Marinette County

2021 - 2030

Land & Water Resources Management Plan

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Marinette County Land and Water Resources Plan

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Acronyms

Agricultural Performance Standards and Prohibitions – APSP
Aquatic Invasive Species – AIS
Area of Concern – AOC
Best Management Practices – BMP’s
Cubic Feet per Second – CFS
Diver Assisted Suction Harvester – DASH
Environmental Protection Agency – EPA
Environmental Quality Incentives Program – EQIP
Eurasian Water-Milfoil – EWM
Exceptional Resource Waters – ERW
Full Time Equivalent – FTE
Geographic Information System – GIS
Groundwater Quality Enforcement Standard – ES
Hydrologic Unit Code – HUC
Information and Education – I & E
International Great Lakes Data – IGLD

Land & Water Conservation Division – LWCD
Land Information Department – LID
Land and Water Resources Management – LWRM
Limited Time Equivalent – LTE
Local Advisory Committee – LAC
Maximum Contaminant Level – MCL
Midwest Invasive Species Network – MISIN
National Oceanic and Atmospheric Administration – NOAA
Natural Resources Conservation Service (Federal) – NRCS
Natural Resources Damage Assessment – NRDA
Nine Key Element Plan – NKE or 9KE
Non-Governmental Organization – NGO
Northeast Wisconsin Land Trust – NEWLT
Outstanding Resource Waters – ORW
Perfluoroalkyl/polyfluoroalkyl Substances – PFAS
Perfluorooctanoate – PFOA
Perfluorooctane Sulfonate – PFOS
Private On-site Water Treatment System – POWTS
Segregated Revenue – SEG
Targeted Runoff Management Program – TRM
Targeted Watershed Assessment – TWA
Teaching Outdoor Awareness & Discover Program – TOAD
Technical Advisory Committee – TAC
Tolerable Soil Loss – T
Tommy G. Thompson – TGT
U.S. Fish and Wildlife Service – USFWS
University of Wisconsin Extension – UWEX
Wastewater Treatment Facility – WWTF
Water Quality Monitoring – WQM
Waterbody Identification Code – WBIC
Wild Rivers Invasive Species Coalition - WRISC
Wisconsin Department of Agriculture, Trade, and Consumer Protection – DATCP
Wisconsin Department of Health Services – DHS
Wisconsin Department of Natural Resources – WDNR
Wisconsin Initiative on Climate Change Impacts – WICCI

Chapter 1. Plan Development and Public Participation

This Marinette County Land and Water Resources Management (LWRM) Plan will guide agencies that manage land to protect and improve water resources in Marinette County from 2021 through 2030.

Plan development process

With oversight provided by the Marinette County Development Committee (DC), the LWRM Plan is a product of Land Information Department Staff, with input from a Local Advisory Committee (LAC) representing farming, lake groups, schools, local governments, and the general public. Technical Advisors from the Wisconsin Department of Natural Resources (WDNR), Natural Resources Conservation Service (NRCS), United States Fish and Wildlife Service (USFWS), neighboring counties, and the University of Wisconsin Extension also provided content and other development assistance.

Marinette County Conservation staff are the main plan authors. Unfortunately, the ability to garner external input has been significantly impacted by the personal contact restrictions imposed by the COVID-19 pandemic.

One of the steps in the revision process was to provide copies of the LWRM Plan to representatives of the local, state, and federal agencies that work to manage and protect the natural resources in Marinette County. Public participation came via a local advisory committee that met virtually on December 16, 2020 to review the draft LWRM Plan and make recommendations for goals, objectives, and priority actions. A public hearing was held on January 5, 2021 to garner additional public input.

Public comment was also sought from December 16, 2020 through January 5, 2021 via a survey posted on the Marinettecounty.com website. The survey was advertised in local newspapers, on County and LID Facebook pages, and LID email lists.

The current plan reflects the continued and regular interaction with state and federal agency staff. WDNR staff were directly involved in the creation of this plan through their technical advice and review of the draft. This plan reflects our conservation needs as expressed by resource professionals, the public, and our best professional judgment. These efforts resulted in the goals for Marinette County resource management that are discussed in Chapter 3.

Plan requirements

The Marinette County LWRM Plan was developed to meet the requirements of the County Land and Water Management Planning Program. ATCP 50.12 codifies specific standards for LWRM Plan approval and was verified against the ARM-LWR-167 LWRM Plan Review Checklist, Wis. Stats. § 92.10 & Adm. Code § ATCP 50.12 (January, 2018). This includes the formation of a local Technical Advisory Committee (TAC) and Local Advisory Committee (LAC). The TAC members provided plan content, comments, and recommendations through January 5, 2021. The LAC met December 16, 2020.

Local Advisory Committee comments and recommendations were presented to the Marinette County Development Committee as part of the public hearing held January 5, 2021. The LID noticed and conducted a public hearing to solicit broad public input and recommendations. The notice of public hearing, and minutes can be found in Appendix M. The LWRM Plan was approved by the full Marinette County Board on February 23, 2021.

Performance standards and prohibitions

In Chapter NR151 of the Wisconsin Administrative Code the DNR established agricultural and non-agricultural performance standards and prohibitions to protect water quality. In Chapter ATCP 50, the DATCP identified conservation practices farmers must follow to meet the DNR standards. These standards require counties to consult with DNR for technical assistance and identify how they will assist landowners to achieve compliance with Agricultural Performance Standards and Prohibitions (APSP).

Landowners may receive individual determinations involving conditions on their property through conservation plans, cost share agreement, other Marinette County compliance related communications under the NR151 implementation strategy, and Marinette County, in addition to the DNR, may issue notices under NR151.09 or NR151.095.

Marinette County is committed to implementing the standards consistent with State Statute 92.10(6)(a)5 and ATCP 50.12(2)(i) Wis. Adm. Code. APSP implementation is a primary focus of the administration, compliance monitoring and enforcement of the Animal Waste Management Ordinance. Marinette County's strategy for Department of Natural Resources Administrative Code Chapter NR 151 implementation is discussed in greater detail in Chapter 5.

Chapter 2. Assessment of Water Quality and Resource Conditions

Physical Setting

Main information sources for physical setting in Marinette County are the WDNR *Ecological Landscapes of Wisconsin* series published in 2015. Marinette County contains the North Central Forest, Northeast Sands, and Northern Lake Michigan Coastal Ecological Landscapes. Excerpts from these publications most closely aligned with Marinette County are below.

North Central Forest Ecological Landscape

The North Central Forest Ecological Landscape encompasses about 10% (143 miles^2) of northwestern Marinette County. The growing season averages 115 days (base 32°F), ranging from 85 to 140 days. This growing season length is the shortest of all ecological landscapes in the state. The average annual temperature is 40.3°F, the third lowest of any ecological landscape in the state. The average January minimum temperature is -2°F, one degree colder than other northern ecological landscapes. The average August maximum temperature is 79.3°F, the same as the mean of other northern ecological landscapes.

Mean annual precipitation here is 32.3 inches, ranging from 30 to 35 inches. Precipitation in the North Central Forest is similar to the state average and almost 1 inch more than other northern ecological landscapes. Annual snowfall averages 63 inches, ranging from 24 to 139 inches.

The cool temperatures and short growing season in the North Central Forest are not adequate to support agricultural row crops, such as corn, in most parts of this ecological landscape. Only 6% of the ecological landscape is in agriculture. The climate is favorable for forests, which cover more than 73% of the ecological landscape.

Most of the surface formations of the North Central Forest are due to glacial activity during the late Wisconsin glaciation, about 25,000 to 11,000 years ago. Landforms include end and ground moraines, kettles, pitted outwash, drumlins, eskers, ice-walled lake plains, outwash channels, and outwash plains.

The Brule and Paint Rivers Drumlinized Ground Moraine occupies the eastern portion of the ecological landscape found in Marinette County. Many drumlins occur on the till plain, notably the Wabeno and Bass Lake Drumlins. These drumlins contain materials characteristic of earlier ice advances, indicating that they were already formed prior to the most recent advance. Areas between drumlins and in nondrumlin areas are filled

with sand and gravel sediments from meltwater streams and are often covered with silty loess deposits 6 to 24 inches thick. Bedrock-controlled knolls and ridges are common in the northeastern and southwestern parts of the Subsection.

Overall water quality in lakes and streams is very good. For example, the headwaters of a number of Wisconsin's cleanest and most renowned streams arise here, namely, the Pine, Popple, Peshtigo rivers, all of which originate in or near the Headwaters Wilderness Area of the Chequamegon- Nicolet National Forest. Activities that can negatively impact water quality are relatively limited in this headwaters area. Sediment and pollutant loads are low, and the diversity of aquatic organisms is significant for both common and rare species that are pollution-sensitive.

The prevalent plant community in this ecological landscape is Northern Mesic Forest, also referred to as northern hardwoods forest or hemlock-hardwoods forest, depending on canopy dominants.

Northeast Sands Ecological Landscape

The Northeast Sands Ecological Landscape encompasses 1,542 square miles, representing 2.8% of Wisconsin's total area, making it the fifth smallest ecological landscape in the state. Approximately half of this unique landscape (786 miles^2) is found in Marinette County. It lays in a wide band running roughly SSW to NNE.

The short growing season (122 days) is similar to other northern ecological landscapes and limits yield potential for row crop agriculture. January minimum temperatures average higher than other northern ecological landscapes. The average August maximum temperature (78.8°) is the third coolest of any other ecological landscape in the state.

Precambrian bedrock of volcanic and metamorphic origin, formed during the Lower Proterozoic (roughly 2,500 to 1,050 million years ago) almost completely underlies the Northeast Sands. The northern part of the ecological landscape is notable for its many waterfalls, almost all of which are associated with this ancient bedrock. Cambrian sandstone, with some dolomite and shale, underlies a small area along the eastern edge of the Northeast Sands. In some places, glacial deposits are thin enough that underlying bedrock directly affects vegetation and is sometimes exposed at the surface.

The Green Bay Lobe covered this ecological landscape during the last part of the Wisconsin glaciation. As the Green Bay Lobe melted and retreated eastward, outwash was deposited over lower-lying surface features, so the ecological landscape now appears as a nearly level-to-rolling sandy outwash plain, pitted in places, with sandy heads-of-outwash and loamy moraines protruding through the outwash sediments. Heads-of-outwash, uncommon in most of Wisconsin, are a distinctive glacial feature here. A series of north-south trending morainal and head-of-outwash hills runs the length of the west side of the Northeast Sands. They are oriented in roughly parallel positions, marking the outer extent of Green Bay Lobe deposits in northeastern Wisconsin.

Most upland soils formed in acid outwash sand on outwash plains or outwash heads. The dominant soil is excessively drained and sandy with a loamy sand surface, rapid permeability, and very low available water capacity. More than half the land surface is made up of outwash sand and gravel. Glacial till deposits here have pH values that are neutral to calcareous, unlike the acid tills of most of northern Wisconsin, because dolomite was incorporated into the till as glaciers passed over the Niagara Escarpment.

Marinette County rivers and streams of the Northeast Sands Ecological Landscape include the Menominee, Peshtigo, Pike, and Pine rivers and are some of the state's most biologically diverse and popular recreational rivers and streams. Scattered lakes are present, with local concentrations of small lakes in the far north, far south, and the northeast. Several large impoundments have been constructed, such as those on the Menominee and Peshtigo rivers. Water quality is generally good in these impoundments and support game and pan fish populations appealing to anglers.

Water quality in free-flowing rivers and streams is generally good across the Northeast Sands, due to the combination of substantial forest cover and lack of extensive industrial, agricultural, and residential development. There are medium-sized streams and large rivers with diverse habitats and rare aquatic species as well as small, coldwater streams with populations of native brook trout. Erosion, sediment build-up, water diversion ditches and dams impact some stream habitats. Failing septic systems may pose a potential water quality threat on some streams.

Forests cover almost 77% of this ecological landscape. Aspen is the most abundant cover type, and dry forests dominated by scrub-oak and jack pine are common. Plantation-grown pine, hemlock-hardwoods, and northern hardwoods are also among the important upland cover types. Common lowland communities include wet-mesic forests dominated by northern white-cedar, black spruce-tamarack swamps, and alder-dominated shrub swamps. Agriculture (only 7% of the area) is concentrated mostly in the southeastern and northernmost portions of the ecological landscape.

Northern Lake Michigan Ecological Landscape

This ecological landscape encompasses 2,004 square miles (1,282,877 acres), representing 3.6% of the area of the state of Wisconsin. It covers about 35% (500 miles$^{2)}$ of SE Marinette County.

Cold winters and warm summers are moderated by the thermal mass of Lake Michigan, especially in coastal areas. The mean growing season is 140 days, mean annual temperature is 42.8°F, mean annual precipitation is 32.1 inches, and mean annual snowfall is 46 inches. Lake effect snow can be significant, especially along Lake Michigan. Rainfall and growing degree days are adequate to support agricultural row crops, small grains, hay, and pastures.

The Northern Lake Michigan Coastal Ecological Landscape is primarily underlain by Silurian dolomite but with some sandstone and igneous and metamorphic rocks. Generally, the land is covered by a layer of soils of glacial origin.

A broad, level lacustrine plain occurs in areas bordering the west shore of Green Bay, where an extensive delta has been created at the mouth of the Peshtigo River. Landforms along the Lake Michigan shore include beaches, dunes, bay mouth bars, and complex ridge-and-swale topography. Embayment lakes and freshwater estuaries are also characteristic of the Lake Michigan shore.

Soils are diverse. Shallow soils and exposures of dolomite bedrock are frequent near the Lake Michigan and Green Bay coasts. Poorly drained sands are common in the lake plain west of Green Bay and in depressions between dunes and beach ridges. Beyond the lake plain west of Green Bay, the ground moraine is composed mostly of moderately well-drained, rocky sandy loams, interspersed with lacustrine sands and clays. Peats and mucks are common along the west shore of Green Bay and in the northwestern part of the ecological landscape.

Lake Michigan is cold, deep, oligotrophic, and relatively clean; Green Bay, an estuary that is also the largest bay on Lake Michigan, is warm, shallow, productive, and dynamic. It has been heavily polluted, especially by industries that formerly dumped wastes into the Fox River at the head of the bay (which is within the Central Lake Michigan Coastal Ecological Landscape). The larger rivers that flow through this ecological landscape into Green Bay include the Menominee, Oconto, Peshtigo, and Pensaukee. These rivers and their tributaries drain the uplands west of Green Bay before passing through the extensive wetlands along Green Bay's west shore. There are few large inland lakes. Several impoundments constructed on rivers west of Green Bay were subjected to high levels of pollution from past industrial activity.

Historically, the uplands were almost entirely covered by forest. Today more than 64% is nonforested. Most of this land is now in agricultural crops (51%), with smaller amounts of grassland (6%), nonforested wetlands (6%), shrubland 0.1%), and urbanized areas (1%). The most abundant cover type in the forested uplands (262,119 acres, or 20% of the ecological landscape) is maple-basswood, with smaller amounts of aspen-birch. Forested wetlands (mostly lowland hardwoods, with some conifer swamps) cover slightly over 14% of the area. Other cover types are comparatively scarce but of high importance ecologically and include maple-beech, hemlock-hardwoods, eastern white pine, and mixtures of boreal conifers (dominants include white spruce-balsam fir-white pine-white cedar). Important nonforested wetland communities include marsh, sedge meadow, and shrub swamp.

The following portion of the **Physical Setting** is largely derived from the 1991 *Soil Survey of Marinette County, Wisconsin.*

Topography and Drainage

Elevations range from 1,660 feet in the northwest to 580 feet above sea level at the shoreline of Green Bay in the southeast corner of the county. Surface water flows

mainly from northwest to southeast, where it enters Green Bay. The Peshtigo and Menominee Rivers and their tributaries provide much of the surface flow.

The secondary drainage systems (ditching) are minimally developed in most of the county. Much of the surface runoff flows into basins and depressions where it tends to accumulate and is released slowly to streams and ground water. Many basins do not have outlets.

Soils

Marinette County has a rich and varied history of glacial geology. Glacial ice, part of the Continental Glaciation, covered all of Marinette County as recently as 10,000-12,000 years ago. The last glacial advance was marked by two distinct lobes that moved into the county. The Green Bay Lobe, entered the county from the northeast, while the Langlade Lobe entered from the northwest. The edges of the furthest advance of these ice lobes are marked by end moraines and can be seen throughout the county. Many times these moraines are only a few miles apart, indicating there was considerable advance and retreat of the glacier due to climatic changes.

Due to the many ice fluctuations, soil patterns are very complex in many county areas. Some areas, such as the southwest corner of the county, are sandy outwash deposited by glacial melt water in front of glacial ice. Other areas were deposited directly under the ice without aid of melt water. These areas form ground moraines and contain particles ranging from very small clay to boulders, collectively termed glacial till.
Some glacial reminders remain today as wet bogs or kettles formed by blocks of ice that broke off stagnating ice margins. These wet areas formed as this ice was buried by outwash sediments. When the ice melted, a cavity was left behind. Many of these cavities intersected the water table, leaving kettle lakes that remain today. The soil associations of Marinette County may be lumped into three groups, based on their glacial history.

Soils formed in glacial till.
About 23 percent of Marinette County is made up of glacial till soil associations. They include the Emmet-Charlevoix, Menominee-Emmet, Cunard-Emmet, and Sarona-Keweenaw associations (Map 2-1). The majority of cropland and farms are located in the southern part of the county on Emmet soils. Gently sloping Emmet soils comprise the largest acreage of prime farmland in Marinette County. The Sarona-Keweenaw association in the north is generally used for woodland. Erosion and wetness are the main limitations in managing these soils as cropland, pasture, and woodland. Wetness, excessive slope, and shallow depth to dolomite are main limitations affecting building site and recreational development, as well as sanitary facilities.

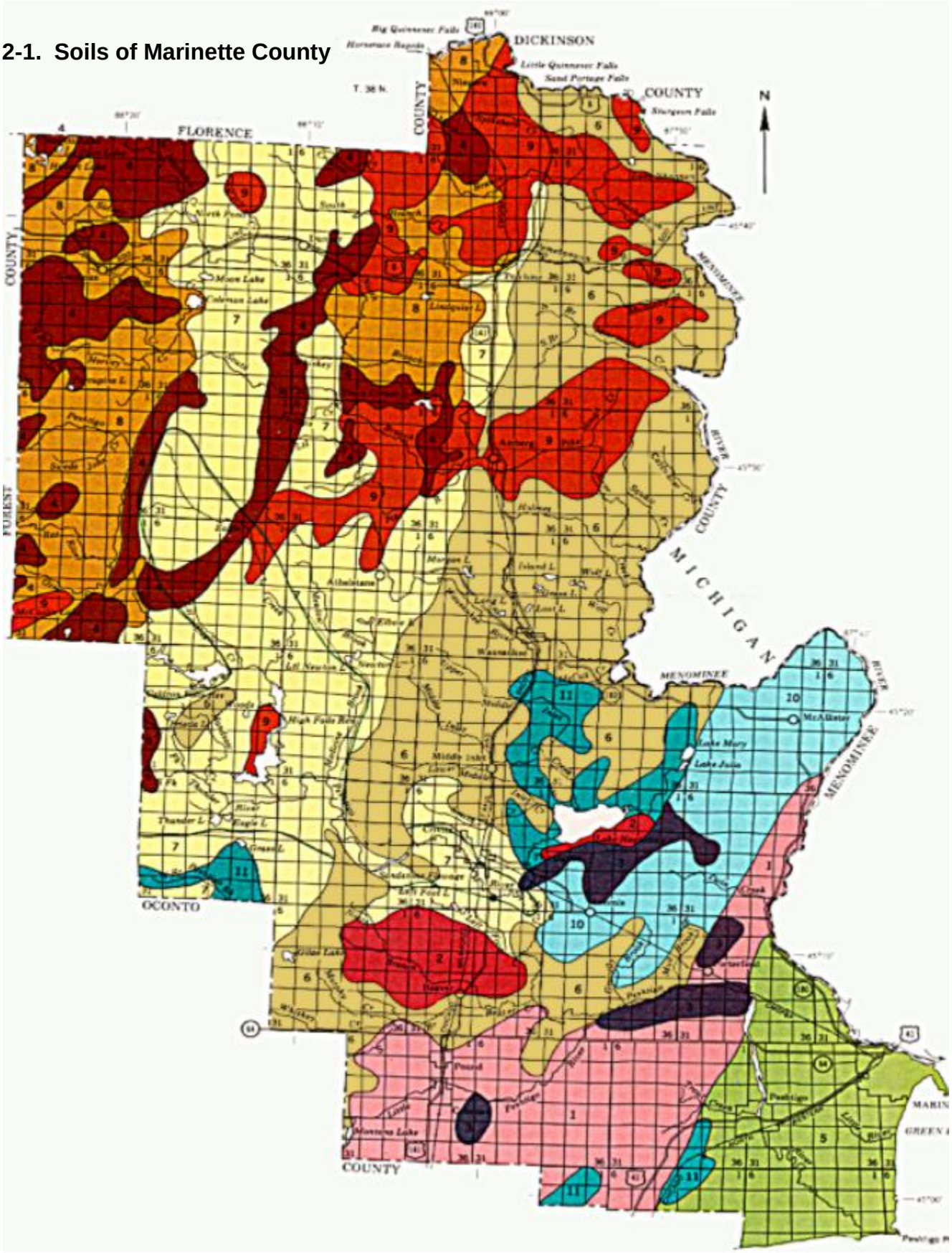
Soils formed in glacial outwash and till

About 68 percent of Marinette County soils consist of the Wainola-Deford, Mancelona-Emmet-Menahga, Menahga, Pence-Padus, and Ishpeming-Michigamme-Rock outcrop associations. These soils were formed on a complex topography of moraines, outwash plains, stream terraces, and glacial lake basins. Most areas of this group are used for woodland. Some of the less sloping areas are used as cropland or pasture. Water and wind erosion, bedrock outcrops, and droughtiness are the main limitations in managing these soils as woodland, cropland, or pasture. Excessive slope is the main limitation affecting building sites and recreational development. Rapid permeability or moderate permeability, wetness and excessive slope are the main limitations on sanitary facilities. These soil associations underlay the fastest growing areas of the county, in terms of recreational use, population growth and new construction. They are also among the most susceptible to ground water contamination.

Organic soils

Organic soils make up about 9 percent of the county. The Seelyeville-Markey-Emmet and Seelyeville-Markey associations make up this group. The soils in this group were formed in glacial lake basins, on outwash plains, stream terraces, moraines, and drumlins. Most areas of this group are best suited for woodland or wildlife. Wetness and low strength are the main limitations in managing these soils as woodland, cropland, or pasture. These same limitations affect building site and recreational development, and sanitary facilities.

Map 2-1. Soils of Marinette County



SOIL LEGEND*

AREAS DOMINATED BY SOILS THAT FORMED IN GLACIAL TILL

1 — Emmet-Charlevoix association: Deep, nearly level to steep, well drained and somewhat poorly drained, loamy soils on moraines and drumlins

2 — Menominee-Emmet association: Deep, nearly level to steep, well drained, sandy and loamy soils on outwash plains, moraines, and drumlins

3 — Cunard-Emmet association: Moderately deep and deep, nearly level to steep, well drained, loamy soils on moraines and drumlins

4 — Sarona-Keweenaw association: Deep, nearly level to steep, well drained, loamy and sandy soils on moraines

AREAS DOMINATED BY SOILS THAT FORMED IN GLACIAL OUTWASH AND TILL

5 — Wainola-Deford association: Deep, nearly level and gently sloping, somewhat poorly drained to very poorly drained, sandy and mucky soils in glacial lake basins

6 — Mancelona-Emmet-Menahga association: Deep, nearly level to steep, well drained to excessively drained, sandy and loamy soils primarily on end moraines

7 — Menahga association: Deep, nearly level to steep, excessively drained, sandy soils on moraines, outwash plains, and stream terraces

8 — Pence-Padus association: Deep, nearly level to very steep, well drained, loamy soils on outwash plains, stream terraces, moraines, kames, and eskers

9 — Ishpeming-Michigamme-Rock outcrop association: Moderately deep, gently sloping to moderately steep, somewhat excessively drained and well drained, sandy and loamy soils, and rock outcrop, on outwash plains and moraines

AREAS DOMINATED BY ORGANIC SOILS

10 — Seelyeville-Markey-Emmet association: Deep, nearly level to steep, very poorly drained and well drained, mucky and loamy soils in glacial lake basins, on stream terraces, outwash plains, and moraines, or on upland moraines and drumlins

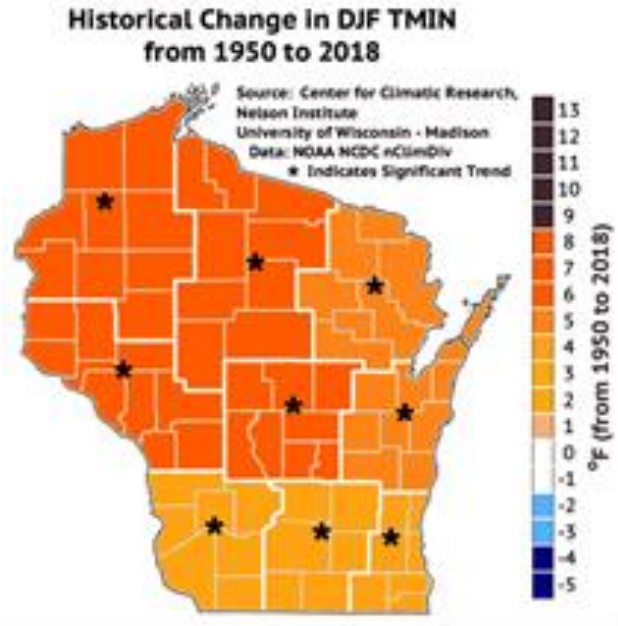
11 — Seelyeville-Markey association: Deep, nearly level, very poorly drained, mucky soils in glacial lake basins and on stream terraces, outwash plains, and moraines

*Texture terms in the descriptive headings refer to the surface layer of the major soils in the associations.

Climate and Precipitation

The frequency, duration and amount of precipitation influence surface and groundwater quality and quantity, soil moisture, runoff characteristics, and the physical condition of waterways. Marinette County lies in the continental zone that has long, cold, snowy winters and summers that are mostly warm with hot humid periods.

The Wisconsin Initiative on Climate Change Impacts (WICCI) has broken the state into nine regions and tracked historical changes from 1950 through 2018 in a number categories. For Northeastern Wisconsin Winter Precipitation has increased by 5% while Summer Precipitation has decreased by 5%. All seasons have seen increases in the daily minimum and maximum temperatures. The greatest changes have been the winter daily minimums. The climatic figures (2-1 through 2-5) below display a sampling of these changes.



