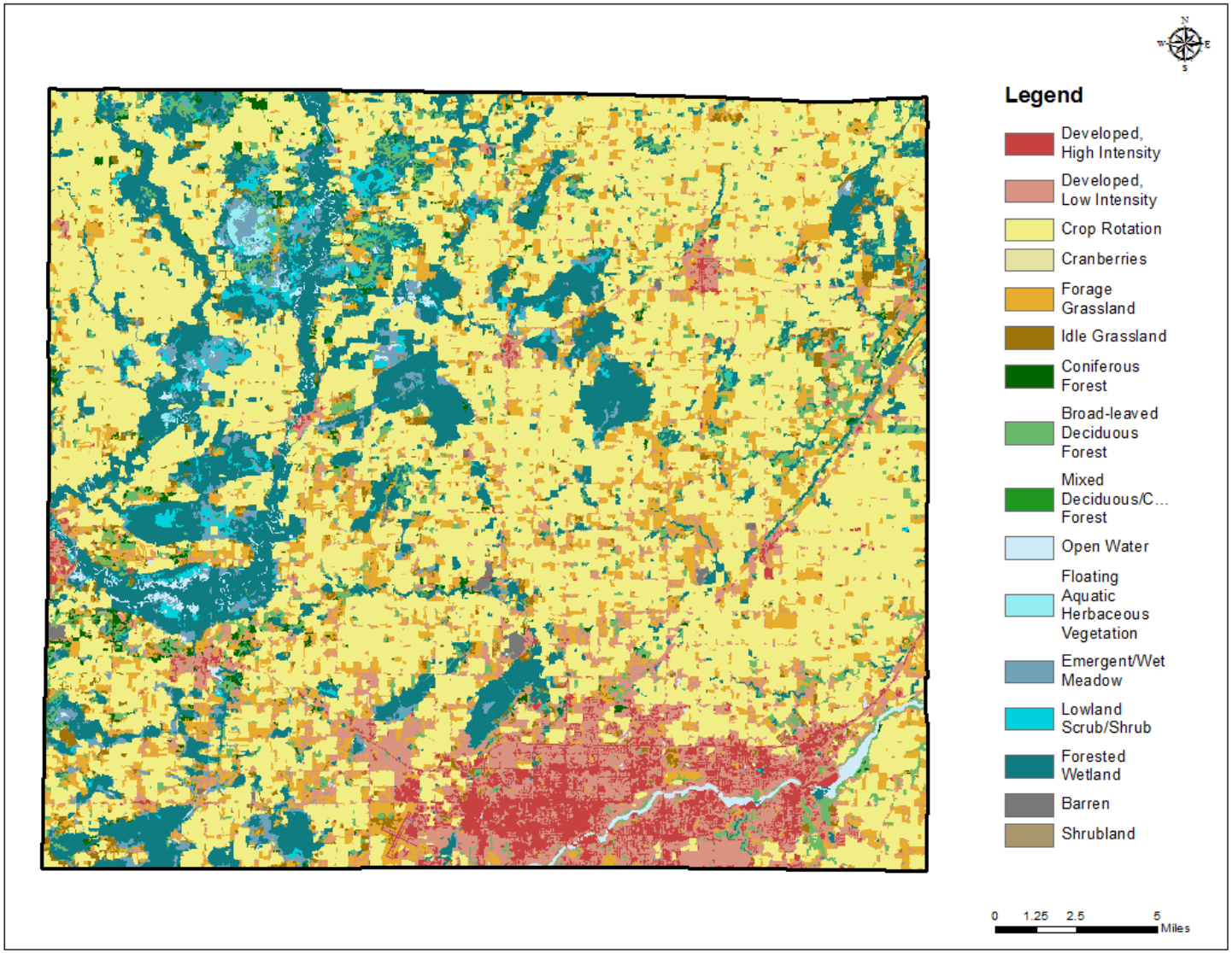

FIGURE 1. OUTAGAMIE COUNTY LAND COVER (WDNR WISCLAND2)

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1.5 Agricultural Trends

Agriculture remains the dominant land use in Outagamie County, containing 210,085 cropland acres in 2012. In 2012, Outagamie County ranked 8th statewide in milk production; 9th in corn silage; 4th in Soybean; 12th in corn for grain, and 29th in hay.

- Agricultural land is decreasing as more and more acres are rezoned out of Agricultural zones or annexed and rezoned by cities and villages
- Average size of a farm increased 18% since 2007 while the number of farms decreased by 14%
- Alfalfa and hay land decreased by 3,609 acres since 2007 (8% decrease)
- Total cattle (all cattle) numbers increased by 15 % since 2007
- Total dairy cow numbers increased by 336 since 2007 (1% increase)

This data was taken from the USDA, National Agricultural Statistics Service, 2012 Census of Agriculture - County Profile

Economic, political and social factors will continue to impact farmland and related rural areas. It is expected that the number of farms in the County will steadily decline, while the size of the remaining farms will increase. These changes pose a challenge to all the stakeholders in terms of the planning for and sustaining of agricultural economic stability, diversifying farming operations, and protecting the natural resources.

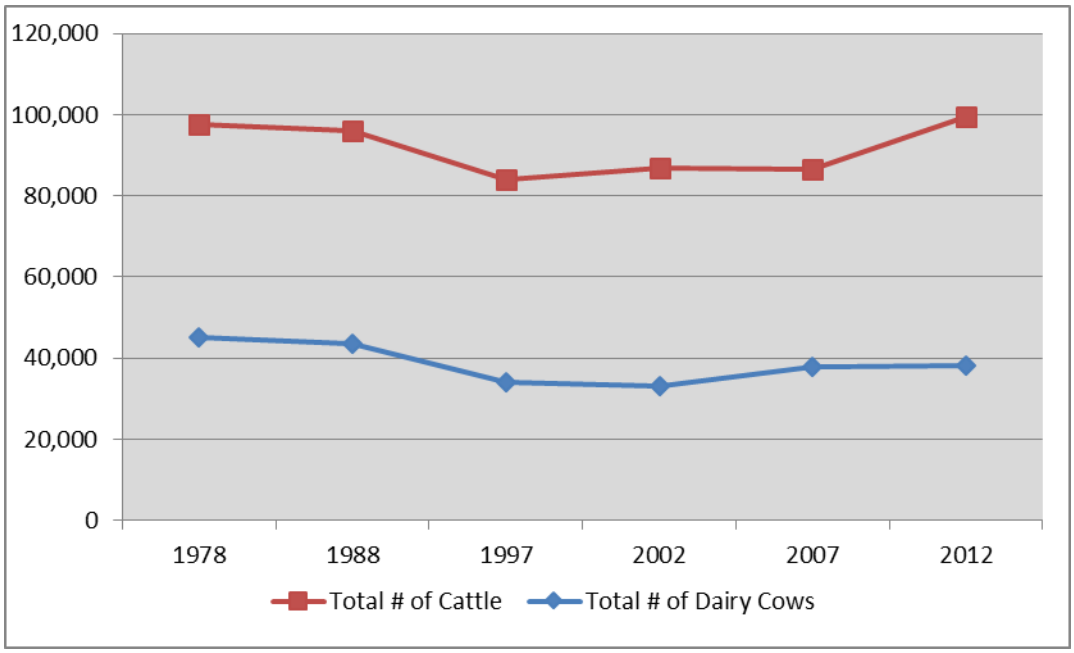

FIGURE 2. CATTLE NUMBER TRENDS IN OUTAGAMIE COUNTY 1978-2012 (USDA CENSUS OF AGRICULTURE)

2. Resource Assessment

2.1 Water Resources

2.1.1 Watersheds

Outagamie County has about 1,250 mile of streams and rivers and 237 acres of lakes and impoundments.

The western half of Outagamie County is in the southeastern section of the Wolf River Basin. All or portions of six watersheds drain this part of the county, including: Arrowhead River and Daggets Creek Watershed, Lower Wolf River Watershed, North Branch and Main Stem Embarrass River Watershed, Wolf River/New London and Bear Creek Watershed, Shioc River Watershed, and Middle Wolf River Watershed. There are 33 Outagamie County lakes in the basin, most unnamed and small. Only Black Otter Lake and one unnamed lake are larger than 25 acres.

The Wolf River drains the flat, mostly poorly drained northwestern quarter of Outagamie County. From the northern boundary near Leeman, the river flows parallel to an escarpment formed by the Prairie du Chien Group, then southward through Shiocton to a point about three miles northeast of Hortonville, where it turns abruptly west through Waupaca County and into Winnebago County where it joins the Lake Winnebago System.

The Lower Fox River empties a drainage basin of 6,641 square miles in its 39 stream miles, flowing northeast from the outlet of Lake Winnebago to Green Bay. The river is impounded by 12 dams and is navigable through 17 locks. The river has the appearance and characteristics of a large flowing stream rather than a series of impoundments.

In general, the shallow waters of Outagamie County do not provide a great deal of recreation potential; however, the Wolf and Embarrass Rivers are heavily used. Black Otter Lake is a 75-acre impoundment of Black Otter Creek located in the village of Hortonville and the town of Hortonville in the southwestern portion of Outagamie County. In winter/spring 1989-90, Black Otter Lake was drawn down for mechanical dredging and repairs were made on the dam, and the lake was again drawn down over the winter of 2009 to address a Eurasian Milfoil problem.

Wolf River Basin

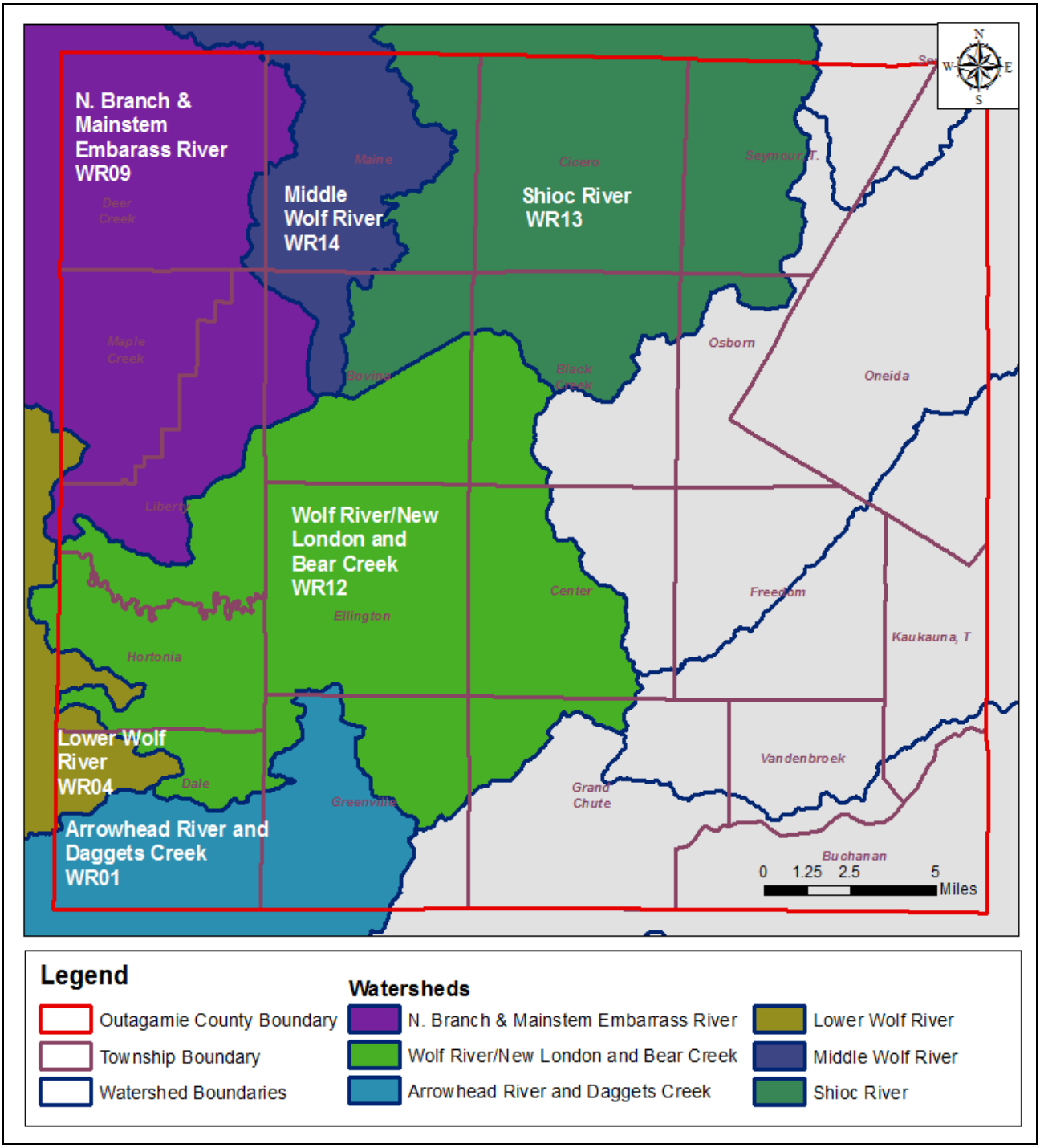

FIGURE 3. WOLF RIVER BASIN WATERSHEDS.

ARROWHEAD RIVER, RAT RIVER, DAGGETS CREEK WATERSHED (WR01)

General Watershed Characteristics

The Arrowhead River, Rat River, and Daggets Creek Watershed covers 135 square miles or 86,400 acres. Approximately 70% lies within Winnebago County, 29% in Outagamie County, and 1% in Waupaca County. The watershed is nearly level or gently sloping with land use being primarily agricultural. Cash grain farming is currently the predominant agricultural land use in the watershed.

Land & Water Resource Assessment

Common water resource problems in the watershed include sedimentation of the tributaries and sediment loading to the lakes, channelization, excessive filamentous algae and periphyton growth from nutrient loading, limited habitat, low dissolved oxygen levels, high bacteriological levels, low stream flows during dry weather, and streambank and shoreline erosion. In this watershed the most serious pollutants are nutrients (phosphorus), sediment, manure in surface water, and nitrates in groundwater.

Rat River

The Rat River, which has drainage area of 69.7 square miles, is a tributary to the main stem of the Wolf River that empties into Lake Poygan. The Rat River consists of many unnamed intermittent tributaries, most of which are only drainage ditches.

The upper portion of the Rat River, in Outagamie County, includes the 11 miles of the Rat River, beginning from the headwaters about 3 miles west of Hortonville to the confluence of the Little Rat River 2.5 miles south of Dale. The upstream portion contains areas that are experiencing rapid residential development where sediment and phosphorus loading from construction site erosion is a concern. The stream is ranked high priority for phosphorus and low dissolved oxygen and is currently under TMDL development.

THE ARROWHEAD RIVER, RAT RIVER, AND DAGGETS CREEK PLAN

In 1992, a watershed control plan was developed by the WDNR, DATCP, and the Land Conservation Departments of Outagamie and Winnebago counties. The plan outlined runoff pollution problems, established water quality goals and objectives, and identified management practices to achieve those goals and objectives.

Water quality objectives were identified for the entire watershed area, while water resource objectives were identified individually for each subwatershed. A need to reduce both phosphorus and sediment by a high level (50% reduction from current estimated loading levels) was identified as the water quality objective for the entire watershed. Common to all seven subwatersheds were the water resource objectives of increasing aquatic life through improved habitat conditions, and protecting and enhancing wildlife through improved wetland and grassland habitat. Conservation practices such as reduced tillage, grassed waterways, streambank stabilization, nutrient management, manure storage, barnyard runoff systems, and buffers were

implemented during the priority watershed project. The sign-up phase of the project was completed in 1997 and the implementation phase was completed with the end of the project on December 31, 2004.

LOWER WOLF RIVER WATERSHED (WR04)

General Watershed Characteristics

The Lower Wolf River watershed covers parts of Outagamie, Waupaca, and Winnebago Counties and includes a portion of the Mainstem Wolf River from the junction with the Embarrass River to the mouth of the Waupaca River, including the lower portion to the Weyauwega Millpond. The Mainstem Wolf River flows within the watershed for about 19 miles and contains a diverse warm water sport fishery. Wetlands adjacent to the river provide excellent spawning grounds.

Land & Water Resource Assessment

There is only a very small portion of the Lower Wolf River Watershed located in Outagamie County. The only creek in the Outagamie County portion of the watershed is Potters Creek, located in the Southwest quarter of the township of Hortonia, and drains into the Waupaca portion of the watershed.

Potters Creek

Potters Creek is a brown stained, hard-water stream discharging to the Wolf River. Streambank erosion is a common problem along this stream. Stream habitat evaluations ranged from fair to good. Polluted runoff problems are evident.

NORTH BRANCH AND MAINSTEM EMBARRASS RIVER WATERSHED (WR09)

General Watershed Characteristics

The North Branch and Mainstem Embarrass River Watershed lies in Outagamie, Waupaca, and Shawano counties and covers 292 square miles.

There is one municipal point source discharger in the Outagamie County portion of the watershed: Bear Creek Wastewater Treatment Facility.

Land & Water Resource Assessment

The data search for the Wolf River Basin plan indicates severe polluted runoff problems exist, with heavy soil losses, impaired fisheries, excess vegetation, and dissolved oxygen violations.

Bear Creek

Bear Creek is a nine-mile-long tributary to the Embarrass River. GLK Foods Inc., a sauerkraut processing plant, has a lagoon next to the stream for discharging cooling and wash water. The

stream is used for spring spawning of northern pike and supports panfish most times of the year. Bear Creek is listed as impaired for Total Phosphorus and Total Suspended Solids and is ranked high priority. Other impairments include degraded biological community and degraded habitat. Bear Creek is currently under TMDL development.

Mainstem Embarrass River

The Mainstem Embarrass River extends from Caroline in Shawano County, east and southward through Waupaca and Outagamie Counties to New London where it flows into the Wolf River. Major tributaries to the mainstem include the Pigeon River, Mill, Maple, and Bear creeks. The river has a diverse fishery and is best known for its smallmouth bass. In addition to its fishery, the river offers canoeing. The mainstem of the Embarrass River is also an important sturgeon spawning stream. Soil erosion rates in the watershed are critical, with animal waste runoff also a problem. The Mainstem Embarrass River is ranked an Exceptional Resource Water by the WDNR.

Maple Creek

Maple Creek is a natural warm water stream that, at this time, does not support a fishery. Intense agricultural activities have degraded this stream. The Hilsenhoff Biotic Index rating for Maple Creek shows fair to poor water quality. Excessive vegetation is also a problem.

SHIOC RIVER WATERSHED (WR13)

General Watershed Characteristics

The Shioc River is a tributary to the Wolf River, having its headwaters in Shawano County and flowing south and west to meet the Wolf River in Outagamie County, north of the city of Shiocton.

There are 11 point-source dischargers in the Shioc River Watershed. Of the 11 dischargers, 8 are located in Outagamie County: Village of Black Creek, Village of Nichols, City of Seymour, Seymour Canning, Alto Dairy, Beatrice Cheese, Fremont Company, and the Twelve Corners Cheese Factory.

Land & Water Resource Assessment

Black Creek

Black Creek is the largest tributary to the main stem Shioc River. Three industries and two municipalities discharge to Black Creek. Black Creek was assessed in the 2016 listing cycle and total phosphorus data overwhelmingly exceed 2016 WisCALM criteria for Fish and Aquatic Life use and biological impairment was observed. Black Creek is ranked high and is proposed for the 303(d) impaired waters list.

Shioc River

The mainstem is formed by the confluence of the West and East Branches Shioc River north of Navarino and extends for 28 miles. The mainstem's fishery is derived from the Wolf River and is especially important during spring when walleye and bass use the river for spawning. One river characteristic is extreme water level fluctuations with low water and isolated pools during the summer months. The Shioc River and its tributaries flow through agricultural land with little or no vegetative buffering. The water is listed as impaired for Total Phosphorus and is ranked high priority. The Shioc River is currently under TMDL development.

Herman Creek

Herman Creek is a 11.6 mile long tributary to the Shioc River, having its headwaters in Shawano County and flowing south and west to meet the Shioc River in Outagamie County, in the northwest corner of the City of Nichols. Herman Creek is a warm-water forage fishery. There are no point sources on the creek, and no information is currently available on nonpoint sources and no recent monitoring data has been collected. Most of the land surrounding the creek is in agriculture and the runoff from this land use may influence water quality.

MIDDLE WOLF RIVER WATERSHED (WR14)

General Watershed Characteristics

The 128 square mile watershed lies in Shawano, Waupaca, and Outagamie Counties. The watershed extends from the confluence of the Red River, north of Shawano, to the point where the Shioc River meets the Wolf River north of Shiocton.

There are seven point source dischargers to the Middle Wolf River Watershed, all located in Shawano County.

Land & Water Resource Assessment

Mainstem Wolf River

There are 47 miles of the Wolf River in this watershed and no major tributaries to the river. The portion of the river below the City of Shawano is very important for sturgeon spawning in the spring. Pollution sources along the Wolf River are nonpoint in nature; animal wastes and cropland runoff. Fisheries Management staff have collected data indicating that young sturgeon use the river as a nursery area for up to four years before they move downstream into the Winnebago System's deeper waters. Sturgeon have watch status in Wisconsin and are under close observation by WDNR and various conservation groups. The Lake Winnebago waterway system has the largest single concentration of sturgeon in the world. Poor water quality presents serious problems for lake sturgeon. Preserving the fish's environment is crucial to its survival and the spawning and nursing areas of the Wolf River from Shawano to New London must be protected. The mainstem Wolf River is listed as impaired for PCB's and is ranked low priority.