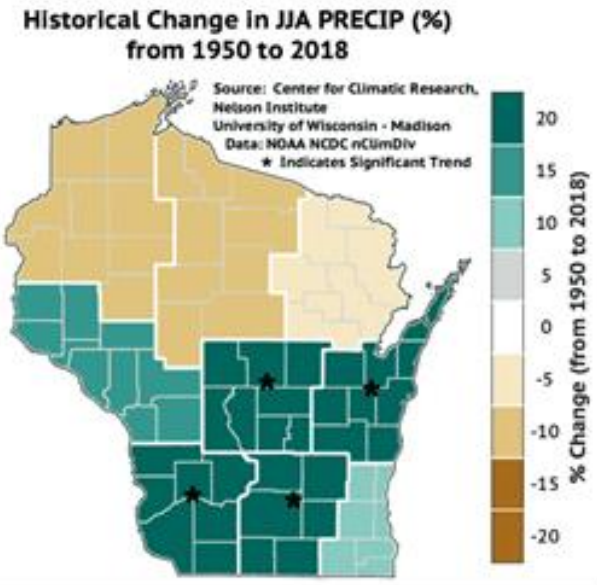
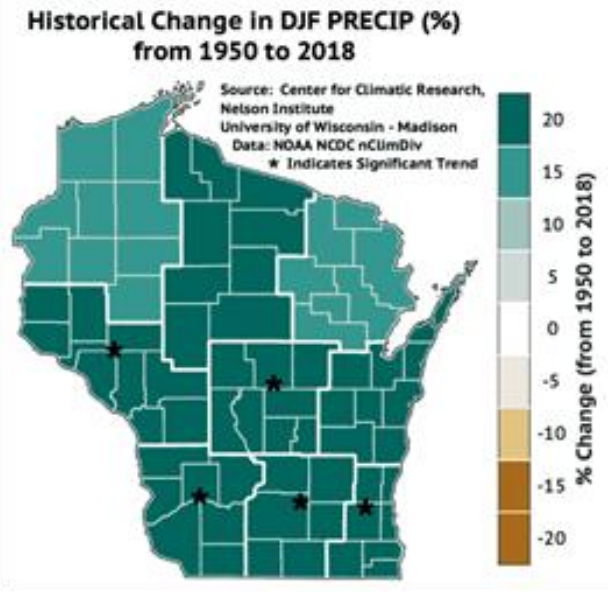


Figure 2-1 shows increasing minimum temperatures in December through February from 1950 to 2018. For our Northeast Region the nightly winter lows average about 5 degrees warmer.	Figure 2-2 shows a decreasing amount of precipitation falling in June through July from 1950 to 2018. For our Northeast Region the summer rainfall has decreased about 5%.



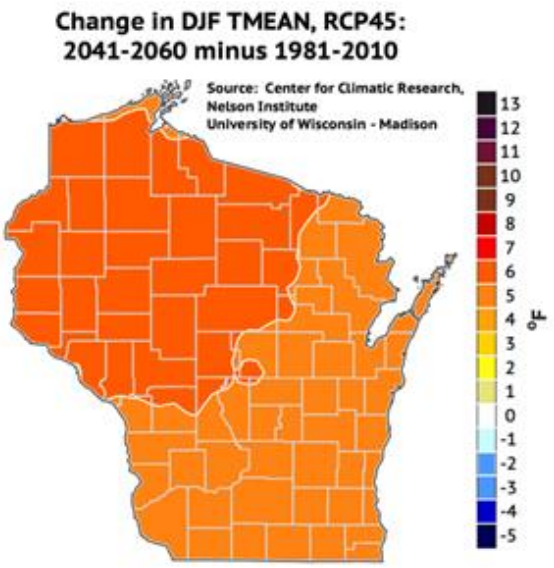


Figure 2-3 shows increasing precipitation in December through February from 1950 to 2018. Snow and rain in the Northeast Region has increased about 15%.	Figure 2-4 above predicts average temperatures in December through February increasing by 5 degrees in twenty years over the 1981- 2010 averages.

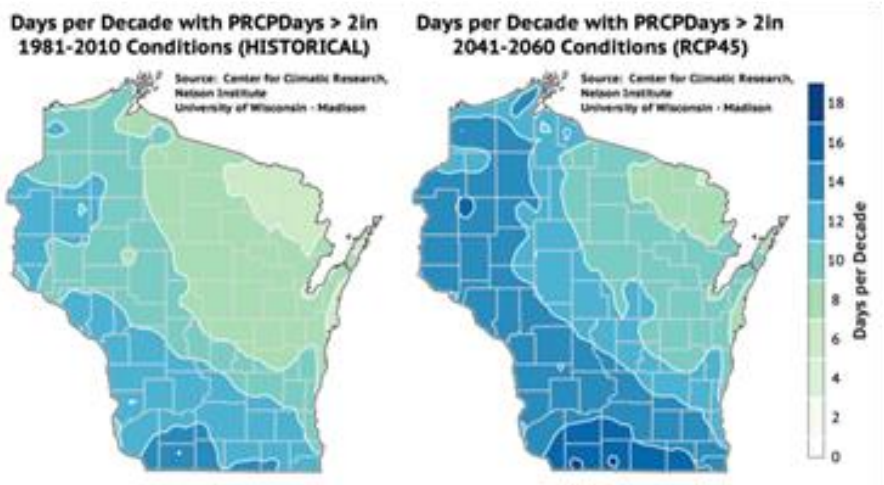


Figure 2-5 predicts an increasing number of weather events with greater than 2” of precipitation.

Water Resources

Marinette County has an abundance of surface water resources. More than four hundred lakes and nine hundred miles of streams are scattered throughout the county. Approximately twenty-five percent of Marinette County, or 228,000 acres, is considered wetlands. Ground water is the main source of drinking water and the source of many streams and lakes in Marinette County.

Watershed Discussions

Marinette County Discussion and Comments in Table 2-1 are in **black** type. WDNR stream related comments are in **blue** type. Note: 9KE refers to a Nine Key Element Plan consistent with EPA's framework for improving water quality in a holistic manner within a geographic watershed. The first three elements characterize and set goals to address pollution sources. The remaining six elements determine specific resources and criteria to implement and evaluate the plan. WDNR groundwater related comments are in **green** type. WDNR invasive species related comments are in **brown** type. Each watershed is assigned a 10 digit Hydrologic Unit Code (HUC). For the Upper Green Bay Basin in Marinette County, the first seven digits are 0403010. The last three digits are in the cells in the Watershed column.

Map 2-2 shows twelve watersheds completely or partially within Marinette County. These watersheds are all part of the Upper Green Bay Basin. Marinette County watersheds change in physical character and land use from southeast to northwest. The southern watersheds are primarily agricultural, change to a mix of forest and farms in central Marinette County, and become almost completely forested in the northern third of the county. The map also shows the locations of farms that have installed cost shared BMP's. Some farms have installed more than one BMP. Note: documentation of compliance under NR 151 APSPs began in 2015. A sampling of Marinette County land use classifications can be found in Appendix A.

Table 2-1. Watershed Discussions and Comments

Agricultural Watersheds		
Watershed	Discussion	Comments/Recommendations
GB04 Little R. **HUC** 404	A completed Priority Watershed. Only a small portion of the watershed lies in Marinette County. A 9KE plan is under development in a portion of this watershed by Oconto County.	Five Targeted Runoff Management (TRM) projects have been completed (one in 2005, one in 2008, and three in 2013, one in 2014).
GB07 Lower Peshtigo R. **HUC** 506	A 9KE plan was approved for this watershed by the DNR and EPA in 2015. Trout Cr./Bundy Cr. Sub-watershed are the most densely agricultural areas of the county and significant focus should continue in this area to promote soil and water conservation practices.	Twenty-six TRM projects have been completed (seven in 2005, two in 2006, one in 2008, four in 2009, one in 2010, four in 2011, one in 2012, one in 2013, one in 2014, two in 2015) and one is pending.

	Green Bay forms the southeast boundary of this watershed. This watershed contains Harmony Arboretum, an important eco education asset. PFAS is an emerging contaminant of concern in this watershed. The County should continue to work with the WDNR regarding the management of land spreading waste from the WWTF onto agricultural lands. May be highest profile watershed in county in terms of drinking and groundwater impacts from PFAS. Maintain a familiarity of status of investigations and remedial actions in area. Non-native phragmites is throughout the Southern half of the county and along major highway corridors	This watershed will be a main focus under the NRCS Cooperative Conservation, Demonstration Farm Network and NRDA agreements as well as implementation and documentation of compliance with NR 151 APSP. The watershed is experiencing severe erosion of Green Bay shoreline due high water levels and wind driven wave action. See Appendix H for the most recent WDNR list of AIS known to be in eight waterbodies. Reference Management Recommendations in Lower Peshtigo River TWA WQM Plan 2017. Continue to monitor status and impact of PFAS contamination investigation. Full extent of groundwater impacts not fully defined as of Fall 2020. Surface water treatment systems have been installed in some locations throughout the watershed to reduce amounts of PFAS present. GOAL: Monitor through targeted well sampling events, the levels of Nitrate present in groundwater and incidence of Coliform impacted wells.
GB08 Little Peshtigo R. **HUC** 505	This watershed has the second greatest acreage of farmland in the County. It contains the Villages of Coleman and Pound. Non-native phragmites is throughout the Southern half of the county and along major highway corridors Although the Little Peshtigo River is not considered impaired, A 9KE plan should be developed for this watershed as water quality data suggests nutrients concentrations may be approaching levels of concern. Additionally, high quality waters within the North Branch Beaver Creek exist in this watershed and should be a priority for protection measures. Recent WDNR surveys indicate good to excellent conditions on streams throughout this watershed. The Upper portion of this watershed has seen increased installation of center pivot	Twenty-four completed (six in 2005, two in 2008, three in 2010, two in 2011, two in 2012, one in 2013, two in 2015, three in 2019) and two pending TRM projects. This watershed will be a main focus under the NRCS Cooperative Conservation and Demonstration Farm Network agreements. See Appendix F for recent WDNR monitoring results on Bass and Gilas Lakes. Marinette County staff are implementing a study to determine the cause of rising Phosphorus levels in Bass Lake See Appendix H for the most recent WDNR list of AIS known to be in ten waterbodies Continue supporting habitat improvement projects within the NB Beaver Creek. Soil health principles and alternatives to center pivot irrigation on agricultural lands should be explored and implemented in this area of the

	irrigation high capacity wells for agricultural lands.	county to reduce pressures on local aquifers and ground water dependent waterways. GOAL: Monitor through targeted well sampling events, the levels of Nitrate present in groundwater and incidence of Coliform impacted wells.

Transition Watersheds

Watershed	Discussion	Comments/Recommendations
GB09 Middle Inlet Lake Noquebay **HUC** 503	Lake Noquebay is one of our most important recreational assets. Under a priority watershed, which closed in 2006, thirty-three landowners installed agricultural and developed riparian Best Management Practices (BMP's). This watershed contains part of the Village of Crivitz. Middle Inlet and the other tributary streams to Lake Noquebay are in good to excellent condition based off 2016 WDNR assessments. While nutrients concentrations in the streams are currently not at levels of concern, protection of these high-quality streams is a priority. Nutrient management and soil health principles should be promoted in the watershed.	We will continue to seek additional resources to collaborate with the Lake Noquebay Rehabilitation District on protection efforts including aquatic plant harvesting, Dam operation, and AIS prevention/control. One completed TRM project in 2009 and in 2018 Marinette County staff are implementing a study to determine the cause of rising Phosphorus levels in Lake Noquebay. See Appendix F for recent WDNR monitoring results on Noquebay, Mary, Big Newton, and Little Newton Lakes and Appendix H for the most recent WDNR list of AIS known to be in four waterbodies. Medium Priority for development of a 9KE plan to continue soil and water conservation practices that promote soil health principles and protect high quality waterways. GOAL: Monitor groundwater impacts from increased development and use, through well sampling programs and encouragement. Indicator contaminants Chloride, Nitrate, and Coliform.
GB10 Middle Peshtigo Thunder R. **HUC** 504	Was a Priority Watershed that closed in 2009. 11 landowners installed agricultural and developed riparian BMPs. This watershed contains much of the Tommy G. Thompson State Park. Camp Bird, a major component of County environmental education efforts, is found in this watershed. This watershed contains 1/2 of the Village of Crivitz.	One completed TRM project in 2012. See Appendix F for recent WDNR monitoring results on Thunder Lake and Caldron Falls Flowage. See Appendix F for the most recent WDNR list of AIS known to be in fourteen waterbodies. Soil health principles and alternatives to center pivot irrigation on agricultural lands should be explored and implemented in this area of the

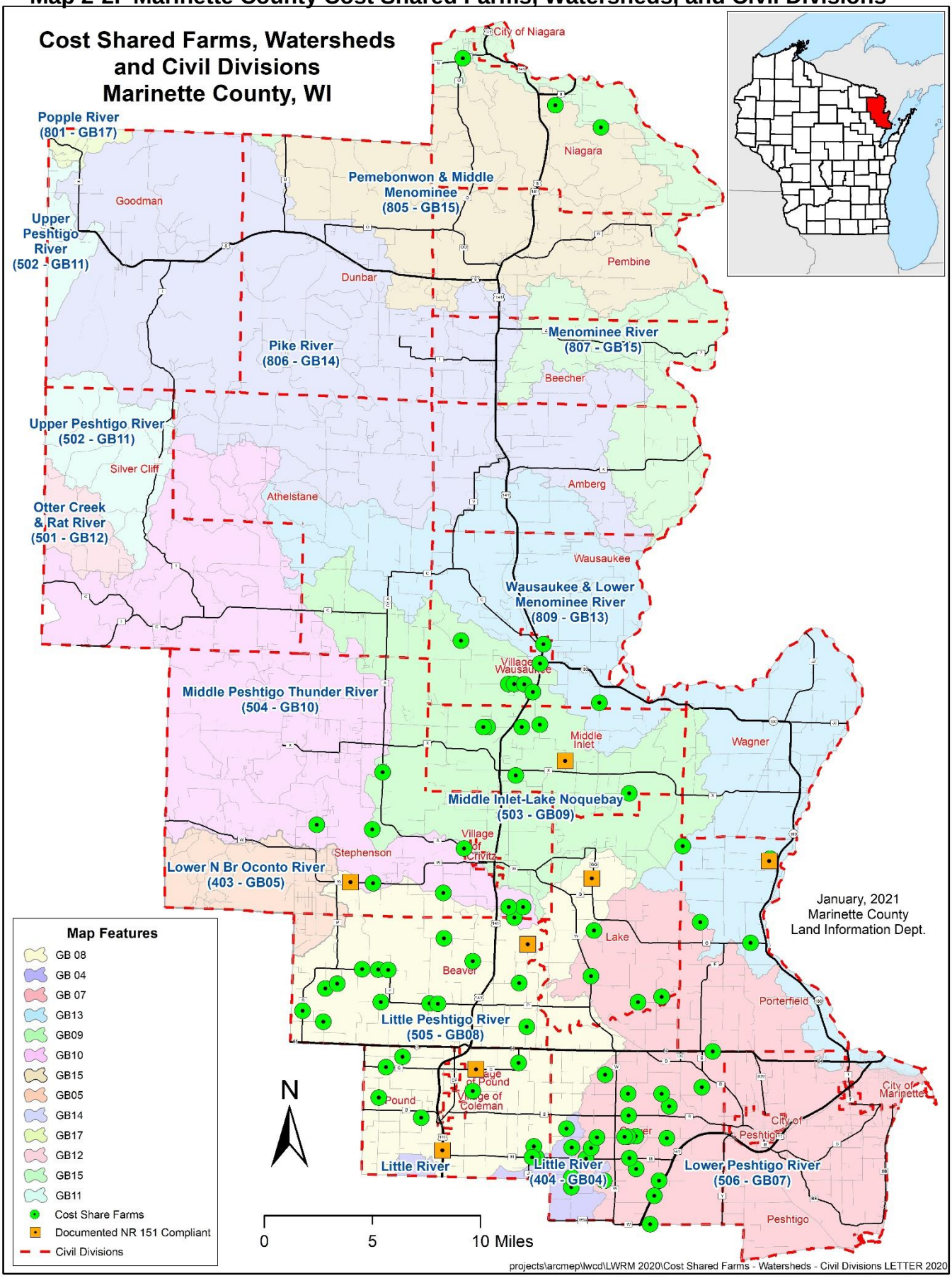
	The lower portion of this watershed has seen increased installation of center pivot irrigation high capacity wells for agricultural lands.	county to reduce pressures on local aquifers and ground water dependent waterways. TENTATIVE GOAL: Monitor groundwater impacts from increases in development and use, through well sampling programs and encouragement. Indicator contaminants Chloride, Nitrate, and Coliform.
GB13 Wausaukee Lower Menominee R. **HUC** 809	This watershed contains several heavily developed lakes, significant agriculture and a portion of the City of Marinette. Graceful cattail, an AIS new to Marinette County, was confirmed in August 2020. The Lower Menominee River contains an EPA designated Area of Concern (AOC) due to historic industrial and municipal discharges of paint sludge, PCBs, arsenic, and coal tars.	The Lower Menominee River AOC has been delisted as a Federal Area of Concern after a large dredging project removed 1000's of cubic yards of contaminated river sediment. One completed TRM project in 2016 WDNR, WRISC, the landowners, and possibly other stakeholders will pursue eradication of Graceful cattail Continue to monitor status and impact of PFAS contamination investigation. Full extent of groundwater impacts not fully defined as of Fall 2020.

Forested Watersheds

Watershed	Discussion	Comments/Recommendations
GB05 Lower North Br. Oconto R.	Most of the small portion of this watershed lying in Marinette County is County Forest.	See Appendix F for recent WDNR Yankee Lake monitoring results
GB11Upper Peshtigo R. **HUC** 502	Most of this watershed lying in Marinette County is County Forest or WDNR land including a portion of the TGT State Park.	
GB12 Otter Cr. & Rat R. **HUC** 501	Only a small portion of this watershed lies in Marinette County. Two lakes have Associations.	See Appendix F for the most recent WDNR list of AIS known to be in two waterbodies
GB14 Pike River **HUC** 806	This watershed contains almost no Ag. The Pike R. and North Branch Pike R. are in the Wild and Scenic Rivers program.	A road/stream crossing inventory was completed in 2009 and used by USFWS to prioritize restoration efforts within the watershed. See Appendix E for recent WDNR monitoring results on Lily Lake and Appendix F for the most recent WDNR list of AIS known to be in eight waterbodies
GB15 Pemebonwon & Middle Menominee R. **HUC** 805	A significant pocket of agricultural land exists within the GB15 watershed in the vicinity of the City of Niagara. Northland Scholars Academy is located on Camp Lake.	Two completed TRM projects (one in 2010). A road/stream crossing inventory was conducted in 2013.

	The Back 40 Mine has been proposed to be constructed on the Michigan side of the Menominee River in this watershed.	See Appendix H for the most recent WDNR list of AIS known to be in seven waterbodies Encourage Arsenic sampling from wells as Florence county is known for elevated Arsenic in groundwater.
GB17 Popple R. **HUC** 801	Although only 2,600 acres of this watershed lie in the County, it contains heavily developed Hilbert and LaFave Lakes.	Hilbert and LaFave Lakes are experiencing some of the most severe impacts to riparian cottages and homes from high water levels. See Appendix H for the most recent WDNR list of AIS known to be in two waterbodies.

Map 2-2. Marinette County Cost Shared Farms, Watersheds, and Civil Divisions



Lakes

Marinette County contains 442 lakes covering 13,735 surface acres. These vary in size from 2,409 acre Lake Noquebay to small pothole lakes less than 2 acres. Ninety-six percent of these lakes are less than 100 acres in size. Ninety-two percent are less than 50 acres in size. Seventy percent of all Marinette County Lakes are less than 10 feet deep, while eighty-three percent are less than 20 feet deep.

Of the 442 lakes found in Marinette County, 125 have all or some of their shoreline in public ownership. There are 320.35 miles of lake shoreline. With the purchase by the WDNR of former Wisconsin Public Service lands adjoining the Peshtigo River Flowages, ninety-one miles, or twenty-eight percent are publicly held.

Lake water levels have shifted from some of the lowest on record at the release of the 2010 LWRM plan version to some of the highest water levels ever seen on inland lakes. At one point, the Hilbert Lake Association in northwest Marinette County considered installing a high capacity well to refill the lake. By 2019 and 2020, ways to drain Hilbert Lake were being explored. The high water has also led to a significant increase in shoreline erosion and inundation of riparian houses and outbuildings. Many landowners responded by installing riprap and other measures.

In 2005, falling water levels left 100's feet of Bay of Green Bay lake bed exposed, which was quickly colonized by phragmites. Marinette County participated in two large control efforts with the WDNR and Ducks Unlimited in 2009 and 2011. West Shore phragmites has now been largely eliminated by high water and wave action. Since 2018, the main issue along the Green Bay shoreline has been extreme shoreline erosion.

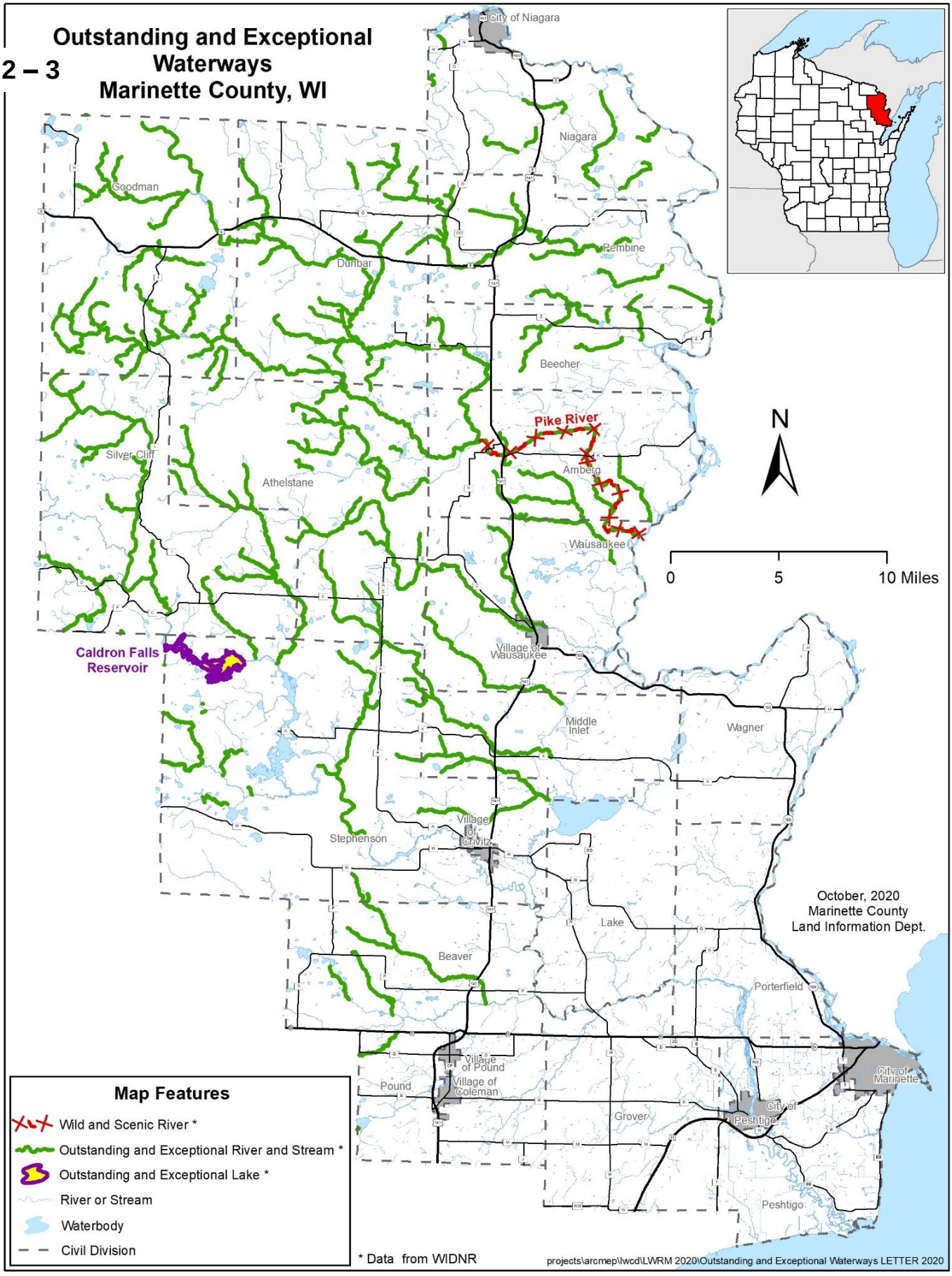
NOTE: See the **Water Quantity** discussion for greater detail on water levels.

Streams

Marinette County contains 304 rivers and streams with a total surface area of 4,700 acres and a total length of 920 miles. There are 191 rivers and streams (totaling 614 miles) classified as trout water. These are the highest numbers of trout streams and miles of any county in the state. More streams are designated as Exceptional (ERW) or Outstanding Resource Waters (ORW) than any other county in the state. Fifty-two streams or stream sections are designated as ORW by the Wisconsin Department of Natural Resources. An additional 109 streams or stream segments are designated as ERW.

ERW and ORW are designations given to Wisconsin's highest quality water bodies and receive special levels of protection from degradation due to "point source pollution." Point source pollution originates from a discrete source such as an industrial or wastewater outflow from a pipe. Map 2 – 3 below shows the locations of Marinette County Outstanding and Exceptional waterways.

Map 2 – 3


Outstanding and Exceptional Waterways
Marinette County, WI
City of Niagara
Niagara
Goodman
Dunbar
Pembine
Beecher
Pike River
Amberg
Silver Cliff
Athelstane
Wausaukee
N
0
5
10 Miles
Caldron Falls Reservoir
Village of Wausaukee
Middle Inlet
Wagner
Stephenson
Village of Crivitz
Lake
Beaver
Porterfield
Village of Pound
Village of Coleman
Pound
City of Marinette
City of Peshtigo
Grover
Peshtigo
October, 2020
Marinette County
Land Information Dept.
Map Features
Wild and Scenic River *
Outstanding and Exceptional River and Stream *
Outstanding and Exceptional Lake *
River or Stream
Waterbody
Civil Division
* Data from WIDNR
projects\arcmep\lwcd\LWRM 2020\Outstanding and Exceptional Waterways LETTER 2020

The eighty percent of Marinette County streams less than ten feet wide comprise only six percent of the total stream surface area. The seven largest rivers in the county incorporate almost seventy-nine percent of the total stream and river surface area.

The Peshtigo and Menominee are the two largest county rivers. The Menominee River flows for 119 miles and drains 4,150 square miles of Wisconsin and Michigan while the Peshtigo River flows for 144.8 miles, draining 1,155 square miles. The Lower Menominee River in the City of Marinette was an Area of Concern designated by the US Environmental Protection Agency. After 30 years of pollution cleanup and restoration efforts, the Area of Concern has been removed from an international list of the 43 most polluted places on the Great Lakes. This AOC is Wisconsin's first of five to be delisted.

The Peshtigo River, and especially the Menominee River originate from, or drain significant portions of, land outside of Marinette County. This leaves Marinette County to some extent, dependent on good environmental decisions and land use outside of local control. Nonpoint source pollution and invasive exotic species are just two possible threats. Also, Michigan has issued the four foundational State permits required for the commencement of construction and operations a large open pit metallic (gold and zinc) mine within 100 feet of the Menominee River from the Pemebonwon and Middle Menominee River Watershed (GB15). In 2017, the WDNR completed a Targeted Watershed Assessment monitoring project which provided substantial data to analyze current conditions and to make recommendations for future management actions in the area; the full Stream Narrative can be referenced in Appendix G.

One hundred fifty-nine of Marinette County′s three hundred and four streams have shorelines that are at least partially publicly owned. Of 1835 miles of frontage, 554 miles, or 30.2 percent, are publically owned and free from development. Almost seventy percent of all stream and river frontage is privately owned.

Groundwater

Groundwater is the main source of drinking water in Marinette County. Groundwater is stored underground in soil pore spaces and cracks within rock layers. Unconsolidated material and rock layers which hold groundwater are called aquifers.

The southeastern third of the county is underlain by the Potsdam Sandstone, Saint Peter Sandstone, and the Lower Magnesian and Trenton limestone formations. The northwestern two-thirds of the county are underlain by igneous and metamorphic bedrock that yields little or no water. In both areas the overlying glacial deposits are aquifers.

Groundwater flows from recharge areas such as hills and exposed bedrock to discharge areas such as lakes, rivers, and wetlands. Regional recharge areas are typically farther from discharge areas. The direction of regional flow is southeast toward Green Bay.

Recharge areas for local groundwater flow are generally closer to discharge areas. In most cases, local groundwater flow follows the topography.

Sandy soils, a high water table, or shallow bedrock are among the conditions that make ground water susceptible to contamination. The WDNR considers the Little River, Lower Peshtigo River and Little Peshtigo River watersheds to have high potential for groundwater contamination for one or more of these conditions. The Middle Inlet Lake Noquebay watershed is considered to have a medium potential for groundwater contamination.

According to the Wisconsin Water Use 2017 Withdrawal Survey developed by the WDNR, Marinette County's use of 1 to 2.5 billion gallons of water ranks 33rd in the state for ground water withdrawal. The US Geological Survey has maintained one ground water level monitoring well in the Town of Pembine since 1938. The lowest groundwater level record at the site was 24.06 feet below the ground surface when the well was originally drilled. The highest ground water level was recorded in 1960 at 18.01 feet below the ground surface. Current data shows ground water at the highest levels since the mid 1980's. The average of five readings in 2020 is 19.88 feet.

Currently, there are two main groundwater contaminants of concern in Marinette County, nitrates and Perfluoroalkyl/polyfluoroalkyl substances (PFAS). PFAS are human-made chemicals in industry and consumer products since the 1940s. These chemicals do not easily break down in the environment and are known to accumulate in the environment and humans. In a nationwide study, low levels of PFAS were determined to be present in the blood of most Americans. Two PFAS, perfluorooctanoate (PFOA) and perfluorooctane sulfonate (PFOS), are the most extensively studied of these chemicals. In 2018, the WDNR received formal notice that groundwater samples from the Town of Peshtigo contained PFAS.

Nitrates are described by The Wisconsin Groundwater Coordinating Council as a:

> A water-soluble molecule that forms when ammonia or other nitrogen rich sources combine with oxygen. The concentration of nitrate in water is often reported as "nitrate-N" which reflects only the mass of nitrogen in the nitrate (ignores the mass of oxygen). Nitrate levels in groundwater are generally below 2 parts per million (as nitrate-N) where pollution sources are absent. Higher levels indicate an anthropogenic source of contamination such as agricultural or turf fertilizers, animal waste, septic systems or wastewater. The health-based groundwater quality enforcement standard (ES) for nitrate-N in groundwater and the maximum contaminant level (MCL) for nitrate-N in public drinking water are both 10 ppm. Everyone should avoid long-term consumption of water containing nitrate above this level. Infants below the age of 6 months who drink water containing nitrate in excess of the MCL are especially at risk, and could become seriously ill with a condition called methemoglobenemia or "blue-baby syndrome". This condition deprives the infant of oxygen and in extreme cases can cause death. Birth defects have also been linked to nitrate exposure.

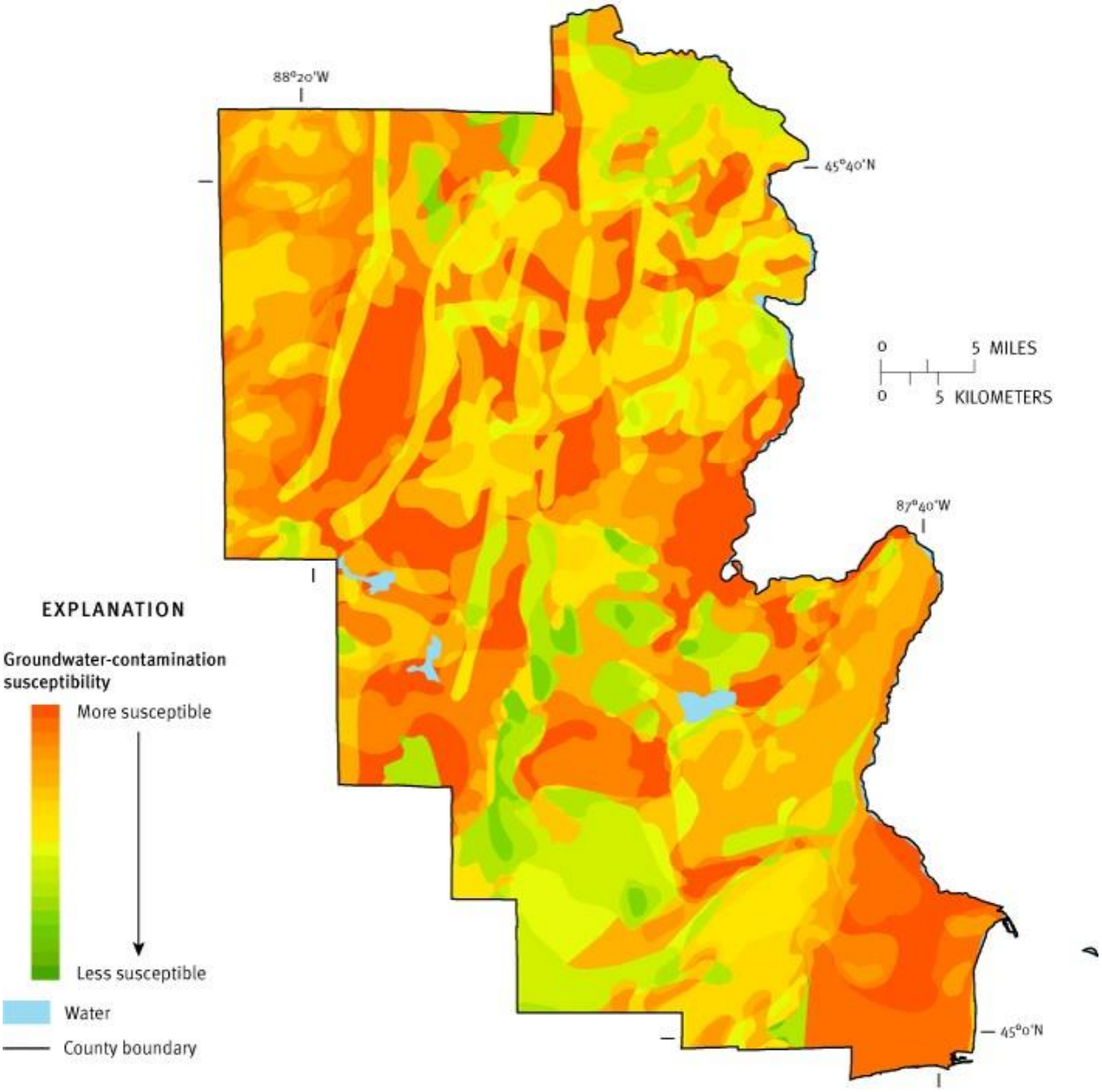
> The Wisconsin Department of Health Services (DHS) also highlights thyroid disease and colon cancer as additional health concerns and states, “When nitrate levels are high, everyone should avoid long-term use of the water for drinking and preparing foods that use a lot of water. “

According to the 2020 Wisconsin Groundwater Coordinating Council Report to the Legislature:

> Nitrate is Wisconsin’s most widespread groundwater contaminant. Nitrate contamination of groundwater is increasing in extent and severity in the state. A 2012 survey of Wisconsin municipal water-supply systems found that 47 systems have had raw water samples that exceeded the nitrate-N Maximum Contaminant Level (MCL), up from just 14 systems in 1999.
>
> Increasing nitrate levels have been observed in an additional 74 municipal systems. Private water wells, which serve about one third of Wisconsin families, are at risk as well. Statewide, about 10% of private well samples exceed the MCL for nitrate-N, although one third of private well owners have never had their water tested for nitrate. In agricultural areas, such as the highly cultivated regions in south-central Wisconsin, around 20%-30% of private well samples exceed the MCL. Nitrate concentrations are poised to further increase as nitrate pollution penetrates into deep aquifers and migrates farther from original source areas.

The Council Report also estimated approximately 2.3% of Marinette County’s 10,295 private drinking water wells have nitrate levels exceeding the 10 parts per million Nitrate standard. There has not been a systematic study done of Marinette County groundwater resources to look for nitrates.

Map 2-4. Marinette County – Groundwater Contamination Susceptibility Analysis

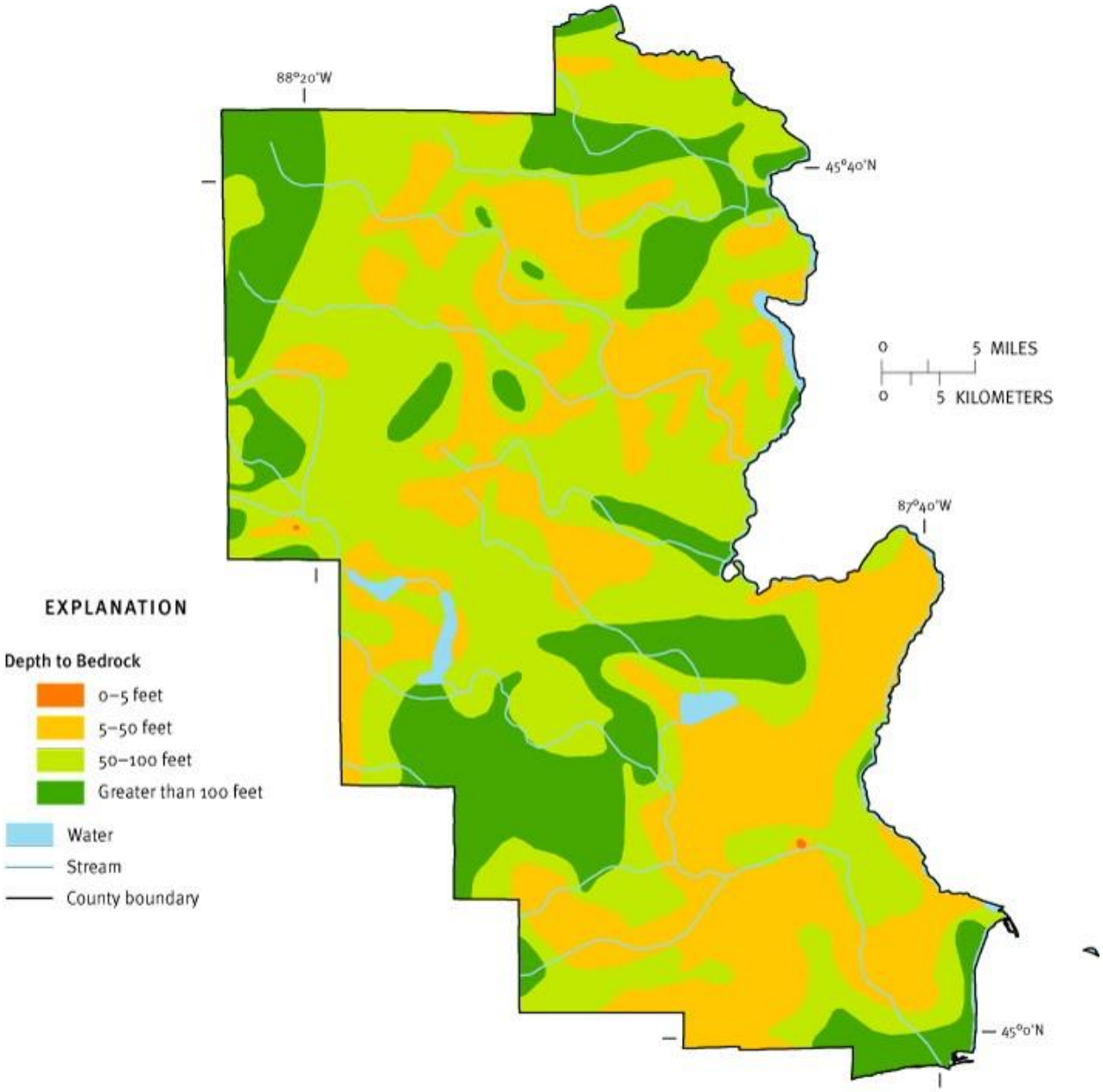


This groundwater-contamination susceptibility map is a composite of five resource characteristic maps, each of which was derived from generalized statewide information at small scales, and cannot be used for any site-specific purposes.

Map source: Schmidt, R.R., 1987, Groundwater contamination susceptibility map and evaluation: Wisconsin Department of Natural Resources, Wisconsin's Groundwater Management Plan Report 5, PUBL-WR-177-87, 27 p.

Figure created for the "Protecting Wisconsin's Groundwater Through Comprehensive Planning" web site, 2007, *http://wi.water.usgs.gov/gwcomp/*

Map 2-5. Marinette County – Depth to Bedrock

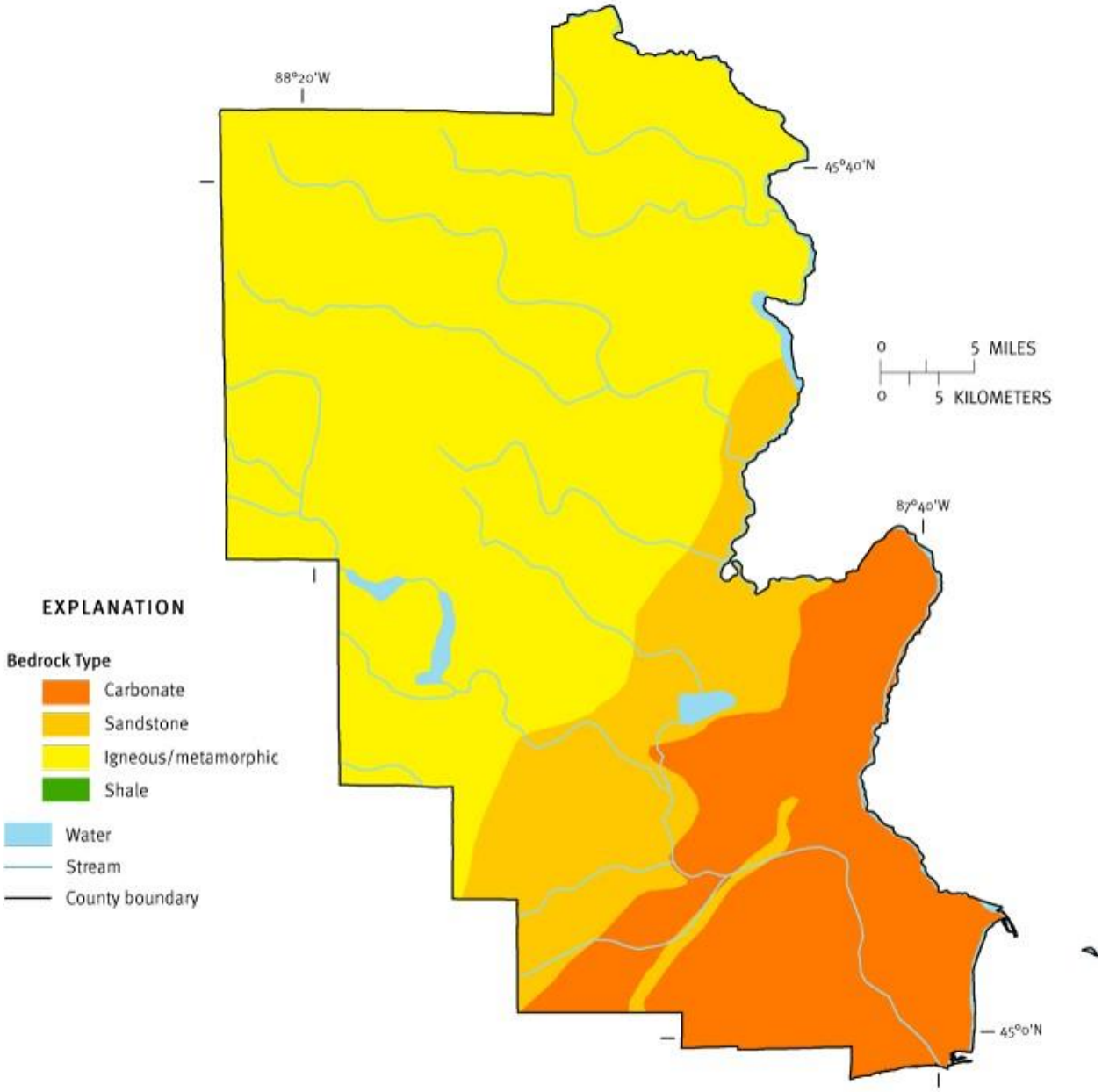


This resource characteristic map was derived from generalized statewide information at small scales, and cannot be used for any site-specific purposes.

Map source: Schmidt, R.R., 1987, Groundwater contamination susceptibility map and evaluation: Wisconsin Department of Natural Resources, Wisconsin's Groundwater Management Plan Report 5, PUBL-WR-177-87, 27 p.

Figure created for the "Protecting Wisconsin's Groundwater Through Comprehensive Planning" web site, 2007, *http://wi.water.usgs.gov/gwcomp/*

Map 2-6. Marinette County – Bedrock Type

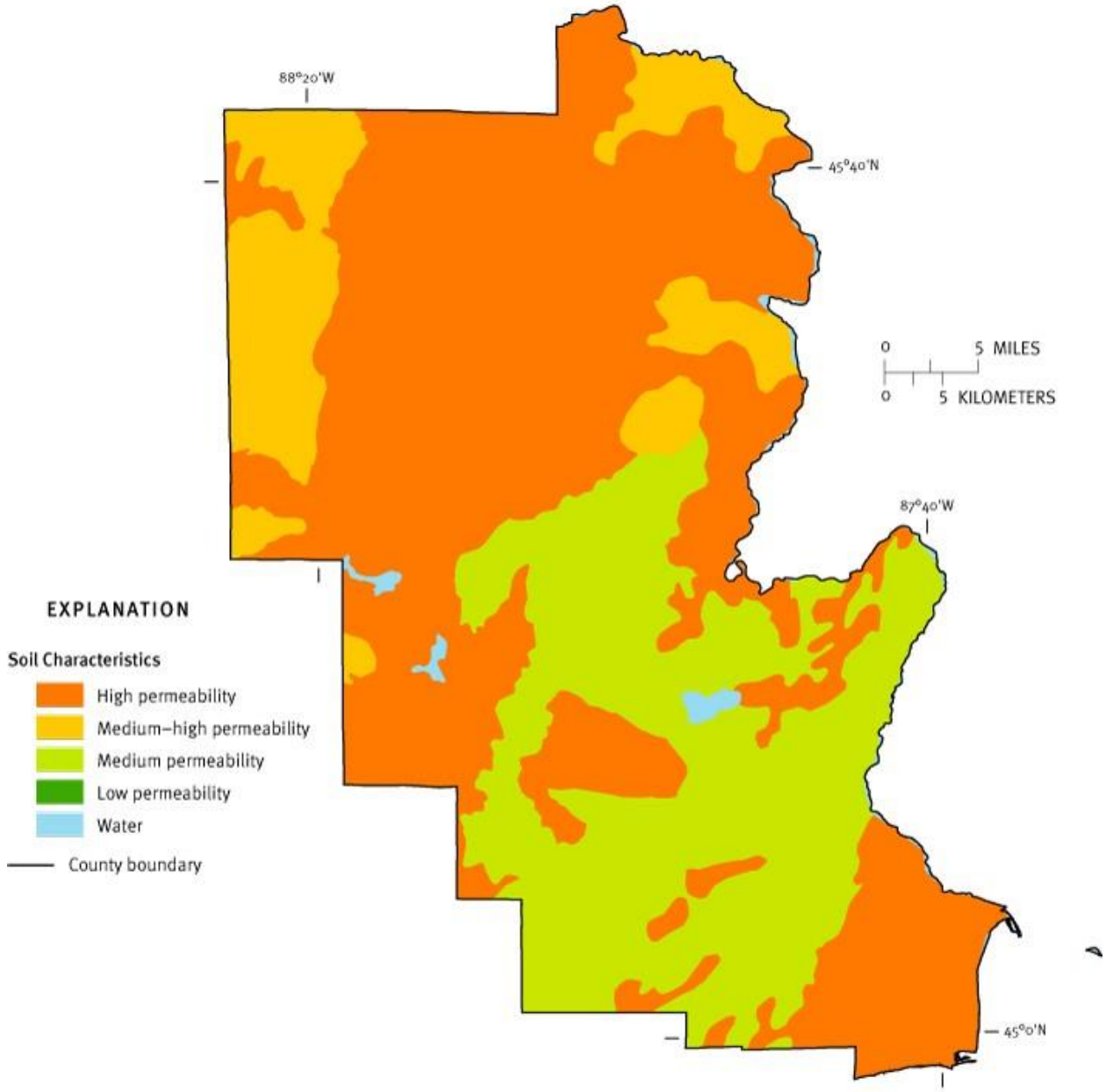


This resource characteristic map was derived from generalized statewide information at small scales, and cannot be used for any site-specific purposes.

Map source: Schmidt, R.R., 1987, Groundwater contamination susceptibility map and evaluation: Wisconsin Department of Natural Resources, Wisconsin's Groundwater Management Plan Report 5, PUBL-WR-177-87, 27 p.

Figure created for the "Protecting Wisconsin's Groundwater Through Comprehensive Planning" web site, 2007, *http://wi.water.usgs.gov/gwcomp/*

Map 2-7. Marinette County – Soil Characteristics

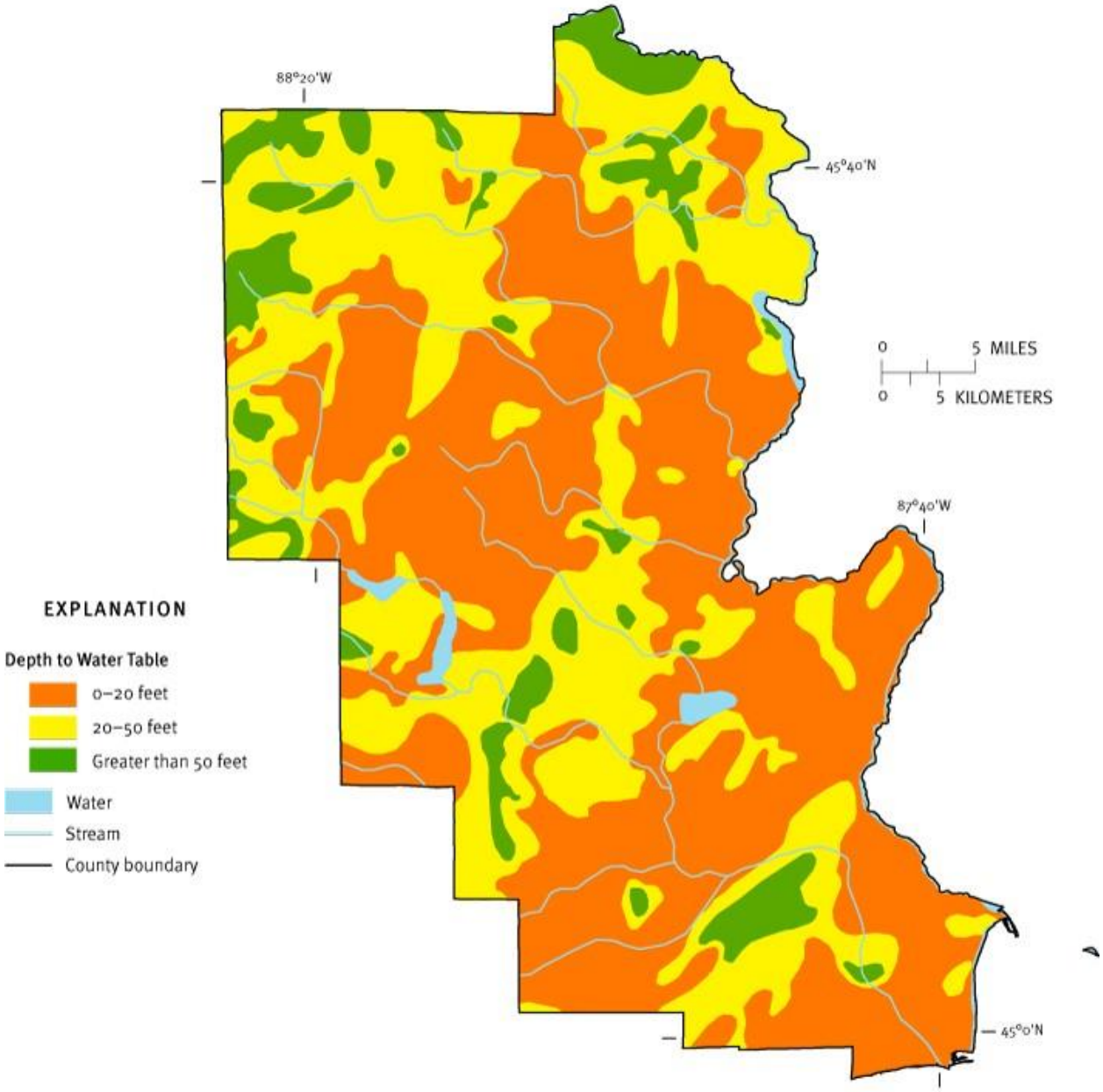


This resource characteristic map was derived from generalized statewide information at small scales, and cannot be used for any site-specific purposes.

Map source: Schmidt, R.R., 1987, Groundwater contamination susceptibility map and evaluation: Wisconsin Department of Natural Resources, Wisconsin's Groundwater Management Plan Report 5, PUBL-WR-177-87, 27 p.