LOWER FOX RIVER BASIN

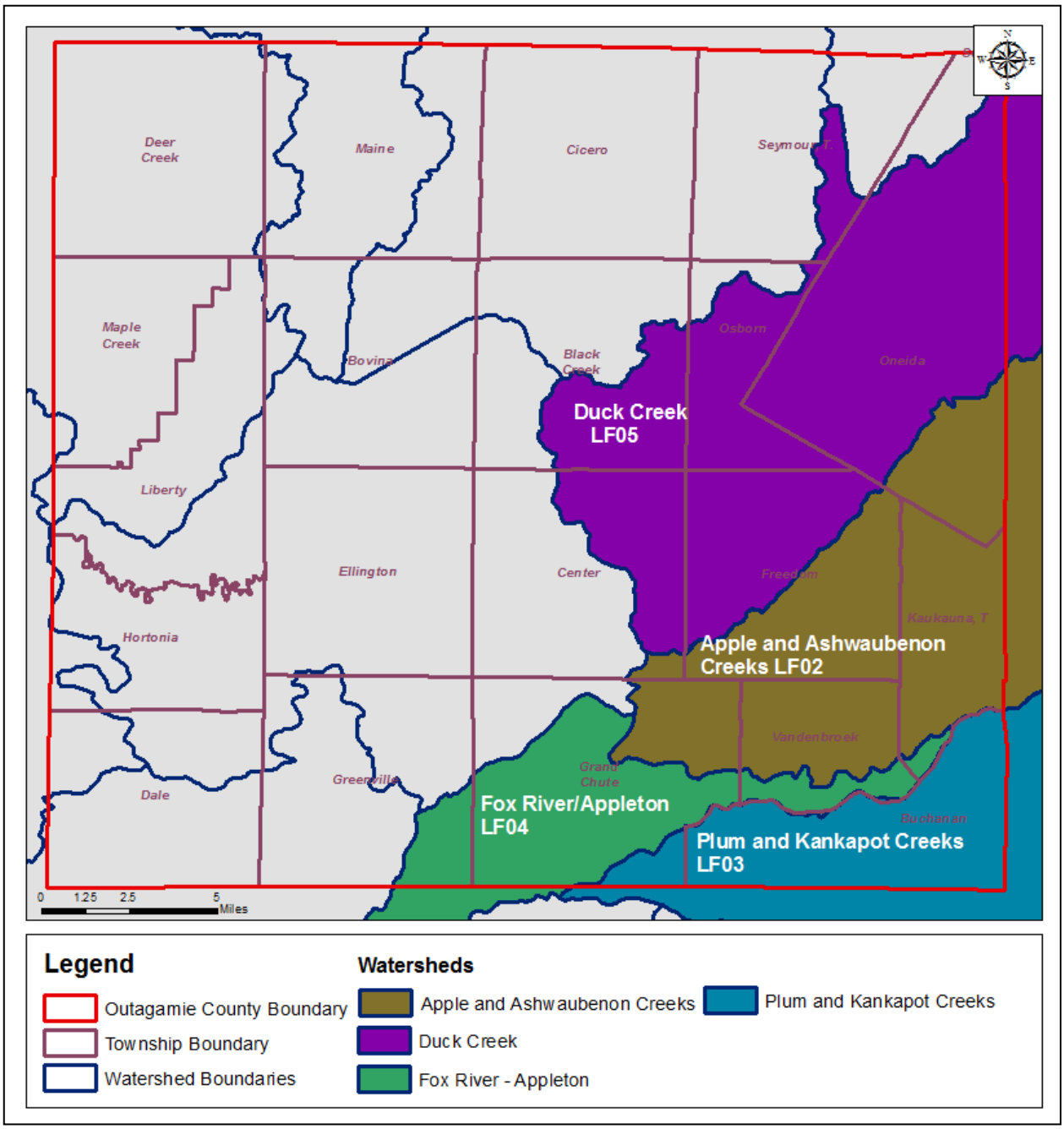

FIGURE 4. OUTAGAMIE COUNTY LOWER FOX RIVER BASIN WATERSHEDS.

DUCK CREEK WATERSHED (LF05)

General Watershed Characteristics

The Duck Creek Watershed, approximately 152 square miles in surface areas, lies within Outagamie County (67%) and Brown County (33%). Land use in upstream portions of the watershed is predominately agricultural while downstream areas are dominated by residential and urban uses in and near metropolitan Green Bay.

Duck Creek originates in Burma Swamp, a large wetland (approximately 2,000 acres) located in central Outagamie County. A total of 71 miles of named and unnamed streams are located in the watershed and all enter Green Bay at or near the mouth of Duck Creek.

Land & Water Resource Assessment

Duck Creek

Duck Creek is classified as a continuous, warm water sport fishery for most of its length. The upper reaches are classified as continuous warm water forage fish waters that only partially meet their resource potential because of degraded water quality and habitat. If water quality improves due to nonpoint source pollution management, the fishery of the lower reaches would improve, and the downstream water quality of lower Green Bay would benefit. The fishery of the upper reaches is limited by stream size, lower flows and water quality. Duck Creek is impaired due to total phosphorus and total suspended sediment and the TMDL for Duck Creek was approved in 2012. Outagamie County Land Conservation performed an inventory of the Upper Duck Creek subwatershed for the development of a 9 Key Element Watershed Plan for TMDL implementation in 2015. Based on inventory results cropland erosion and runoff appeared to be the biggest contributor of phosphorus and sediment. The amount of extensive tile drainage in crop fields in the Upper Duck Creek is also suspected to be contributing a significant portion of phosphorus and sediment. The *Upper Duck Creek Nonpoint Source Watershed Plan* was approved by EPA and DNR in 2016 and implementation began in 2017.

Trout Creek

Trout Creek supports a warm water forage fishery, including a threatened species, Redside Dace. The Trout Creek mainstem is well buffered by woodlands with few nonpoint source problems. The headwaters, however, originate in agricultural areas and water quality would improve with corrective action taken. Trout Creek is also impaired for total phosphorus and total suspended sediment and currently has a TMDL that was approved in 2012.

APPLE & ASHWAUBENON CREEKS WATERSHED (LF02)

General Watershed Characteristics

The Apple & Ashwaubenon Creeks Watershed is 113 square miles in size. Approximately 60 percent lies within Outagamie County and 40 percent is located in Brown County. There are 171 miles of named and unnamed streams in the watershed, all of which empty into the Fox River. Land use in the watershed is primarily agriculture and residential, though industrial areas do exist in the urban areas of Green Bay and the north side of Appleton.

Land & Water Resource Assessment

All or portions of the creeks in the Apple & Ashwaubenon Creeks Watersheds are impaired due to phosphorus and sediment. The waters are currently under the Lower Fox Basin TMDL that was approved in 2012.

Apple Creek

Apple Creek, a 24-mile creek, flows through an agricultural watershed with clay soils and high erosion rates. Low or no stream flow during critical summer months also plays a major role in limiting aquatic life in the watershed. Apple Creek watershed was inventoried in 2016 by Outagamie County Land Conservation for the development of a 9 Key Element Watershed Plan. Inventory results indicate cropland erosion and runoff as the main contributor of phosphorus and sediment in the watershed. Extensive streambank erosion was also found to be occurring and found to be contributing a significant amount of the phosphorus load in the watershed. Apple Creek watershed is also subject to increasing urbanization from the Fox Valley area. The *Apple Creek Nonpoint Source Implementation Plan* was approved by EPA and DNR in 2017.

Ashwaubenon Creek

Ashwaubenon Creek, a 15-mile sluggish, hard water stream flowing through agricultural and residential areas in Brown and Outagamie County. The water quality of Ashwaubenon Creek is adversely affected by nonpoint sources of pollution, primarily intensive farming and highway development. Cropland erosion, streambank encroachment, and construction erosion have degraded stream habitat and water quality. Streambank erosion and sedimentation contribute to substantial turbidity and poor habitat.

Dutchman Creek

Dutchman Creek, a 17-mile stream, has fair water quality and stream habitat, which is threatened by residential and industrial development in the lower watershed and agricultural nonpoint source pollution in the upper watershed. The stream is affected by sedimentation and excess nutrients. Streambanks are generally in poor condition and buffering is limited or absent. In addition to being listed as impaired due to phosphorus and sediment, Dutchman creek is also impaired due to Ammonia.

THE DUCK, APPLE, AND ASHWAUBENON CREEKS WATERSHED PLAN

In 1997, a Watershed control plan was developed by the Wisconsin Department of Natural Resources, the Department of Agriculture, Trade and Consumer Protection, the Land Conservation Departments of Outagamie and Brown counties, and the Oneida Nation Planning Department. The plan outlined pollution runoff problems, established water quality goals and objectives, and identified management practices that will work to achieve those goals and objectives. The project ended December 31st, 2010.

PLUM AND KANKAPOT CREEKS WATERSHED (LF03)

General Watershed Characteristics

The Plum and Kankapot Creeks Watershed is 84 square miles in size. The watershed occupies the following counties; Calumet, Outagamie, Brown, and Winnebago County. There are 92 miles of named and unnamed streams in the watershed, all of which empty into the Fox River. Land use in the watershed is primarily agriculture.

Land & Water Resource Assessment

Both Plum and Kankapot Creeks are listed as impaired due to sediment and phosphorus. The waters are currently under the Lower Fox Basin TMDL that was approved in 2012. In 2014, Plum and Kankapot Creeks subwatersheds were inventoried for the development of a 9 Key Element subwatershed plan by Outagamie County Land Conservation in cooperation with Brown and Calumet County Land Conservation Departments. Based on inventory results cropland erosion and runoff along with extensive stream bank erosion on both Plum and Kankapot Creeks were identified as contributing to the majority of the sediment and phosphorus loading in the watersheds. The *Plum and Kankapot Creeks Nonpoint Source Watershed Plan* was approved in 2015. Implementation of the plan began in spring of 2015.

Plum Creek

Plum Creek, is a 19- mile stream with poor water quality. There are two municipal and one industrial point source dischargers in the watershed, none of which are located in Outagamie County. Problems include low dissolved oxygen, high nutrient levels and high sediment levels which were attributed primarily to nonpoint pollution. Poor land practices in the watershed cause nonpoint source pollution that degrades water quality in the upper reaches of the Plum Creek. The headwaters are intensively farmed and cropland erosion, streambank encroachment, and barnyard runoff are common. The lower reaches have very steep banks, which prohibit pasturing, and cropping. The Fox River receives high pollutant loading from Plum Creek. Plumes of sediment are evident where Plum Creek discharges to the Fox River in the spring of the year as well as after significant precipitation events.

Kankapot Creek

Kankapot Creek, is a 9-mile stream with poor water quality. There is one municipal and on industrial point source dischargers in the watershed, both are located in Calumet County. Stream habitat is rated poor to fair. Kankapot Creek receives a considerable amount of nutrients, suspended solids, and bacteria from runoff. Poor land practices in the watershed cause nonpoint source pollution that degrades the water quality in Kankapot Creek.

FOX RIVER/APPLETON (LF04)

General Watershed Characteristics

The Fox River/Appleton Watershed includes a 39 square mile area of land in Winnebago County and south-central Outagamie County. This includes the city of Appleton. There are two municipal point source dischargers and four industrial point source dischargers in the Outagamie County portion of the watershed: City of Appleton, Heart of the Valley Metropolitan Sewerage District, Anchor Food Products, Foremost Farms USA Coop Appleton (2 facilities) and Thilmany Division International Paper.

Land & Water Resource Assessment

In 1992 a watershed assessment was conducted by WDNR to determine the impacts of nonpoint source pollution on water quality. The Fox River/Appleton Watershed was ranked high priority for streams. The main tributary to the Fox River is Mud Creek and many unnamed tributaries. The headwaters were mainly agricultural and are rapidly becoming developed by industrial parks. This, of course, results in large increases of stormwater velocities to these streams. Construction of these new businesses also creates large erosion problems and heavy doses of sediment to the streams. Both Mud Creek and the Lower Fox River are listed as impaired due to sediment and phosphorus. The waters are currently under the Lower Fox Basin TMDL that was approved in 2012.

Mud Creek

Mud Creek, an 8-mile stream, originates in an urban area and continues through the southwestern corner of Appleton before discharging into the Fox River. Stream habitat is degraded, Streambank erosion is infrequent, however there are some raw areas with high erosion potential during high flows. Construction activities near the creek mouth appear to be contributing a significant amount of sediment to the creek. In addition to being impaired by sediment and phosphorus Mud Creek is also listed as impaired due to chloride.

Fox River (Lower Fox River)

The Lower Fox River originates at the outlet of Lake Winnebago and flows northeast for 39 miles where it empties into the Bay of Green Bay. Historically, the Lower Fox River is a significant waterway. Rapid development in the early 1900's led to wetland destruction, increased runoff, and the discharge of raw sewage and chemical waste to the river. In 1931, the

Green Bay Metropolitan Sewage District was formed as Green Bay's first sewage treatment plant, and in 1949 the State of Wisconsin mandated the installation of waste water treatment facilities for all Fox Valley municipalities and paper mills. Despite these efforts water quality in the Fox River continued to decline. In 1972 the Federal Clean Water Act was enacted which lead to greater pollution control efforts and dramatic improvements in water quality in the Fox River. In addition to phosphorus and sediment the Lower Fox River is also listed impaired for PCB's. The DNR has noted that as many as 360 different chemicals have been found in the water, sediments, fish and wildlife of the Lower Fox River. These chemicals include PCBs, dioxins, furans, mercury, ammonia, DDT and other pesticides. In 2009, the ongoing Fox River Cleanup Project began, a multi-year PCB cleanup effort that includes dredging, capping, and covering over a 13 mile stretch of the Lower Fox River.

UPPER GREEN BAY BASIN

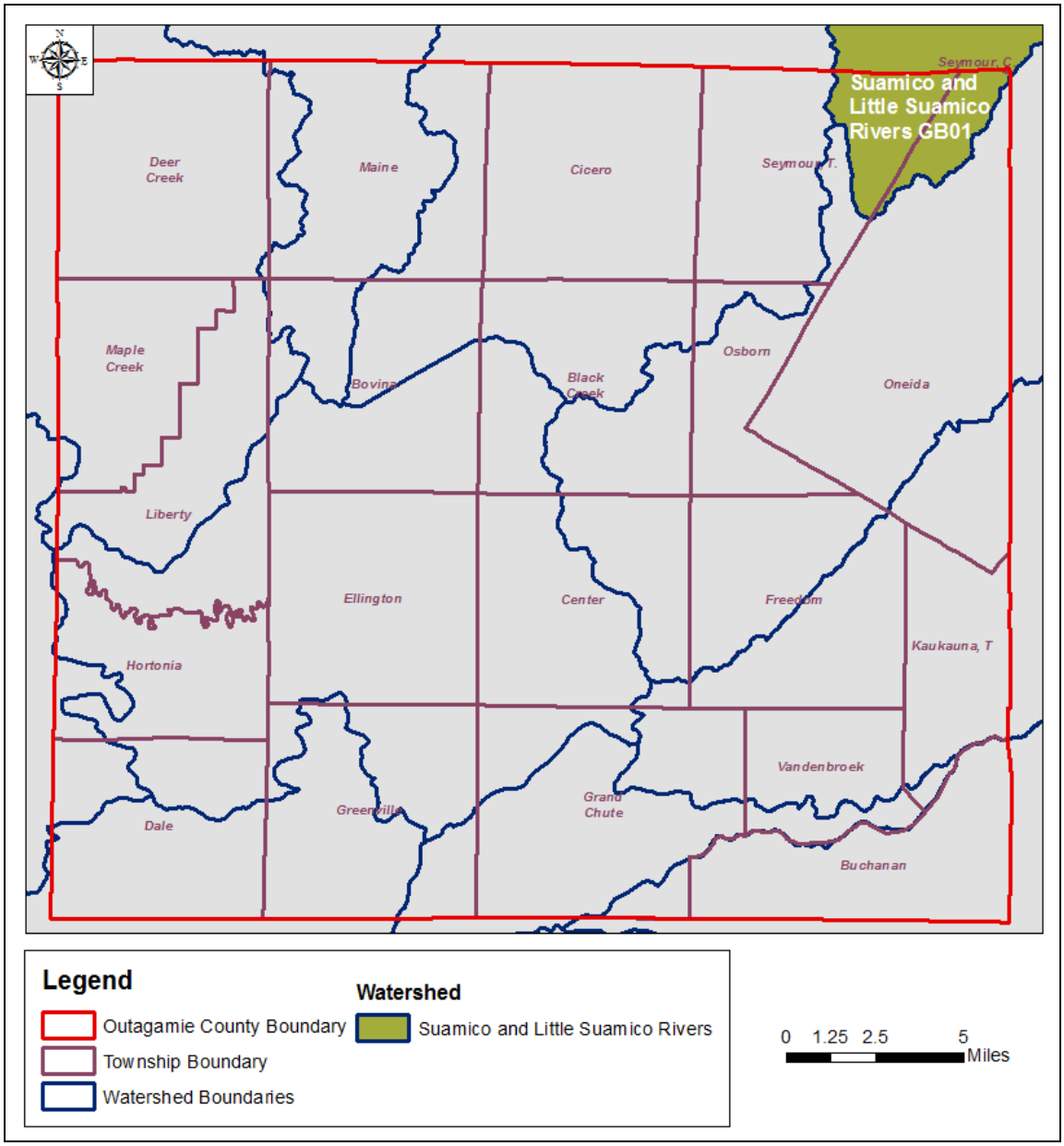

FIGURE 5. OUTAGAMIE COUNTY UPPER GREEN BAY BASIN WATERSHEDS.

SUAMICO AND LITTLE SUAMICO RIVERS (GB01)

General Watershed Characteristics

The Suamico and Little Suamico Rivers Watershed includes a 172 square mile area of land in the counties of Brown, Oconto, Shawano, and Outagamie. Only a small portion (approximately 14 square miles) of the watershed lies within the Northeast corner of Outagamie County. The Suamico and Little Suamico Rivers drain directly to the Bay of Green Bay.

Land & Water Resource Assessment

Land use in the Outagamie County portion of watershed is primarily agriculture. The Suamico and Little Suamico Watershed is ranked high priority for streams. The DNR has determined that nonpoint source pollution has had a negative impact on the water quality within this basin.

Suamico River

The South Branch of the Suamico River, is a 9.45 mile river that falls in both Outagamie and Brown County. The river is managed for fishing and swimming and is currently not considered impaired. In Outagamie County, the Suamico and Little Suamico River watershed is mostly dominated by agricultural land use.

2.1.2 Designated Waters

Outstanding and Exceptional 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 which provide outstanding recreational opportunities, support valuable fisheries and wildlife habitat, have good water quality, and are not significantly impacted by human activities.

Outstanding Resource Waters do not have any point sources discharging pollutants directly to the water, 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, increases of pollutant levels are not allowed.

Exceptional Resource Waters may have a point source discharger. 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.

The Embarrass River is the only waterbody in Outagamie County the falls into the ORW/ERW category. Figure 6 shows the portion of the Embarrass River classified as ERW that is located in Outagamie County.

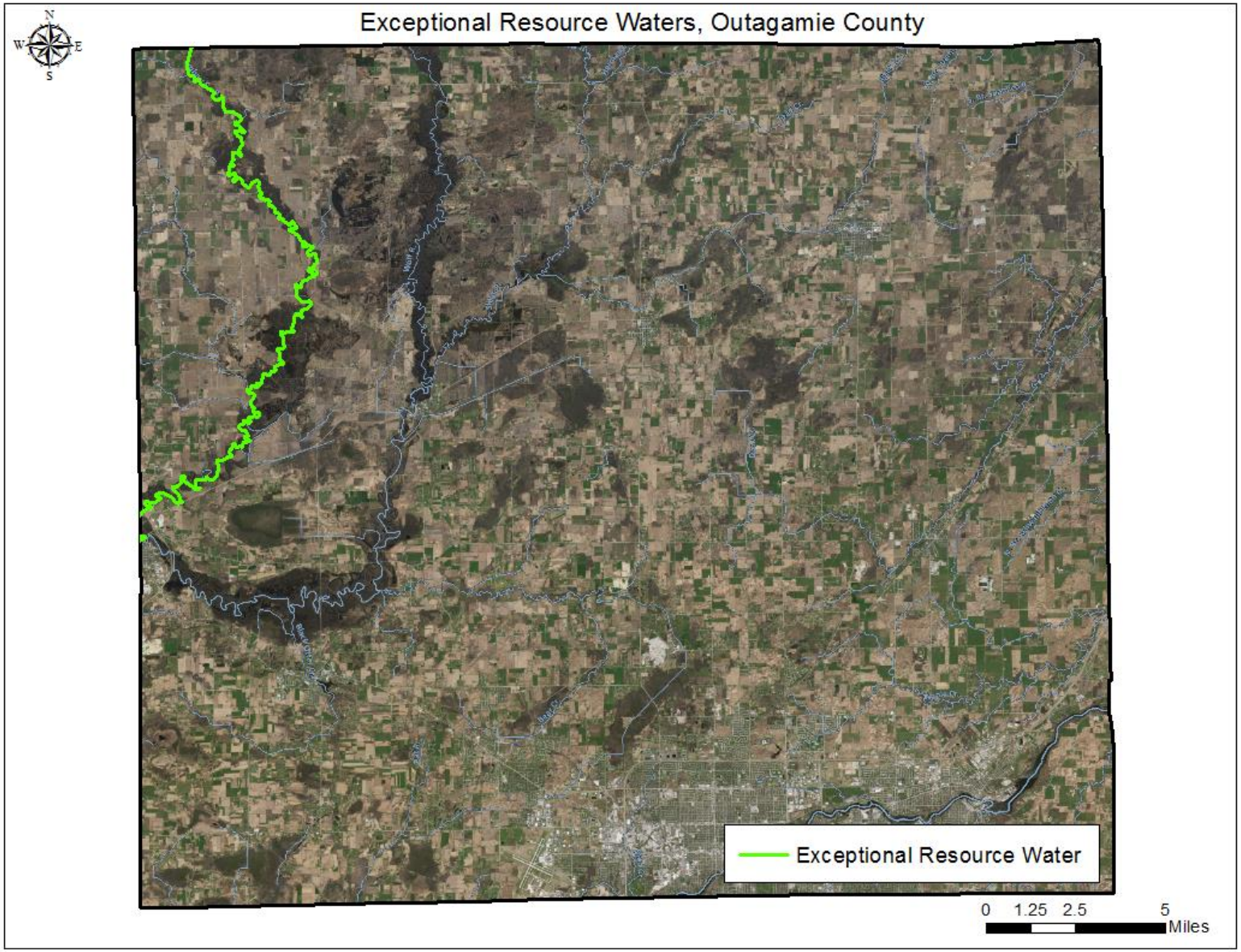

FIGURE 6. EXCEPTIONAL RESOURCE WATERS, OUTAGAMIE COUNTY.

Impaired Waters

Section 303(d) of the Clean Water Act requires the State to prepare a list of impaired water bodies that will remain so even after the application of technology-based standards typically applied to point sources of pollution. The State is to identify the pollutants causing the problem, identify the sources of that pollution and develop a Total Maximum Daily Load (TMDL) of that pollution that a water body can receive and still meet water quality standards. The State is then required to set priorities for implementing strategies to meet the TMDL. Figure 7 and Table 1 shows 303d listed waters in Outagamie County.