Figure created for the "Protecting Wisconsin's Groundwater Through Comprehensive Planning" web site, 2007, *http://wi.water.usgs.gov/gwcomp/*

Map 2-8. Marinette County – Depth to Water Table

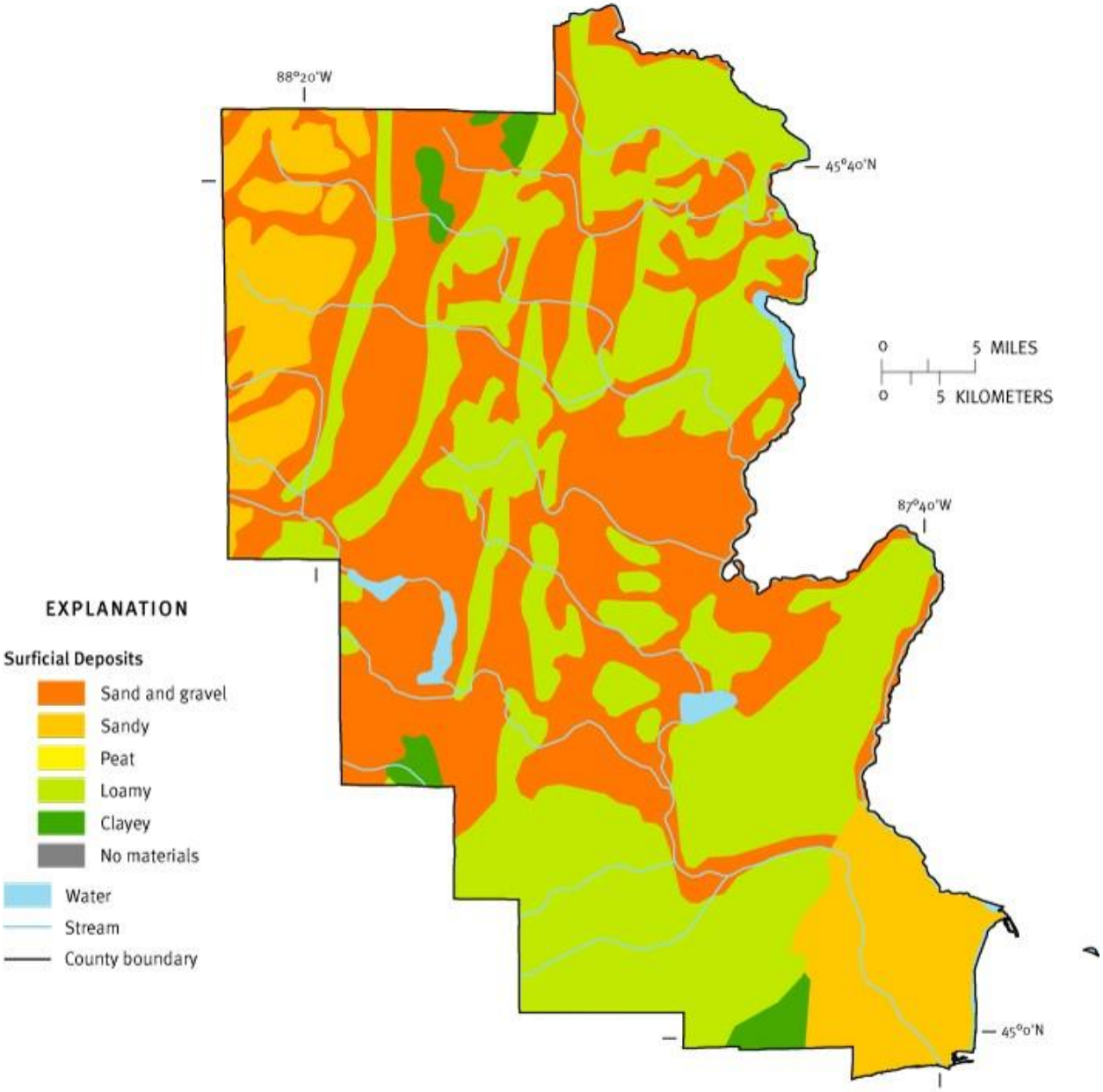


This resource characteristic map was derived from generalized statewide information at small scales, and cannot be used for any site-specific purposes.

Map source: Schmidt, R.R., 1987, Groundwater contamination susceptibility map and evaluation: Wisconsin Department of Natural Resources, Wisconsin's Groundwater Management Plan Report 5, PUBL-WR-177-87, 27 p.

Figure created for the "Protecting Wisconsin's Groundwater Through Comprehensive Planning" web site, 2007, *http://wi.water.usgs.gov/gwcomp/*

Map 2-9. Marinette County – Surficial Deposits



This resource characteristic map was derived from generalized statewide information at small scales, and cannot be used for any site-specific purposes.

Map source: Schmidt, R.R., 1987, Groundwater contamination susceptibility map and evaluation: Wisconsin Department of Natural Resources, Wisconsin's Groundwater Management Plan Report 5, PUBL-WR-177-87, 27 p.

Figure created for the "Protecting Wisconsin's Groundwater Through Comprehensive Planning" web site, 2007, *http://wi.water.usgs.gov/gwcomp/*

Water Quantity

The last LWRM plan was written at the end of an extended low water period in Marinette County. Beginning in 1998 water levels began to drop, reaching their nadir (according to the Menominee MI NOAA station 9087088) at 574.84 feet (ref IGLD 1985) on January 20, 2013. At that time, many residents could not recall lower lake levels going as far back as forty-five years.

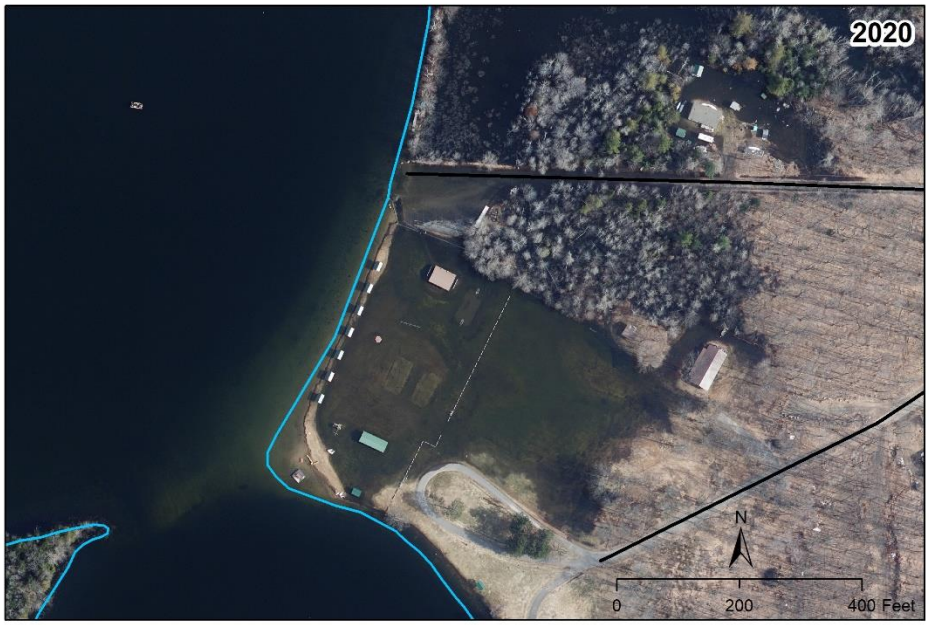
United States Geological Service flow data for the Peshtigo and Menominee Rivers were particularly striking. The Peshtigo River has been continuously monitored for 66 years. The Average Annual Mean flow, which averages in the daily high and low flows for the entire monitoring period, was 906 Cubic Feet per Second (CFS). In 2009 the Annual Mean Flow was 526 CFS, the lowest ever recorded. The Menominee River has been monitored for even longer, 74 years. The Annual Mean Flow over that period is 3,290 CFS. In 2009 it was 1,909 CFS, also the lowest on record.

Low flows and lake water levels a decade ago affected access to lakes and rivers. Some boat landings were completely dry. Large woody habitat (fallen trees) was often completely out of the water. It might seem counter intuitive, but those low flows and high temperatures were generally a boon to the growth of aquatic plants. That in turn caused a spike in complaints regarding navigation and recreation. Phragmites in particular benefited from the low water levels and spread exponentially along the west shore of Green Bay.

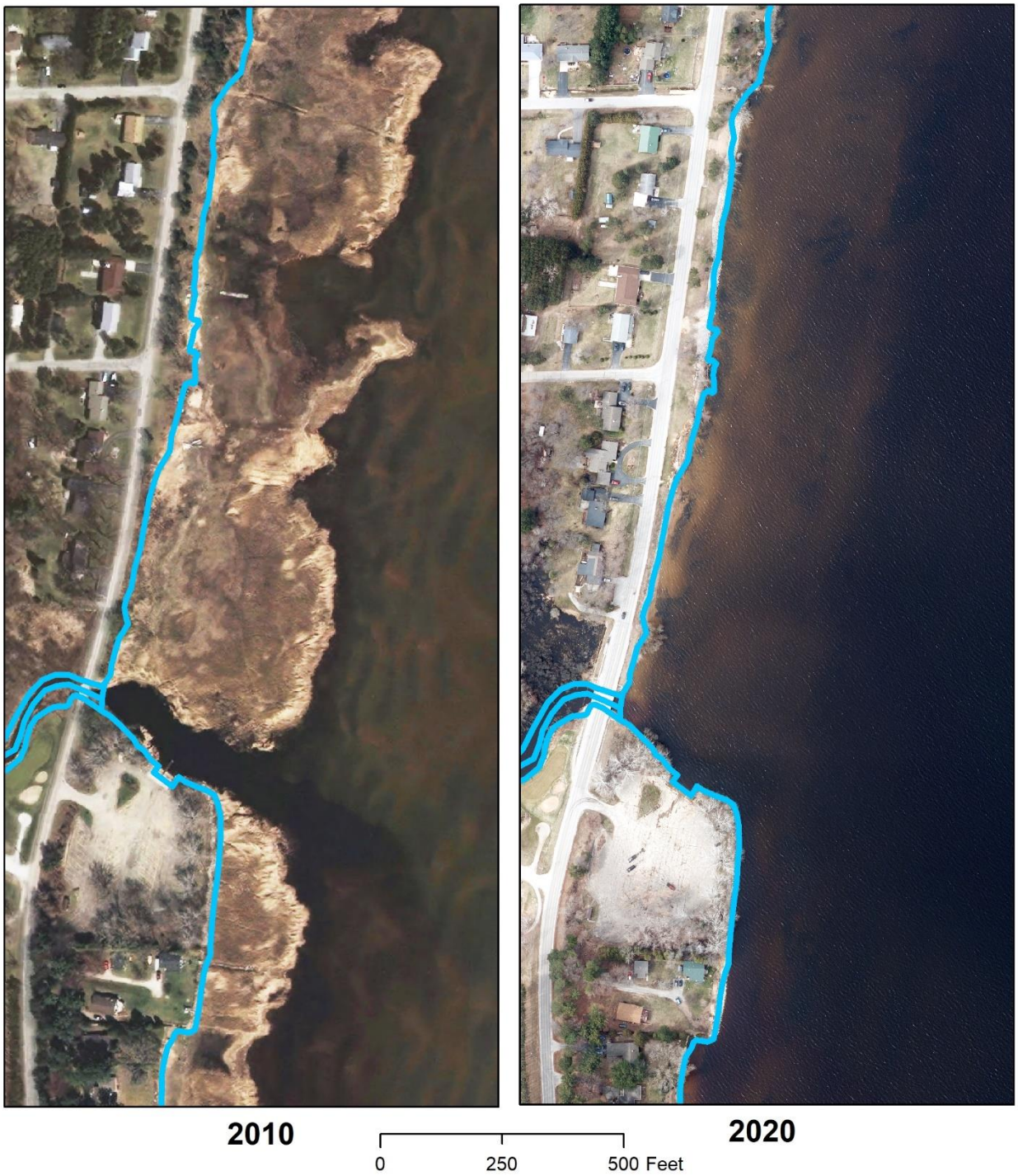
In 2020, Marinette County is at the other end of the surface water level spectrum. The highest water level ever recorded at the Menominee MI NOAA station was 583.24 feet (ref IGLD 1985) on Jun 10, 2020. Many long term residents have reported water levels at heights unknown in fifty years. Shoreline erosion on the Green Bay shoreline and inland lakes is rampant. The 2019 Peshtigo River Average Annual Mean flow was 1,566 CFS, the highest ever recorded. The 2019 Menominee River Annual Mean Flow was 5,536 CFS, also the highest on record.

Current high flows and lake water levels are also affecting access to lakes and rivers. Some boat ramps and docks are completely underwater. Boat landing parking lots are sometimes covered with water as well. Riparian docks and piers are often under water. High water and high winds led to unprecedented shoreline erosion and rendered some riparian homes and cottages unusable. The photos below compare 2010 water levels at Goodman Park on Lake Hilbert in northwestern Marinette County to 2020 conditions.

Hilbert Lake



The photos below compare Little River outlet water levels in southeastern Marinette County where it empties into Green Bay. In 2010, almost 400 feet of lake bed was exposed at the river mouth. At the time, this area was massively infested with Phragmites. The April 2020 photo to its right shows how water levels have risen. Inundation of structures and extreme shoreline erosion have replaced Phragmites as the main concern along outland waters.



Proper installation and maintenance of Private On-site Water Treatment System (POWTS) systems are of concern due to their prevalence and disproportionate concentration near waterbodies. Since 1996, Marinette County has issued more than 9,000 POWTS permits for home septic systems. These systems were installed under State of Wisconsin standards and sited based on thorough Soil Evaluations.

Of greater concern are approximately 10,000 POWTS more than twenty-five years old. Many of these systems may be undergoing significant deterioration due to age. They predate the much higher installation standards of today's POWTS and were sited using a simple Percolation Test. This situation may result in POWTS drain fields failing to meet the required 36" separation from groundwater and other limiting factors. The systems most at risk are those riparian areas and where the water table has risen substantially.

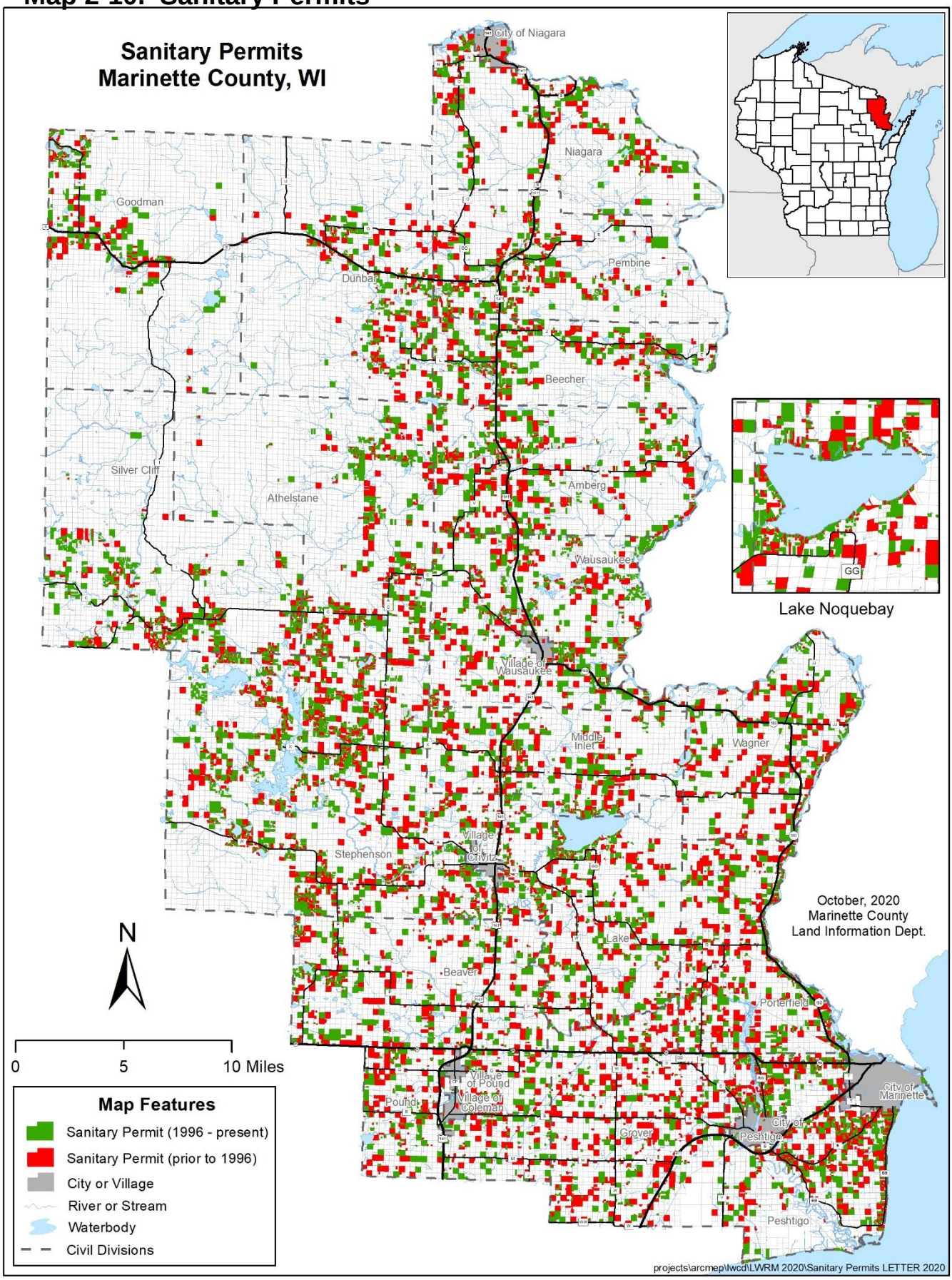
The Wisconsin Initiative on Climate Change Impacts (WICCI) predicts intensified rain events in coming years. Extreme weather, combined with old or poorly sited in-ground POWTS, high groundwater, and increased impervious surfaces, all raise the risk of septic system failure and possible private well contamination.

Map 2-4 below shows the locations of POWTS across Marinette County. The areas with few systems are largely County Forest or large wetland complexes. Lake Noquebay is shown in the map inset. More than three-hundred POWTS are located within the immediate lake area.

Natural movement of unpolluted **water** and free passage (**space**) along naturally vegetated water courses provide **food** and **shelter** for fish and other wildlife. These are the four components of habitat. Best management practices that help fish and wildlife, also protect infrastructure and benefit people. There are many examples. Properly installed culverts that allow easy fish passage also prevent catastrophic failures during storms. Natural shoreline vegetation protects shorelines from erosion, preserving property values while protecting water quality. Wetland protection, enhancement and restoration allow for greater temporary water storage and attenuate peak flood stage. Wetlands are also critically important habitat. Cropping practices such as No-Till and Cover Crops keep soil where it belongs, maintain cropland productivity and safeguard water quality.

To put just one example into perspective, a Peshtigo River Watershed culvert inventory found 679 stream crossings. Many of these culverts were found to be undersized, too long, perched, had ponding above the culvert, or a plunge pool below. All of these situations result in impediments to fish and higher risk of failure.

Map 2-10. Sanitary Permits



Exotic species

Invasive exotic species have become a threat to northern forests (Gypsy Moths, Emerald Ash Borer, Japanese Knot-weed), lakes (Eurasian Water Milfoil, Zebra Mussels), prairies (dozens of species), wetlands (Phragmites, Purple Loosestrife). Because our natural resources are so critical to tourism and quality of life, these exotic invaders threaten the economy of Marinette County by impeding navigation and use of our lakes and streams, crowding out more desirable species, and creating noxious odors. Exotic species cost private citizens, local governments, and agencies tens of billions of dollars each year.

Exotic species have the ability to invade natural systems and dominate and even sometimes eliminate native competitors. Introduced species may compete directly with native species for nutrients, sunlight, or space. They also compete indirectly by altering the food web or physical environment. Native species with limited population size or range are particularly at risk. According to a Nature Conservancy report, exotic species have contributed to the population decline of 42 percent of threatened or endangered species in the U.S. Many exotic species pose a threat to agricultural areas, urban parks, yards, and roadsides.

Aquatic Invasive Species (AIS)

In the 2011 LWRM plan, thirty Marinette County lakes and streams were known to contain AIS. As of October 2020, the WDNR website now lists 65 water bodies with at least one, and as many as seven, invasive species. Part of the drastic increase is because more people are looking for AIS, but the problem is real. The WDNR named twelve dominant AIS. The main species are Banded Mystery Snail (20 waterbodies), Chinese Mystery Snail (11), Curly-Leaf Pondweed (4), Eurasian Water-Milfoil and Hybrids (34), Phragmites (12), Purple Loosestrife (11), Round Goby, Rusty Crayfish (19), Yellow Floating Heart (2), and Zebra Mussel (14). Additionally, species like Phragmites and Purple Loosestrife can show up in any wet spot across Marinette County. Appendix F lists the 65 affected waterbodies by watershed and shows what invasive species they currently host.

Nutrient laden runoff from crop fields, failing septic systems, urban areas, and construction sites exacerbate aquatic invasive plant problems. Phosphorus from this runoff can support growth of exotic aquatic plant species, and sometimes native species, to nuisance levels. Changes to state plant management rules, especially WDNR Administrative Code Chapter NR 109, require the creation of an aquatic plant management plan for each water body where extensive aquatic plant management is proposed.

The Marinette County LWCD has worked with lake associations, lake districts, and local units of government on thirty-three aquatic plant related projects, including management plans for Thunder Lake, Beecher Lake, Sandstone Flowage, Lake Noquebay, McCaslin Lake, and Peshtigo Flowage. Table 2-2 lists past and current AIS projects.

With the growing popularity of water gardens, the likelihood of noxious AIS arriving in Marinette County along with out of state plants grows exponentially. For example, Hydrilla verticillata, called by some the “world’s worst weed,” made an appearance in a Marinette County private pond in 2007. Through quick action by the landowners and Marinette County staff, Hydrilla was eradicated. Unfortunately, eradication of Hydrilla made the pond safe for a second invasive, Yellow Floating Heart to dominate. Despite years of effort and several control methods, the plant persists to this day. In December 2020, the LWCD was notified that a third AIS, Graceful Cattail, is in the pond. All three of these species are the intentional, and unintentional, result of one order from an out-of-state water garden nursery.Fortunately the pond is quite isolated.

The two species Marinette County has worked hardest to control are phragmites and Eurasian Water-Milfoil. *Phragmites australis,* or Common Reed, was a particular nuisance for property owners in the City of Marinette and Town of Peshtigo along the Green Bay shore as the 2011 LWRM plan was being written and as recently as 2017. This plant grows more than 12 feet tall and forms colonies so dense they are almost impenetrable. They block water views and impede access. It is a plant that spreads primarily through the growth of underground rhizomes. Just a rhizome fragment can start a new colony. Fortunately, at least from an AIS standpoint, extremely high water levels along the Green Bay shoreline have largely eliminated phragmites as a nuisance. However, the high water has opened up many inland locations, such as road rights-of way to infestations.

Eurasian Water-Milfoil (EWM) can grow in beds so dense watercraft cannot pass through them. When the plants die back, decomposition of the plants can lead to localized oxygen depletion and fish kills. Because of the impacts to recreation and in response to requests from riparian property owners and lake groups, Marinette County has built significant capacity to control EWM. The LID has hired, and worked with the Wild Rivers Invasive Species Coalition to hire, watercraft inspectors to educate boaters about EWM. We have obtained grants to partially fund individual herbicide treatment efforts. LID staff have also built a Diver Assisted Suction Harvester (DASH) to essentially vacuum up EWM from the bottom of water bodies. The DASH has become an important tool to quickly respond and control small pioneer infestations and eliminate scattered individual plants that might survive herbicide treatments.

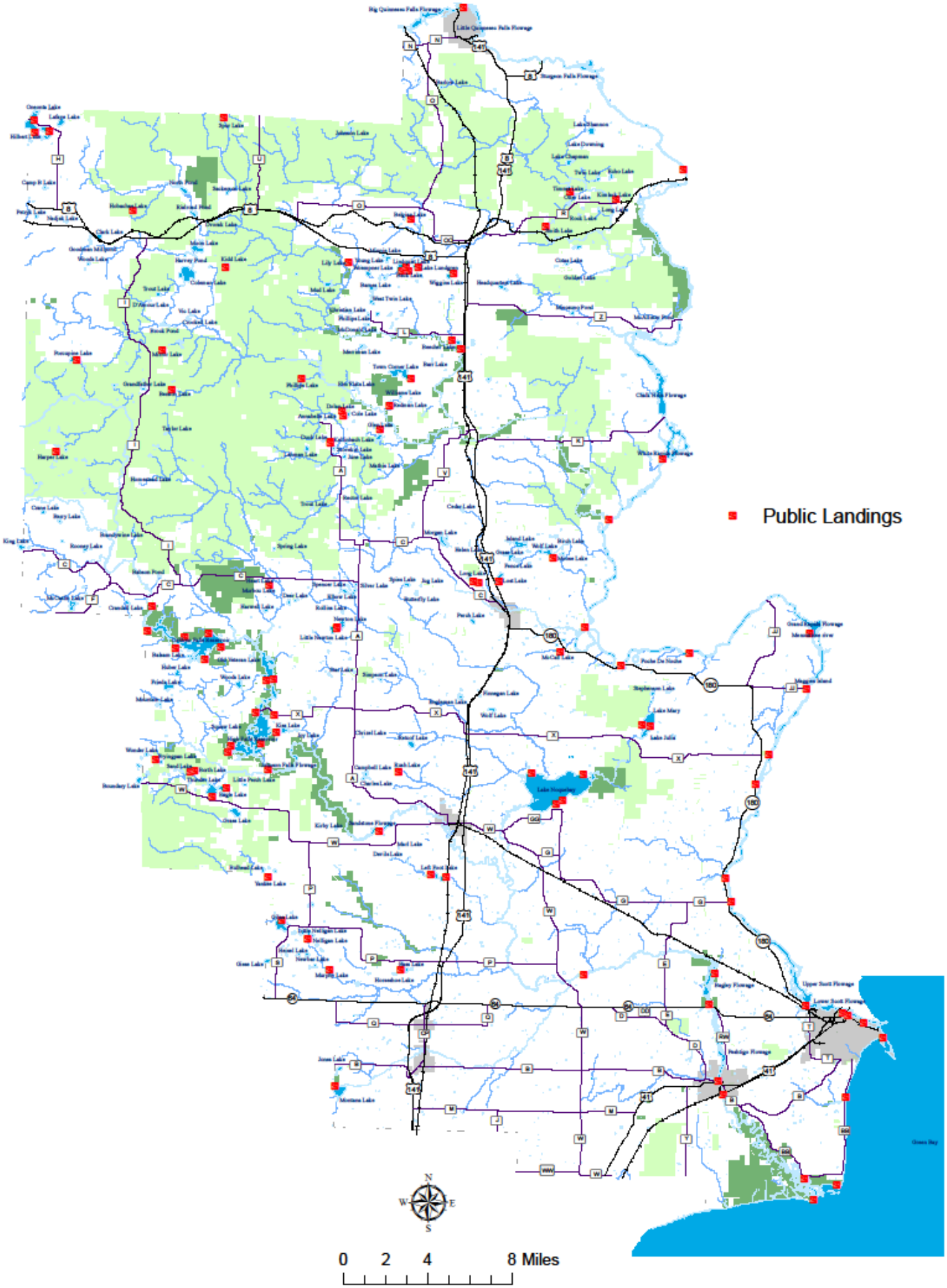
LID staff are currently testing herbicide containment barriers (under water curtains) designed and built in-house to improve the efficacy of herbicide use and expand the areas where herbicides can be used. The barriers consist of light weight polyethylene sheeting with floats at the top and weights at the bottom. In use, the barriers are deployed to surround areas of dense EWM growth prior to herbicide application. The barriers drastically reduce water exchange and hold the herbicide in place to improve EWM control. Use of barriers allows for the use of herbicides in areas with high water exchange rates such as near lake inlets and outlets. By slowing herbicide dissipation rates, the barriers also allow managers to use a lower herbicide concentration to lower chemical costs and impacts on non-target species.

Table 2-2. Marinette County AIS projects, past and current.