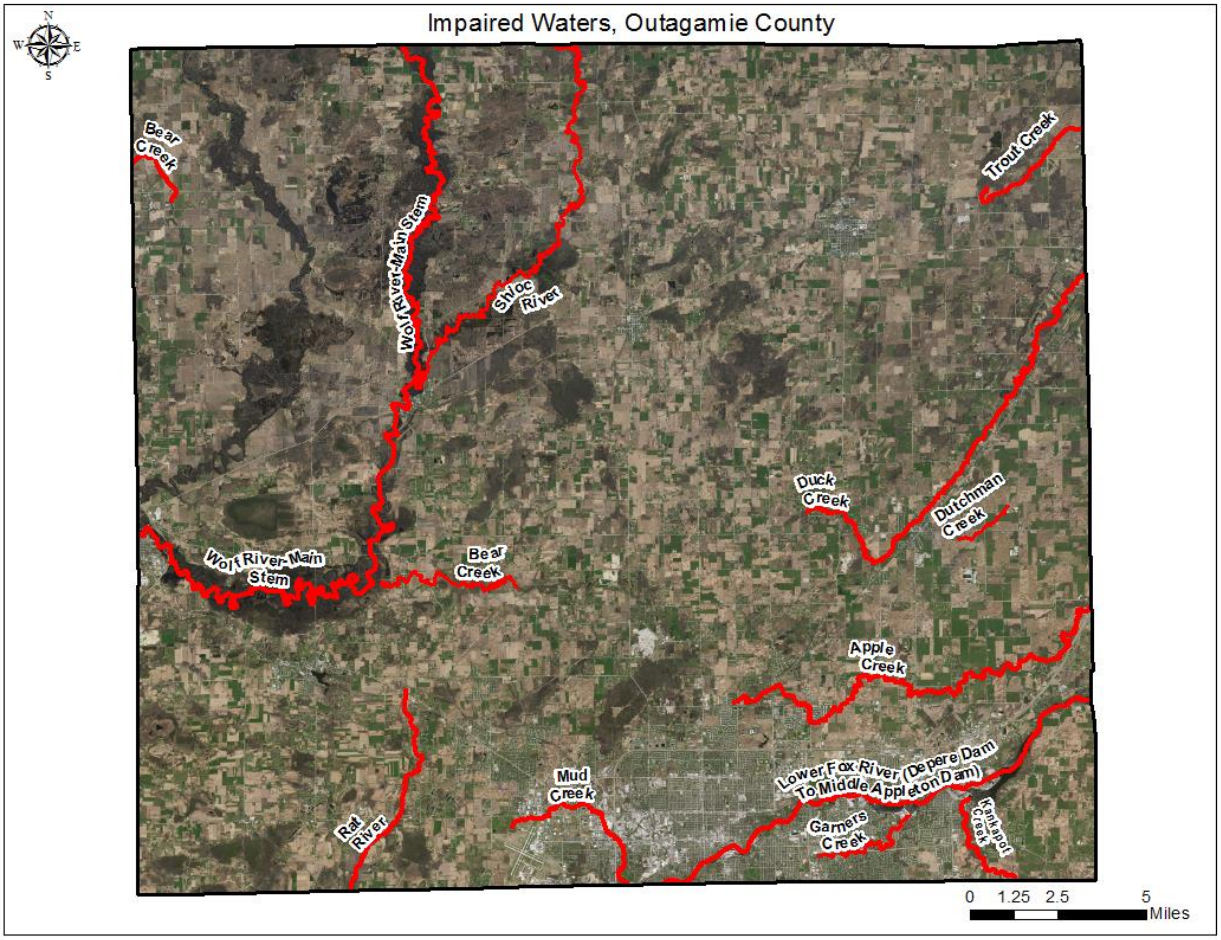

FIGURE 7. IMPAIRED WATER RESOURCES, OUTAGAMIE COUNTY, WISCONSIN.

TABLE 1. WDNR 303D WATERS STATUS FOR OUTAGAMIE COUNTY.

Official Name	Local Name	Start Mile	End Mile	WBIC	County	Water Type	Pollutant	Impairment	303 Status	TMDL Priority
Apple Creek	Apple Creek	3.99	23.88	124100	Brown, Outagamie	River	Total Phosphorus	Low DO	TMDL Approved	Not Applicable
Apple Creek	Apple Creek	3.99	23.88	124100	Brown, Outagamie	River	Sediment/Total Suspended Solids	Elevated Water Temperature, Degraded Habitat	TMDL Approved	Not Applicable
Bear Creek	Bear Creek	0.5	2	316000	Outagamie	River	Total Phosphorus	Water Quality Use Restrictions	TMDL Development	High
Bear Creek	Bear Creek	2	8	316000	Outagamie	River	Total Phosphorus	Water Quality Use Restrictions	TMDL Development	High
Bear Creek	Bear Creek	8.41	11.98	292100	Outagamie, Waupaca	River	Total Phosphorus	Degraded Biological Community	Addition	High
Bear Creek	Bear Creek	8.41	11.98	292100	Outagamie, Waupaca	River	Sediment/Total Suspended Solids	Degraded Habitat	TMDL Development	High
Black Creek	Black Creek	16	27.71	317100	Outagamie, Shawano	River	Total Phosphorus	Degraded Biological Community	Proposed for List	High
Black Otter Lake (Hortonville)	Black Otter Lake (Hortonville)			315600	Outagamie	Lake	Total Phosphorus	Water Quality Use Restrictions	Proposed for List	High
Duck Creek	Duck Creek	4.96	25.69	409700	Brown, Outagamie	River	Total Phosphorus	Low DO	Pollutant Removed	Not Applicable
Duck Creek	Duck Creek	4.96	25.69	409700	Brown, Outagamie	River	Sediment/Total Suspended Solids	Low DO, Degraded Habitat	Pollutant Removed	Not Applicable
Duck Creek	Duck Creek	25.69	32.9	409700	Outagamie	River	Total Phosphorus	Low DO	TMDL Approved	Not Applicable

Official Name	Local Name	Start Mile	End Mile	WBIC	County	Water Type	Pollutant	Impairment	303 Status	TMDL Priority
Duck Creek	Duck Creek	25.69	32.9	409700	Outagamie	River	Sediment/Total Suspended Solids	Degraded Habitat	TMDL Approved	Not Applicable
Duck Creek	Duck Creek	25.69	32.9	409700	Outagamie	River	Mercury	Contaminated Fish Tissue	303d Listed	Low
Dutchman Creek	Dutchman Creek	4.06	16.03	121600	Brown, Outagamie	River	Sediment/Total Suspended Solids	Degraded Habitat	Water Delisted	Delisted 2008
Dutchman Creek	Dutchman Creek	4.06	16.03	121600	Brown, Outagamie	River	Ammonia (Unionized) - Toxin	Chronic Aquatic Toxicity	Water Delisted	Delisted 2008
Dutchman Creek	Dutchman Creek	16.05	17.97	121600	Outagamie	River	Total Phosphorus	Low DO	TMDL Approved	Not Applicable
Dutchman Creek	Dutchman Creek	16.05	17.97	121600	Outagamie	River	Ammonia (Unionized) - Toxin	Chronic Aquatic Toxicity	303d Listed	Low
Fox River	Lower Fox River (Depere Dam To Middle Appleton Dam)	7.39	32.18	117900	Brown, Outagamie	River	PCBs	Contaminated Fish Tissue	EAP Project	Not Applicable
Fox River	Lower Fox River (Depere Dam To Middle Appleton Dam)	7.39	32.18	117900	Brown, Outagamie	River	Total Phosphorus	Low DO	TMDL Approved	Not Applicable

Official Name	Local Name	Start Mile	End Mile	WBIC	County	Water Type	Pollutant	Impairment	303 Status	TMDL Priority
Fox River	Lower Fox River (Appleton Dam To L. Winnebago Outlet)	32.18	40.09	117900	Outagamie, Winnebago	River	PCBs	Contaminated Fish Tissue	EAP Project	Not Applicable
Fox River	Lower Fox River (Appleton Dam To L. Winnebago Outlet)	32.18	40.09	117900	Outagamie, Winnebago	River	Total Phosphorus	Low DO	TMDL Approved	Not Applicable
Garners Creek	Garners Creek	0	5	127700	Outagamie	River	Chloride	Chronic Aquatic Toxicity	Addition	Low
Garners Creek	Garners Creek	0	5	127700	Outagamie	River	Total Phosphorus	Degraded Habitat	TMDL Approved	Not Applicable
Garners Creek	Garners Creek	0	5	127700	Outagamie	River	Sediment/Total Suspended Solids	Degraded Habitat	TMDL Approved	Not Applicable
Kankapot Creek	Kankapot Creek	0	2.66	126800	Outagamie	River	Sediment/Total Suspended Solids	Degraded Habitat	TMDL Approved	Not Applicable
Kankapot Creek	Kankapot Creek	0	2.66	126800	Outagamie	River	Total Phosphorus	Degraded Habitat	TMDL Approved	Not Applicable
Kankapot Creek	Kankapot Creek	2.66	9.57	126800	Calumet, Outagamie	River	Sediment/Total Suspended Solids	Degraded Habitat	TMDL Approved	Not Applicable
Kankapot Creek	Kankapot Creek	2.66	9.57	126800	Calumet, Outagamie	River	Total Phosphorus	Degraded Habitat	TMDL Approved	Not Applicable
Mud Creek	Mud Creek	0	3.71	129500	Outagamie, Winnebago	River	Sediment/Total Suspended Solids	Degraded Habitat	TMDL Approved	Not Applicable

Official Name	Local Name	Start Mile	End Mile	WBIC	County	Water Type	Pollutant	Impairment	303 Status	TMDL Priority
Mud Creek	Mud Creek	0	3.71	129500	Outagamie, Winnebago	River	Total Phosphorus	Degraded Habitat	TMDL Approved	Not Applicable
Mud Creek	Mud Creek	0	3.71	129500	Outagamie, Winnebago	River	Chloride	Chronic Aquatic Toxicity, Acute Aquatic Toxicity	Addition	Low
Mud Creek	Mud Creek	3.71	6.87	129500	Outagamie	River	Sediment/Total Suspended Solids	Degraded Habitat	TMDL Approved	Not Applicable
Rat River	Rat River	13.14	24.81	251800	Outagamie, Winnebago	River	Total Phosphorus	Low DO	TMDL Development	High
Shioc River	Shioc River	0	28	316800	Outagamie, Shawano	River	Total Phosphorus	Water Quality Use Restrictions	TMDL Development	High
Trout Creek	Trout Creek	0	12.77	410200	Brown, Outagamie	River	Total Phosphorus	Sediment/Total Suspended Solids	Pollutant Removed	Not Applicable
Trout Creek	Trout Creek	0	12.77	410200	Brown, Outagamie	River	Sediment/Total Suspended Solids	Sediment/Total Suspended Solids	Pollutant Removed	Not Applicable
Unnamed	Local Water	0	4.71	5022162	Calumet, Outagamie	River	Total Phosphorus	Degraded Biological Community	Proposed for List	Medium
Unnamed	Un Creek (T22n-R16e-S22)	0	5	316100	Outagamie	River	Total Phosphorus	Water Quality Use Restrictions	Proposed for List	High
Wolf River	Wolf River-Main Stem	41.04	65.58	241300	Outagamie, Waupaca	River	PCBs	Contaminated Fish Tissue	303d Listed	Low
Wolf River	Wolf River-Main Stem	65.58	85.58	241300	Outagamie, Shawano, Waupaca	River	PCBs	Contaminated Fish Tissue	303d Listed	Low

*Duck Creek (4.96-25.69 miles), Trout Creek (0-12.77 miles) and Dutchman Creek (4.06-16.03 miles) were removed from the state list since these segments go through tribal land, whereas State of Wisconsin Water Quality Standards do not apply.

2.1.3 Total Maximum Daily Load Plans

Section 303(d) of the Clean Water Act requires all states to develop Total Maximum Daily Loads (TMDL) for waters on the Impaired Waters List. A TMDL is the amount of pollutant a waterbody can receive and still meet water quality standards. Computer models are used to calculate pollutants loads for a watershed based on water quality monitoring, topography, land use, climate, soil types, and current management practices. A TMDL considers both waste load allocation (point sources) and load allocation (nonpoint sources) along with a margin of safety.

Lower Fox River TMDL

Lower Green Bay is impaired by excessive phosphorus and sediment loading from the Lower Fox River, which leads to algae growth, oxygen depletion, submerged aquatic vegetation, and water clarity problems. The Lower Fox TMDL analysis shows that in basin phosphorus load reductions of 59.2% and sediment load reductions on 54.9% will be necessary to achieve noticeable improvements in algae production and water clarity in the LFR Basin and Green Bay Area of Concern (AOC). The Wisconsin Department of Natural Resources and EPA approved a total maximum daily load in 2012 to address impairments LFR Basin and Green Bay AOC. The Lower Fox River TMDL identified the following restoration goals for the Lower Fox River Basin:

- Reduce excess algal growth.
- Increase water clarity in Lower Green Bay.
- Increase growth of beneficial submerged aquatic vegetation in Lower Green Bay.
- Increased dissolved oxygen levels.
- Restore degraded habitat.

A copy of the Lower Fox River TMDL can be viewed at http://dnr.wi.gov/topic/tmdls/ .

Upper Fox and Wolf River Basin TMDL

The Upper Fox River Basin and Wolf River Basin are two separate basins that converge within a series of pool lakes in Winnebago County before flowing into Lake Winnebago. The waters located in the Upper Fox and Wolf River Basins are impaired due to excess phosphorus and total suspended solids. Addressing water quality impairments in the Upper Fox and Wolf basins is necessary to restore water quality. Currently the development of a TMDL for the Upper Fox and Wolf River Basin is in progress. A draft list of impaired waters and subbasins for the TMDL has been created.

An initial stakeholder meeting for the Upper Fox and Wolf River Basin TMDL was held on September 17, 2014. A second stakeholder meeting was held on June 15, 2016 and a third stakeholder meeting was held on 8/23/2017. The Draft SWAT and Lake Model reports were out for public comment period until 10/28/2016. The next project steps are to draft allocations, hold

a stakeholder meeting to discuss allocations and draft TMDL, and then hold a public hearing on the draft TMDL.

Additional information on the Upper Fox and Wolf River Basin TMDL process can be found at http://dnr.wi.gov/topic/tmdls/

2.1.4 Groundwater

The major sources of groundwater aquifers in Outagamie County are the St. Peter Sandstone of Ordovician age and the Sandstones of the Upper Cambrian Series. Where they are sufficiently thick, glacial sand and gravel are an important source of groundwater.

Groundwater in the county is under water table and artesian conditions. The source of the groundwater is precipitation that falls on the surface and infiltrates downward into the underlying materials. Regional movement of the groundwater in the eastern third of the county is controlled by the bedrock structure, and the discharge is toward the east and south. Throughout the rest of the county, the movement of water is controlled mainly by bedrock and surface topography, and the water moves toward streams and bedrock valleys.

The depth to groundwater table is usually not far below the surface, generally less than 50 feet. In the northwestern quarter of the county, groundwater is mostly within 20 feet of the surface. The risk for groundwater contamination is low for most of the county except for the northeast corner of the county.

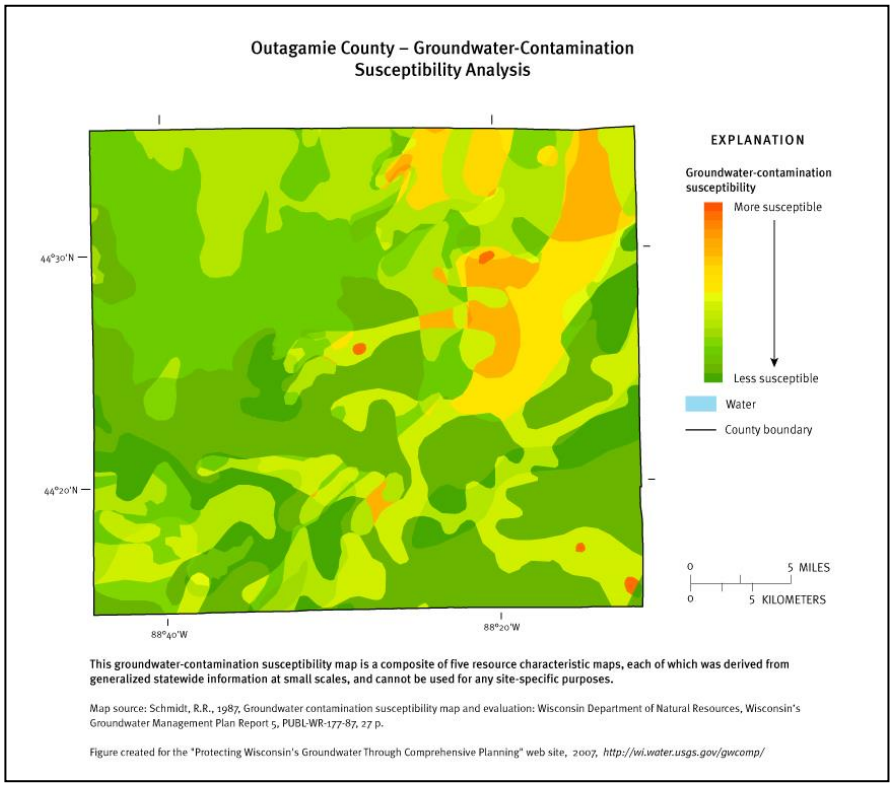

FIGURE 8. GROUNDWATER CONTAMINATION SUSCEPTIBILITY-OUTAGAMIE COUNTY

2.1.5 Wetlands

Wetlands occupy about 19 percent of the land area of the County. This acreage includes those areas that are very sparsely wooded, inland shallow fresh marshes, inland deep fresh marshes, shrub swamps, and bogs. It does not include those areas considered wet soils, which have been drained for agricultural use or used without drainage as pasture. These wet soils may produce such crops as agricultural row crops, mint, lawn sod and vegetables.

In addition to providing habitat for fish, waterfowl, and other wildlife species, the remaining wetlands are important for the recharge of aquifers and the protection of groundwater quality. They are extremely efficient at trapping and filtering out nutrients and sediments contained in runoff and they provide highly effective flood storage areas. It is critical that the remaining wetland resources in Outagamie County be protected from further destruction. For the protection of wetlands adjacent to lakes and rivers, technical and financial resources for streambanks and shoreline erosion control measures need to be expanded.

2.2 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 Outagamie County consists mostly of soils derived either from material deposited by glaciers or from material deposited as lacustrine sediment. The lacustrine sediment is mainly silt and fine sand found mostly along major river systems of the Wolf, Embarrass, Shioc, Black Creek, Bear Creek, and Rat

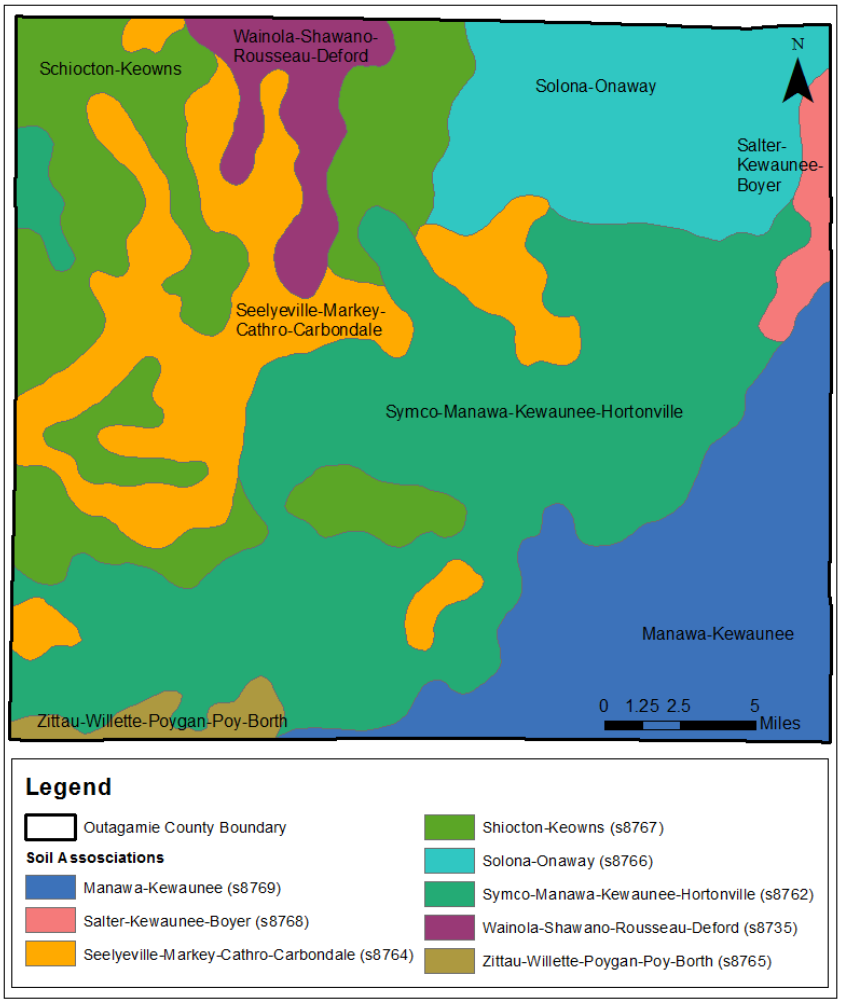

FIGURE 9. GENERAL SOIL ASSOCIATIONS OUTAGAMIE COUNTY.

Rivers. An area about 10 miles wide covered with reddish loam to clay loam glacial drift extends from the northeast corner of the county to the southwest corner. Soils in this area are gently sloping to moderately steep. The southeastern part of the county is covered with reddish clayey lacustrine sediment that was deposited in Glacial Lake Oshkosh. This area is nearly level. There are 85 different soil types found throughout Outagamie County. These are grouped into 7 major soil associations that have distinctive soil patterns, relief, and drainage factors. The Outagamie 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.

2.3 Land Resources

2.3.1 Woodlands

Outagamie County was entirely forested before settlement took place. The northern part was mainly mixed conifer-northern hardwood forest and the southern part, as well as areas extending north in the center of the county, was a central hardwood forest. Scattered low areas were covered with various sedges, grasses, willows, and tag alder. At present the forests of Outagamie County occupy about 83,120 acres or approximately 20 percent of the total land acres. Of the timber types present, swamp hardwoods are the predominate type. This type, along with northern hardwoods and oak/hickory comprise the majority of commercial forests in the County.