Project Name	End Date	Award Amt
Lake Noquebay Water Quality Monitoring and Macrophyte Survey	31-Dec-94	$9,999.75
Lake Noquebay Water Quality Trend Monitoring & Macrophyte Study	31-Dec-01	$10,000.00
Peshtigo Flow age Riparian Study and Education	30-Jun-02	$10,000.00
Aquatic Invasive Species Study	31-Dec-04	$6,847.20
Sandstone Flow age Aquatic Plant Inventory	30-Jun-06	$4,110.00
Thunder Lake Aquatic Plant Mgnt Plan Development	30-Jun-06	$7,800.00
Lake Noquebay Comprehensive Management Plan	30-Jun-09	$10,000.00
Hydrilla Rapid Response Project Phase 1	31-Dec-08	$10,000.00
New ton Lakes EWM Rapid Response Project	30-Jun-10	$10,000.00
McCaslin Lake APM Plan Project	30-Jun-10	$4,996.50
Beecher Lake AIS Education & Prevention Project	31-Dec-09	$8,931.00
AIS Coordinator Project	31-Dec-11	$200,000.00
Sandstone Flow age APM Planning Project	30-Jun-10	$2,868.75
Peshtigo Flow age AIS Education, Planning & Prevention Project	31-Dec-11	$9,180.00
Beecher Lake EWM Control Project	31-Dec-11	$22,566.00
THUNDER LAKE APM PLANNING PROJECT	31-Dec-11	$3,000.00
CBCW and AIS monitoring	31-Dec-13	$30,230.97
Sandstone Flow age AIS Control	31-Dec-12	$7,719.00
Marinette County Hydraulic Conveyor Project	31-Dec-16	$80,100.03
AIS Coordinator	31-Dec-15	$150,000.00
Yellow Floating Heart	31-Dec-15	$16,875.00
Lake Michigan - Green Bay Coastal Protection and Restoration	31-Dec-16	
Glen Lake Management Plan	31-Dec-18	$11,135.71
Lake Michigan - Green Bay Coastal Protection and Restoration (Sub-aw ard)	21-Dec-15	$20,000.00
Watercraft Inspection (1st year of 2 year agreement)	31-Dec-16	$10,171.09
Beecher Lake EWM Control Project Phase II	31-Dec-18	$96,322.00
Lake Lundgren EWM Rapid Resonse	31-Dec-18	$20,000.00
Lake Michigan - Green Bay Coastal Protection and Restoration (Sub-aw ard)	31-Dec-16	$10,000.00
Watercraft Inspection (2nd year of 2 year agreement)	31-Dec-16	$17,150.00
Herbicide Enclosure Study	30-Jun-21	$35,279.36
Lake Noquebay Nutrient Study - Phase 1	31-Dec-20	$25,000.00
Dolan lake EWM Rapid Response	30-Jun-22	$18,172.50
Lake Noquebay Nutrient Study - Phase 2	30-Jun-22	$33,800.00
	Total Dollar Amount	**$912,254.86**

Map 2-11 shows the locations of Marinette County boat landings. Watercraft, trailers, live wells and bait buckets moved between water bodies without proper cleaning are a known transport vector for fragments of most invasive plants such as Eurasian water milfoil (EWM). Until the EWM fragments are totally dry and dead, they remain viable and can result in a new infestation. Zebra mussels, already known to inhabit Green Bay and Lake Noquebay, can survive as near microscopic larvae in bilges, live wells, and water trapped in boat trailers. The LID, WRISC, and WDNR monitor boat landings for new infestations.

Map 2-11. Boat Landings of Marinette County



Map 2-12. Marinette County Impaired Waterways

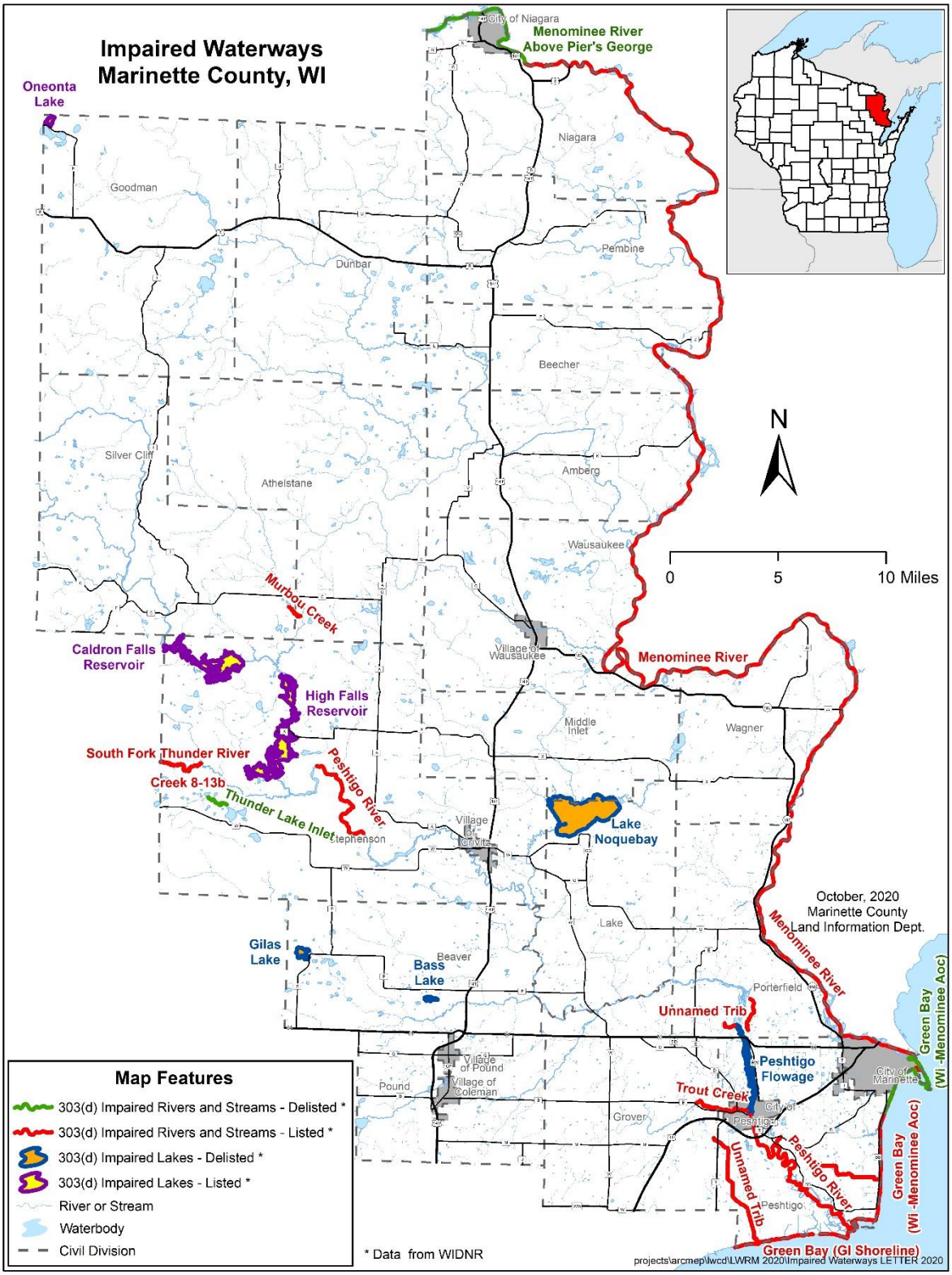


Table 2-3. Marinette County Impaired Waterways 2020

Official Name (Click for Details)	Local Name (Click for Map)	Start Mile	End Mile	WBIC	Water Type	Pollutant	Impairment	Status	Priority
Trout Creek	Trout Creek	0.00	3.65	515900	River	Unknown Pollutant	Degraded Biological Community	303d Listed	Low
Unnamed	Unnamed Trib to Peshtigo River	0.00	0.63	5008538	River	Unknown Pollutant	Degraded Biological Community	303d Listed	Low
Unnamed	Unnamed Trib to Peshtigo River	0.00	0.53	515600	River	Unknown Pollutant	Degraded Biological Community	303d Listed	Low
Unnamed	Unnamed Trib to Peshtigo River	0.45	2.21	5008359	River	Unknown Pollutant	Degraded Biological Community	303d Listed	Low
Unnamed	Unnamed Ditch to Lk Michigan	0.00	3.53	3000624	River	Unknown Pollutant	Degraded Biological Community	303d Listed	Low
Unnamed	Unnamed Trib to Lake Michigan	0.00	6.04	498000	River	Unknown Pollutant	Degraded Biological Community	303d Listed	Low
Menominee River	Menominee River	0.00	3.45	609000	River	PCBs	PCBs Contaminated Fish Tissue	303d Listed	Low
Menominee River	Menominee River	0.00	3.45	609000	River	Mercury	Mercury Contaminated Fish Tissue	303d Listed	Low
Menominee River	Menominee River	0.00	3.45	609000	River	PAHs	NA	Pollutant Removed	Delisted 2020
Menominee River	Menominee River	0.00	3.45	609000	River	Arsenic	NA	Pollutant Removed	Delisted 2020
South Fork Thunder River	South Fork Thunder River	0.00	4.36	538400	River	Chloride	Chronic Aquatic Toxicity	303d Listed	Low
Murbou Creek	Murbou Creek	0.00	0.85	541800	River	Unknown Pollutant	Degraded Biological Community	303d Listed	Low
Thunder Lake Inlet	Creek 8-13b	0.00	1.25	533700	River	Unknown Pollutant	Elevated Water Temperature	303d Listed	Low
Green Bay	Green Bay (GI Shoreline)	0.00	131.20	70	Great Lakes Shoreline	PCBs	PCBs Contaminated Fish Tissue	303d Listed	Low
Peshtigo River	Peshtigo River	0.00	11.72	515500	River	Mercury	Mercury Contaminated Fish Tissue, Mercury Contaminated Sediments	303d Listed	Low
Green Bay	Green Bay (Wi - Menominee Aoc)	0.00	6.43	70	River	Mercury	NA	Pollutant Removed	Delisted 2008
Green Bay	Green Bay (Wi -	0.00	6.43	70	River	PAHs	NA	Water Delisted	Delisted 2020

Official Name (Click for Details)	Local Name (Click for Map)	Start Mile	End Mile	WBIC	Water Type	Pollutant	Impairment	Status	Priority
	Menominee Aoc)								
Green Bay	Green Bay (Wi - Menominee Aoc)	0.00	6.43	70	River	Arsenic	NA	Water Delisted	Delisted 2020
Menominee River	Menominee River Above Pier's George	88.15	95.37	609000	River	PCBs	NA	Water Delisted	Delisted 2008
Menominee River	Menominee River Above Pier's George	88.15	95.37	609000	River	Mercury	NA	Water Delisted	Delisted 2008
High Falls Reservoir	High Falls Reservoir			540600	Impoundment	Mercury	Mercury Contaminated Fish Tissue	303d Listed	Low
Peshtigo River	Peshtigo River	54.29	59.89	515500	River	Unknown Pollutant	Elevated Water Temperature	303d Listed	Low
Peshtigo Flowage 1086	Peshtigo Flowage			515800	Impoundment	Mercury	NA	Water Delisted	Delisted 2020
Bass Lake	Bass Lake			521400	Lake	Mercury	NA	Water Delisted	Delisted 2010
Bass Lake	Bass Lake			521400	Lake	Total Phosphorus	NA	Water Delisted	Delisted 2010
Lake Noquebay	Noquebay Lake			525900	Lake	Mercury	NA	Water Delisted	Delisted 2018
Gilas Lake	Gilas Lake			523300	Lake	Mercury	NA	Water Delisted	Delisted 2010
Thunder Lake Inlet	Thunder Lake Inlet	0.00	1.25	533700	River	Unknown Pollutant	NA	Water Delisted	Delisted 2020
Caldron Falls Reservoir*	Caldron Falls Reservoir (Imp)			545400	Impoundment	Mercury	Mercury Contaminated Fish Tissue	303d Listed	Low
Oneonta Lake	Oneonta Lake			503300	Lake	Unknown Pollutant	Excess Algal Growth	303d Listed	Low
Menominee River	Menominee River	3.45	43.04	609000	River	PCBs	PCBs Contaminated Fish Tissue	303d Listed	Low
Menominee River	Menominee River	3.45	43.04	609000	River	Mercury	NA	Pollutant Removed	Delisted 2008
Menominee River	Menominee River	43.04	88.15	609000	River	PCBs	PCBs Contaminated Fish Tissue	303d Listed	Low
Menominee River	Menominee River	43.04	88.15	609000	River	Mercury	NA	Pollutant Removed	Delisted 2008

Terrestrial Invasive Species

From 2002 to 2008 the LWCD administered the WDNR Gypsy Moth Suppression Program. This was our first involvement with controlling terrestrial invaders. At this writing we are no longer involved in the program, but at its peak Marinette County staff

facilitated pesticide spraying of more than 14,000 acres of forest in a year. Our efforts related to other terrestrial exotics have been minimal due to a lack of financial resources. In 2010, garlic mustard, a scourge of upland mesic forest, was known to be in two Marinette County locations. By 2020, the number of Garlic Mustard infestations has increased to 14. Two new species, Japanese Knotweed and Wild Parsnip, were not of particular concern in 2010. According to 2020 data from the Midwest Invasive Species Network (MISN), both of these species have now been found across Marinette County at 90 sites each.

Since the writing of the last plan, the Tommy G. Thompson State Park fully opened. The COVID-19 pandemic has led to an increase in camping. With thousands of campers from across Wisconsin visiting the state park and county campgrounds, introduction of even more invasive exotic plants is a certainty. Resources will need to be found and brought to bear on preventing their introduction and spread. Our local forest products economy, outdoor recreation, and quality of life depend on it.

Land use

The vegetative cover of Marinette County was once predominantly conifer-hardwood forest and pine savannah. The huge old growth white pines that were found in abundance in Marinette County were the trees of choice for loggers. Following logging and the huge fires of the late 1800's, other tree species replaced the white pine and many other land uses grew in importance. Farm acreage peaked in 1945 at 350,000 acres and has declined ever since. After WWII, recreation became increasingly important and is still increasing. Forestland, for recreation and forest products, is once again the largest land use. See Appendix A for a sampling of the major land uses in the county.

Management decisions we make regarding use of our land will determine the environmental future of Marinette County. Greater demands are being made on our land and water resources as ever increasing numbers of people visit, recreate, work and live in Marinette County.

Marinette County continues to be fragmented into increasingly smaller parcels as larger holdings are sold off and frequently subdivided. There were 49,905 parcels in Marinette County in 1999. By 2010, that number increased by 5,899 to a total of 55,804 parcels, an 11.8% increase in twelve years. In 2020, the number of parcels has increased by an additional 1,438. Fragmentation is the least in the northernmost Towns and is the greatest in the Town of Peshtigo and near urban areas.

In rural areas, development continues to occur disproportionately near lakes and rivers. The last plan version noted: "Peshtigo, Menominee, and Rat Rivers have seen significant development. Smaller lakes such as Shannon (47 acres, 50 lots), Simpson (13 acres, 16 lots and 51 back lots), Balsam (8 acres, 11 lots), and several others are also being almost totally surrounded by developed lots. On the Peshtigo River from High Falls Flowage down stream to Crivitz, more than 130 new lots have been delineated for development since the last writing of the LWRM plan."

Since 2011, many of the lots described above now have one or more structures and significant amounts of impervious surfaces.

The 2011 plan also noted that several Towns developed or were developing comprehensive land use plans. Marinette County has greatly expanded our Geographic Information System (GIS) capability to meet the needs of local government in making these plans and to deal with the challenges of additional growth. Marinette County adopted a 20-Year Comprehensive Plan to provide the *"policy framework from which county officials will refer to when making their future land use decisions. This comprehensive plan was prepared to address the future development and preservation concerns affection the county during the next 20 years."* As required by state law, many Towns, and Marinette County, are contemplating 10-year revisions to existing Land Use Plans. It remains true that much work outside the traditional confines of Land and Water Conservation needs to be done. These efforts are just as important to long-term environmental health of the county as controlling pollution from barnyards and crop fields.

Agriculture

Marinette County is experiencing significant changes in the farming community. The number of farms continues to decline as the average size of remaining farms increases. Figure 2-6 below compares the most recent data available with 2012. Marinette County is also seeing changes in cropping practice. The acreage of alfalfa in the county continues to decline while corn and soybean acreage has increased. See Map 2-13 for Marinette County agricultural and non-agricultural land cover and reference Table 2-4 for acreage.

Map 2-13. Marinette County Agricultural and Non-Agricultural Land Cover

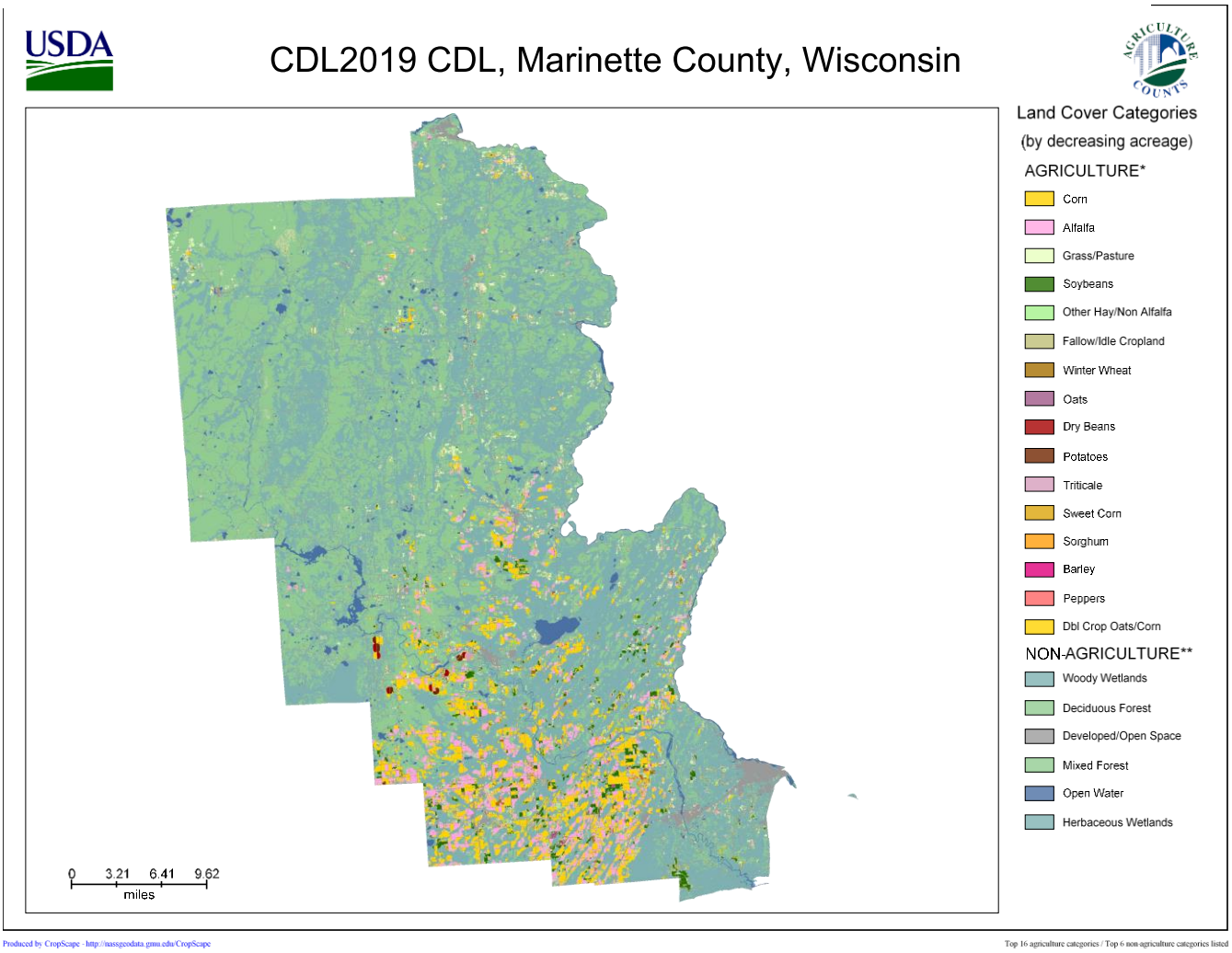


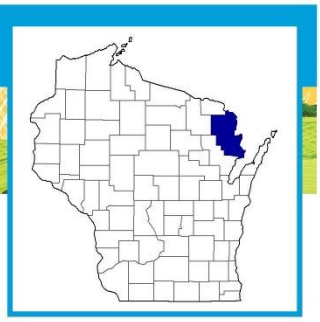
Table 2-4 Marinette County 2019 Agricultural and Non-Agricultural Land Cover

Category	Acreage
Corn	40839.9
Alfalfa	29727.9
Grass/Pasture	16514.1
Soybeans	10032.4
Other Hay/Non Alfalfa	4507.3
Fallow/Idle Cropland	4413.6
Winter Wheat	1573.2
Oats	1303.7
Dry Beans	553.3
Potatoes	412.8
Triticale	224

Sweet Corn	175.2
Sorghum	128.5
Barley	52.7
Peppers	46.7
Dbl Crop Oats/Corn	43.8
Sunflowers	43.1
Sugarbeets	28
Peas	25.8
Cabbage	24
Cauliflower	22.7
Rye	18.7
Cherries	16.2
Pumpkins	14.2
Clover/Wildflowers	11.6
Christmas Trees	11.1
Cucumbers	9.6
Apples	4
Sod/Grass Seed	2.9
Dbl Crop Triticale/Corn	2.4
Dbl Crop WinWht/Corn	2.2
Dbl Crop WinWht/Soybeans	1.3
Other Crops	1.3
Dbl Crop WinWht/Sorghum	1.1
Carrots	0.9
Herbs	0.7
Spring Wheat	0.4
Other Tree Crops	0.4
Blueberries	0.2
Woody Wetlands	390542.3
Deciduous Forest	304466.5
Developed/Open Space	31985
Mixed Forest	28282.1
Open Water	17689.5
Herbaceous Wetlands	9342.8
Developed/Low Intensity	7164

Figure 2-6. County Profile

2017 CENSUS OF AGRICULTURE *County Profile*



Marinette County
Wisconsin

Total and Per Farm Overview, 2017 and change since 2012

	2017	% change since 2012
Number of farms	515	-4
Land in farms (acres)	133,068	+1
Average size of farm (acres)	258	+5
Total	($)	
Market value of products sold	116,012,000	+14
Government payments	1,466,000	-6
Farm-related income	2,886,000	+65
Total farm production expenses	98,746,000	+23
Net cash farm income	21,618,000	-11
Per farm average	($)	
Market value of products sold	225,265	+19
Government payments (average per farm receiving)	7,758	+11
Farm-related income	12,125	+67
Total farm production expenses	191,740	+27
Net cash farm income	41,976	-7

1 Percent of state agriculture sales

Share of Sales by Type (%)

Crops	21
Livestock, poultry, and products	79

Land in Farms by Use (%) [a]

Cropland	67
Pastureland	5
Woodland	21
Other	7

Acres irrigated: 1,945
1% of land in farms

Land Use Practices (% of farms)

No till	13
Reduced till	13
Intensive till	30
Cover crop	12

Farms by Value of Sales

	Number	Percent of Total [a]
Less than $2,500	179	35
$2,500 to $4,999	48	9
$5,000 to $9,999	74	14
$10,000 to $24,999	50	10
$25,000 to $49,999	36	7
$50,000 to $99,999	29	6
$100,000 or more	99	19

Farms by Size

	Number	Percent of Total [a]
1 to 9 acres	38	7
10 to 49 acres	130	25
50 to 179 acres	201	39
180 to 499 acres	90	17
500 to 999 acres	29	6
1,000 + acres	27	5

USDA United States Department of Agriculture
National Agricultural Statistics Service
www.nass.usda.gov/AgCensus

Marinette County contains approximately 106,896 acres of farmland (based on NRCS land cover data). Two watersheds, the Lower Peshtigo River and the Little Peshtigo River, contain almost 61% of that total. Those two watersheds are the main focus of recent TRM program funded projects. Twenty-seven TRM projects have been completed or are pending in the Lower Peshtigo River Watershed. An additional twenty-six TRM projects have been completed or are pending in the Little Peshtigo

River Watershed. Refer back to Map 2-2 on page 19 for locations of previously cost shared farms.

The Middle Peshtigo-Thunder Rivers and Middle Inlet-Lake Noquebay are completed Priority Watersheds that were ranked High for protection. These watersheds are a mix of agricultural and forest land. Both watersheds have soils highly susceptible to ground water contamination and localized nonpoint source pollution problems due to agriculture. An Atrazine Prohibition Area was designated in the Middle Inlet Lake Noquebay watershed. Recreational and residential development is bringing agricultural activities into closer proximity with homes and cottages, increasing risk factors.

Prior to the Targeted Runoff Management Program, the above watersheds received the bulk of implementation efforts aimed at controlling agricultural runoff pollution. Most farms operating in those two watersheds have already installed and implemented BMP's for water quality.

Cropland soil erosion has not been a serious problem in Marinette County. Most of the cultivated acreage is located on gently sloping soils in the southern part of the county. The Northern Cropland Study, conducted in 1995, surveyed thousands of cropland acres in Marinette County. Cropland soil erosion was found to be negligible. Soil loss, greater than T (Tolerable Soil Loss), was occurring on less than one percent of all cropland. No cropland fields were found to be eroding at greater than two times the Tolerable Soil Loss rate. In 1991, 2002, and 2005 the LID conducted the DATCP Erosion Transect Survey. The survey covered 534 points and 315 miles. The survey supported the findings of the Northern Cropland Study. Cropland erosion was not a significant problem in Marinette County. The survey may be continued as needed to assess cropland erosion in the future.

However, these studies are few and not current. They do not factor in the climactic changes we are currently experiencing or those predicted by WICCI. The erosion data do not consider the extremely high water levels currently being experienced. Marinette County will see greatly improved cropland resilience to storm events in the coming years through the promotion and implementation of soil health practices such as No-Till farming and Cover Crops. In any case, the LID will deal with the few locations in the county where acute erosion occurs.

Winter spreading of Manure has largely ended in Marinette County due to the installation of Manure Storage facilities and associated practices. Despite wet/cold falls, numerous winter thaws, and wet/late springs in recent years the vast majority of farm operations have had the storage capacity to wait until favorable conditions to spread manure.

Nutrient and pesticide management is a key component of the implementation strategy to reduce runoff pollution. Phosphorus is a primary contaminant of surface waters as it determines how much aquatic plant and algae growth can occur. One pound of phosphorus has been shown to support 500 pounds of plant growth. Nitrogen is a

known contaminant of ground water, but its presence is also an indicator that other agricultural chemicals may be present. Sandy soils in the northern part of the county are among the most susceptible in the state for ground water contamination. Fortunately, we have been able to fully utilize all the SEG cost-sharing available to us and implement nutrient management plans up to the spending limits.

The new County Conservationist and Conservation Specialist will continue past efforts to provide nutrient management cost sharing. Working closely with the NRCS, they will also improve overall plan implementation through farmer education and by providing technical assistance.

Shoreline buffers (riparian vegetative buffers) reduce erosion, filter runoff, and provide wildlife habitat. On some of Marinette County′s agricultural land, these important land/water interfaces are fragmented or absent. In a few areas, row crops are grown right up to the edge of intermittent and perennial streams. In other areas, cattle have direct access to surface waters, causing erosion and runoff pollution problems. These problems are most apparent in the Lower Peshtigo and Little Peshtigo watersheds. With the addition of a NRCS grant funded Conservation Specialist and other grants we plan to greatly increase our efforts to promote and install shoreline buffers and manage cattle access to surface waters.

Chapter 3. Goals, Objectives and Actions

The goals established in this plan will be implemented over a ten-year period beginning in 2021. They represent current revised priorities for land & water resource management based on the changing environmental conditions in our twelve watersheds, the judgment of county staff and partner agencies, and especially citizens concerns. LID efforts are always steered by the needs of our citizens. However, citizen needs for which more resources can be brought to bear are more likely to receive a higher level of focus. Remedial agricultural activities will target our agricultural and transition watersheds. Ordinance development and enforcement will occur county-wide, as will educational efforts. Control and education efforts directed toward exotic invasive species will be determined by the locations and severity of outbreaks.