Although the woodland acreage of the County is relatively small, it provides a considerable source of timber and related products for private use. The woodlands are also very important in terms of providing habitat for a variety of wildlife species. More importantly, from an agricultural perspective, are the soil conservation benefits from wind and water erosion reduction. Improved woodland management will be necessary in order to maintain these benefits. Programs that promote tree planting and sustained management of woodland resources help landowners accomplish this objective. These include the federal Conservation Reserve program and the Wisconsin Managed Forest Law Program.

A disturbing trend affecting the woodland resources in the county comes from development pressures that result in fragmentation or outright destruction of wooded areas. Protection is needed through effective implementation of land use planning.

2.3.2 County Parks, Forests, Natural Areas and Other Lands

Natural Areas

Hortonville Bog State Natural Area

Hortonville Bog State Natural Area is located 4.4 miles north of Hortonville on Hwy M. The state natural area is located in two watersheds; WR09-North Branch and Mainstem Embarrass River, and WR12-Wolf River/New London and Bear Creek. The majority of the area is located

in WR12. Hortonville Bog is an open ericaceous bog with a very deep sphagnum layer. Although there is no open water, the bog is very spongy.

View Ridge Natural Area

A 34 acre area for rustic hiking and bird watching with no facilities. The natural area is located east of New London, Wisconsin off Hwy S. on Allcan Rd.

Nature Center/Preserves

Gordon Bubolz Nature Preserve

Gordon Bubolz Nature Preserve is located just north of Appleton off of North Lyndale Dr. The preserve in 725 acres in size and offers 8.5 miles of seasonal trails.

Mosquito Hill Nature Center

The Mosquito Hill Nature Center is just east of New London. Mosquito Hill is a 430-acre environmental education center.

County Parks

Plamann Park

Plamann Park has 257 acres of scenic hills and trails. The park is located north of Appleton, WI between N Meade St and N Ballard Rd. The park provides many recreational opportunities such as sledding, cross country ski trails, hiking trails, disc golf course, children's farm, baseball diamonds and more.

Barker Park

A small 27 acre picnic area offering Wolf River access and handicap accessible fishing docs.

2.4 Plant and Animal Resources

2.4.1 Wildlife Resources

Although many types of native wildlife populations suffered as European settlers continued to change the landscape of Wisconsin, others actually increased. They thrived in the habitats, which farming and logging provided. White-tailed deer populations in the thick northern forests remained low during the logging heyday because of intense exploitation. As the forests re-generated with lush, young growth and as early farming provided a good mix of field and forest, the deer numbers swelled. When central Wisconsin farms grew perennial crops of bluegrass as a seed source, prairie chickens thrived. But it wasn't long before these habitats were altered and the prairie chicken populations dropped. Still other wildlife, such as crows, blackbirds, and alien house sparrows, starlings, and rodents prospered all too well by their association with people.

Hunters and early conservationists began noticing the exploitation of Wisconsin's natural resources around the 1870's. They slowly worked toward regulating the use of natural resources as they enacted laws to protect wildlife populations and woodlands. Wildlife management was

considered increasingly necessary since people had greatly altered natural landscapes, but the needs of wildlife frequently conflicted with many human land uses. Efforts to restore some populations of extirpated wildlife were undertaken throughout the 1900's by reintroducing them into their former haunts. Some successful attempts at restocking include the wild turkey, trumpeter swan, American (pine) marten and fisher.

2.4.2 Wildlife Areas

Deer Creek Wildlife Area

Deer Creek Wildlife Area is located in the northwest corner Outagamie County, 30 miles northwest of Appleton. The property totals 1,490 acres, approximately 2 miles east of the Embarrass River to which it drains, and 3 miles west of the Wolf River. Area acquisition began in 1942, with the purchase of 440 acres from Outagamie County. Most of the acquisition occurred between 1957 and 1965. The wildlife area is surrounded primarily by small farms, but extensive wooded areas exist to the north and west. The center of the property has peat soils, ineffectively drained by a series of about 6 miles of drainage ditches. Around the perimeter are gently rolling uplands of fine and very fine sands.

Mack Wildlife Area

Mack Wildlife Area is in central Outagamie County in the Town of Bovina. The property lies 2 miles northeast of Shiocton and 14 miles northwest of Appleton. The area was purchased as a single unit in 1943, and acquisition is complete at 1,357.9 acres.

The area is surrounded by privately owned dairy and cash-crop farms. A large lowland forest continues beyond the wildlife area boundary to the southeast. The area has a high water table, is very flat, and contains some ditches remaining from historic farming practices.

In 1991, the Wisconsin Department of Transportation (WDOT) purchased a 480 acre wetland restoration site just north of the Mack Wildlife Area. The project was established as a mitigation bank for transportation projects primarily related to the reconstruction of U.S. 45 in the New London area.

2.4.3 Threatened and Endangered Species

In 1985, Wisconsin's Natural Heritage Inventory (NHI) program was established by Wisconsin legislature in part of an international network of inventory programs. The program is responsible for maintaining data on locations and status of rare species, natural communities, and natural features throughout the state. The WDNR Bureau of Endangered Species maintains a list of the rare species, natural communities, and natural features at the town-range level that can be found at http://dnr.wi.gov/topic/NHI/data.asp . According to this list there are two species, the Karner Blue Butterfly and Snuffbox, listed on the federally endangered species list that have been documented in Outagamie County. The Henslow's Sparrow, Black Tern, and Salamander

Mussel also documented in the county are on the federal list of species of concern. Outagamie County is also home to several other rare species of birds, plants, reptiles, fish, mammals, and insects.

In addition to the plant and animal species listed in the NHI, Outagamie County contains several important natural community types that may provide critical habitat for rare, threatened, and endangered species. These natural communities include: Northern Dry Forest, Northern Mesic Forest, Northern Sedge Meadow, Northern Tamarack Swamp, Northern Wet Forest, Northern Wet-mesic Forest, Open Bog, Southern Dry-mesic Forest, Southern Hardwood Swamp, Southern Mesic Forest, Wild Rice Marsh, Alder Thicket, Emergent Marsh, Floodplain Forest, Hardwood Swamp, and Black Spruce Swamp.

2.4.4 Invasive and Exotic Species

Invasive and exotic species are non-native plants, animals, and pathogens to an ecosystem whose introduction causes or is likely to cause harm. Invasives often out compete native species and negatively impact native habitat. Outagamie County is impacted by several aquatic and terrestrial invasive species such Emerald Ash Borer, Garlic Mustard, Zebra Mussel, Rusty Crayfish, Round Goby, Reed Canary Grass, and Buckthorn. Outagamie County should actively educate its citizens on the negative impacts of invasive species, proper removal methods, as well as how to prevent the spread of invasives.

3.0 Estimated Rural Nonpoint Source Pollutant Loading and Priority Watershed Reduction Goals.

Total suspended sediment (TSS) and phosphorus (P) are accepted by natural resource professionals to be the two components of nonpoint or runoff pollution that are most detrimental to surface waters. These pollutants degrade water quality and impair recreational and biological uses. The principal rural nonpoint sources of pollution to the surface waters of Outagamie County are:

- Sediment delivery from cropland and construction sites;
- Sediment eroded from shorelines, streambanks, and drainage ditches;
- Phosphorus contaminated runoff from barnyards, livestock feeding areas, and pastured land.
- Phosphorus contaminated runoff from fertilizer and manure applications to cropland.

3.1 Sediment Delivery

Sediment adversely impacts water resources in a number of ways. Suspended sediment decreases water clarity making it difficult for many aquatic species to find food. High sediment concentrations abrade fish gills making the fish more susceptible to disease. The sediment also affects light penetration reducing the ability of rooted aquatic plants to survive. Sediment serves

as the transport mechanism for a large portion of the total phosphorus loading to the county. Finally, sediment covers and eliminates the bottom habitat critical for aquatic insects and fish spawning. The major sources of sediment include cropland, streambank, shoreline, and construction site erosion.

Cropland Sediment Loading

Intensive agricultural practices have caused significant amounts of eroded soil to reach the rivers, lakes, streams and wetlands of Outagamie County and travel downstream. Cropland erosion (sheet, rill and gully) is the primary source of sediments that are carried downstream.

Streambank Erosion

Recent streambank inventories done on Plum Creek, Apple Creek, and Kankapot Creek indicate that streambank erosion is also contributing to a significant portion of the sediment load in Outagamie County.

T, Soil Loss, and Sediment Delivery

The relationship between these three factors is sometimes misunderstood, and both "T" Value and soil loss have been greatly misused over the years. Below are the definitions of each followed by an explanation of how these values were considered in this document.

"T" Value

"T", or Tolerable Soil Loss, is an estimate of the amount of soil that can be lost from a cropped field on a continual basis and still retain an adequate level of soil productivity. This value is strictly based on soil type.

Soil Loss

This is the estimated amount of soil that is moving from one place to another on the landscape. It is calculated using the Revised Universal Soil Loss Equation and it provides a value that can be compared to "T".

Sediment Delivery

This is the estimated amount of soil that is actually being delivered to surface water. Therefore, it is the most relevant in terms of water quality. Within the Lower Fox TMDL and Upper Fox and Wolf TMDL, sediment delivery was estimated using the Soil and Water Assessment Tool (SWAT).

The "T" value has been used as a standard in past state and federal programs. These programs were most concerned with maintaining the long-term productivity of the soil. Recent program objectives are more interested in protecting the surface waters of the state, which are held in public trust. In order to protect the surface waters we must think in terms of sediment delivery, not "T" values. The average "T" value for soils in Outagamie County is approximately 4.1 Tons/Acre/Year. However, to achieve water quality goals, the standard may be measured in terms of tons per acre per year actually delivered to the streams. Figures 10 and 11 below show SWAT modeled TSS yield for subwatersheds in the Lower Fox, Upper Fox, and Wolf Basins.

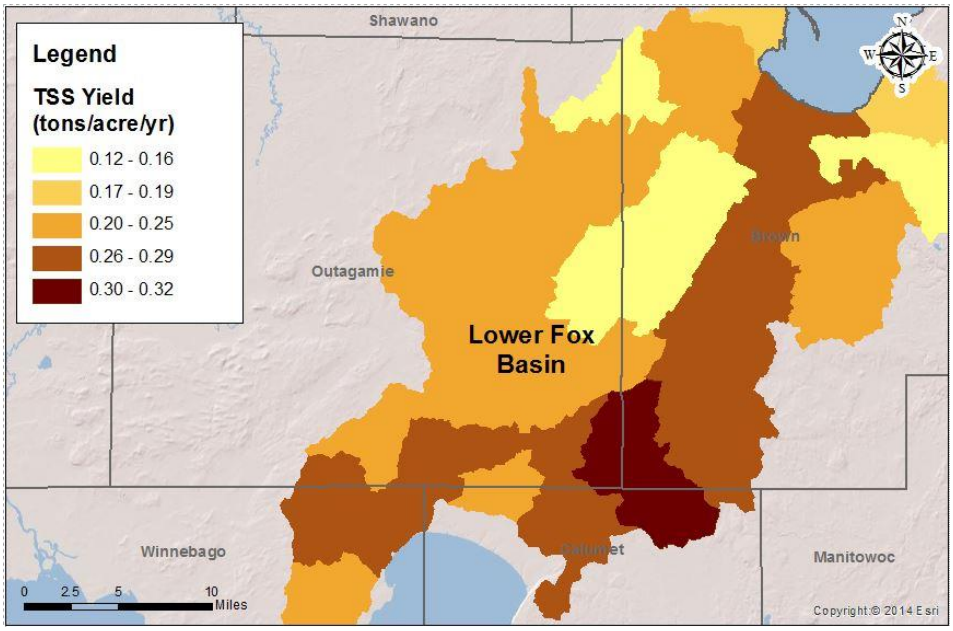

FIGURE 10. LOWER FOX TMDL SWAT MODEL TSS YIELDS IN LOWER FOX BASIN.

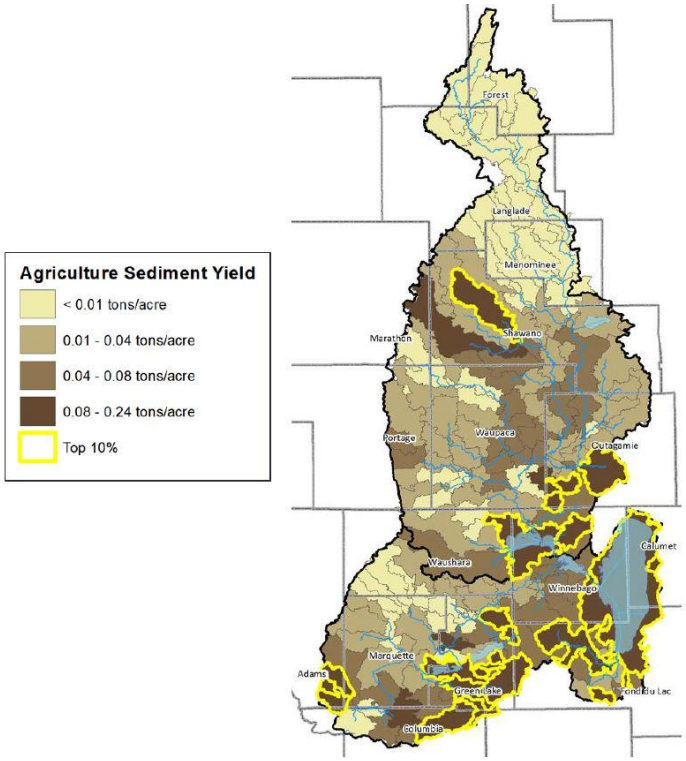

FIGURE 11. DRAFT UPPER FOX AND WOLF BASIN TMDL SWAT MODEL TSS YIELDS IN UPPER FOX AND WOLF BASIN.

TMDL Watershed Sediment Reduction Goals

The Lower Fox River TMDL was approved by EPA setting phosphorus and sediment reduction goals for each subwatershed in the Lower Fox River Basin. The percent reduction needed for each subwatershed is listed below. These goals will be accomplished primarily through the widespread use of residue management practices, which reduce soil loss values on most fields to T or below, as well as with other practices including cover crops, grassed waterways, streambank and shoreline stabilization, and encouraging buffers where needed.

Lower Fox River TMDL Sediment Reduction Goals:

Apple Creek: Total 51.2%, Agriculture 56.1%

Ashwaubenon Creek: Total 41.2%, Agriculture 39.7 %

Dutchman Creek: Total 38.5%, Agriculture 35.8%

Plum Creek: Total 70.4%, Agriculture 74.6%

Kankapot Creek: Total 62.2%, Agriculture 67.4%

Garners Creek: Total 49.0%, Agriculture 32.4%

Mud Creek: Total 28.1%, Agriculture 8.8%

Duck Creek: Total 55.0%, Agriculture 58.6%

Sediment Delivery from Construction Sites

Soil erosion and sediment delivery in urban areas of the County originate primarily at construction sites where large areas of exposed soil remain for extended periods of time and are subject to washing from snow melt and rainfall events. University research has shown that soil loss from construction sites range from 10 to 50 tons or more of silt and sediment per acre.

Urban sources of pollution are addressed through the enforcement of county and city zoning ordinances. The dense urban areas of Outagamie County are primarily located in the southern one third of the county and are classified as Phase II MS4 Permitted municipalities by the Wisconsin Department of Natural Resources. Phase II MS4 municipalities have to obtain a permit to discharge runoff to waters of the state. The permit covers discharges from construction sites, post-construction sites, existing storm water facilities and illicit discharges to name a few. Pollutant reduction guidelines are also a part of the permit, with phosphorous and sediment being the current pollutants of concern. The Phase II MS4 municipalities were required to limit their sediment discharge by 20% in 2008 and 40% by 2013. The 2013 MS4 annual report shows that Outagamie County met the 40% reduction in sediment discharge from urban areas. The phosphorous limits or reductions have not been established at the time of this report.

The remaining townships of Outagamie County that are not Phase II MS4 permit holders are under the authority of the county's storm water and erosion control ordinances. The ordinances require an 80% reduction in sediment during construction and post construction. The construction site allowable discharge is 5 tons/acre which mimics the tolerable agricultural sediment loss numbers. The post construction reduction numbers are in the tens of pounds/acre realm which is significantly less than the tolerable agricultural sediment loss numbers.

Overall reduction in sediment delivery from changes in land use of agricultural to residential/commercial have not been calculated. As mentioned above, the construction site ordinance requires limiting the construction sites to agricultural goals. Construction sites that are stabilized with storm water facilities installed reduce the sediment loading to less than 1% of the current agricultural goals.

3.2 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, which promotes macrophyte and algae growth. Excessive macrophyte growth causes severe oxygen fluctuations in the streams. 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. Also, excessive plant growth in the streams can restrict water flow and increase sedimentation rates.

High nutrient loading also causes nuisance algae blooms. The algae affects aesthetics, interferes with boating, swimming, and other recreational use of the waters, and further impacts water quality and aquatic life. Certain varieties of algae can be toxic and can sicken and kill humans and pets. In addition, when the algae and other undesirable aquatic plants die, they consume oxygen during decomposition that can cause fish kills in both winter and summer. Estimated levels of phosphorus loading in the Lower Fox, Upper Fox, and Wolf Basins are shown in Figure 12 and 13.

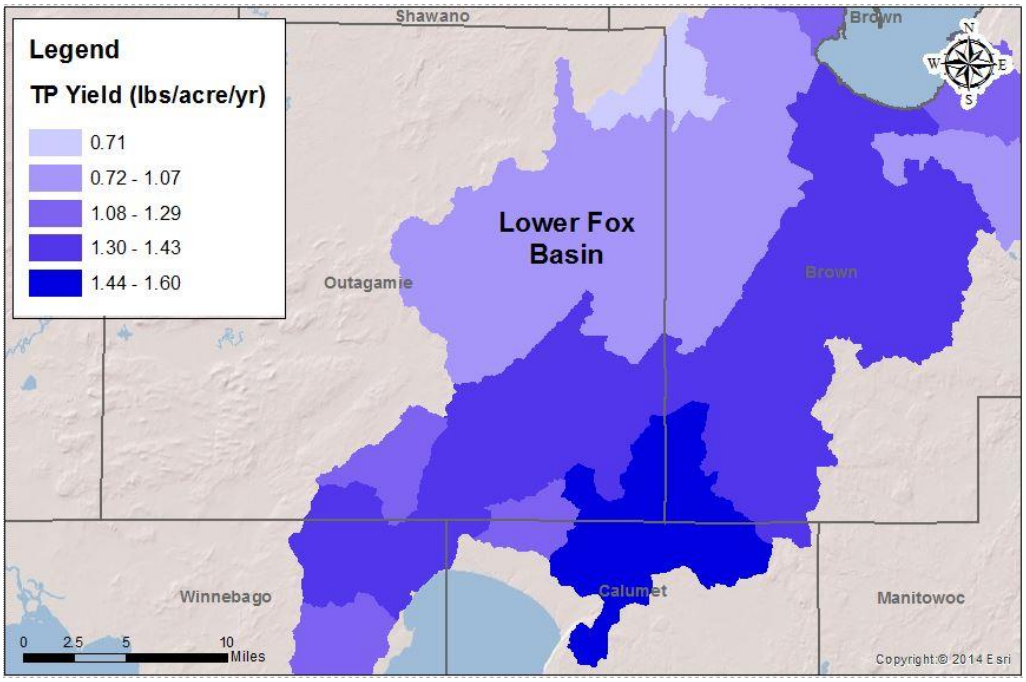

FIGURE 12. LOWER FOX TMDL SWAT MODELED PHOSPHORUS LOAD ESTIMATES.

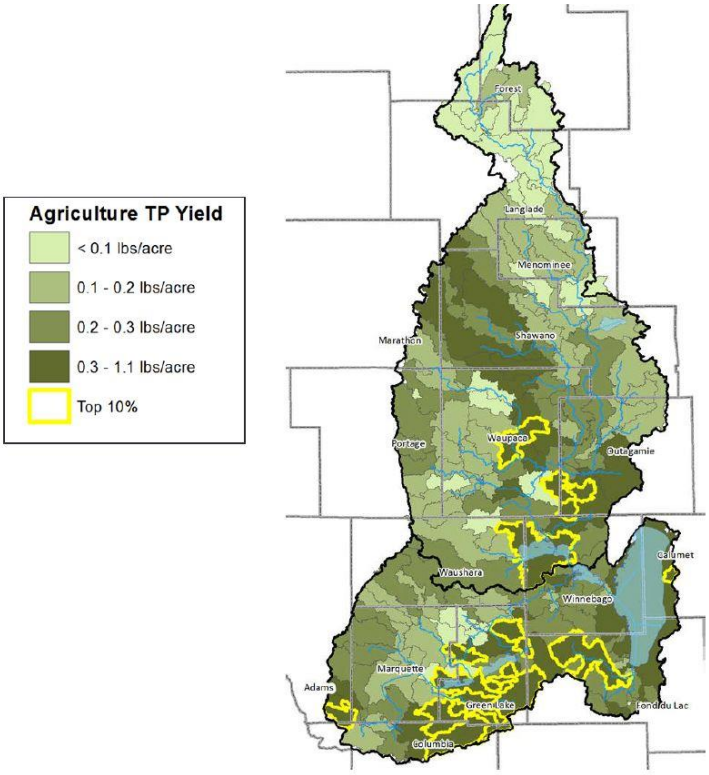

FIGURE 13. DRAFT UPPER FOX AND WOLF TMDL SWAT MODELED PHOSPHORUS LOADING ESTIMATES.

TMDL Watershed Phosphorus Reduction Goals

The Lower Fox River TMDL approved in 2012 set phosphorus and sediment reduction goals for the subwatersheds in the Lower Fox River Basin. Percent reduction goals for each subwatershed to meet TMDL limits are listed below.