The objectives provide more detailed and readily measurable steps toward reaching each goal. A table is associated with each goal and set of objectives to identify the actions planned for each watershed based upon data and discussions from the Chapter 2. Assessment of Water Quality and Resource Conditions. The actions described in the following tables are based on current conditions and known resource concerns. As new environmental issues arise, requests for help are made, or new resources are made available, the actions taking by Marinette County will change in response.

Goal #1: Protect and enhance surface and groundwater quality.

Water, along with Food, Shelter, and Space, are the four critical habitat components for all living things - including people. Clean water, available in the appropriate amounts at the proper times, is often the difference between life and death for many organisms. Many of the objectives listed under Goal 1 will also help meet Goal 2. Furthermore, healthy lakes and streams are critical to our tourism economy and quality of life. Farms are largely limited to the five watersheds shown in Table 3-1. Implementation of Objectives D and E will place county-wide.

Objectives:

A. Provide technical assistance and cost sharing for construction of permanent and somewhat permanent agricultural BMP's
B. Provide technical assistance and cost sharing for cropland BMP planning and implementation
C. Improve Nutrient Management plan implementation and promote soil health.
D. Develop and implement ground and surface water monitoring strategies and programs.
E. Maintain and enhance administration of the **Sanitary** and **Agricultural Performance Standards and Animal Waste Management** Codes
F. Implement a Priority Farm strategy. (See page 63)

Table 3-1. Goal One Actions by Watershed.

Watershed	Comments	Actions
GB04 Little R.	A 9KE plan is under development in a portion of this watershed by Oconto County. Only a small portion of this watershed is in Marinette County	-Install as many EQIP, TRM, and DATCP funded agricultural BMP's for water quality as possible. -Ensure BMPs will be implemented to meet NR 151 Ag PSP (livestock or cropland). -Evaluate prior TRM, NMP and other soil conservation cost share projects with DNR staff in these two watersheds to determine how many are/remain in compliance with NR 151 APSP and how many are not. -Improve Nutrient Management Plan (NMP) implementation and soil health through the NRCS Cooperative Conservation and Demonstration Farm Network agreements. -Seek resources to systematically monitor groundwater Nitrate levels and the incidence of Coliform impacted wells. -Work with WDNR, DATCP, and NRCS to identify Priority Farms -Complete a study to determine the cause of rising Phosphorus levels in Bass Lake (GB08). -During this 10-year plan cycle make the shift from a farmstead BMP focus to emphasizing cropland BMPs -Implement the Priority Farm Strategy -Implement milestones within the Lower Peshtigo 9E plan
GB07 Lower Peshtigo R.	A 9KE plan was approved for this watershed. Trout Cr./Bundy Cr. Sub-watershed are the most densely agricultural areas of the county. -Continued high water tables in the watershed raise concerns about septic systems failing to groundwater	
GB08 Little Peshtigo R.	-This watershed has the second greatest acreage of farmland in the County. It contains Villages of Coleman and Pound. -The WDNR believes a 9KE plan should be developed for this watershed. -Additionally, high quality waters within the North Branch Beaver Creek exist in this watershed and should be a priority for protection measures. -Phosphorus levels continue to rise in Bass Lake after an alum treatment See Appendix J graph of rising Phosphorus levels.	
GB09 Middle Inlet Lake Noquebay	Lake Noquebay is one of our most important recreational assets. However, in-lake Phosphorus levels are continuing to rise. See Appendix J graph of rising Phosphorus levels. -This watershed contains part of the Village of Crivitz. -Middle Inlet and the other tributary streams to Lake Noquebay are in good to excellent condition based off 2016 WDNR assessments. While nutrient concentrations in the streams are currently not at levels of concern, protection of these high-quality streams is a priority.	-Install as many EQIP, TRM, and DATCP funded agricultural BMP's for water quality as possible. -Ensure BMPs will be implemented to meet NR 151 Ag PSP (livestock or cropland). -Improve NMP implementation and soil health through the NRCS Cooperative Conservation and Demonstration Farm Network agreements. -Seek resources to systematically monitor groundwater Nitrate levels and the incidence of Coliform impacted wells. - Work with WDNR, DATCP, and NRCS to identify Priority Farms -Complete a study to determine the cause of rising Phosphorus levels in Lake Noquebay.
GB10 Middle Peshtigo Thunder R.	This watershed transitions from agriculture to primarily vacation properties. It contains High Falls, Caldron Falls, and Sandstone Flowages.	-Install as many EQIP, TRM, and DATCP funded agricultural BMP's for water quality as possible. -Ensure BMPs will be implemented to meet NR 151 Ag PSP (livestock or cropland). -Improve NMP implementation and soil health through the NRCS Cooperative Conservation and Demonstration Farm Network agreements.

GB13 Wausaukee Lower Menominee R.	This watershed contains several heavily developed lakes, significant agriculture and a portion of the City of Marinette.	-Seek resources to systematically monitor groundwater Nitrate levels and the incidence of Coliform impacted wells. - Work with DNR, DATCP and NRCS to identify Priority Farms and implement the strategy.

Goal #2: ***Protect and enhance natural fish and wildlife habitat***

The other goals and objectives work hand in hand to benefit people and the creatures around us. As noted above, water is one of the four components of habitat. Many of the objectives listed under Goal 1 will also help meet Goal 2. All the objectives under this goal will be implemented county-wide. However, in the short and medium term, work will be focused on utilizing NRCS and/or NRDA grant funds to remove impediments to fish passage, improve fish spawning habitat, and benefit native pollinators in southeastern Marinette County.

Objectives:

A. Provide technical assistance and cost sharing to restore wetlands and enhance shoreline habitat.
B. Provide assistance and cost sharing to minimize impediments to movement of fish and wildlife.
C. Provide assistance and cost sharing to manage and/or prevent the spread of invasive exotic species.
D. Maintain and enhance administration of the **Shoreland/Wetland Zoning** Code.

Table 3-2. Goal Two Actions by Watershed.

Watershed	Comments	Actions
GB07 Lower Peshtigo R.	Peshtigo River and Menominee River provide spawning habitat for important fish species such as Lake Sturgeon. Tributaries to Green Bay are critically important to Northern Pike. Non-native phragmites, Japanese Knotweed and Wild Parsnip throughout and along major highway corridors	-Remove impediments to fish and wildlife passage and improve/restore spawning wetlands through implementation of the NRCS and NRDA agreements. - Promote and establish native pollinator habitat - Continue to work with WRISC to access and implement grants for invasive species control
GB08 Little Peshtigo R.	-This watershed has the second greatest acreage of farmland in the County. It contains the Villages of Coleman and Pound. -Non-native phragmites, Japanese Knotweed and Wild Parsnip throughout and along major highway corridors -Branches of Beaver Creek and several tributaries contain Brook Trout	- Continue to work with WRISC to access and implement grants for invasive species control. -Work with the US Fish and Wildlife Service to prioritize and remediate fish passage and other habitat issues. - Promote and establish native pollinator habitat -Continue supporting WDNR habitat improvement projects within NB Beaver Creek.
GB09 Middle Inlet Lake Noquebay	-Lake Noquebay is one of our most important recreational assets. -This watershed contains part of the Village of Crivitz.	-Continue to seek additional resources to collaborate with the Lake Noquebay Rehabilitation District on protection efforts including aquatic plant harvesting, Dam operation, and AIS prevention/control.
GB10 Middle Peshtigo Thunder R.	-This watershed contains much of the Tommy G. Thompson State Park. -This watershed contains 1/2 of the Village of Crivitz. -Thunder Lake, High Falls Flowage, Little Newton Lake, and Sand Stone Flowage contain Eurasian Water Milfoil	-Work with WRISC and the TGT State park staff to prevent establishment and spread of invasive species -Continue to assist Lake Associations with AIS control. -Complete Herbicide Enclosure Project -Implement the WDNR Lake Management and Protection Network

GB13 Wausaukee Lower Menominee R.	-This watershed is bordered by the Menominee River. It contains several heavily developed lakes, significant agriculture and a portion of the City of Marinette. -Graceful cattail, an AIS new to Marinette County, was confirmed in August 2020.	With WDNR, WRISC, the landowners, and possibly other stakeholders, pursue eradication of Graceful cattail -Implement the WDNR Lake Management and Protection Network -Implement the WDNR Lake Management and Protection Network
GB11 Upper Peshtigo R.	Most of this watershed lying in Marinette County is County Forest or WDNR land including a portion of the TGT State Park.	-Work with WRISC and the TGT State park staff to prevent establishment and spread of invasive species -Implement the WDNR Lake Management and Protection Network
GB14 Pike River	This watershed contains almost no Ag. The Pike R. and North Branch Pike R. are in the Wild and Scenic Rivers program. A road/stream crossing inventory was completed in 2009.	-Work with the US Fish and Wildlife Service to prioritize and remediate fish passage and other habitat issues. -Continue work with WDNR fisheries staff and seek resources for trout habitat improvements -Implement the WDNR Lake Management and Protection Network
GB15 Pemebonwon & Middle Menominee R.	A road/stream crossing inventory was conducted in 2013. Even though many watershed streams flow through undeveloped Marinette County forest, the impacts of late 1800's logging and improperly installed culverts are negatively impacting native brook trout.	-Work with the US Fish and Wildlife Service to prioritize and remediate fish passage and other habitat issues. -Continue work with WDNR fisheries staff and seek resources for trout habitat improvements -Implement the WDNR Lake Management and Protection Network
GB17 Popple R.	Hilbert and LaFave Lakes are experiencing some of the most severe impacts to riparian cottages and homes from high water levels.	Work with landowners and local units of Government to minimize shoreline erosion -Implement the WDNR Lake Management and Protection Network

Goal #3: Improve overall resiliency to extreme weather events

Actions taken to reach this goal will also help fish and wildlife, protect vital infrastructure and lower costs for local units of government. All three Objectives will be pursued county-wide. Flood prone areas, population concentrations, highest prevalence of impervious surfaces, and disturbed natural soils are of greatest concern. Initially, greater focus will be on proper installation of culverts at stream crossings and implementation of cropland farming practices that improve soil health. With increased internal capacity and external collaboration, the LID will expand into other areas as needed. This goal has significant overlap with Goal Two.

Objectives:

A. Work to achieve the Marinette County Natural Hazard Mitigation Plan Goals. (See appendix K)
B. Facilitate natural water movement by studying potential problem areas and removing impediments
C. Maintain and enhance administration of the **Flood Plain Zoning** Code and mapping

Table 3-3. Goal Three Actions by Watershed.

Watershed	Comments	Actions
GB04 Little R.	This watershed will be a main focus under the NRCS Cooperative Conservation, Demonstration Farm Network and NRDA agreements.	-Implement as many acres of "No Till" cropping practices and cover crops as funding allows to reduce cropland erosion
GB07 Lower Peshtigo R.	-Contains the Cities of Marinette and Peshtigo. -This watershed will be a main focus under the NRCS Cooperative Conservation, Demonstration Farm Network and NRDA agreements.	-Remove as many fish passage impediments as funding allows to also reduce the risk of flood damage to stream crossings -Implement as many acres of "No Till" cropping practices and cover crops as funding allows to reduce cropland erosion. -Implement milestones within the Lower Peshtigo River 9KE plan.
GB08 Little Peshtigo R.	This watershed has the second greatest acreage of farmland in the County. It contains the Villages of Coleman and Pound. -This watershed will be a main focus under the NRCS Cooperative Conservation and Demonstration Farm Network agreements.	-Implement as many acres of "No Till" cropping practices and cover crops as funding allows to reduce cropland erosion
GB09 Middle Inlet Lake Noquebay	Lake Noquebay is one of our most important recreational assets. -This watershed contains part of the Village of Crivitz.	Continue to collaborate with the Lake Noquebay Rehabilitation District on protection efforts and Dam operation.
GB10 Middle Peshtigo Thunder R.	This watershed contains much of the Tommy G. Thompson State Park on Caldron Falls Flowage. -This watershed contains 1/2 of the Village of Crivitz. -A road/stream crossing inventory was completed in 2017 for Trout Unlimited to prioritize watershed restoration efforts.	-As resources become available, use the ranked list of stream crossings being developed by the USFWS to prioritize the repair and/or

GB13 Wausaukee Lower Menominee R.	This watershed contains several heavily developed lakes, significant agriculture and a portion of the City of Marinette. Its east border is the Menominee River.	replacement of culverts. - Work with Town governments in these watersheds to improve culvert installations.
GB14 Pike River	This watershed contains almost no Ag. The Pike R. and North Branch Pike R. are in the Wild and Scenic Rivers program.	
GB15 Pemebonwon & Middle Menominee R.	A significant pocket of agricultural land exists within the GB15 watershed in the vicinity of the City of Niagara. -Northland Scholars Academy is located on Camp Lake.	
GB17 Popple R.	Although only 2,600 acres of this watershed lie in the County, it contains heavily developed Hilbert and LaFave Lakes which are experiencing severe impacts to riparian cottages and homes from high water levels. -High water has closed the Town Park on Hilbert Lake	Continue to help riparian landowners and the Town of Goodman explore ways to mitigate the impacts of high water and harden infrastructure

Goal #4: **Provide educational programming, land and water information, and other assistance in support of local goals**

Successfully meeting the other plan goals begins with building understanding and support through robust implementation of following objectives. Many of the most positive plan outcomes will only be possible with strong public support. Good decisions are based on sound information and data. LID staff perform basic research and collect land and water related data to inform land use decisions and program delivery. "Other assistance" covers a multitude of tasks that build local capacity and assist local partners, especially grant writing. Use of the TOAD program, Northwoods Journal and social media will continue to be offered county-wide. If Marinette County is successful in commencing a ground water monitoring program, the testing results will be disseminated county-wide and used to inform land management decision.

Objectives:

A. Promote natural resources appreciation and environmentally sound stewardship using the TOAD Program, social media, and other appropriate means.
B. Provide organizational and planning assistance to landowners, groups, and local governments.
C. Educate the public and decision makers about conservation challenges.
D. Support and promote environmentally sound land management practices.
E. Increase local conservation on the land through inter-agency collaboration and involvement of non-governmental organizations

Table 3-4. Goal Four Actions by Watershed.

Watershed	Comments	Actions
GB04 Little R.	A main educational focus under the NRCS Cooperative Conservation and, Demonstration Farm Network agreements.	In partnership with Oconto and Shawano Counties, offer Field Days and other educational events to watershed producers.
GB07 Lower Peshtigo R.	A main education focus under the NRCS Cooperative Conservation, Demonstration Farm Network agreements. This watershed contains Harmony Arboretum, an important eco education asset. Contains the cities of Marinette and Peshtigo.	In partnership with Oconto and Shawano Counties, offer Field Days and other educational events to watershed producers. -Continue partnership with the Northern Lights Master Gardeners and UWEX to offer the Nature and Horticulture Series events at Harmony. -Fully reopen the Harmony Demonstration Garden. -Continue to work closely with City of Marinette and Peshtigo School systems for educational programs. -Complete the education kiosk for the Fish Viewing Platform in Peshtigo. -Promote Lower Peshtigo River 9KE plan through education and outreach milestones.
GB08 Little Peshtigo R.	This watershed has the second greatest acreage of farmland in the County. It contains the Villages of Coleman and Pound.	In partnership with Oconto and Shawano Counties, offered Field Days and other educational events to watershed producers.

	-This watershed will be a main focus of the NRCS Cooperative Conservation and Demonstration Farm Network agreements.	-Continue to work closely with the Village of Coleman School system for educational programs
GB09 Middle Inlet Lake Noquebay	This watershed contains part of the Village of Crivitz.	Complete the Lake Noquebay Nutrient Study and disseminate the results. -Continue to work closely with the Village of Crivitz School system for educational programs
GB10 Middle Peshtigo Thunder R.	This watershed contains much of the Tommy G. Thompson State Park. -Camp Bird, a major component of County environmental education efforts, is found in this watershed. -This watershed contains 1/2 of the Village of Crivitz.	Work with TGT State Park Staff, WRISC and WDNR AIS program staff on AIS programming. -When the pandemic ends, once again offer Sand Lake Conservation Camp at Camp Bird.
GB15 Pemebonwon & Middle Menominee R.	Contains the City of Niagara.	-Continue to work closely with the Village of Crivitz School system for educational programs.

Identification of Priority Farms

It has long been county policy to place greater importance on putting conservation practices on the land (especially manure storage facilities and associated farmstead BMP's) rather than on planning and inventories. This strategy has been very successful in essentially eliminating winter spreading of manure within Marinette County. WDNR and other research has shown the great majority of manure related runoff events and fish kills occur when winter spread manure is carried by melting snow to ground and surface water.

Due to our efforts, there are only a few smaller scale dairy or beef operations in the county without a manure storage facility. Through implementation of three Priority Watershed Projects and extensive use of the Targeted Runoff Management program, seventy-eight manure storage facilities and associated BMP's were installed voluntarily on Marinette County farms. Two county staff facilitated ending the winter spreading of manure on a total of 59,418 cropland acres. Having a manure storage facility also allows for proper implementation under a 590 compliant Nutrient Management plan.

Regarding evaluation of effectiveness, tracking winter manure spreading has proved to be very straight forward. Manure on snow is very visible and but almost never seen in Marinette County.

However, for 2021 Marinette County will have new land information records software, new high resolution aerial ortho-photography, one-foot level accurate LiDAR data, a new County Conservationist, a new Conservation Specialist (funded by a five-year NRCS Cooperative Conservation grant), and a much more integrated relationship with local NRCS staff. This additional capacity **will allow Marinette County to transition from a long focus on constructed, farmstead BMP's and move the programmatic emphasis to cropland practices and overall soil health.**

Now is also the time for local, state and federal agencies to better understand the state of agriculture and cropland in Marinette County. Current data is needed to properly utilize the modelling tools available to us. In the writing of this plan, it was necessary to use information up to 29 years old. No Total Maximum Daily Loads have been developed for any watershed.

A key prerequisite for prioritizing farms and farmland will be current data. Appendix C. contains Chapter 5 of *Lower Peshtigo River Watershed Management Plan*. In it, Figure 5-1 outlines some of the steps deemed necessary to learn more about the biota, environmental health, and human risks in the watershed. In late 2020, most of the information gathering prescriptions have not been met. However, with new staff and better tools this situation can change.

In any case, in all areas of Marinette County, acute runoff and erosion events, situations that affect ORW/ERW's, citizen complaints, and assistance to other agencies/local governments will continue to receive highest priority.

Chapter 4. Plan Implementation

The Goals and Objectives for this revision on page 37 above vary greatly from those in the 2011 version (See Appendix B). Primarily, these changes are driven by evolving environmental issues and/or concerns of private citizens. Secondarily, the changes are in response to acquisition of grant funding the addition of staff and cost sharing. **One thing that will not change with the new goals and objectives is Marinette County's use of educational programs, technical assistance, local capacity building and facilitation, grant writing and cost sharing to encourage voluntary adoption of conservation practices.** Non-point source pollution control, shoreline erosion reduction, habitat protection, invasive species management and many other efforts depend on this multi-pronged approach for success.

Appendix E shows our 2019 work plan and the results obtained by our program efforts. Appendix D is our 2020 work plan and represents both ongoing programs and individual initiatives directly related to conservation on the land and environmental education. The work plan does not estimate the number of hours spent on general administration of the LID. The estimated number of hours per year for each activity is to give a sense of the estimated size and scope of the program, and should not be considered in workload analysis. For many of the action items, exponential growth is possible if resources become available. Benchmarks, based on analysis of the most recent year for which complete data is available, ***are in italics*.**

An additional consideration in developing this work plan is that the same flexibility and responsiveness that make the LID relevant in Marinette County make it very difficult to forecast what the workload will be beyond a year from now. The next environmental crisis or issue may take the LID in an entirely different direction. The same is true if new resources become available to deal with existing problems such as terrestrial exotic species or impediments to fish passage. The 2010 version of the LWRM plan referred to species like Garlic Mustard and Japanese Knotweed as being "still in the early stages of county infestation and now is the time to deal with them." Unfortunately the resources to do so never appeared and an opportunity was lost.

Regarding wildlife habitat, we know about the importance of free movement to many aquatic species. We have made use of the limited funding available for in-stream habitat work to allow aquatic life access to greater portions of water courses.

Opportunely, the practices and land use changes that benefit the movement of aquatic life also boost resiliency to extreme weather events. For example, replacement of improperly installed or undersized culverts to allow fish passage also lets water flow more naturally to minimize the risks of catastrophic failure. In any case, as the means become available to meet local needs, the LID will make every effort to utilize them.

There is a somewhat stronger emphasis in this LWRM plan version on administration of local ordinances. For more than 20 years, we have leaned heavily on providing educational programming and cost sharing to gain voluntary ordinance compliance and environmentally friendly land stewardship. Unfortunately, by themselves, education and cost sharing are not enough. The combination of high ground and surface water levels, higher land use intensity, land parcel fragmentation, increasing impervious surfaces, weather extremes and other factors require the use of every tool available to protect the public health and welfare.

There is also greater plan emphasis on the gathering and disseminating land and water data. Good land use decisions must be based on science and empirical data. Marinette County will use newly available technology to obtain and analyze data to inform our decisions and adapt our management and regulatory schemes.

For example, Bass Lake, in the Little Peshtigo River watershed benefitted from one of Marinette County's first Targeted Runoff Management (TRM) projects and a WDNR Lake Program grant alum treatment. The TRM project greatly reduced phosphorus laden runoff to the lake. The alum treatment removed existing phosphorus from the water column and bound it to lake sediment. The project was so successful Bass Lake was removed from the federal 303d list of impaired waters. Bass, northern pike and pan fish returned to the lake, as have anglers. Now, twenty–two years later phosphorus levels are starting to rise again and the LID is utilizing yet another Lake Program grant to fund research into why.

Another example can be found at Lake Noquebay, our largest natural lake. Despite being the target of a very successful Priority Watershed project and several TRM projects, and despite the steady removal of phosphorus through an extensive aquatic plant harvesting program, phosphorus levels are rising in Lake Noquebay. See Appendix J showing rising Average Annual Phosphorus Levels since, 1979. The LID is working with the Lake Noquebay Rehabilitation District to utilize two WDNR Lake Program grants to learn why.

Bass Lake and Lake Noquebay have little in common as far as their watershed characteristics, lake type, land use, etcetera. What they do have in common is that successfully responding to the rising phosphorus levels depends on good data to inform good land use and management decisions.

Lastly, LWRM plan implementation will overlap and integrate with carrying out other planning initiatives (two of which are detailed below) and grant funded projects described in other plan chapters.

Nine Key Element Planning

In 2015, Land Information Department staff developed a Nine Key Element Plan for the Lower Peshtigo River Watershed. Watershed plans funded by Clean Water Act section 319 funds must be consistent with the nine key elements the EPA has identified as critical for achieving improvements in water quality (USEPA 2008). The nine elements from the USEPA Nonpoint Source Program and Grants Guidelines for States and Territories are as follows:

1. Identification of causes of impairment and pollutant sources or groups of similar sources that need to be controlled to achieve needed load reductions, and any other goals identified in the watershed plan. Sources that need to be controlled should be identified at the significant subcategory level along with estimates of the extent to which they are present in the watershed.

2. An estimate of the load reductions expected from management measures.

3. A description of the nonpoint source management measures needed for implementation to achieve load reductions in element 2, and a description of the critical areas in which those measures will be needed to implement this plan.

4. Estimate of the amounts of technical and financial assistance needed, associated costs, and/or the sources and authorities that will be relied upon to implement this plan.

5. An information and education component used to enhance public understanding of the plan and encourage their early and continued participation in selecting, designing, and implementing the needed nonpoint source management measures.

6. A reasonably expeditious schedule for implementing the nonpoint source management measures identified in this plan.

7. A description of interim measurable milestones for determining whether nonpoint source management measures or other control actions are being implemented.

8. A set of criteria that can be used to determine whether loading reductions are being achieved over time and substantial progress is being made toward attaining water quality standards.

9. A monitoring component to evaluate the effectiveness of the implementation efforts over time, measured against the criteria established under element 8.

Nine Key Element (9KE) plans have several similarities with the LWRM plan. However, as 9KE plans are done at the HUC 10 (watershed) and HUC 12 (sub-watershed) level, there is greater degree of detail. Appendix C is Chapter 5 of the 9KE plan which describes the Planned Activities, Milestones and Time Frames. The 9KE plan was

intended to cover the period from 2016 to 2026. There is substantial overlap in LWRM plan goals and objectives for the Lower Peshtigo River Watershed and those in the 9KE plan. The milestones within the Lower Peshtigo 9E plan will be used to set/create specific action items within annual workplans submitted to DATCP and also to prioritize NR 151 compliance efforts with the WDNR.

Marinette County Natural Hazards Mitigation Plan

PURPOSE OF THE PLAN

Hazard Mitigation is defined as any action taken before, during, or after a disaster to permanently eliminate or reduce long-term risk to human life and property from natural and man-made hazards. Hazard mitigation planning assesses risks and evaluates community vulnerability to potential hazards. Deficiencies are identified and strategies are developed that help mitigate problem areas. By developing an effective hazard mitigation plan a community can potentially reduce the impacts of a future disaster. Potential disaster impacts include loss of lives and property, environmental and economic concerns, reduced essential services and quality of life. The result of this planning process is an Action Plan that identifies appropriate steps to help mitigate present and future hazards. The Marinette County Natural Hazards Mitigation Plan aims to identify risks and highlight areas where we may be more vulnerable to potential hazards. Deficiencies are identified and strategies are developed to mitigate problems. The plan can be referenced in Appendix L.

Resiliency

Human activities increase the amount of greenhouse gases in the atmosphere, primarily through burning fossil fuels and deforestation, which expedite global climate change. One type of mitigation strategy is inhibiting greenhouse gas emissions through laws that limit how much can be released into the air.

Individuals can also help reduce emissions by decreasing energy use at school, work, and in their private dwellings; driving and flying less; and by increasing carpooling, biking, or walking. Mitigation attempts also include ways to store carbon in the environment to hinder its release into the atmosphere as carbon dioxide. Natural resource professionals can alleviate impacts by preventing forest destruction and protecting wetlands and peatlands that are a key contributors in capturing and storing greenhouse gases. Agricultural producers can do their part by minimizing tillage and the amount of bare soil.

Adaptation means identifying and preparing for climate change impacts. Impacts like increased flooding, heat waves, longer growing seasons, and warmer winters will leave human populations and ecosystems at risk, but there are initiatives Marinette County can take to be less vulnerable to these changes.

For example, communities can prepare for climate change by updating storm water infrastructure to handle bigger floods; rezoning flood plains to avoid property damage

with increased flooding; and developing heat emergency action plans to assist vulnerable urban populations during heat waves. Natural resource managers can also help species adapt by altering planting vegetation to increase shade for cold water trout streams, minimizing forest monocultures, or creating wildlife corridors to help animals move to better habitats as the climate changes.

Even with aggressive mitigation efforts, our climate will continue to change over the next 50 to 100 years because of the amount and longevity of greenhouse gases already in the atmosphere. We have to prepare for and adapt to those changes. It is important to pursue both mitigation and adaptation in order to remain resilient to climate change.

In Wisconsin, temperatures are projected to increase 4 to 6 degrees by mid-century and may rise as much as 12 degrees by the end of this century. Precipitation in Wisconsin could increase 10 to 30 percent in the spring and winter by the end of this century.

On average, plant species below the forest canopy have migrated 30 miles northwest in the last 50 years, but changing climates have outpaced plant movement over the same period, shifting more than 50 miles in the same direction. These lags will likely increase and threaten the survival of species which cannot adapt.

Appendix L lists the Mitigation Goals for the Marinette County Natural Hazards Mitigation Plan.

Annual Work Plans

Appendices D and E contain the 2020 and 2019 Work Plans respectively. The tables show what were the main Land & Water Conservation Division efforts, based on citizen and resource needs. However, recent history has shown us new issues and new funding opportunities frequently occur.

In 2009, Marinette County LWCD staff spent 13,013 hours on various efforts including routine conservation programs, special projects, supporting activities and administration. By 2019, the most recent year for which complete staff hourly data is available, the full-time, and one limited term staff, of the Marinette County Land Information Department spent 9,094 hours on those activities. This 30% decrease in hours was due to grant expirations and a departmental restructuring that eliminated approximately two Full Time Equivalent (FTE) employees. The 2019 hours do not reflect the Property Listing, GIS, and Sanitary/Zoning staff time spent in delivery of conservation and environmental education programming.

Table 4-1 below describes the current external funding sources for 2021 and estimates the number of Land Information Department hours. It reflects the addition of a County Conservationist, Conservation Specialist, and expanded Conservation LTE hours. Marinette County has adopted new financial management software and is fully implementing the federal Uniform Grant Guidance procedures. The data below is the most accurate and thorough estimates of hours and external funding available in LID history.

Table 4-1. Major Grant Funded Projects and Initiatives Planned or Ongoing in 2021

Program	External Funding Amount	Source	Est. County Staff Hours	Notes
Targeted Runoff Management	$450,000	WDNR	660 FTE	Reflect the cost-sharing cap, not actual Project costs for the three planned 2021 projects.
Cooperative Conservation Grant	$84,643	USDA-NRCS	2,420 FTE 55 LTE	Starting in 2021, this five-year grant funds a Conservation Specialist to improve delivery of EQIP BMPs and build local program capacity.
LWRM Plan Implementation	$247,744	DATCP	4,823 FTE 646 LTE	Reflects the BASG, Bond and SEG cost share funding available.
Green Bay Restoration Project	$136,378	NRDA Council	548 FTE	Starting in 2021, this two-year grant funds fish habitat work on Peshtigo River and tributaries/ditches draining to Green Bay.
Dolan Lake Eurasian Water Milfoil Control Project	$4,689	WDNR Lakes Pgm	108 FTE 106 LTE	Second year of a three-year project to control EWM in Dolan Lake
Lake Monitoring And Protection Network Grant	$19,934	WDNR Lakes Pgm.	419 FTE	First use of a new WDNR funding source to provide AIS control and prevention services
Demonstration Farm Network	$10,514	USDA-NRCS	166 FTE	Starting in 2021, this three-year grant partially funds a partnership with Oconto and Shawano counties to hire project manager to build a network of farms demonstrating soil health and cropland runoff reduction BMPs
Bass Lake Alum Treatment Evaluation	$3,000	WDNR Lakes Pgm	379 FTE 15 LTE	Final year of a three-year effort to learn why phosphorus levels are rising in Bass Lake after a 1998 alum treatment. This treatment led to removal of Bass Lake from the federal 303d list.
Lake Noquebay Nutrient Study – Phase II	$17,710	WDNR Lakes Pgm	481 FTE 125 FTE	Final year of a four-year effort to determine the phosphorus sources and loads to Lake Noquebay
Aquatic Invasive Species Herbicide Enclosure Grant	$2,380	WDNR Lakes Pgm	481 FTE 153 LTE	Final year of a three-year project to study use of underwater curtains in EWM herbicide treatments to increase efficacy, lower costs, and minimize impacts to non-target aquatic plants
Totals	$976,992		10,485 FTE 1,100 LTE	

Chapter 5. Regulations for Plan Implementation

State and local regulations

Wis. Stats. CHAPTER 281.16 Water and Sewage (3) NONPOINT SOURCES THAT ARE AGRICULTURAL (a) The department of natural resources, in consultation with the department of agriculture, trade, and consumer protection promulgate rules prescribing performance standards and prohibitions for agricultural facilities and practices that are nonpoint sources.

Wis. Admin. Code. DEPARTMENT OF NATURAL RESOURCES CHAPTER (*January 2020*) NR151Subchapter II 151.01 Purpose. The purpose of this subchapter is to prescribe performance standards and prohibitions in accordance with the implementation and enforcement procedures contained in ss. NR151.09 and 151.095 for agricultural facilities, operations and practices.

Wis. Admin. Code. DEPARTMENT OF AGRICULTURE, TRADE AND CONSUMER PROTECTION CHAPTER ATCP 50.12 Land and water resource management plan (2) Land and water resource management plan (h) Compliance procedures, including notice, hearing, enforcement and appeal procedures, that will apply if the county takes action against a landowner for failure to implement conservation practices required under this chapter, ch. NR 151 or related local regulations.

MARINETTE COUNTY CODE OF ORDINANCES

CHAPTER 10 ENVIRONMENTAL SITE ASSESSMENT (May 2009)

10.01 Intent (1) Purpose. Hazardous waste and toxic substances have become a major concern in the acquisition and ownership of real estate. Federal and State laws and regulations impose sever restrictions and significant economic sanction upon the owners of real estate that contain hazardous waste and toxic substances. This ordinance is intended to protect the citizens of Marinette County by assessing the acquisition, of delinquent tax foreclosure, purchase, or otherwise, of lands by Marinette County that may or may not contain hazardous waste and toxic substances. It is the intent of Marinette County to foreclose on tax delinquent properties with known contamination so as to eliminate any health risk to the general public. Each property will be evaluated to determine the extent of the contamination and to determine whether the county has the resources to abate such health risks. It is an additional interest of Marinette County to manage all County-owned or controlled lands in such a manner as to meet the due care standards promulgated by State and Federal laws and regulations relating to toxic and hazardous substances, and to recommend precautions against foreseeable acts or omissions relating to such county-owned or controlled lands.

CHAPTER 15 PRIVATE SEWAGE SYSTEMS (*Dec 2008*)

15.02 PURPOSE. The purpose of this chapter is to protect and promote the health, safety, prosperity, aesthetics and general welfare of the people and communities within Marinette County. The general intent of this chapter is to regulate the location, construction, installation, alteration, maintenance and use of onsite waste disposal systems so as to protect the health of residents and transients and to secure safety from disease, nuisance and pestilence and for the protection of the groundwater resource.

CHAPTER 17 ZONING CODE (*April 2020*)

17.02 Purpose. The provisions of this chapter are intended to encourage the use of lands and natural resources in the County in accordance with their character and adaptability to promote orderly development; secure safety to life and property; protect highways from economic suffocation by encroaching uses; preserve land values; encourage and promote public health, morals, safety and general welfare; regulating, restricting and determining the areas within which agriculture, forestry and recreation may be conducted; and establishing districts which are deemed best suited to carry out such purposes outside of the limits of incorporated villages and cities in accordance with the provisions of '59.97, Wis. Stats.

CHAPTER 18 AGRICULTURAL PERFORMANCE STANDARDS AND ANIMAL WASTE MANAGEMENT (*May 2006*)

18.01 (3) Purpose: The purpose of this chapter is to regulate agricultural practices and the management of animal waste to:

(a) Ensure the proper location, design, installation, use and abandonment of animal feedlots and animal waste storage facilities.
(b) Protect the safety, welfare, environmental quality and aesthetic values of Marinette County.
(c) Prevent the deliberate mismanagement of manure.
(d) Establish a procedure for the permitting of animal feedlots and waste storage facilities.
(e) Achieve a soil erosion rate on all croplands equal to, or less than, the Tolerable (T) rate established for that soil.
(f) Minimize conflicts between agricultural operations and municipalities, non-farm landowners and visitors.
(g) Protect the future viability of agriculture in Marinette County.

CHAPTER 19 FLOOD PLAIN ZONING (May 2011)

19.01(3) Statement of Purpose. This ordinance is intended to regulate floodplain development to:

(a) Protect life, health and property;
(b) Minimize expenditures of public funds for flood control projects;
(c) Minimize rescue and relief efforts undertaken at the expense of the taxpayers;
(d) Minimize business interruptions and other economic disruptions;
(e) Minimize damage to public facilities in the floodplain;
(f) Minimize the occurrence of future flood blight areas in the floodplain;
(g) Discourage the victimization of unwary land and homebuyers;
(h) Prevent increases in flood heights that could increase flood damage and result in conflicts between property owners; and
(i) Discourage development in a floodplain if there is any practicable alternative to locate the activity, use or structure outside of the floodplain.

CHAPTER 20 NONMETALLIC MINING RECLAMATION (May 2007)

20.02 Purpose. The purpose of this chapter is to establish a local program to ensure the effective reclamation of nonmetallic mining sites on which mining takes place in the County of Marinette after the effective date of this chapter, in compliance with Chapter NR135, Wisconsin Administrative Code and Subchapter I of Chapter 295, Wisconsin Statutes.

CHAPTER 21 SHORELAND-WETLAND ZONING (Nov*ember 2018*)

21.01(3) Purpose. For the purpose of promoting the public health, safety, convenience and welfare, this chapter has been established to:

(a) Further the maintenance of safe and healthful conditions and prevent and control water pollution through:

(1) Limiting structures to those areas where soil and geological conditions will provide a safe foundation.
(2) Establishing minimum lot sizes to provide adequate area for private sewage disposal facilities.
(3) Controlling filling and grading to prevent serious soil erosion problems.

(b) Protect spawning grounds, fish and aquatic life through:
(1) Preserving wetlands and other fish and aquatic habitat.
(2) Regulating pollution sources.
(3) Controlling shoreline alterations, dredging and lagooning.

(c) Control building sites, placement of structures and land uses through:
(1) Separating conflicting land uses.
(2) Prohibiting certain uses detrimental to the shoreland area.
(3) Setting minimum lot sizes and widths.
(4) Regulating side yards and building setbacks from waterways.
(5) Allow only limited lifetime expansion to non-conforming structures.

(d) Preserve shore cover and natural beauty through:
(1) Restricting the removal of natural shoreland cover.
(2) Preventing shoreline encroachment by structures.
(3) Controlling shoreland excavation and other earth moving activities.
(4) Regulating the use and placement of boathouses and other structures
(5) Preventing the destruction and degradation of wetlands.
(6) Preserving native wetland plant/tree communities.

(e) Protect and preserve wetlands through:5
(1) Restricting the placement of fill material in wetlands.
(2) Encouraging avoidance and minimization of wetland impacts.
(3) Preserving native wetland plants and tree communities.

(f) Prevent flood damage through:
(1) Restricting filling, grading, and the placement of structures in floodplains and wetlands.
(2) Preserving the ecological integrity of floodplains and wetlands.
(3) Restoring floodplains and wetlands to increase floodwater storage.

CHAPTER 23 LAND DIVISION AND SUBDIVISION REGULATIONS (*June 2003*)

23.01 (2) PURPOSE AND INTENT. The purpose of the code is to promote the public health, safety and general welfare of the residents and landowners of the County, to further the orderly layout and use of land, and to secure safety from fire, panic and other dangers.

CHAPTER 25 CONSTRUCTION AND EFFECT OF ORDINANCES (*June 2004*)

(4) Ordinance enforcement by citation for Chapters 15, 17, 18, 19, 20, 21, and 23 of the Marinette County Code. This Ordinance identifies the citation method of enforcement specified in ' 66.0113 Wis. Stats.

The full texts of the Marinette County Ordinances listed above may be viewed at www.marinettecounty.com.

Agricultural Performance Standards and Prohibitions Implementation Strategy

A main focus of the Land and Water Conservation Division is to implement the NR151 Agricultural Standards and Prohibitions as outlined under Goal 1. Below are listed the compliance procedures for our NR151 implementation strategy.

- Enforce Chapter 18 of the Marinette County Code of Ordinances: AGRICULTURAL PERFORMANCE STANDARDS AND ANIMAL WASTE MANAGEMENT
- Prioritize farms and/or cropland for installation of BMPs based upon the watersheds described in this plan as well as ATCP 50.12(2)(f) and other state and local criteria.
- Inform and educate landowners/operators about performance standards and prohibitions as stated under NR 151 APSP.
- Conduct surveys, including on-site visits, for cropland and livestock facilities and convey compliance status and maintenance responsibility to landowners/operators
- Discuss with landowners/operators the best management practices needed to achieve compliance with performance standards and prohibitions
- Seek financial assistance for eligible landowners/operators to achieve compliance with performance standards and prohibitions under NR 151, some landowners are not eligible to receive cost share after they have been previously documented in compliance with NR 151 APSP.
- Develop cost-share agreements with eligible landowners/operators and provide them with technical assistance to achieve compliance with performance standards & prohibitions under NR 151 APSP.
- Assist the Department of Natural Resources with stepped enforcement and issuance of notices under NR 151.09 and NR 151.095.
- Track compliance status of cropland and livestock facilities and provide compliance status information to the Department of Natural Resources upon request. This includes notifying WDNR when the landowner/operator does not comply with a notice issued under NR 151.09 or NR 151.095.
- When local ordinances do not apply, refer cases of noncompliance to the local district attorney when requested by the Department of Natural Resources.
- Collect, evaluate for accuracy and submit annual reporting information on performance standards implementation to DNR and DATCP.

The appeals process, compliance provisions and entire text of Marinette County Ordinances can be found at the Marinette County Web site www.marinettecounty.com or at:

Land Information Department
Resource Center, 1925 Ella Court St.
Marinette, WI 54143-1717

Appendix H lists the relevant conservation practices to achieve compliance with performance standards and prohibitions and to address identified water quality and erosion problems.

Chapter 6. Information and Education Strategy

Information and education (I&E) objectives are critical to reaching each resource goal of this plan. Success in meeting resource goals requires many individuals in the county to change the way they treat land and water resources. Individuals will not make these changes unless they understand the importance of water resources, the ways to protect those resources, and are aware of available assistance.

The heart of the Marinette County I&E strategy is the Teaching Outdoor Awareness and Discovery (TOAD) program. The idea for the TOAD program came from a Senegalese ecologist's quote (shown below) and Richard Louv's book, *Last Child in the Woods – Saving our Children from Nature Deficit Disorder* and the "No Child Left Inside" initiatives it inspired.

In the end, we will conserve only what we Love.
We will Love only what we understand.
We will understand only what we are taught.

- *Baba Dioum*

TOAD programming is not just for show and tell, nor because it is fun to work with kids. In a typical week, only 6 percent of children age nine to thirteen play outside on their own. Studies by the National Sporting Goods Association and by American Sports Data, a research firm, show a dramatic declines in such outdoor activities as swimming and fishing. The rapid increase in childhood obesity seen in the current generation of

children leads many health-care leaders to worry these children may be the first since World War II to die at an earlier age than their parents.

The photo above shows Anne Bartels, our Education Specialist (leaning against the right corner of the TOAD trailer) and a group of 6th grade students from Peshtigo Elementary School. The students are wearing TOAD hip boots used in the gathering of aquatic insects. The species and numbers of aquatic insects are great indicators of water quality and over stream health. The students analyze the insect data they collect to determine the type of stream and its condition. This is one of our most popular field activities. The photo was taken at Camp Bird, operated by the Marinette County Facilities and Parks Department. Camp Bird can hold up to 240 overnight visitors and is used by many groups. This is the also the site of Marinette County's Sand Lake Conservation Camp for 6th to 8th graders every June.

The photo on the left shows a collection of hip boots and the assortment of monitoring equipment. TOAD equipment is stored in dedicated plastic totes. Each activity has its own assortment of totes that are swapped in and out of the trailer based on what is needed for the activity. Having one set of each type of equipment, that can be quickly brought to any one of our eight school districts is a much more efficient use of limited time, space, and financial resources.

Factoring out other variables, studies in California and nationwide have shown that schools using outdoor classrooms and other forms of experiential education produce significant student gains in social studies, science, language arts, and math. One 2005 study by the California Department of Education found that students in outdoor science programs improved their science testing scores by 27 percent.

Studies of children in schoolyards with both green areas and manufactured play areas have found that children engaged in more creative forms of play in the green areas, and they also played more cooperatively. Recent research also shows a positive correlation between the length of children's attention spans and direct experience in nature. Studies at the University of Illinois show that time in natural settings significantly reduces symptoms of attention-deficit (hyperactivity) disorder in children as young as age five. The research also shows the experience helps reduce negative stress and

protects psychological wellbeing, especially in children undergoing the most stressful life events.

The LWCD began offering the Teaching Outdoor Awareness and Discovery (TOAD) program in 2001. The TOAD program brings together an extensive array of outdoor equipment that can be brought to schools or field locations for the study of water quality, forestry, aquatic insects, birdwatching, etc. The TOAD program also includes our large collection of mammal *Pelts and Skulls,* mounted *Birds-on-a Stick,* animal replicas, nature study equipment and trailered collection of canoes and paddling equipment.

The TOAD program is an excellent tool for combating nature deficit disorder. It is also a way to teach people the wonders of nature and show they can have as much fun outside as inside. Children that know and love nature, rather than fear it, grow up to make environmentally friendly decisions. Since its creation, the TOAD program has continued to grow in popularity and expend in breadth. Although the majority of TOAD programs are presented to school age children, programs also presented to families and adult groups. Figures 6-1 and 6-2 below show the growth in the TOAD program.

In the I&E strategy, objectives for each goal have been detailed. New messages and activities may be developed as the plan is implemented and in response to emerging issues. I&E strategy implementation will be evaluated and modified along with other work plan components each year.

In addition to programs, messages, and strategies to build general awareness and appreciation of nature, the LWCD environmental education program works to support and promote: the implementation and installation of Best Management Practices for water quality, the regulations that protect the health safety and welfare of Marinette County citizens, and any other programs offered by the LWCD or other Marinette County departments.

Audience

I&E program components will reach all age groups that live in Marinette County.

1. **Riparian Audience:** Landowners that live or conduct an enterprise adjacent to a lake, river, or stream. Also, seasonal and short term visitors that come to recreate on county lakes and streams.

2. **Agricultural Audience:** Agricultural and horticultural producers, cooperatives, agricultural consultants, and cooperating agencies.

3. **Institutional Audience:** Lake associations and districts, local government, sporting and environmental groups, business associations, chamber of commerce, news media, service clubs, and churches.

4. **Urban Audience:** Permanent and seasonal residents of cities, villages, or concentrated rural areas (subdivisions).

5. **Educational Audience:** Teachers, students, home school groups, and day care facilities.

Implementation Team

The education strategy was developed by Marinette County Land Information Department staff with assistance from the Marinette County UW-Extension (UWEX), WDNR, and NRCS.

The Marinette County LID take lead responsibility for the implementation of the information and education strategy. UWEX and WDNR provide supporting assistance. The LWCD works with and seeks additional support from local units of government, sporting and environmental organizations, lake districts and associations, and other community groups and businesses.

Goal #4: Provide educational programming, land and water information, and other assistance in support of local goals

This goal has changed significantly from the previous plan to reflect actual workload and types of work. Obviously TOAD remains a major part of the goal, but we do much more. Examples include the amount of monitoring/research staff do and the amount of assistance provided to county departments, partner agencies, local service groups, and local units of government. These activities were not adequately capture in previous plan versions.

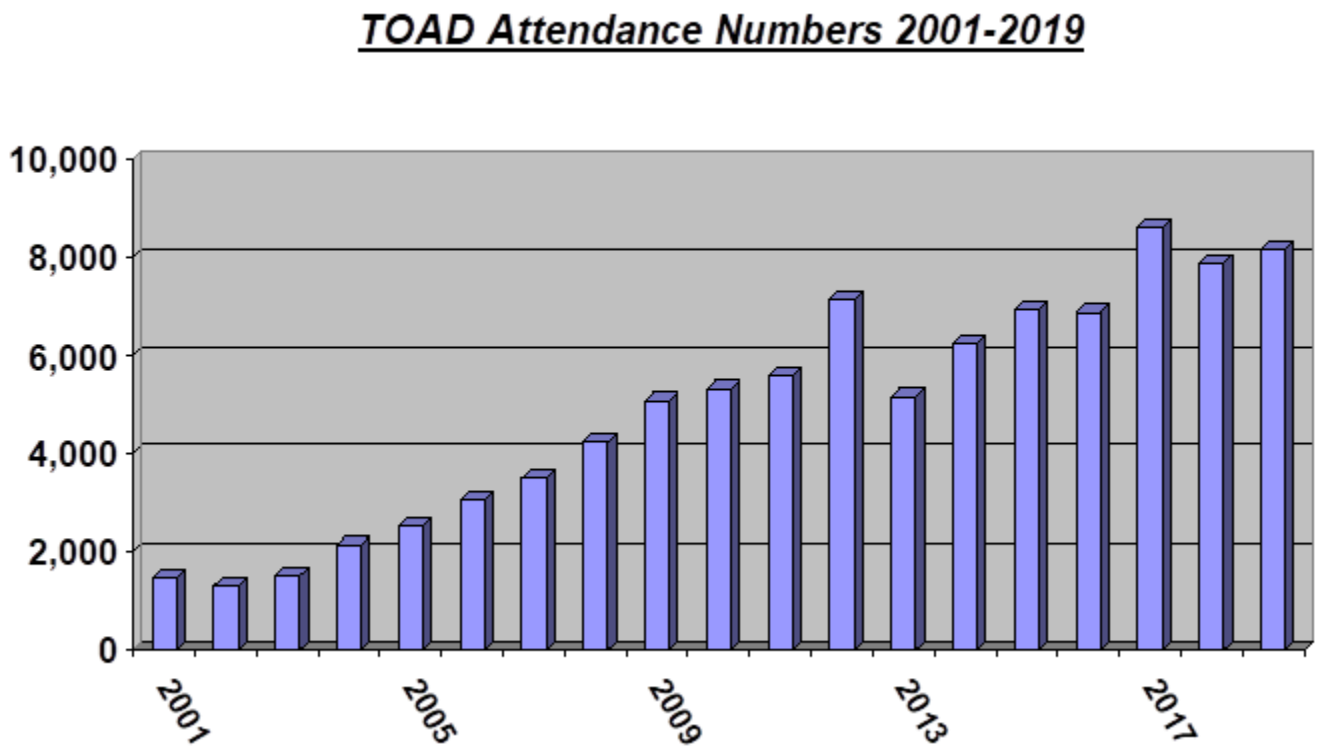
Two examples of monitoring/research are the Bass Lake and Lake Noquebay projects discussed page 39. A third is the Aquatic Invasive Species Herbicide Enclosure Grant mentioned in on page 27. As a grant requirement, project results will be disseminated at the 2021 Wisconsin Lakes Convention and more broadly to partner agency staff and lake groups across Wisconsin. We feel these curtains will change and enhance the herbicide control of Eurasian Water-Milfoil in Wisconsin.

Marinette County staff have obtained millions of grant dollars for farmers, lake groups, local governments, and landowners for many purposes. Sometimes Marinette County is the grantee. Other times we develop the grant application for an external entity. Obtaining resources for local projects and in response to local requests is a major staff

activity. What follows is a deeper discussion of the objectives under this goal.

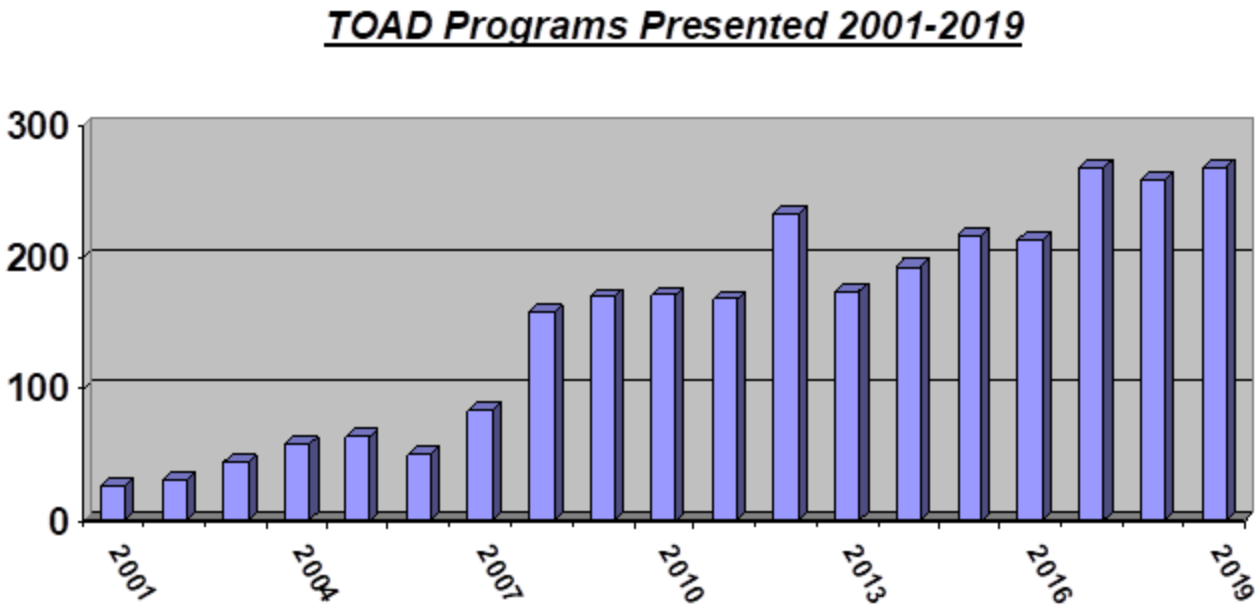
Objective A – Promote natural resources appreciation and environmentally sound stewardship using the TOAD Program, social media, and other appropriate means.

Since its creation, the TOAD program has continued to grow in popularity and expand in breadth. Figures 6-1 and 6-2 below show TOAD program growth.



2001 – 1,461	2008 – 4,217	2014 – 6,427
2002 – 1,307	2009 – 5,058	2015 – 6,948
2003 – 1,496	2010 – 5,308	2016 – 6,895
2004 – 2,131	2011 – 5,565	2017 – 8,636
2005 – 2,507	2012 – 7,155	2018 – 7,889
2006 – 3,053	2013 – 5,139	2019 – 8,187
2007 – 3,482		

93,761 = cumulative total participants



2001 – 26
2002 – 31
2003 – 44
2004 – 58
2005 – 64
2006 – 50 * *Drop in programs due to absence of I&E Specialist Oct-Dec. 2006*
2007 – 84 ** No *I&E Specialist until March 2007*
2008 – 157
2009 –170
2010 – 171
2011 – 168
2012 – 233
2013 – 174
2014 – 193
2015 – 217
2016 – 213
2017 – 268
2018 – 259
2019 – 268

2,848 = *total programs presented*

Note: After March 2020, all in-person TOAD activities were suspended per COVID-19 guidelines. Later in the summer, a few outdoor programs were held. Early in the fall 2020 school year a few TOAD programs were delivered under strict social distancing protocols. However, because the attendance and number of programs offered were so heavily and artificially impacted, 2020 TOAD numbers are not included above.

LID staff make extensive use of social media to spread the conservation message, including daily posts to Facebook. We also provide the *Northwoods Journal*, a general interest monthly newspaper from June through September. The journal highlights current events, natural resource concerns, wildlife species spotlights, outdoor activities and many other topics. Normally the journal is offered for free at businesses,

restaurants, and offices across the county, but due to the pandemic, the journal was solely on-line in 2020. The LID also offers the quarterly *Notes from the Shore* to lake associations and districts across the county. The notes focus on topics and issues of interest to riparian landowners.