Lower Fox River TMDL Total Phosphorus Reduction Goals:

Apple Creek: Total 64.2%, Agriculture 78.6%

Ashwaubenon Creek: Total 63.1%, Agriculture 74.0 %

Dutchman Creek: Total 59.0%, Agriculture 76.4%

Plum Creek: Total 77.2%, Agriculture 86.0%

Kankapot Creek: Total 72.3%, Agriculture 81.8%

Garners Creek: Total 55.1%, Agriculture 63.1%

Mud Creek: Total 35.5%, Agriculture 39.0%

Duck Creek: Total 63.2%, Agriculture 76.9%

Phosphorus reductions will be accomplished primarily through sediment reduction, which in turn reduces the transported phosphorus attached to the soil particles, with additional practices targeted to reduce dissolved Phosphorus. Widespread acceptance of nutrient and pesticide management practices and barnyard runoff control systems will also be needed to achieve desired reduction. Reduced spreading of livestock waste during frozen or snow periods will also be targeted by encouraging storage of livestock waste during these high risk periods. Other practices identified through the TMDL planning and implementation process include:

- Reduced Phosphorus in dairy cow feed rations by 25%.
- Manure Incorporation (increase proportion incorporated within 72 hours).
- Nutrient Management (stabilize soil-test P at average of 40 ppm).
- Conservation tillage.
- Cover crops (on low residue fields and fields with high slope).
- Vegetative buffer strips.
- Encourage biofuel crops.
- Grassed Waterways and Water and Sediment Control Basins.
- Streambank Restoration.
- Identifying and trying innovative technologies such as constructed treatment wetlands, saturated buffers, low disturbance manure injection, interseeding cover crops, phosphorus removal structures, etc.

4.0 Plan Development and Public Participation

4.1 Related Resource Management Plans

The following plans were instrumental in development of this plan:

- Outagamie County Farmland Preservation Plan (2012)
- Total Maximum Daily Load and Watershed Management Plan for Total Phosphorus and Total Suspended Solids in the Lower Fox River Basin and Lower Green Bay (2012)
- Nonpoint Source Implementation Plan for the Plum and Kankapot Creeks Watersheds (2015)
- Nonpoint Source Implementation Plan for the Upper Duck Creek Watershed (2016)
- Nonpoint Source Implementation Plan for the Apple Creek Watershed (2017)

4.2 Public Participation

Outagamie LCD is currently active in several outreach committees and groups that cover the Lower Fox River Basin, and the Wolf River Basin as part of the TMDL process. Outagamie County LCD is a participant in the Lower Fox Outreach Committee that meets quarterly and the Lower Fox TMDL Agricultural Committee that meets bi-monthly. These two committees consist of stakeholders involved in implementation of the Lower Fox River TMDL. Outagamie County LCD is also involved in the Lower Fox Demonstration Farm Network and Farmer Round Table groups active in the Lower Fox. The Outagamie County Land Conservation Department has taken into account stakeholder input given at these committee and group meetings in the process of developing the comprehensive plan. Outagamie County also plans to participate in similar committees and outreach groups in the Upper Fox-Wolf Basin once the TMDL is finished. Table 2 summarizes the Farmer Roundtable and Watershed meetings that have been held in 2017.

TABLE 2. SUMMARY OF WATERSHED MEETINGS HELD IN 2017.

Date	Event	Location	Attendees	Agenda/Meeting Summary
2/2/2017	Lower Fox Watershed Farmer Round Table	Liberty Hall, Kimberly, WI	93 Total (50 Farmers, 43 Agency/Crop Consultants)	Presentations on soil health, available equipment in Lower Fox, and adaptive management pilot project. Farmer Panel and small group discussions to gain input on resource concerns and program direction
3/8/2017	Duck Creek Sub Watershed Meeting	Osborn Town Hall, Seymour, WI	13 producers, 1 crop consultant	Presentation on soil health, Demonstration Farm Practices, and water quality in Lower Fox. Group discussion about Conservation Practices and resource concerns.

Date	Event	Location	Attendees	Agenda/Meeting Summary
3/21/2017	Apple Creek Sub Watershed Meeting	Freedom Town Hall, Freedom, WI	7 producers, 2 crop consultants	Presentation on soil health, Demonstration Farm Practices, and water quality in Lower Fox. Group discussion about Conservation Practices and resource concerns.
3/13/2017	Plum/Kankapot Subwatershed Meeting	The Marq, De Pere, WI	5 producers, 1 crop consultant	Presentation on soil health, Demonstration Farm Practices, and water quality in Lower Fox. Group discussion about Conservation Practices and resource concerns.

Participants in the Lower Fox Round Table event held in February 2017 were surveyed on several topics relating to conservation. Participants were asked about preferred outreach and education methods, interest in farmer led groups and demonstration events, likeliness to adopt conservation practices, and what types of practices they were willing to try. Selected results from the survey are shown in Appendix D.

In 2014, the Outagamie County Land Conservation Department partnered with the Alliance for the Great Lakes, local consultants/agronomists and Brown County on a survey of agricultural landowners in the Lower Fox Basin in 2014 to better understand the farming community regarding conservation, nutrient management, and water quality. The survey was done using both paper surveys and one on one interviews. There were 108 interviews conducted and 69 questionnaires completed. A summary of the study's results can be found in Appendix E. Results from this survey were also used in the development of this plan.

The Land Conservation Department has also been an active participant and member of the Save the Bay effort, originally started by Congressman Reid Ribble and now being carried on by Congressman Mike Gallagher. This effort brings together a broad mix of stakeholders within the Lower Fox and Wolf River Basins including farmers, industry leaders, government officials, university staff, and the general public to discuss the impacts affecting the Bay and approaches to addressing non-point. The group meets two times each year and continues to provide valuable input towards non-point implementation in the basins.

4.3 Public Hearing

Outagamie County held a public hearing in conjunction with a monthly Land Conservation Committee Meeting on October 24, 2017. The plan will subsequently be presented to the full County Board on February 6th of 2018.

4.4 How We Work with Other State and Federal Agencies

Outagamie County partners with state, local, and federal agencies in managing its natural resources. Outagamie County is currently working closely with the WDNR, USGS, USFWS, the neighboring counties of Brown, Calumet, and Winnebago, and Oneida Nation to implement the Lower Fox River TMDL as well as to develop a multi- county GIS tracking system for implementation. Outagamie County LCD also has an operational agreement with the NRCS.

In addition to working with other government agencies, the county is also working with several local nonprofit agencies in the implementation of the Lower Fox River TMDL including: Fox-Wolf Watershed Alliance, The Nature Conservancy, Alliance for the Great Lakes, The Sand County Foundation, and Northeast Stormwater Consortium.

4.5 Program Integration

The goals of this plan will be achieved through full implementation of all Federal, State, and County Soil and Water Conservation Programs. The following are brief descriptions of each of the applicable programs.

- **Section 319 funding- Nine Key Element Plans**

The EPA has identified nine key elements that are critical for achieving improvements in water quality. The EPA requires that these nine elements be addressed in watershed plans funded with incremental Clean Water Act section 319 funds. Plans must address the nine elements (see below) if they are developed in support of a section 319- funded project.

Summary of the Nine Minimum Elements:

1. Identify the causes and sources
2. Estimate pollutant loading into the watershed and the expected load reductions
3. Describe management measures that will achieve load reductions and targeted critical areas
4. Estimate the amounts of technical and financial assistance and the relevant authorities needed to implement the plan
5. Develop an information/education component
6. Develop a project schedule
7. Develop the interim, measurable milestones
8. Identify indicators to measure progress and make adjustments
9. Develop a monitoring component

Outagamie County Land Conservation has been working on developing nine key element watershed plans for subwatersheds in the Lower Fox River Basin. The Plum and Kankapot Watershed plan received DNR/EPA approval in January 2015. Implementation began in spring of 2015 and will continue until 2025. The Upper Duck Creek Watershed plan was approved in spring of 2016. Implementation began in 2017 and will continue until 2027. Apple Creek

watershed plan was approved in August of 2017; implementation is expected to begin in 2018. Outagamie County will continue developing 9 Key Element watershed plans for subwatersheds in the Lower Fox River and for the Upper Fox/Wolf River once a TMDL is approved to help guide implementation.

- **Great Lakes Restoration Initiative (GLRI)**

The Great Lakes Restoration Initiative was launched in 2010 to accelerate efforts to protect and restore the Great Lakes. The three key priorities within the focus area are: accelerating the cleanup Areas of Concern, Reducing harmful algae in three priority watersheds (Lower Fox River, Wisconsin; Saginaw River, Michigan; Maumee River, Ohio), and preventing the introduction of new invasive species. The EPA awards GLRI grants to state and local agencies working to improve and restore the Great Lakes. To date, Outagamie County has received 3 separate GLRI grants to implement watershed initiatives in the Lower Fox Basin totaling over $6 million in the last several years.

- **Working Lands Initiative (WLI)**

Program participants receiving credit through the WLI are required to meet soil and water conservation standards consistent with NR151. Outagamie County is committed to implementing the program and will inventory and determine conservation compliance for all participants and will periodically spot check compliance for existing enrollees.

This Wisconsin DATCP program requires participants to reduce soil loss from individual crop fields below the T-value. Outagamie County will continue to support participation in this program and monitor soil loss. The WLI standards were revised in 2010 and are on file at the LCD Office and on the Outagamie County Website.

- **Wildlife Habitat Incentives Program (WHIP)**

The Agricultural Act of 2014 repealed the Wildlife Habitat Incentive Program. NRCS will continue to support existing active WHIP contracts entered into prior to passage of the Agricultural Act of 2014, using the rules and policy in effect at the time of contract obligations. Portions of the WHIP were rolled into the Environmental Quality Incentives Program (EQIP).

- **Wildlife Damage Abatement And Claim Program**

The Wildlife Damage Abatement and Claim Program provides abatement and claim assistance to landowners receiving wildlife damage. The damage must be caused by deer, bear, geese, or turkeys to commercial seedlings, orchard trees, agricultural crops, nursery stock, apiaries, or livestock. Landowners are eligible for abatement practices such as fencing, shooting permits, scare devices, etc. Landowners may be reimbursed for their crop losses up to a maximum cap after deductions.

➢ **USDA – Environmental Quality Incentive Program (EQIP)**

EQIP uses a local workgroup of Federal, State and County Employees to determine priorities in order to distribute federal funds to help cost share conservation practices. It is a voluntary program designed to meet local resource concerns. The Land Conservation Department has worked very closely with NRCS through the EQIP. The LCD provides most of the technical assistance to landowners who install practices through EQIP. The utilization of Contribution Agreements has allowed the Department to replace equipment and offset diminishing State staffing grants. For more information, go to http://www.wi.nrcs.usda.gov

➢ **USDA - Conservation Reserve Program (CRP)**

The Conservation Reserve Program was developed to assist landowners in voluntarily converting highly erodible and environmentally sensitive cropland from the production of annual crops to less intensive uses such as permanent grass, legumes, forbs, wildlife cover or trees. Regular sign-up, in most cases, involves offers of entire fields. CRP normally has a 10 or 15 year lease payment. Producers can offer land for CRP general sign-up enrollment only during designated sign-up periods. For information on upcoming sign-ups, contact the local FSA office.

Continuous sign-up is primarily for partial fields and small plots. The sign-up is ongoing and covers priority practices such as filter strips, riparian buffers, shelter belts, field windbreaks, grassed waterways and shallow water areas for wildlife. For information, go to: http://www.wi.nrcs.usda.gov or http://www.fsa.usda.gov/dafp/cepd/crp.htm .

➢ **USDA - Conservation Reserve Enhancement Program (CREP)**

CREP uses federal and state resources to safeguard environmentally sensitive land next to rivers and streams through the Conservation Reserve Program (CRP). Producers enrolled in CRP remove land from agricultural production and plant native grasses, trees, and other vegetation to improve water quality, soil, and wildlife habitat. CREP provides rental payments and other financial incentives to encourage producers to voluntarily enroll in 10- to 15-year CRP contracts. Participation in CREP has been somewhat limited in the County due to the rigid vegetation management requirements; however it's still a viable option for landowners who are willing to abide by the requirements.

➢ **Agricultural Conservation Easement Program (ACEP)**

The Agricultural Act of 2014 established the Agricultural Conservation Easement Program. It repealed FRPP, GRP, and WRP but does not affect the validity or terms of any contract, agreement or easement entered into prior to enactment. The Agricultural Conservation Easement Program provides financial and technical assistance to help conserve agricultural lands and wetlands and their related benefits.

- **Department of Natural Resources Wildlife Management**

The DNR Wildlife Management staff is committed to preserving, enhancing and restoring wildlife habitat and populations in Outagamie County. The staff is willing to provide technical assistance to the Land Conservation Department, and other governmental and private organizations.

The Wildlife Management staff may also provide assistance in the form of grant writing, cost sharing, and manpower for projects benefitting wildlife and wildlife habitats on public and private lands. An example of such a project would be the procuring of state turkey stamp and/or National Wild Turkey Federation funds to hire a Limited Term Employee to promote the installation of buffer strips along waterways.

- **Managed Forest Law (MFL)**

The goal of the Managed Forest Law (MFL) program is to encourage long-term sound forest management. MFL is a tax incentive program for industrial and non-industrial private woodland owners who manage their woodlands for forest products while also managing for water quality protection, wildlife habitat and public recreation. In return for following an approved management plan, property taxes are set at a lower rate.

5.0 Implementation Strategy for NR 151 Agricultural Nonpoint Performance Standards.

The following will discuss the Outagamie County Land Conservation Department (LCD) strategy for implementation of the NR 151 performance standards. Outagamie County takes a mostly voluntary approach with landowners to implement the state's performance standards with limited enforcement through the County's Agricultural Performance Standards and Livestock Waste Management Ordinance, the Farmland Preservation Program, and TMDL implementation. The implementation strategy details the methodologies that are employed to assure landowners are in compliance with the state mandated regulations. Landowners who do not voluntarily bring their sites into compliance are moved through a stepped process outlined within the County Ordinance.

TABLE 3. NR 151 AGRICULTURAL NONPOINT PERFORMANCE STANDARDS.

Performance Standard	Effective Date	Conservation Initiatives
NR. 151.02 Sheet, Rill and Wind Erosion performance standard. Control soil erosion to meet tolerable soil loss (T) calculated by RUSLE 2.	10/1/2002, Standard applies to pastures 7/1/2012.	Install contour farming, cover crops, less intensive crop rotations, diversions, field windbreaks, residue management, strip-cropping, and terrace systems. Related runoff controls: critical area stabilization, grade stabilization structures, sinkhole treatment, water and sediment control basins, grassed waterway systems.
NR 151.05 Manure storage facilities performance standards. Construct, maintain, and close manure storage facilities to prevent manure overflows and leaks.	10/1/2002	Meet NRCS standards for construction, maintenance, and closure using technical standards: 313 (waste storage facility), 360 (closure of waste impoundments), 634 (manure transfer standard).
NR 151.06. Clean water diversion performance standard. Divert clean water from feedlots, manure storage areas and barnyard areas.	10/1/2002	Install diversions, roof runoff systems, subsurface drains, and underground outlets.
NR 151.08 Manure Management Prohibitions a. No overflow from manure storage facilities. b. No unconfined manure stacks within the Water Quality Management Area. c. No direct runoff from feedlots and manure storage facilities. d. No unlimited access of livestock to shore lands that prevents maintenance of adequate sod cover.	10/1/2002	a. Design and construct facilities to technical standards, maintain facilities including adequate freeboard, repair or replace facilities as needed. b. Relocate manure piles, construct manure storage facilities. c. Install barnyard runoff control systems, including diversions, milking center waste control systems, relocating or abandoning animal feeding operations, roof runoff systems, sediment basins, subsurface drains, underground outlets, water and sediment control basin, wastewater treatment strips, well decommissioning. For manure storage facility runoff, see (a.) above. d. Install access roads and cattle crossings, animal trails and walkways, critical area stabilization, livestock fencing, livestock watering facilities, prescribed grazing, riparian buffers, streambank and shoreline protection.

Performance Standard	Effective Date	Conservation Initiatives
NR 151.07 Nutrient Management. All nutrients shall be applied in conformance with a nutrient management plan to control nutrient runoff into waters of the State.	1/1/2008	Develop and follow an annual nutrient management plan for applying fertilizer or manure according to NRCS 590 Standard. Base plans on soil tests conducted by a DATCP certified laboratory. Become qualified to prepare plan or use qualified planners. Apply nutrients according to UWEX recommendations for crops. Install additional conservation or management practices to reduce nutrient loading. Field verification of manure nutrient management.
NR 151.04 Phosphorus index performance standard. Croplands, pastures, and winter grazing areas shall average a phosphorus index of 6 or less over the accounting period and may not exceed a phosphorus index of 12 in any individual year in the accounting period.	1/1/2011, 7/1/2012 for pastures.	NRCS 590 Nutrient management plan.
NR 151.055 Process wastewater handling performance standard. There may be no significant discharge of process wastewater to waters of the state.	1/1/2011	Waste Storage, Waste Transfer, or Waste Treatment
NR 151.03 Tillage Setback Performance Standard. Prevent tillage operations from destroying streambanks and depositing soil directly into surface waters.	1/1/2011	Increase tillage setback. Enroll riparian areas in the Conservation Reserve Enhancement Program.

5.1 Information and Education Activities

Every effort is made to inform Outagamie County landowners about the required agricultural performance standards and prohibitions. Both county and federal staff provide landowners with the same consistent overview of the regulatory requirements.

This effort utilizes existing fact sheets in addition to any materials provided by the DNR and DATCP. The primary focus is on establishing a voluntary approach to meeting compliance. . See Chapter 6 for a detailed I & E work plan.

5.2 Priority Farm Strategy

Priority farms are defined as those farms that are in violation of state prohibitions and performance standards. These farms have: significant problems with manure management; croplands with excessive nutrient applications; or cropland with excessive rates of soil erosion.

Priority farms will be identified through the following prioritization process:

- Working Lands Initiative Program
- Complaints
- Land and livestock facilities in TMDL/9 Key Element watersheds
- Request from landowners
- Those sites as identified by field staff has having known runoff issues

Working Lands Initiative

In 2009, the Working Lands Initiative changed the Farmland Preservation Program to require conservation compliance with land and water conservations standards. There are six townships in the Farmland Preservation Zoning Districts in Outagamie County that participate in the program as well as on Agricultural Enterprise Area.

Implementation Strategy:

- Non-compliant participants are given a schedule of compliance and technical assistance to achieve compliance.
- Participants are assisted in applying for funding through EQIP/GLRI/SEG/TRM.
- Re-inspections of farms every four years.

TMDL Implementation Strategy

The Lower Fox TMLD is currently being implemented on sub-watershed scale basis (HUC 12). The subwatersheds are being implemented in order of highest nutrient and sediment loading rankings and availability of funding and staff. Additional 9 Key Element Plans for subwatersheds in the Lower Fox Basin will be developed as time and resources allow and will follow the Draft Lower Fox River Basin TMDL Implementation Schedule (Table 4). The county anticipates using this same process once the Upper Fox and Wolf River TMDL is approved as well.

9 Key Element Watershed Planning Process:

1. Inventory of subwatershed (cropland, barnyard, tile, culverts, etc.) through site visits, windshield surveys and GIS data analysis.
2. Model phosphorus and sediment loads by source using STEPL.

3. Identify priority farms and resource concerns using EVAAL[1] and ACPF[2] models. See Figure 14 & 15.
4. Data analysis and prepare plan.
5. Submit to EPA/WDNR for review.
6. Utilize watershed plan to secure funding and prioritize implementation of conservation practices.

TABLE 4. DRAFT LOWER FOX TMDL IMPLEMENTATION SCHEDULE.

Subwatershed Schedule		
Subwatershed	9 Key Element Plan	Implementation
Plum	2014	2015
Kankapot	2014	2015
Upper East	2015	2017
Upper Duck	2015	2017
Apple Creek	2016	2018
Lower East	2017	2018
Bower Creek	2018	
Lower Fox	2018	
Middle Duck	2018	
Lower Duck	2018	
Dutchman Creek	2019/2020	
Ashwaubenon Creek	2019/2020	
Baird Creek	TBD	
Lower Green Bay	TBD	
Garners Creek	TBD	
Neenah Slough	NA	
Mud Creek	TBD	

[1] Additional information on EVAAL can be found at http://dnr.wi.gov/topic/nonpoint/evaal.html.
[2]Additional information on ACPF can be found at http://northcentralwater.org/acpf/.

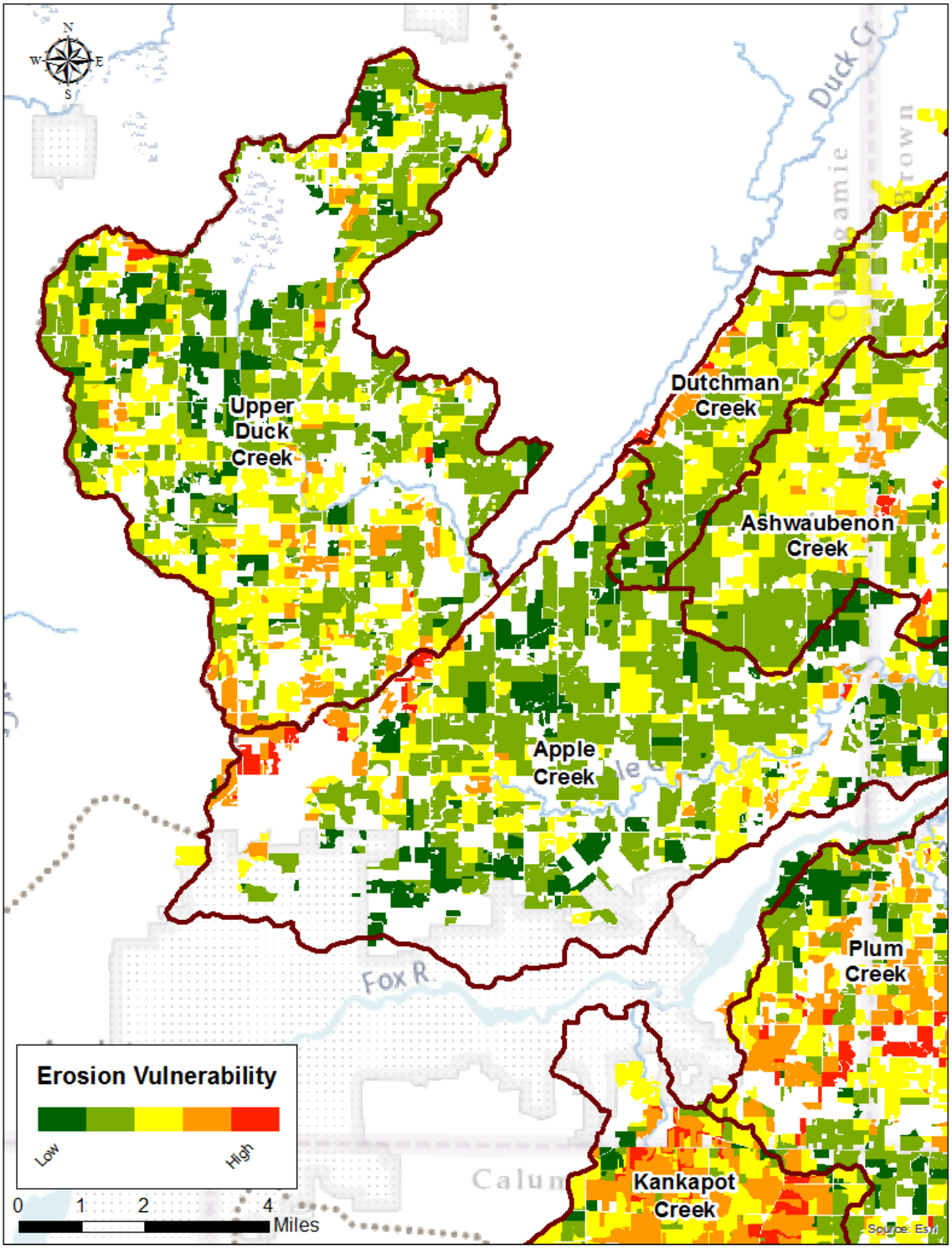

FIGURE 14. EROSION VULNERABILITY ASSESSMENT FOR AGRICULTURAL LANDS (EVAAL) MODEL RESULTS BY FIELD IN UPPER DUCK CREEK, APPLE CREEK, ASHWAUBENON CREEK, DUTCHMAN CREEK, PLUM CREEK, AND KANKAPOT CREEK WATERSHEDS.

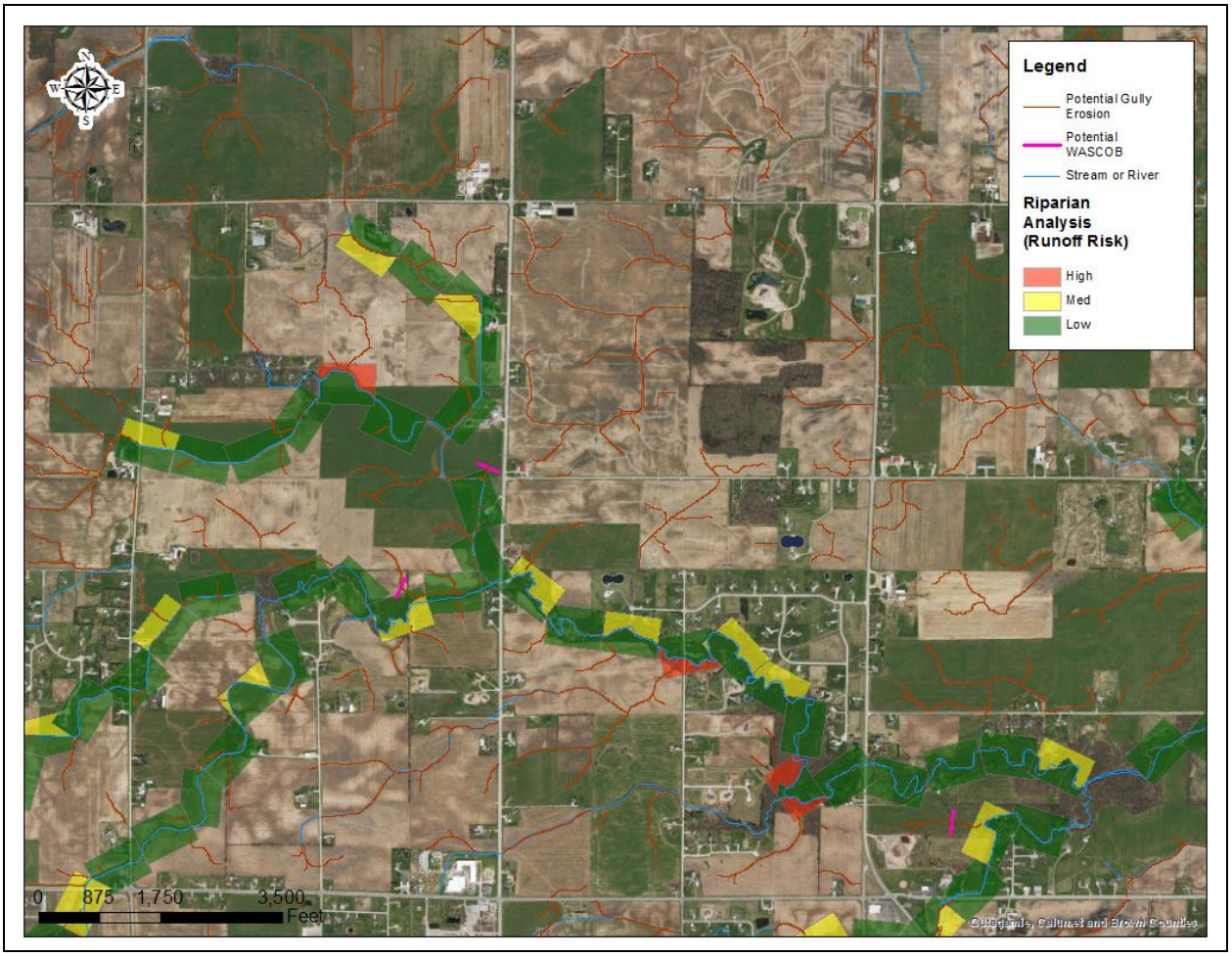

FIGURE 15. AGRICULTURAL CONSERVATION PLANNING FRAMEWORK (ACPF) ANALYSIS ON SELECTED PORTION OF APPLE CREEK WATERSHED.

5.3 Compliance and Enforcement of Standards and Prohibitions

Compliance/Noncompliance Notification Process

Compliance is determined by LCD staff and documented. Any landowners inventoried for compliance are notified in writing with the letter being delivered either through certified mail or hand delivered by Departmental staff. The following information is included in letters of compliance:

- Performance standard(s) or prohibitions(s) complied or not complied with
- Cropland or livestock facility status of existing or new operation

- Determination which best management practices or other corrective measures are needed to comply with performance standard(s) or prohibition(s) and whether or not they are eligible for cost sharing
- If cost sharing is available:
  - Written notice of available cost share offer
  - Offer to provide or coordinate technical assistance
  - A compliance schedule to meet the performance standard(s) or prohibition(s)
  - An explanation of possible consequences if the landowner or operator fails to comply with the provisions of the notices, including enforcement or loss of cost sharing or both
  - An explanation of state or local appeals procedures.
- If no cost sharing is available:
  - A compliance schedule to meet the performance standard(s) or prohibition(s)
  - An explanation of possible consequences if the landowner or operator fails to comply with the provisions of the notices
  - An explanation of state or local appeals procedures.
- If the landowner or operator is determined to be in compliance with the performance standard(s) or prohibition(s), compliance must be maintained by the existing landowner or operator and heirs or subsequent owners.

Enforcement Process

Should a landowner who is found to be out of compliance with state performance standards and prohibitions refuse technical and financial assistance from the Outagamie County Land Conservation Department, they will be notified by mail that they are subject to enforcement actions pursuant to NR 151.09. Enforcement action will be followed through entirely within Outagamie County through the Corporation Council Office with notice being issued pursuant to NR 151.09(5) or (6), or 151.095(6) or (7) which is also incorporated into the Outagamie County Livestock Waste Management and Agricultural Performance Standards Ordinance.

Appeals Process

Any person aggrieved by a decision such that it adversely impacts the substantial interests of that person may appeal a decision. The following can be appealed:

(1) Final compliance determination made in writing by the land conservation department.

(2) Final permit application decisions made in writing by the land conservation department.

(3) Final permit modification or denial decision made in writing by the land conservation department.

(4) Final permit suspension or revocation decisions made in writing by the land conservation department.

The County Land Conservation Committee shall hold a hearing within 45 days of a notice of appeal being filed. The County Land Conservation Committee may affirm or reverse in whole or part or it may modify the decision on the review. A written determination will be mailed or delivered, with this being the final determination.

5.4 Funding and Technical Assistance

The Outagamie County LCD utilizes various sources of funding for conservation practices including local, state, and federal cost share programs. Annual allocations from the DATCP are earmarked for conservation practices such as grassed waterways, grade stabilization structures, roof runoff management systems, underground outlets, sediment basins, filter strips, nutrient management, and diversions. A complete list of practices can be found in Appendix A.

The LCD and LCC will continue to participate and work with the Outagamie County Local Advisory Workgroup to identify program resource concerns. The criteria used to evaluate applications for cost share funds will be reviewed annually and revised as necessary by the LCC. Overall ranking criteria will be based on resource priorities, bringing farms in to compliance with the Ag Performance Standards, and funding availability.

The land conservation department with all its partners has been very successful in securing funds in the past to complete as many practices as the staff can manage. These efforts will continue to be a priority.

Technical assistance will be provided throughout project implementation in the form of the following:

- Conservation planning assistance
- Agronomy consulting
- Engineering survey, design, and construction oversight
- Certification of construction project to applicable standards
- Cost containment

Upon completion of the required practices, LCD staff will issue a letter of compliance to the landowner indicating the site has been brought into compliance with applicable performance standards and prohibitions.

5.5 Implementation Budget

Outagamie County LCD utilizes various sources of funding for conservation practices including local, state, and federal cost share programs. The land conservation department and its partners has been very successful in securing funds in the past to complete conservation projects.

Currently LCD staff are funded by four sources: Outagamie County tax levy, DATCP staffing grant, GLRI grant funds, and Large Scale TRM funds. Outagamie County has twelve full time staff positions: County Conservationist, Program Assistant, two Agronomist/Conservation Planners, five Conservation Technicians, Project Coordinator and a Watershed Planner/GIS Specialist. Table 5 shows grants awarded to Outagamie County LCD that will be used in the 2018 to 2028 comprehensive plan time period. Table 6 shows the total projected costs for the LCD for the next 10 years.

TABLE 5. GRANTS RECEIVED BY OUTAGAMIE COUNTY LCD FOR CONSERVATION IMPLEMENTATION.

Grant	Source	Timeframe	Amount	Funding Allocations
Targeting Outcome-Based Sediment Reduction in the Lower Fox Watershed.	GLRI	2015-2020	$2,370,002.00	Staff/Conservation Practices/Outreach/Water Quality Monitoring
Plum & Kankapot Creeks Watersheds Large-scale TRM Project	WDNR	2015-2019	$999,966.00	Staff/Conservation Practices
Nine Key Element Plan Development in the Lower Fox River Basin	WDNR	2017-2019	$121,176	Staff/Outreach
Upper Duck Creek TMDL Implementation Large-scale TRM Project	WDNR	2017-2019	$844,198.00	Staff/Conservation Practices
Priority Vegetative Filter Strip Installation in Upper Duck Creek	GLRI	2017-2020	$750,000.00	Staff/Conservation Practices/Outreach/ Water Quality Monitoring
		Total:	**$5,085,342.00**	

TABLE 6. PROJECTED COST SHARE DOLLARS AND STAFFING COSTS FOR 2018-2028.

Year	Capital Intensive Projects (LWRM, EQIP, DNR, CCRP, TRM, Other)	Staff Costs	Totals
2018	$1,969,856	$906,008	$2,875,864
2019	$2,009,253	$951,308	$2,960,561
2020	$2,049,438	$1,073,873	$3,083,126
2021	$2,090,427	$1,127,557	$3,217,984
2022	$2,132,236	$1,183,935	$3,316,171
2023	$2,174,881	$1,243,132	$3,418,013
2024	$2,218,379	$1,305,288	$3,523,667
2025	$2,262,747	$1,370,552	$3,633,299
2026	$2,308,002	$1,439,080	$3,747,082
2027	$2,354,162	$1,511,034	$3,865,196
2028	$2,401,245	$1,586,586	$3,987,831

5.6 Goals and Objectives

Using past workloads, data from watershed plans, input from the local watershed group meetings and citizen input, a work plan was developed (see Chapter 8). This work plan provides a balanced approach to implement Outagamie County's strategy to protect our natural resources. The work plan will be reviewed annually by the LCC. The LCC may adjust the work plan to take advantage of new and/or additional funding opportunities. Unless stated, the LCD will take the lead role in all actions.

Goals and Objectives

Goal 1: Protect and enhance the quality of our surface water, groundwater, and soils.

Objectives:

- Implementation of Agricultural Performance Standards.
- Manage crop nutrient sources in an economic and environmentally sound matter.
- Continue to work with partnering agencies to protect ground water sensitive areas in the county
- Continue administration of LWRM and TRM funding as well as assist in administration of Federal EQIP funding.
- Continue implementation of Lower Fox TMDL and 9 Key Element Watershed Plan development and Implementation.

Goal 2: Protect and enhance wetland and upland habitat.

Objectives:

- Restore wetland habitat where possible in the county.
- Identify programs to help restore and enhance upland habitat in the county.

Goal 3: Ensure the consistent implementation of the stormwater and erosion control ordinance in Outagamie County.

Objectives:

- Work with all units of the government in the county to assure the minimum requirements of the ordinances are met.
- Ensure county internal procedures for implementing ordinances are efficient and effective.

Goal 4: Partner with and involve citizens on soil and water conservation initiatives in rural and urban areas.

- Educate urban and rural residents on health and value of land and water resources and protection measures.
- Inform and educated county, municipal and town officials on the health an value of land and water resources in the county

- Educate and inform water users in the county about the threats posed by invasive and exotic species.

5.7 County Ordinances

5.7.1 Livestock Waste Management Ordinance Revision

In 1985, the Outagamie County Land Conservation Department created an Animal Waste Storage Ordinance. The purpose of this ordinance was to regulate all storage facilities of animal waste. The Ordinance was revised in 2007 to create the Agricultural Performance Standards and Livestock Waste Management Ordinance in order to implement the Agriculture Performance Standards. The revision included updating the appropriate construction standards and specifications and also addressed the Performance Standards where applicable. The Ordinance is on file at the LCD Office and on the Outagamie County Website.

5.7.2 Stormwater Management Ordinance

Uncontrolled stormwater runoff from land development and land redevelopment activity has a significant impact upon water resources and the health, safety and general welfare of the community, and diminishes the public enjoyment and use of natural resources. Specifically, uncontrolled stormwater runoff can:

(1) Degrade physical stream habitat by increasing stream bank erosion, increasing streambed scour, diminishing groundwater recharge, diminishing stream base flows and increasing stream temperature;

(2) Diminish the capacity of lakes and streams to support fish, aquatic life, recreational and water supply uses by increasing loadings of sediment, suspended solids, nutrients, heavy metals, bacteria, pathogens and other urban pollutants;

(3) Alter wetland communities by changing wetland hydrology and by increasing pollutant loads;

(4) Reduce the quality of groundwater by increasing pollutant loading;

(5) Threaten public health, safety, property, and general welfare by overtaxing storm sewers, watercourses, and other minor drainage facilities;

(6) Threaten public health, safety, property, and general welfare by increasing major flood peaks and volumes;

(7) Undermine floodplain management efforts by increasing the incidence and levels of flooding.

In order to address the negative impacts of stormwater on the environment, Outagamie County Adopted a Stormwater Management Ordinance in 2004 under the authority granted by S. 59.693, Wisconsin Statutes.

The general purpose of the Ordinance is to set forth long-term, post-construction stormwater requirements and criteria which will diminish the threats to public health, safety, welfare, and the aquatic environment due to runoff of stormwater from land development and land redevelopment activity. Specific purposes are to:

(1) Further the maintenance of safe and healthful conditions, and to maintain and enhance the quality of life within the community;

(2) Prevent and control the adverse effects of stormwater, prevent and control soil erosion, prevent and control water pollution, protect spawning grounds, fish, and aquatic life;

(3) Prevent conditions that endanger downstream property including: control exceedance of the safe capacity of existing drainage facilities and receiving water bodies; prevent undue channel erosion; control increases in the scouring and transportation of particulate matter; and, prevent unwanted alteration of downstream channels, such as farm waterways, from dry to wet conditions.

5.7.3 Erosion and Sediment Control Ordinance

Uncontrolled runoff from land disturbing construction activity carries a significant amount of sediment and other pollutants to the waters of the state.

The intent of the Outagamie County Erosion Control Ordinance is to require use of best management practices to reduce the amount of sediment and other pollutants resulting from land disturbing construction activities on development sites. Use of the Ordinance fosters consistent, countywide application of the construction site performance standards for new development and redevelopment contained in Wis. Admin. Code. subchs. III and IV of ch. NR 151 (Wis. Admin. Code §§ NR 151.10—151.15, 151.20—151.26).

The main purpose of the Ordinance is to further the maintenance of safe and healthful conditions, prevent and control water pollution, prevent and control soil erosion, protect spawning grounds, protect fish and aquatic life, control building sites, control placement of structures and land uses, preserve ground cover and scenic beauty, and promote sound economic growth. This will be done by minimizing the amount of sediment and other pollutants carried by runoff or discharged from land disturbing construction activity to waters of the state in the county. It is also the purpose to meet the performance standards in Wis. Admin. Code subchs. III and IV of ch. NR 151 (Wis. Admin. Code §§ NR 151.10—151.15, 151.20—151.26), and to meet the requirements

for construction erosion in the phase II National Pollutant Discharge Elimination System (NPDES) administered by the Federal Environmental Protection Agency (EPA).

5.7.4 Other Related Ordinances

Outagamie County has several ordinances that have implications on activities relating to the conservation of soil and water resources. LCD staff often assist other county departments in assuring ordinance requirements are properly administered and implemented by the permittee. Brief descriptions of the ordinances that Outagamie County will use to implement the LWRM plan will follow:

- **County Zoning Ordinance**

Pursuant to the provisions of sections 59.97 and 59.99, Wis. Stats., this ordinance governs the use of publicly and privately owned land. As it relates to the LWRM plan, it is the purpose of this ordinance to ensure adequate educational and recreational facilities; recognize the needs of agriculture, forestry, industry and business in future growth; encourage uses of land and other natural resources which are in accordance with their character and adaptability; provide adequate light and air, including access to sunlight for solar collectors and to wind for wind energy systems; encourage the protection of groundwater resources; preserve wetlands; and conserve soil, water and forest resources.

- **Shoreland – Floodplain - Wetland Ordinance**

This ordinance is adopted pursuant to the authorization contained in sections 59.97, 59.971, 59.99, 87.30, 144.26 and 236.45, Wis. Stats. Uncontrolled use of the shorelands and pollution of the navigable waters of the county has an adverse effect on water quality and habitat. The legislature of Wisconsin has delegated responsibility to the county to further control flooding and protect against costly flood damages; prevent and control water pollution; protect spawning grounds, fish and aquatic life; control building sites, placement of structures and land uses; and preserve shore cover and natural beauty.

- **Non-Metallic Mining Reclamation Ordinance**

This ordinance is adopted under authority of Section 295.13(1), Wisconsin Statutes, Section NR 135.32, Wisconsin Administrative Code, and Section 59.51, Wisconsin Statutes. In 2002 Outagamie County passed this Non-Metallic Mine Reclamation Ordinance to assure lands opened to mining are reclaimed to near pre-mining conditions or to a use that is environmentally friendly and safe. The requirements of this ordinance apply to all operators of nonmetallic mining sites within Outagamie County operating on or after August 1, 2001.

6.0 Information & Education Strategy

This chapter will explain the information and education strategy that was designed to help the county achieve its water quality goals. Implementation of this strategy is intended to build awareness about local runoff pollution problems and encourage residents to implement conservation practices, which reduce nutrient and sediment loading.

Successfully encouraging people to implement conservation practices is not easy. Experience shows that individuals often lack the motivation to try a conservation practice because they don't feel runoff pollution is a problem on their property or they may have other concerns that need to be addressed. Before people attempt new conservation practices they must recognize the drawbacks to their current management practices, feel that the risks imposed by the practices are manageable, and feel that the rewards it offers are worthwhile. The implementation process can be very slow (it can take many years) and is far from guaranteed. Farmers are especially wary of assuming more risk since they already operate high venture businesses in today's poor economic atmosphere.

The county will use 3 tools to encourage landowners to adopt new conservation practices:

1) The I & E Strategy;

2) Cost-sharing to ease the financial risks associated with certain conservation practices;

3) Use of regulatory actions.

The I & E Strategy supports both the cost-sharing and regulatory tools by fostering awareness about them, but its primary function is to overcome the barriers that prevent residents from implementing conservation practices.

To address knowledge barriers, the I & E Strategy contains activities designed to disseminate information throughout the county. Some examples may include newsletters, direct mail, media coverage, social media, or informational meetings. In order to address skill barriers, demonstrations, field days, and one-on-one instruction are planned. Other activities that get people involved in projects and give them a stake in its success are also helpful to overcome attitude barriers about conservation resource and protection.

This strategy is based on the goals of building awareness and reducing the amount of sediment and nutrient loading through the installation of conservation practices. To address these goals, certain I & E actions must be taken. Each action aims to provide information about conservation related topics or explain a conservation practice to a particular audience or landowner. Accomplishing the I & E requires a strategic process of actions and some of these actions are

outlined below. Just like the objectives are used as steps to accomplish the plan's goals, so are the activities used in the I & E Strategy.

- **One on One Contacts with Landowners**

  There is no better way to convince landowners to adopt new practices than having a technician or agronomist spend time with them on their property. This is not always possible due to lack of staff hours. The Land Conservation Department has in the past and will continue to make onsite visits with landowners a top priority. It is also recognized that one-on-one contacts are the basis for a trusting and cooperative relationship that eventually leads to conservation practice installation.

- **Newsletters**

  The LCD does not currently send out its own newsletter. However, the Outagamie County UWEX Ag Office does send out a quarterly newsletter that the LCD adds information to on an as needed basis. The LCD also contributes to the semi- annual newsletter "The Basin Buzz" which is distributed to agricultural landowners in the Lower Fox River Basin and to "The Source" which is distributed to citizens in the Fox- Wolf Basin through the Fox-Wolf Watershed Alliance. Past and current issues of these newsletters can be viewed at http://fwwa.org/ .

- **Direct Mailings**

  The LCD sends direct mailings to notify landowners of available grant funds that may be available to them (GLRI, TRM, etc), upcoming farm inventory for NR 151, Farmland Preservation, or for watershed planning efforts , and for other miscellaneous conservation projects that may involve or concern landowners.

- **Contractor Workshops**

  Contractor education workshops will be conducted periodically. Contractor awareness of soil and water conservation issues is critical to successful implementation of remedial measures and the maintenance of good contractor, landowner, and agency working relationships.

- **Nutrient Management Workshops**

  Nutrient Management workshops will be conducted periodically to teach landowners and operators how to implement Nutrient Management plans on their own.

  Meetings with area private agronomists and consultants will be held periodically to discuss current programs available for area producers, as well as share information gathered through

implementation and monitoring in other current active projects. It's also an opportunity to share information about equipment the LCD has available for producers to utilize in order to try new management techniques while minimizing initial investments.

- **Informational Meetings**

Meetings will be held periodically to provide I & E about the health and value of land and water resources in the county. Specific groups will be targeted, such as urban and rural residents, developers, other agencies, committees and elected officials, etc.

- **Formal Presentations**

Formal presentations to various organizations are an excellent way to raise the awareness of landowners for natural resource issues. Some of the targeted audiences include: Farm Bureau, Forage Council, Technical College Ag classes, Lake and River organizations, Civic groups, schools, etc. Presentations will be conducted occasionally throughout the year in response to requests. In addition department staff working in conjunction with UWEX staff will develop presentations, tours, and field demonstrations on conservation related topics.

- **Social Media**

Outagamie County Land Conservation Department maintains a Facebook© webpage that is updated regularly with upcoming events, program information, and educational information. The LCD is also working on developing a You Tube© page to share informational and educational videos.

https://www.facebook.com/Outagamie-County-Land-Conservation-Department-472103222860825/

https://www.youtube.com/channel/UCYnLkSTrfTQjSsQtKnd1qJw

Partnerships with Local Groups

The Outagamie County LCD works closely with several other local groups in education and outreach to citizens on the importance of conservation. Below are brief descriptions of the groups we work with on education and outreach:

Fox -Wolf Watershed Alliance

An independent, non-profit organization that identifies issues and advocates effective policies and actions to protect, restore and sustain the water resources of Wisconsin's Fox-Wolf River Basin. The Outagamie County Land Conservation Department works closely with the Fox-Wolf Watershed Alliance in applying for grants, on information and education, and TMDL implementation.

Northeast Wisconsin Stormwater Consortium

A subsidiary group of the Fox-Wolf Watershed Alliance that is made of a consortium of 41 member communities including Outagamie County. NEWSC facilitates the implementation of storm water programs by fostering partnerships, sharing information, seeking administrative efficiency, and pooling resources.

Lower Fox Demonstration Farms Network

The Lower Fox Demonstration Farms Network conducts demonstrations of the effectiveness and adaptability of conservation practice systems to reduce erosion and sedimentation, control phosphorus runoff and address other nonpoint source pollution issues. The network holds field days and workshops on demonstration farm sites in the Lower Fox River Basin. Currently there are two demonstration farms in Outagamie County and two in Brown County and will be expanding to two more farm sites.

Alliance for the Great Lakes

An independent, non-profit organization that works to protect the Great Lakes. The nonprofit involves thousands of people each year in advocacy, volunteering, education, and research to ensure the lakes are healthy and safe for all. Alliance for the Great Lakes have been involved in the education and outreach in the Lower Fox River Basin and work closely with the local land conservation departments and other entities working to protect the Bay of Green Bay.

"Save the Bay Initiative"

A collaborative initiative among the agricultural, academic, industry, government, and nonprofit leaders in Wisconsin's 8th congressional district in which conservation practices are identified, shared, and promoted to reduce harmful substances flowing into the Bay of Green Bay and Lake Michigan. The initiative was started by former 8th District Congressman Reid Ribble. Current Representative Mike Gallagher has pledged to continue the mission. The initiative has led to the creation of the "Sustain the Bay Foundation", through which local industries and philanthropists may donate funding towards the purchase of new and innovative equipment to make available for producers to utilize in the Lower Fox River Basin to further pollution reduction efforts.

7.0 Monitoring, Tracking, and Reporting

A comprehensive system of measurement, which shows efforts are making a difference, is essential to any conservation program. When evaluating a specific program, a system of qualitative and quantitative measurements must be used to determine a program's effectiveness. This approach needs to take into account a variety of factors; including overall protection of the targeted resource, quality of service to the customer, and fiscal responsibility.

7.1 Monitoring compliance

Currently farm compliance with NR 151 standards is tracked by parcel with an outdated GIS tracking system. Outagamie County will be switching to a County wide permitting system in May of 2018 that will be used to track permits, working lands initiative program, best management practice implementation, and cost share agreements.

Outagamie County LCD is also currently working with Brown, Calumet and Winnebago Counties and Fox-Wolf Watershed Alliance to develop a multi-county tracking system for tracking implementation efforts on a watershed basis. The system will track complaints, compliance/noncompliance, farm inspections, installed practices, and grants spatially and quantitatively using GIS. This system will streamline planning, applying for grants, implementation, and grant reporting. This system is expected to be ready for use in 2018.

7.2 Local Water Quality Monitoring Projects

In 2003, the Lower Fox River Watershed Monitoring Program (LFRWMP) was initiated. The multi-year monitoring and assessment program was made possible through a $1.5 million grant to UWGB. As part of this program, continuous discharge is measured and water samples are collected and analyzed for phosphorus and total suspended sediment. Additional GLRI grant funds have allowed for the continuation and creation of additional monitoring sites in the Lower Fox. The monitoring network includes the following stations both in, and downstream of Outagamie County.

1. Duck Creek at CTH FF; data record 2004-present
2. Apple Creek at CTH U/Campground; data record 2004-06
3. Ashwaubenon Creek at Creamery Road; data record 2004-06
4. Plum Creek near Wrightstown; data record 2010- present
5. West Plum Creek at New Road near Wrightstown; 2014-present
6. Silver Creek at Florist Drive at Oneida, WI; 2013-present

The LFRWMP stations are operated cooperatively by USGS, UWGB, GBMSD, UW-Milwaukee, and the Oneida Tribe of Indians. USGS computes daily phosphorus and total suspended sediment loads for each stream based on continuous discharge and discrete low-flow

and automated event sampling. Discharge, water quality data, and loads are published in annual USGS data reports and input to a USGS database.

The GBMSD (Green Bay Metropolitan Sewage District), more recently rebranded as New Water, has also been conducting extensive monitoring since 1986 at seven fixed stations located on the Lower Fox River and in Green Bay. Grab samples collected from these sites are analyzed by New Water's certified lab for total phosphorus, total suspended sediment, and several other parameters. Data from select stations directly reflect inputs from Outagamie County segments of the watershed.

Much of this data was used to develop the Lower Fox TMDL project which will entail extensive monitoring of the LF Basin streams as implementation begins.

There are several edge of field monitoring sites in the Lower Fox River Basin that are operated by USGS and UWGB through GLRI funding. These sites are evaluating edge of field runoff and the effectiveness of different management practices. In Outagamie County, an edge of field site was established in 2016 in the Plum Creek Watershed for monitoring surface water and tile water from a crop field and the effectiveness of a treatment wetland for treating phosphorus, sediment, and nitrogen. An additional treatment wetland monitoring was installed in the fall of 2017 in Outagamie County in the Plum Creek watershed.

FIGURE 16. EDGE OF FIELD TREATMENT WETLAND MONITORING SITE, PLUM CREEK WATERSHED, WI.

7.3 Tracking and Reporting Program Activities and Progress

A. Maintain and convey a record of annual site evaluations showing their location and compliance status.
B. Maintain a record of estimated costs of corrective measures for each evaluated parcel.
C. Maintain and convey a record showing parcels where public cost sharing has been applied to implement standards and prohibitions, the amount and source of those funds, and the landowner share.
D. Maintain and convey a record and location of parcels receiving notification and violation letters.
E. Maintain and convey a record and location of compliant and eligible landowners in Working Lands Initiative Program.
F. Maintain and convey a record of the annual cost of technical and administrative assistance needed to administer agricultural performance standards and prohibitions, as established in NR151.

G. Complete and submit the DATCP/DNR Annual Accomplishment Report

Note: All of the above information is currently tracked utilizing the county's current Ag Performance Standards Inventory Tracking Program with reports readily available. LCD will be switching over to new County Wide Permitting System and Multi-county tracking system for future tracking purposes.

7.4 Annual Accomplishment Reports

Every year, the LCD produces an annual accomplishment report that not only gives updates on county programs, but lists achievements, statistics and highlights. Since the county is involved with multiple programs, a detailed quality control procedure has been developed to ensure that the quality and achievements reported by the county are accurate and current.

The county, state, and federal agencies require the county to be checked by an outside quality control team for work done on all programs. The county has countywide single audits. These audits are used to monitor program administration and financial allocations and ensure a high standard of work is performed.

The state is required to check engineering work in addition to a percentage of all Nutrient Management and Farmland Preservation Plans annually. The DNR requires independent audits of the Non-Point Source program.

The LCD develops an annual report based on the above reports and uses this information to inform the LCC, county board, county executive and other lead agencies to the quality and quantity of work being produced by the LCD

8.0 Five Year Work Plan

Goal 1: Protect and enhance the quality of our surface water, groundwater, and soils.			
OBJECTIVES	ACTIONS	AGENCY	PROGRESS TRACKING
Assist landowners in complying with NR 151 agricultural performance standards following the Priority Farm Strategy	**• Annually inventory 20 farms to implement state performance standards and prohibitions.** **•Administer the Farmland Preservation Program and ensure participants maintain compliance with Soil and Water Conservation Standards by reviewing 25% of FPP participants annually (**approximately 85 landowners per year**).** **•Develop and implement schedules of compliance to meet state conservation standards**	LCD, NRCS, DNR	•Number of Farms identified •Number of Farms with compliance schedules/brought into compliance •Annual Accomplishment Reporting
Manage crop nutrient sources in an economic and environmentally sound manner	**•Annually identify 1,500 acres without nutrient management plans and address NM planning through whole farm planning.** •Annually install or upgrade 3-5 Manure Storage Systems to prevent land spreading on frozen or snow covered ground •Work with farmers and consultants to assure compliance with developed NMP's	LCD,NRCS,DNR	•Number of plans & acres completed •DATCP Performance Review •Field Verifications of Plan Compliance
Continue to work with partnering agencies to protect groundwater sensitive areas in county	**•Annually complete 5 well abandonments to seal unused wells in the county** **•Protect priority areas for infiltration and recharge by installing 3 wetland restorations a year** •Educate developers, citizens, etc. on the importance of protecting these priority areas.	LCD, NRCS, UWEX	•Number of wells abandoned •Annual Accomplishment Reporting •Newsletter articles, news releases

Goal 1: Protect and enhance the quality of our surface water, groundwater, and soils.			
OBJECTIVES	ACTIONS	AGENCY	PROGRESS TRACKING
Continue administration of LWRM and TRM funding as well as assist in administration of Federal EQIP funding.	**•Utilize at least 75% of LWRM Grant annually to address "Priority Farms"** **•Submit at least 3 TRM Grant applications annually to address issues on "Priority Farms"** **•Continue working with NRCS in getting at least 5 landowners annually to apply for EQIP to address performance standards issues.** •Continue to work with partner agencies to promote state and federal programs.	LCD	• Annual Accomplishment Report
Continue implementation of Lower Fox TMDL and 9 Key Element Watershed Plan development and Implementation	•Continued collaboration with Brown and Calumet Counties in implementing Plum and Kankapot 9- Key element plan. Continued pursuit of funding is necessary for implementation. •Implementation of Upper Duck Creek and Apple Creek 9-Key Element plans. Continued pursuit of funding is necessary for implementation. •Utilize EVAAL and ACPF model to target high priority fields for conservation practices. •Continue development of 9 Key element plans in Lower Fox River Basin.	LCD, NRCS, TNC, FWWA	•Annual Accomplishment Reporting

Goal 2: Protect and enhance wetland and upland habitat.			
OBJECTIVES	ACTIONS	AGENCY	PROGRESS TRACKING
Restore wetland habitat where possible in the county	•Restore 3 wetlands identified in 9 Key Element Watershed Plans in Outagamie County annually. •Provide technical assistance when available	LCD, NRCS, USFWS, DNR	•Acres of Wetland Restored •Annual Accomplishment Report
Identify programs to help restore and enhance upland habitat in the county	•Promote county, state, and federal programs to assist landowners with technical and financial planning •Refer landowners to nonprofit organizations specializing in upland restoration and enhancement programs	LCD, NRCS, USFWS, DNR	•Acres of Upland Habitat Enhanced/Restored •Annual Accomplishment Report

Goal 3: Ensure the consistent implementation of the stormwater and erosion control ordinances in Outagamie County.			
OBJECTIVES	ACTIONS	AGENCY	PROGRESS TRACKING
Work with all units of government in the county to assure the minimum requirements of the ordinances are met	•Educate citizens about ordinance requirements and their benefits •Twice a year update web page resources for information on conservation practices to control stormwater runoff & construction site erosion •Assist Zoning and Planning in identifying sites where the ordinance requirements are not being met and planning is needed to meet ordinances. •Continue working with Northeast Wisconsin Stormwater Consortium (NEWSC) to facilitate efficient implementation of stormwater programs locally and regionally to meet DNR and EPA requirements.	LCD, Planning and Zoning	•Ongoing education •Ongoing evaluation
Ensure county internal procedures for implementing ordinances are efficient and effective	•Hold 24 internal staff meeting per year to improve policy and procedure •Assist with technical assistance when available	LCD, DATCP, UWEX, Planning & Zoning	Ongoing evaluation

Goal 4: Educate and Engage citizens on soil and water conservation initiatives.			
OBJECTIVES	ACTIONS	AGENCY	PROGRESS TRACKING
Educate urban and rural residents on health and value of land and water resources and protection measures.	**•Continue collaboration with Fox Wolf Watershed Alliance in disturbing bi-annual newsletter "Basin Buzz" and monthly e-newsletter "The Source".** **•Continue Annual Speaking & Poster Contest, Conservation Field Days, and staff presentations at local schools annually** •Continue collaboration with Brown County and other local agencies in holding field day events, tours, and farmer group meetings. (Lower Fox Demonstration Farm Network) •Regularly update county website, Facebook® page and YouTube® page.	LCD, FWWA, NRCS, UWEX	Annual Accomplishment Report
Inform and educate county, municipal and town officials on the health and value of land and water resources in the county	•Conduct at least one annual rural and urban tour for committees, departments and elected officials that focuses on land and water conservation initiatives. •Assist county and townships with Land & Water Resources when time allows	LCD, NRCS, Zoning & Planning	Annual Accomplishment Report
Educate and informs citizens in the county about the threats posed by invasive and exotic species	•Work with other agencies to educate landowners and water users about curly leaf pondweed, Eurasian milfoil, spotted knapweed, buckthorn, Phragmites, purple loosestrife and others. •Organize and encourage others to control the spread of Invasives.	LCD, NRCS, UWEX, DNR, FSA, Glacier land RC&D	Annual Accomplishment Report

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APPENDIX A. ATCP 50 BMP DEFINITIONS.

Manure storage systems- a system of one or more practices, facilities, techniques, or measures used to prevent or reduce pollutants associated with manure.

Manure storage systems closure-means permanently disabling and sealing a leaking or improperly sited manure storage system.

Barnyard runoff control-a system of facilities or practices used to contain, divert, retard, treat, or otherwise control the discharge of runoff from outdoor areas of concentrated livestock activity.

Access road- a road or pathway that confines or directs the movement of livestock, farm equipment, or vehicular traffic, and that is designed and installed to control surface water runoff, to protect an installed practice, or to prevent erosion.

Trails and walkways- a travel lane to facilitate movement of livestock or people.

Contour farming- plowing, preparing, planting, and cultivating sloping land on the contour and along established grades of terraces or diversions.

Cover crop- close-growing grasses, legumes, or small grain grown to control erosion, add organic matter to soil, or to improve soil infiltration, aeration, or tilth.

Critical area stabilization-planting suitable vegetation on erodible areas such as steep slopes and gullies, so as to reduce soil erosion or pollution from agricultural nonpoint sources. “Critical area stabilization" may also include treating areas that drain into bedrock crevices, openings, or sinkholes.

Diversions-a structure installed to divert excess surface runoff water to an area where it can be used, transported, or discharged without causing excessive soil erosion. “Diversion" includes a channel with a supporting earthen ridge on the lower side, installed across the slope with a self-discharging and non-erosive gradient.

Feed storage runoff control systems- a system of facilities or practices to contain, divert, retard, treat, or otherwise control the discharge of leachate and contaminated runoff from livestock feed storage areas.

Field windbreaks- a strip or belt of trees, shrubs, or grasses established or renovated within or adjacent to a field, so as to control soil erosion by reducing wind velocities at the land surface.

Filter strips-an area of herbaceous vegetation that separates an environmentally sensitive area from cropland, grazing land, or disturbed land.

Grade stabilization structures- a structure which stabilizes the grade in a channel in order to protect the channel from erosion, or to prevent gullies from forming or advancing.

Livestock fencing-excluding livestock, by fencing or other means, in order to protect an erodible area or a practice.

Livestock watering facilities-a trough, tank, pipe, conduit, spring development, pump, well, or other device or combination of devices installed to deliver drinking water to livestock.

Milking center waste control systems- a system of facilities or equipment designed to contain or control the discharge of milking center waste.

Nutrient management-controlling the amount, source, form, location, and timing of plant nutrient applications, including application of organic wastes, commercial fertilizers, soil reserves, and legumes, in order to provide plant nutrients while minimizing the movement of nutrients to surface water and groundwater.

Pesticide management-controlling the storage, handling, use, and disposal of pesticides used in crop production in order to minimize contamination of water, air, and non-target organisms.

Prescribed grazing- a grazing system which divides pastures into multiple cells, each of which is grazed intensively for a short period and then protected from grazing until its vegetative cover is restored.

Relocating or abandoning animal feeding operations- discontinuing an animal feeding operation in order to prevent surface water or groundwater pollution from that animal feeding operation or discontinuing an animal feeding operation at one site and commencing that operation at a suitable alternate site in order to minimize the amount of surface water or groundwater pollution from that animal feeding operation.

Residue management-Preparing land surfaces for the planting and growing of crop plants using methods that result in a rough land surface which is covered in varying degrees by vegetative residues of a previous crop, and which provides a significant degree of resistance to soil erosion by raindrop impact, surface water runoff, or wind.

Riparian buffers-an area in which vegetation is enhanced or established to reduce or eliminate the movement of sediment, nutrients, and other nonpoint source pollutants to an adjacent surface water resource or groundwater recharge area, to protect the banks of streams and lakes from erosion, and to protect fish habitat.

Roofs-a weather-proof covering that shields an animal lot or manure storage structure from precipitation, and includes the structure supporting that weather-proof covering.

Roof runoff systems-facilities for collecting, controlling, diverting, and disposing of precipitation from roofs. A “roof runoff system" may include gutters, downspouts, erosion-resistant channels, subsurface drains, and trenches.

Sediment basins- permanent basins that reduce the transport of waterborne pollutants such as eroded soil sediment, debris, and manure sediment. Sediment basins may include containment walls or berms, pickets or screens to filter debris, orifices or weirs to control discharge, and conduits to direct runoff to treatment or discharge areas.

Sinkhole treatment-modifying a sinkhole, or the area around a sinkhole, to reduce erosion, prevent expansion of the hole, and reduce pollution of water resources. Modifications may

include the diversion of runoff around a sinkhole, or the alteration of a sinkhole by excavation, cleanout, filter treatment, sealing, or refilling.

Streambank or shoreline protection-means waterbody-specific treatments used to stabilize and protect the eroding banks of streams or constructed channels, and shorelines of lakes, reservoirs, or estuaries. The practice is designed and installed to provide water quality benefits or control soil erosion including degradation from livestock and may protect fish habitat as an incidental benefit.

Stream crossing-a road or pathway which confines or directs the movement of livestock, farm equipment, or vehicular traffic over a stream, and which is designed and installed to improve water quality, reduce erosion, protect an installed practice, or control livestock access to a stream.

Strip cropping- growing crops in a systematic strip arrangement in which strips of grass, legumes, or other close growing crops are alternated with strips of clean tilled crops or fallow, and in which all of the strips are established on the contour or across a slope to reduce water or wind erosion.

Subsurface drains- a conduit installed below the surface of the ground to collect drainage water and convey it to a suitable outlet.

Terrace systems-a system of ridges and channels installed on the contour with a non-erosive grade and suitable spacing.

Underground outlets-a conduit installed below the surface of the ground to collect surface water and convey it to a suitable outlet.

Waste transfer systems-components such as pumps, pipes, conduits, valves, and other structures installed to convey manure and milking center wastes from buildings and animal feeding operations to a storage structure, loading area, or treatment area.

Wastewater treatments strips- an area of herbaceous vegetation that is used as part of an agricultural waste management system to remove pollutants from animal lot runoff or wastewater, such as runoff or wastewater from a milking center.

Water and sediments control basins-an earthen embankment or a ridge and channel combination which is installed across a slope or minor watercourse to trap or detain runoff and sediment.

Waterway system- a natural or constructed waterway or outlet that is shaped, graded, and covered with a vegetation or another suitable surface material to prevent erosion by runoff waters.

Well decommissioning- permanently disabling and sealing a well to prevent contaminants from reaching groundwater.

Wetland development or restoration-the construction of berms, or the destruction of tile line or drainage ditch functions, to create or restore conditions suitable for wetland vegetation.

APPENDIX B. LOCAL, STATE, AND FEDERAL PARTNERS

Alliance for the Great Lakes
Ducks Unlimited
East-Central Regional Planning Commission
Fox-Wolf Watershed Alliance
The Nature Conservancy
United States Geological Service
NEW Water (Green Bay Metropolitan Sewerage District)
University of Wisconsin- Green Bay
University of Wisconsin-Extension
Oneida Tribe of Indians of Wisconsin
Brown, Calumet, and Winnebago Counties
The Great Lakes Commission
United States Fish and Wildlife Service
United States Environmental Protection Agency
Wisconsin Department of Agriculture, Trade and Consumer Protection
Wisconsin Department of Natural Resources
United States Department of Agriculture- Farm Services Agency
United States Department of Agriculture- Natural Resources Conservation Service
Northeast Wisconsin Stormwater Consortium

APPENDIX C. ACRONYMS

ACPF	Agricultural Conservation Planning Framework
BMP	Best Management Practice
CAFO	Concentrated Animal Feeding Operation
CREP	Conservation Reserve Enhancement Program
CRP	Conservation Reserve Program
DATCP	Department of Agricultural, Trade and Consumer Protection
EPA	Environmental Protection Agency
EQIP	Environmental Quality Incentives Program
EVAAL	EVAAL
FSA	Farm Service Agency
FWWA	Fox Wolf Watershed Alliance
GLRI	Great Lakes Restoration Initiative
LCD	Land Conservation Department
NRCS	Natural Resource Conservation Service
PCB	Polychlorinated biphenyls
RUSLE 2	Revised Universal Soil Loss Equation 2
TP	Total Phosphorus
TRM	Targeted Runoff Management Grant
TSS	Total Suspended Sediment
TMDL	Total Maximum Daily Load
USFWS	U.S. Fish and Wildlife Service
USGS	United States Geological Service
UWEX	University of Wisconsin Cooperative Extension Service
WDNR	Wisconsin Department of Natural Resources

APPENDIX D. SELECTED SURVEY RESULTS FROM FARMER ROUNDTABLE 2017

To what degree do you think that conservation practices improve soil health?

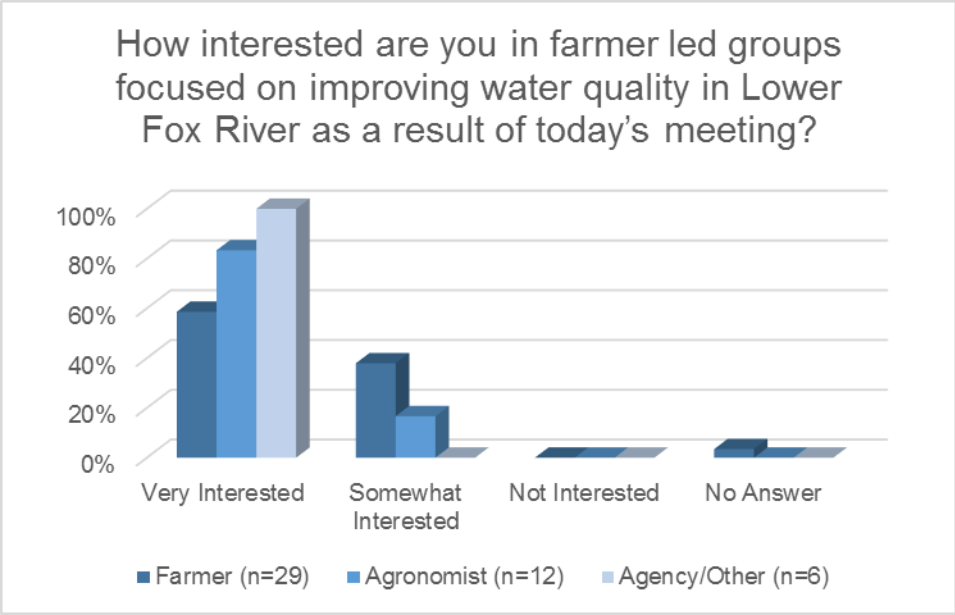
Choices	Responses	
	Percent	Count
Greatly improve	65.75%	48
Slightly improve	28.77%	21
Stay the same	1.37%	1
Slightly decline	0.00%	0
Greatly decline	0.00%	0
Not sure	4.11%	3
Totals	**100%**	**73**

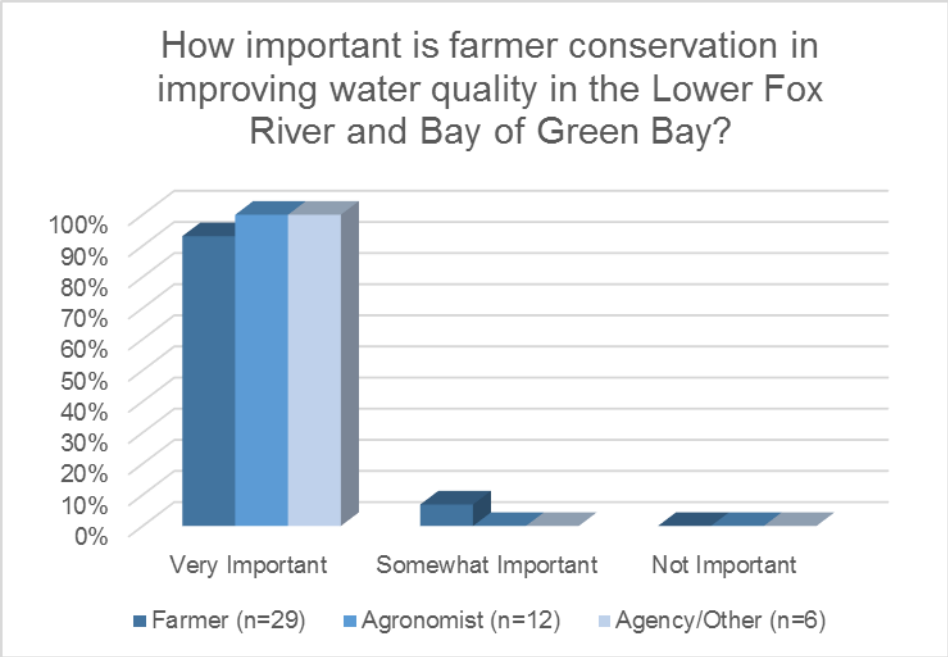
For sharing information about the Demo Farms Network, which of the following outlets would work best to reach you?

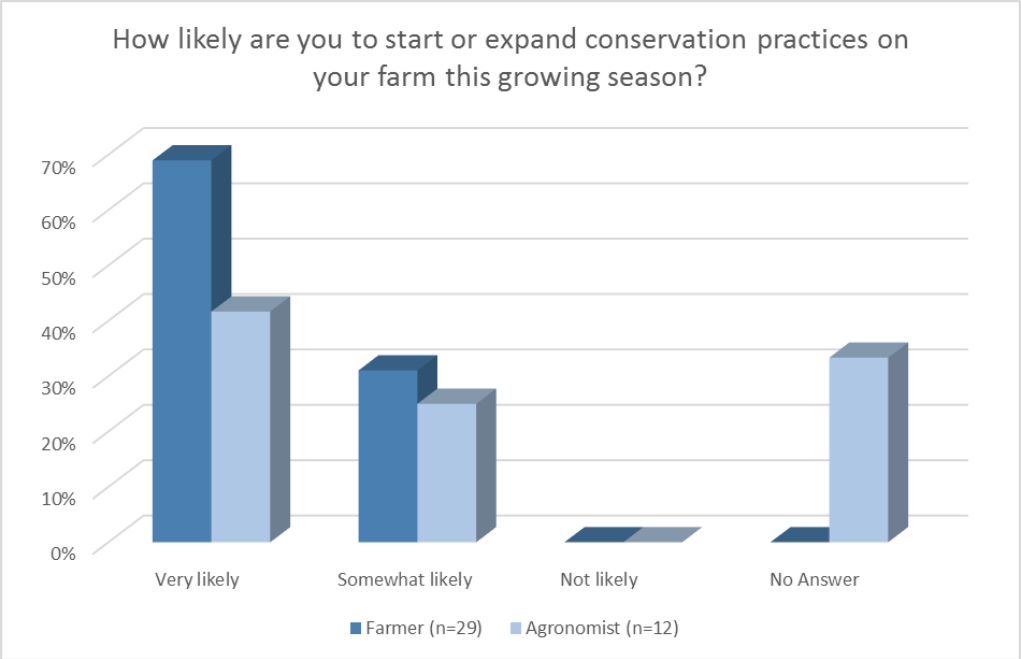
Choices	Responses	
	Percent	Count
Radio	2.91%	3
Newspaper/newsletter	12.62%	13
Television	4.85%	5
Social media (Website, Facebook, Twitter, YouTube)	17.48%	18
Field days	22.33%	23
Text message (notification of field days, Demo Farms Network events, etc.)	39.81%	41
Totals	**100%**	**103**

To what degree do you think that conservation practices improve a producer's bottom-line?

Choices	Responses	
	Percent	Count
Greatly improve	13.70%	10
Slightly improve	57.53%	42
Stay the same	15.07%	11
Slightly decline	5.48%	4
Greatly decline	0.00%	0
Not sure	8.22%	6
Totals	**100%**	**73**


How interested are you in farmer led groups focused on improving water quality in Lower Fox River as a result of today's meeting?
100%
80%
60%
40%
20%
0%
Very Interested
Somewhat Interested
Not Interested
No Answer
Farmer (n=29)
Agronomist (n=12)
Agency/Other (n=6)


How important is farmer conservation in improving water quality in the Lower Fox River and Bay of Green Bay?
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Very Important
Somewhat Important
Not Important
Farmer (n=29)
Agronomist (n=12)
Agency/Other (n=6)



Farmers & Agronomists - If you answered somewhat likely or higher, what are you planning? If not, please tell us more?

- adding cover crop acres and investigating no till
- no tilling corn on corn, corn into alfalfa, mixes into wheat, and more low disturbance manure application
- would like to plant more acres of cover crops
- no till corn
- increase acres each year
- more no till, waterway rebuilding, buffers
- more cover crops and grass water ways to slow drainage and keep nutrients on the fields
- now 50% cover crop, like 75% cover crop
- more covers & no - till
- more cover crop planting
- cover crops after wheat
- cover crops
- too late for 2017 growing season but maybe fall
- I would like to plant cover before manure application
- trying interseeding, manure application and cover crops
- more cover crops
- have had growers try cover crops (barley & rye) would like to try interseeding (especially in soybeans 15 in rows)
- I am a crop consultant. I will promote this stuff.

Do you have any other recommendations for events, outreach, or ideas to improve farmer participation in soil and water conservation?

Farmers -

- I like text messaging
- YouTube videos of demonstrations
- smaller farmer groups in conjunction with the watershed people, visits to see projects in action and results
- more farm demo days with hands on interaction
- farmer group gatherings
- text or email for any demonstrations
- know what is working

APPENDIX E. LOWER FOX RIVER BASIN SURVEY 2014 RESULTS.

Thank you to everyone who participated. To learn more about the above opportunities, survey results, or how to become more involved please contact County Conservation departments.

Brown County Land and Water Conservation Department: (920) 391-4620
Calumet County Land and Water Conservation Department: (920) 849-1442
Outagamie County Land Conservation Department: (920) 832-5073
Winnebago County Land and Water Conservation Department: (920) 232-1950

The survey was funded by the Wisconsin Coastal Management Program and the National Oceanic and Atmospheric Administration, Office of Ocean and Coastal Resource Management under the Coastal Zone Management Act.

ALLIANCE FOR THE GREAT LAKES
ENSURING A LIVING RESOURCE FOR ALL GENERATIONS

Social Factors and Conservation Behavior:

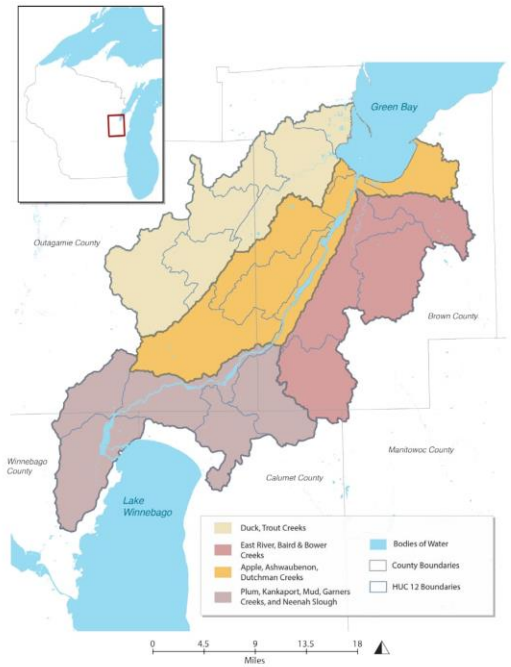
A Survey of Agricultural Landowners in the Lower Fox River Basin in 2014

All photos by Lloyd Degrane in the Lower Fox River Basin

In spring 2014, Brown and Outagamie County Conservation departments, Tilth Agronomy and the Alliance for the Great Lakes partnered to survey farmers in the Lower Fox River Basin to better understand the farming community regarding conservation, nutrient management, and water quality. This was done using both paper surveys and "kitchen side table" interviews.

The following is a summary of those results. While this is not comprehensive of all feedback, included are percentage responses, surveyed farmers' direct quotes, as well as thoughts and suggestions categorized by popular themes. While these responses do not represent every farmer in the Lower Fox River Basin, they do provide valuable insights moving forward. With this summary, we draw attention to the importance of providing all stakeholders in the basin a chance to express their views on improving water, agriculture, and natural resources.

There are 332 total farm operations in the watershed. 108 interviews were conducted and 69 questionnaires were received as part of the survey study.



Nutrient Management

Manure Storage
64% of farmers said they have enough room for manure storage. For the 14% who said 'no', several are interested in expanding storage or building new storage facilities

Time in Farming
50% of surveyed farmers said 'yes/maybe' to bringing manure to a central facility.

Farmers' Thoughts
Some surveyed farmers are reluctant to expand manure storage since they are either nearing retirement or are wary of new investments due to urban development. "We do it [nutrient management] to get the most cost effective yield of crops." "[It's] useful but I would like to develop a better filing system."

Moving Forward

Get Involved
Farmers want to have their voices heard and are a strong part of the fabric of the Lower Fox River community. As efforts to meet water quality standards increase, farmers will have increased opportunities for participation. Much like this survey, this work is a watershed based effort and will include nutrient reductions from urban, suburban and rural sources. Farmers will have more opportunities to share their perspective while learning with others. We recommend farmers take part in these discussions so they become an important part of the decision-making process that affect the long-term sustainability of farming and water quality in this region.

Participate/Implement Change
Subwatershed Plan Implementation in Plum Creek, Kankapot Creek, Upper Duck Creek, and Upper East River are opportunities for farmers to participate in conservation implementation and learn how effective conservation practices improve soil health and water quality by reducing soil and phosphorus run off. For those farmers in the Silver Creek area, you can take part in the Adaptive Management Option project being led by NEW Water (Green Bay Metropolitan Sewage District.) Stay tuned for farmer focus groups facilitated in the coming year. This will be a way for farmers to discuss improving soil health and water quality while sharing information about new farm technologies and learning with others.

Learn More
Demonstration Farm Days provides farmers with information regarding new conservation technologies such as cover crops to improve soil health, increase yields, and improve the water quality in watershed. Contact your county conservationist to find out when the next Demo Farm Day is scheduled.

Improve Soil Health
The survey suggested a strong sense of soil protection among farmers. By prioritizing measures that improve soil health, farmers have an opportunity to improve water quality by starting with actions that begin on their farm. Conservation science has firmly rooted improved soil health to increased yields, while remaining more resilient to negative impacts from weather, and improving downstream water quality impacts by reducing runoff.

Information & Communication

Preferred Methods to Getting Farmer Input on Conservation
(1) One-on-one engagements, (2) Small group meetings/small roundtable discussions, and (3) Field Days and farm shows.

Preferred Ways to Receive Water Quality Information
(1) Newsletters, (2) Magazines, (3) One-on-one hands-on demonstration, and (4) On-farm demonstration field days.

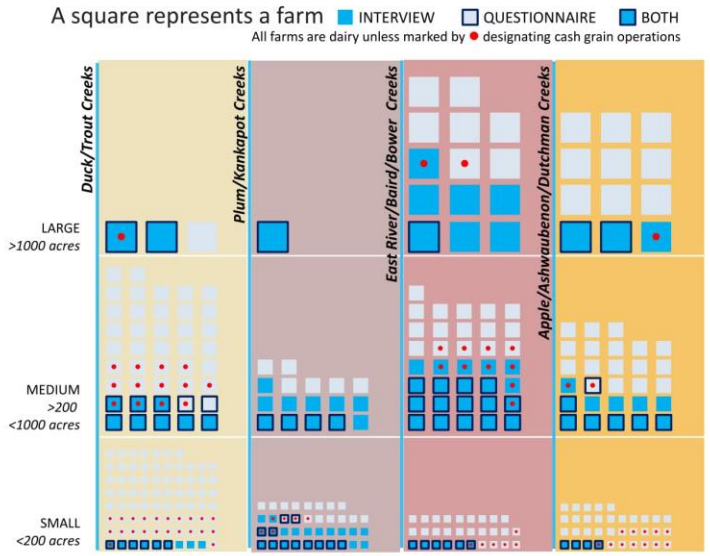
Preferred Organizations for Farm Improvement Tactics/Advice
(1) Local farm cooperatives/crop consultants, (2) Natural Resources Conservation Service, (3) County Conservation departments, (4) Other farmers.

Preferred Organizations for Water Quality Information
(1) Local farm cooperatives/crop consultants, (2) County Land and Water Conservation departments, (3) Natural Resources Conservation Service, (4) Farm Service Agency, (5) University of Wisconsin-Extension, and (6) Farmer-led watershed organization.

Demonstration Farms for Conservation Education
On demonstration farms, farmers would like to see: (1) Cover crops, (2) Tile-related technology such as filters, (3) Buffer strips, (4) Tillage-related practices (residue management), (5) Manure digesters, (6) Planting machinery, and (7) New conservation technologies and practices demonstrated. Also, majority of surveyed farmers are moderately or very interested in the demonstration farms and want to see "results from experimental plots if they are good and bad." "Seeing [practices] or thorough explanation of how practices are established and then how it works through seasons of the year."

Monitoring of Conservaion Practices
61% of surveyed farmers want to see more monitoring to ensure practices are effective, and 45% are willing to do monitoring on their land. For those who said 'no' to monitoring on their land, there is concern about too much government involvement and trust that the practices work as advertised. When it comes to actually conducting monitoring on their land, surveyed farmers alluded to practical concerns such as size of the farm or being too close to retirement to start something new.

Farmers' Thoughts
Farmers have questions regarding Total Maximum Daily Load timeline in the Lower Fox River. They are interested in the costs and effectiveness of conservation practices including performance in the short-term and long-term, and how monitoring is conducted. Several prefer a newsletter that focuses on the demonstration farms. There should be better access to information. "Show economically feasible ways to make conservation work." "Actual layout - cropping around practices, full explanation of what is done and how it will work."



Importance of Land & Water Resources

Prioritization of Lands
93% of surveyed farmers said 'yes/maybe' to prioritizing conservation efforts for highly erodible soils, and 76% said 'yes/maybe' to prioritizing land with high soil phosphorous.

What Conservation Means to Surveyed Farmers
Conservation is associated with the long-term health and stewardship of soil and land related issues. A majority indicates their drive for conservation to be either protecting/preserving natural resources or as an inherent quality of being a farmer.

Importance of Improving Water Quality
Over 90% of surveyed farmers feel that it is moderately to very important to be successful at improving water quality, whereas 80% feel that it is moderately to very important to meet water quality standards for their community.

Farmers' Suggestions
(1) There should be no winter spreading, (2) There should be monitoring of tile drainage, (3) Manure management should be prioritized over investing in farm equipment, and (4) Cover Crops should be used for erosion control.

Farmers' Thoughts
Generally surveyed farmers feel a common connection to water and are invested in protecting land and water resources. They are concerned about erosion and its causes. "We are stewards of the land and we take care of it for the next generation."

Implementing Conservation Practices

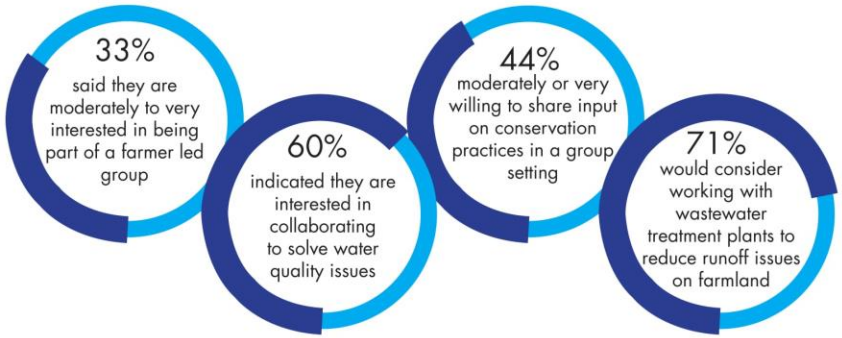
Considering Conservation Even if it Costs Extra Time and Money
84% of surveyed farmers said 'yes/maybe' to paying for conservation and shared themes related to: (1) Personal motivation, (2) Applicability of particular (conservation) practices to their farm, and (3) Being practical. Other motivators were: caring for farmland and soil, clean water, and a general conservation attitude.

Receiving Financial Compensation for Conservation Practices Already Installed
77% of surveyed farmers said 'yes/maybe', and 23% said 'no'. Some main reasons for 'yes' were: (1) Incentive is a good motivation for those already doing conservation, (2) Need help for the expenses associated with conservation practices, and (3) Compensation provided for acreage lost. The main themes for 'maybe' or 'no' are: (1) Hard to formulate this type of payment, (2) Conservation is owner's responsibility, (3) It leads to self-sufficiency/no special benefits, and (4) Conservation is beneficial on its own.

Farmers' Suggestions
Others might consider doing conservation if it is: (1) Cost effective/profitable/feasible, (2) If they know more about the conservation practices/programs/access to technical information, and (3) If the practical issues are dealt with. "If they [farmers] do it and you want them to keep doing it on their own, a little incentive goes a long way. Easiest way to get things done is to give a little incentive."

Sense of Community

Of the farmers surveyed:



Farmers' Thoughts
(1) It's important to continue engaging farmers/taking their input, and (2) dairy and crop farmers need to work together. "We all have to be on the same page and working on it together." "We are all after the same thing - to take care of the land and water."

Farmers' Suggestions Regarding Partnerships:
More information is needed regarding: (1) The nature of the group effort, (2) Its advantages, (3) The type of participation it would entail, (4) Who leads the efforts, and (5) The issues being dealt with.

Future of Farming

Future of Farming in the Lower Fox River
The most frequent responses related to the outlook on the future of farming were related to the idea that future of agriculture is promising (41 mentions) and large farms are here to stay (37 mentions).

Time in Farming
50% of surveyed farmers have farmed for less than 35 years, and 50% of them have farmed for over 35 years, meaning that even though half are expected to retire in the coming years, the other half plan to continue farming into the future.

Farmers' Thoughts
There are increased constraints on farming due to urban concerns. 64% of surveyed farmers believe conservation will improve public perception of farmers by: (1) Increasing understanding of farming, (2) Leading to cleaner water, (3) It is a positive activity that leads to positive publicity, and (4) Conservation builds a sense of community. "If city residents think farmers are trying to reduce pollution, they will respect farmers more."

Farmers' Suggestions to Improve Perceptions
Some surveyed farmers feel what they do is not clearly visible to the community, so "need more education to public, and get success stories out, not just negative ones." "Unless you put up a billboard they don't realize what we are doing or accomplishing."