Objective B – Provide organizational and planning assistance to landowners, groups, and local governments

We write grant applications, provide facilitation and capacity building, and perform targeted research as described in other parts of the plan. Over the years, we have facilitated Phragmites, Eurasian Water Milfoil and Gypsy Moth control with local partners. The LID has helped with the formation of Lake Associations and helped Associations make the transition to Districts. We have obtained more than $2 million for various projects related to AIS control, lake planning, ordinance development, capacity building and water quality research.

Marinette County is the keeper of land information such parcel boundaries, digital elevations, aerial photography, etc. in our Geographic Information System. We also constantly seek out and utilize the latest technology to obtain, store and disseminate land information. Internally, this data informs our ordinance administration, program direction and service offerings.

We hope that one of the outcomes arising from creating a Demonstration Farm Network with NRCS, Shawano County, and Oconto County will be formation of a Producer Led Conservation Group. The LWCD will help with formation of this group and provide assistance as needed.

Marinette County also provides help to with building environmental education infrastructure. Staff helped the local chapter of the Audubon Society build a wildlife observation deck overlooking Green Bay. More recently, LID staff obtained several grants that funded 80% of a Fish Viewing Platform in the City of Peshtigo. See photo on the following page.

Objective C - Educate the public and decision makers about conservation challenges

Many of the environmental issues we currently face cannot be solved without public support. We use all the means at our disposal to keep local officials and citizens current on issues and future threats.

Objective D - Support and promote environmentally sound land management practices

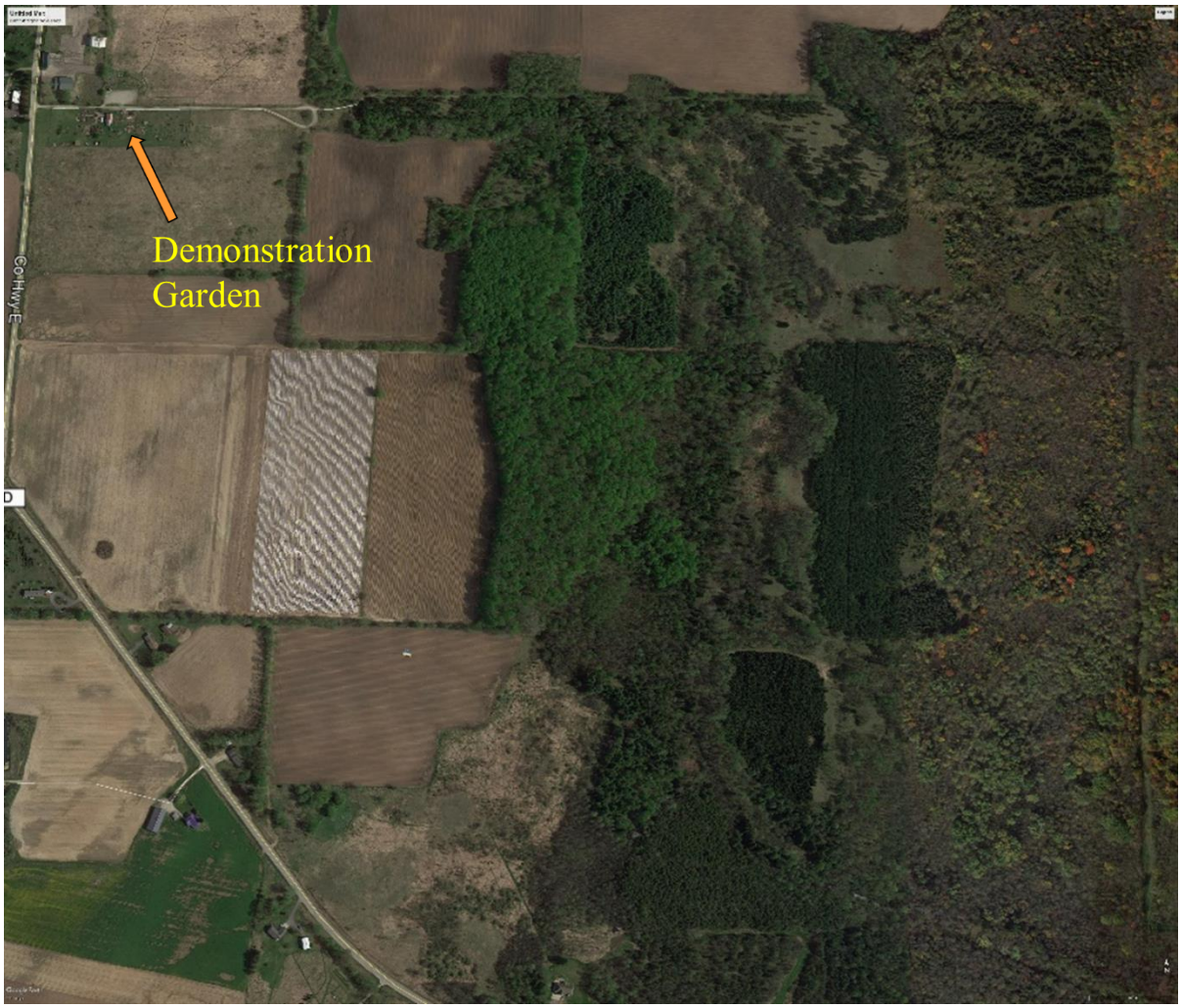
The old expression " An ounce of prevention is worth a pound of cure" could have been invented for invasive species. A significant amount of our effort is still based on explaining why we should worry about them. A key part of local ordinance administration is explain the "why" behind them. The Demonstration Farm Network mentioned on page 62 will help farmers understand how soil health and proper implementation of their nutrient management plan will help their bottom line in addition to protecting water quality. Social research has shown riparian landowners are more likely to make lake friendly land stewardship decisions when they are members of a lake association.

Objective E – Increase local conservation on the land through inter-agency collaboration and involvement of non-governmental organizations

There is strength in numbers and much that can be learned from the experiences of others. Strong and lasting relationships formed with almost all of the lake associations and districts in the county have resulted in many positive outcomes. LID staff have long been involved in the various Wisconsin Land and Water committees. Marinette County has a very long collaborative relationship with Oconto County and with WDNR staff in several programs at several levels. The LID has made use of WDNR grants related to water quality, invasive species, aquatic plant management, and environmental education. We have worked with the USFWS, NRCS, private foundations, local and regional service groups, and hundreds of individual citizens and landowners.

LWCD staff will continue to help the Northeast Wisconsin Land Trust, a nationally-accredited 501(c)(3) nonprofit organization dedicated to permanently protecting northeast Wisconsin's special natural places. Since their founding in 1996, Northeast Wisconsin Land Trust has worked to preserve more than 6,000 acres of natural land, including forests, wetlands, and miles of shoreline, to benefit the health and happiness of the region.

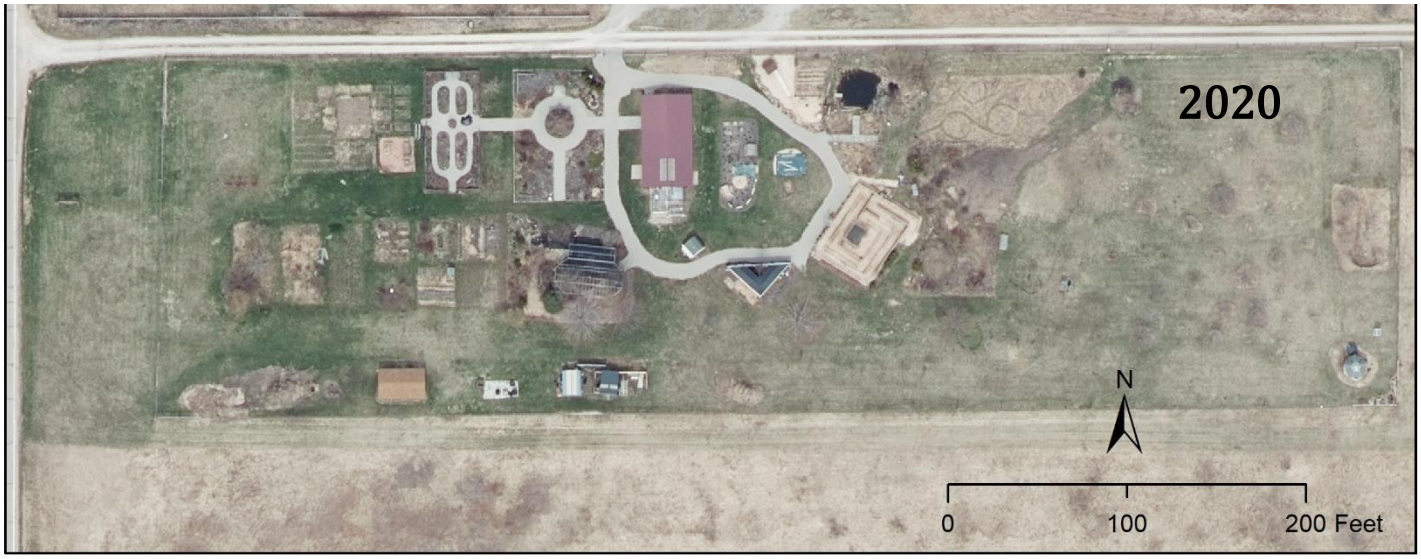
LID staff will continue to work with the University of Wisconsin Extension and the Northern Lights Master Gardeners Association to maintain and enhance Harmony Arboretum. The multi-use property offers outdoor recreation opportunities, interpretive trails and an extensive demonstration garden. Dozens of events are held at the property each year. The following photos show the 460 acre property and the demonstration garden.



The aerial photo above shows almost the entirety of the property. Crop filed rental provides revenue. The property has interpretive trails through a demonstration prairie and through a 100 acre block of old growth quality forest. Multiple habitat types are represented on the property. The northwest corner of the property is the driest area and the wettest area is in the southeast.

The most intensely utilized portion of the arboretum is Demonstration Garden. The Northern Lights Master Gardeners have been the prime source of labor and ideas to put the Demonstration Garden into its current form.

The three photos below show the evolution of the Harmony Arboretum Demonstration Garden since the Land and Water Conservation Department took it over in 1998. The most recent additions are a rebuilt shade garden and a hard surfaced path to improve accessibility.



Chapter 7. Coordination

The voluntary components of this plan rely on State, Federal, and to a much lesser extent, NGO cost sharing. These programs include the NRCS Environmental Quality Incentive; WDNR Targeted Runoff Management, WDNR Lakes, WDNR Aquatic Invasive Species; DATCP Land & Water Resource Management; the US Fish & Wildlife Service, Natural Resources Damage Assessment, Wisconsin Coastal Management, and other public and private grant sources.

Continued staffing assistance from WDNR and DATCP (for day to day operations) and from NRCS and other grant sources (for specific projects) are crucial to the success of the plan. In recent years, the US Fish and Wildlife Service (USFWS) has become a regular partner providing cost sharing for instream habitat enhancement and erosion control projects. Chapter 8 describes a USFWS effort to prioritize fish passage barriers for removal. We anticipate additional opportunities to work on joint projects upon the successful project conclusion.

Here are descriptions of collaborations for 2021 and beyond.

The **NRCS Cooperative Conservation Agreement** will provide technical capacity to implement Farm Bill and NRCS Conservation Programs by funding a Marinette County Conservation Specialist. It will provide additional resource to establish the Demonstration Farm Network described below. The additional staff also allow the LID to expand from a historical farmstead focus into the cropland realm and work directly on developing Conservation Planning, review Nutrient Management Plans for 590 compliance, supplement our existing native pollinator efforts, and implement Northern Pike access and/or spawning habitat projects. Lastly, it will allow us to test private drinking water wells in agricultural areas in a systematic way.

The **NRCS Demonstration Farm Network Agreement** will fund hiring of Project Manager to supervise farm tours and field days promoting innovative BMP's that improve soil health and reduce runoff pollution and erosion. Marinette, Oconto, and Shawano County staff will assist with events, Webpage content, outreach, and data collection. Success will be measured by the number of demonstration farms, the number of farms adopting appropriate BMPs, the number of acres, and input reductions achieved. The SnapPlus and/or STEPL model may be used to estimate pollutant reductions from adopted cropland practices. DNR staff may be consulted with to complete pollutant reduction estimates.

The **Natural Resources Damage Assessment Trustee Council Restoration Project** (NRDA) has two main goals. The first is to build on the work accomplished by the

Oconto County Land Conservation Department to increase the number of adult northern pike in the Bay and its tributaries in both Marinette and Oconto Counties. This goal will be successfully achieved with four major potential actions: 1) identify and prioritize habitat impediments and opportunities, 2) create, restore and connect wetlands to major pike spawning routes, 3) remove fish impediments such as rock dams, improperly placed culverts and farm crossings which restrict water flow, and 4) continue pike research.

The NRDA project will lead to increased collaboration with the **Green Bay Northern Pike and Tributary Fish Working Group.** LWCD staff will assist with appropriate research projects and data gathering in support of our goal to improve fish and wildlife habitat.

The **WDNR Lake Monitoring and Protection Network Grant** will fund local support and assistance in implementation of statewide communication and education priorities to ensure consistent AIS messaging. County staff will collect and report other chemical, biological, or physical data on lakes and lake ecosystems, including data on water levels and lake ice extent and duration as requested by WDNR. We will also coordinate early detection monitoring for AIS and check on WDNR AIS signage at water access sites within county. LID staff will provide AIS outreach and education and deliver technical assistance to grantees or applicants for AIS prevention or control.

Educational programming is constantly evaluated through teacher feedback to ensure that messages are consistent with the latest research and data from agencies and academia. We also work with partner agencies to stay current and ensure consistent interpretation of state and federal codes, statutes, and administrative rules.

The **Northeast Wisconsin Land Trust** (NEWLT) is currently preserving about 1,962 acres of land through conservation agreements with private landowners, outright purchase, creating public preserves open to the public, and donations in Marinette County. LWCD staff participate in annual conservation easement monitoring and provide GIS mapping for the development of new easements. We also help promote NEWLT goals and where appropriate, content interested landowners with NEWLT staff.

Lake and Non-Governmental Organizations

Lakes are a critical Marinette County resource. Their supporting organizations play a key role in implementing this plan. While each organization has goals and objectives, many goals will be consistent with the county plan. Lake associations, districts and

other lake organizations in Marinette County will be crucial for effectively garnering resources to protect lake ecosystems.

The LWCD, in conjunction with other state and local agencies, will continue to provide technical and capacity building assistance to existing lake organizations and to lake front property owners that wish to form qualified (incorporated) lake associations and lake districts. These same services will be provided to service groups that are working to protect the environment. Marinette County has a long history of providing these services to the benefit of all. These efforts will continue to the maximum extent allowed by our resources.

Local Government

Land use planning, ordinance administration, water quality and quantity issues, invasive species and other issues necessitate working with town and municipal governments. Environmental and other problems do not recognize political boundaries. Additionally, shrinking budgets require us all to seek the most cost effective problem solutions. Therefore, Marinette County will continue to work with local governments on projects of mutual benefit. We will also strive to provide local governments with technical assistance, grant writing help, and capacity building such that all governmental entities within the county are providing the greatest possible level of service to our citizens at least cost.

Marinette County staff regularly attend local Towns Association meetings to inform as well as learn about Town issues. In recent years, stronger relationships have been formed with local building inspectors, especially with regard to Marinette County Shoreland Zoning and Sanitary ordinances. We help towns navigate state rules and adjust Town ordinances to meet changes in County and State rules.

Chapter 8. Monitoring and Evaluation

The 2011 plan version noted the lack of current data for water quality, land use, etc. as being a long-term problem, exacerbated by the extreme budget problems across the state and local agencies. In response, Marinette County used multiple grant sources to boost our capacity to perform various types of water monitoring.

Surface Waters

Bass Lake and Lake Noquebay projects are two monitoring efforts discussed in detail in earlier chapters. These projects have greatly increased our skill set and improved our technological base. We just recently completed a Management Plan for the Glen Lake Association. These types of monitoring will continue as opportunities present themselves.

Marinette County performed Total Phosphorus monitoring under the Water Action Volunteers program in 2014 and 2015 in support of an effort to create a Nine Key Element Plan for the Lower Peshtigo River Watershed. This type of effort will be replicated when and where appropriate. Marinette County will consult with DNR Water Quality biologists and Nonpoint Source Coordinators before beginning any water quality monitoring techniques within the Lower Peshtigo HUC 12 watersheds.

Groundwater

The situation for ground water is very different. A small amount of monitoring has been done for the Lake Noquebay project, but Marinette County has never been involved in a systematic effort to understand the state of our groundwater. Goal 1, Objective D was chosen in part to remedy this situation. With the addition of new staff, Marinette County will be in a position to seek out grant funding to support development and implementation of a county-wide groundwater study.

In the short term, the LID has finally enrolled all eligible properties in our Private On-Site Water Treatment System (POWTS) maintenance program. We now have the ability to better monitor regular pumping and inspection of POWTS to ensure proper system operation. Additional monitoring and assessment may be indicated in localized situations.

Water Quantity

Marinette County staff have assisted the US Fish and Wildlife Service (USFWS) and Trout Unlimited with stream crossing inventories in the Pemebonwon, Pike and the upper portion of the Peshtigo River watersheds. In 2020, we are helping the USFWS

identify gaps in their assessment of aquatic barriers within County watersheds. When the inventory data gaps are filled, they build a model to prioritize barriers for removal.

Environmental Education

Many LID education programs seek long term behavioral changes resulting in land use and other decisions with more environmentally friendly outcomes. It is difficult to empirically measure the success of these types of programs with the tools available. Or put another way, how do you measure the environmentally damaging decision NOT MADE, due to our messages? The LWCD continually seeks feedback and comments on educational programs. However, the main measure of program success remains the continued growth in their popularity.

Invasive Species

The area of invasive species remains a growth area relative to monitoring and evaluation. The nature of exotic invasive plants makes the County GIS and Global Positioning Equipment important tools. We perform monitoring in partnership with State and Federal agencies as well as local lake groups.

All WDNR funded AIS management plans include pre and post-treatment aquatic plant surveys to evaluate effectiveness. AIS Management Grants that include research into new and innovative AIS control methods often involve enhanced monitoring including residual testing. We continue to monitor the boat landings of Marinette County for the spread of AIS. Marinette County continues as a Wild River Invasive Species Coalition member in part to garner additional personnel and financial resources for monitoring the spread of invasive species and locating initial infestations. For 2021, Marinette County has entered into a Lake Monitoring and Protection Network agreement with the WDNR to perform various types of monitoring and related outreach.

Agricultural Nonpoint Sources

Marinette County's agricultural monitoring and evaluation has long been limited to applications for Targeted Runoff Management (TRM) program grants, development of other cost shared projects, responses to citizen complaints, and staff discoveries of ordinance violations. For the TRM program, the LID uses the EPA Spreadsheet Tool for Estimating Pollutant Loads (STEPL) and NRCS "Evaluation System to Rate Feedlot Pollution Potential (BARNY) models for grant applications and Final Reports. (1) Prior and Existing TRM projects will be evaluated by LID and WDNR for compliance with NR 151 APSP. SnapPlus may be utilized to estimate pollutant load reductions from cropland practices.

The LID received an NRCS grant to fund a Conservation Specialist for five years. A main goal for this grant is increase landowner participation in Farm Bill/EQIP

programming. STEPL, the Phosphorus Index, SnapPlus, and other NRCS tools will be used to measure the impacts of increased EQIP participation and improved nutrient management plan implementation on cropland runoff.

The LID is participating in an additional NRCS grant funded partnership with Oconto and Shawano Counties to develop a Demonstration Network. The same tools listed above will be used to measure the impacts of reduced tillage, increased cover crops, and improved nutrient management plan implementation on cropland runoff and soil health.

Miscellaneous

Marinette County will continue to use new monitoring tools and additional resources as they become available. We will build on our existing relationships with partner agencies to enhance joint capabilities.

Appendix A. Selected Land Cover Classifications by Watershed

	Little River GB04	Lower North Branch Oconto GB05	Lower Peshtigo GB07	Little Peshtigo GB08
LAND CLASS	Acres	Acres	Acres	Acres
Agriculture	4,437	0	28,069	37,123
Forest	863	11,402	32,342	14,212
Open Water	0	143	1,348	561
Wetland	3,231	5,539	39,025	17,989
Urban	0	0	617	0
TOTAL	8,531	17,084	101,401	69,885
Public Land	540	10,560	11,410	1,251

	Middle Inlet Lake Noquebay GB09	Middle Peshtigo Thunder GB10	Upper Peshtigo GB11	Otter Creek & Rat River GB12
LAND CLASS	Acres	Acres	Acres	Acres
Agriculture	12,585	5,826	584	21
Forest	45,318	62,694	30,787	11,074
Open Water	3,452	3,680	1,430	72
Wetland	28,209	12,239	5,995	1,118
Urban	406	108	0	0
TOTAL	101,401	84,547	38,796	12,285
Public Land	10,696	26,673	20,926	3,315

	Wausaukee & Lower Menominee GB13	Pike River GB14	Pemebonwon & Mid. Menominee GB15	Popple River GB17
LAND CLASS	Acres	Acres	Acres	Acres
Agriculture	10,773	2,787	4,431	0
Forest	55,589	124,731	94,937	2,101
Open Water	2,620	2,212	2,870	353
Wetland	33,403	32,783	30,211	83
Urban	1,920	252	462	0
TOTAL	104,305	162,765	132,911	2,537
Public Land	11,876	91,148	61,883	1

Note: The acres shown are only for Marinette County watershed portions and do not reflect every land cover classification. Land cover data is from the WISCLAND 1991 data set except for cropland acres which are provided by NRCS in 2020. The TOTAL reflects totals for the column, not the total watershed sizes.

Appendix B. Marinette County Goals and Objectives from the 2011 Land and Water Resources Management Plan

GOAL 1 - Help Marinette County citizens make the connection between land use and environmental quality.
Objective A - Promote the appreciation and stewardship of local natural resources and build awareness of local natural resource problems.
Objective B - Support and promote land management practices which reduce runoff pollution and increase natural habitat.
Objective C - Recognize those who use environmentally friendly land stewardship, install Best Management Practices for water quality, or work to protect Marinette County's land and water resources.
Objective D - Provide organizational and planning assistance to landowners, groups, and local government as requested

GOAL 2 - Control runoff pollution from riparian areas and forest lands. Increase natural habitat.
Objective A - Provide technical assistance and cost sharing to restore wetlands and shoreline habitat, stabilize eroding shorelines, and reestablish littoral zone vegetation and aquatic habitat.
Objective B - Provide technical assistance and cost sharing for BMP's on developed riparian areas that protect water quality.
Objective C - Provide technical assistance and cost sharing for implementation of forestry BMP's.
Objective D - Administer NR115, Shoreland Management Program

GOAL 3 - Control runoff pollution from agricultural lands. Increase natural habitat.
Objective A - Provide technical assistance and cost sharing for constructed or somewhat permanent agricultural BMP's for water quality and fish and wildlife habitat protection.
Objective B - Provide technical assistance and cost sharing for planning and implementation of cropland BMP's

GOAL 3 - Control runoff pollution from agricultural lands. Increase natural habitat.
Objective C - Implement the Marinette County Agricultural performance Standards and Animal Waste Management Ordinance
Objective D - Implement priority farm strategy

GOAL 4 -Manage and/or prevent the spread of invasive exotic species
Objective A - Provide technical assistance and/or cost sharing for the prevention and control of exotic species infestations
Objective B - Increase interagency communication and cooperation.
Objective C - Increase the involvement of non governmental organizations in exotic species management
Objective D - Educate the public and decision makers about prevention and control of exotic invasive species
Objective E - Promote and assist volunteer monitoring of exotic species

Other work related activities
Objective A – Professional Improvement
Objective B – Capacity Building and Conservation
Objective C - Outreach

Appendix C. Lower Peshtigo River Watershed Management Plan - Chapter 5. Planned Activities, Milestones and Time Frames

Due to a paucity of water quality, biotic, land use, or specific farm data for Marinette County, the early years of watershed plan implementation (See figure 5-1) will focus on gathering data, filling in knowledge gaps and putting new assessment and modelling tools to use. Once obtained and analyzed, these data will inform and prioritize future application of phosphorus and sediment reduction practices, educational programming, and capacity building. Full plan implementation will depend on acquisition of resources not currently at the disposal of Marinette County or the WDNR.

Although the Lower Peshtigo River Watershed Management Plan focuses upon agricultural causes and sources of pollution, planned activities include general environmental education, habitat restoration, invasive species control, etc. Emphasis has long been placed on reducing loads of phosphorus and sediment to streams while essentially ignoring other stressors and impairments. In the final analysis, it makes little difference to a fish **WHY** it can't live in a particular stream, whether it is low dissolved oxygen, poor habitat, water that is too warm, lack of water, competition from exotic species, turbidity, extreme flashiness, or whatever. A healthy stream has **ALL** the food, shelter, water, and space fish and other aquatic organisms need to live and reproduce. Providing **ALL** those components should be the goal for any management plan.

Marinette County has focused on ending the winter spreading of manure for almost two decades. This plan will continue that effort in the Lower Peshtigo River Watershed. The farm inventory conducted for this plan identified approximately 40 farms large enough to be likely candidates to install cropland and feed lot practices for water quality. Twenty-five of these farms have already installed practices. Of the remaining fifteen, some may cease operation. However, if current agricultural land use trends continue, the cropland acreage in the LPR watershed will only shrink slightly and the cattle numbers will remain roughly the same. As this plan is implemented, it will need to be amended to reflect these realities.

In the long term, general environmental education may be the most critical work in the plan. Information and education is discussed in detail in Chapter 7.

An additional consideration in developing this work plan is that the same flexibility and responsiveness that make the LWCD relevant in Marinette County make it very difficult to forecast what the workload will be beyond next year. The next environmental crisis or issue may take the LWCD in an entirely different direction. The same is true if new resources become available to deal with an existing problem.

Figure 5-1. 2016 – 2026 Planned Activities and Schedule (Plan Elements 1, 2 and 9)					
Goal	Activity		LWCD Partners and/or Funding Sources	Milestone(s)	Time Frame
Learn more about the biota, environmental health, and human health risks in the watershed	Complete and analyze the phosphorus, aquatic insect, and fishery data gathered during the creation of this plan and then amend plan objectives and activities to reflect findings.		WDNR	Monitoring Report	2018
	Fully utilize the Healthy Watershed Assessment tool to predict impaired catchments and possibly prescribe treatments		WDNR, NRCS	Final Report	2019
	Run the SNAP Plus model for the Trout Creek HUC12 using known or representative crop rotations and soil P concentrations		DNR,DATCP, UWEX	Load Reduction Est.	2020
	When the LiDAR data becomes available, utilize the EVAAL model to predict portions of the watershed at risk for excessive soil erosion		WDNR, NRCS	Erosion Prediction Map	Trout Creek 2019
	Expand the knowledge base of fish populations in watershed streams and the streams highest potential use		WDNR	Stream fishery reports	2020
	Survey the watershed for fish passage issues		USFWS, WDNR	Map, GIS Layer Created	2022
	Locate best sites to restore Northern Pike spawning habitat in the Little River and Peshtigo R. Frontal LM HUC12s				
	Identify threats to future conditions such as Exotic Species, development patterns, etc.		As appropriate	Updated GIS and website, NWJ articles	Ongoing
	Map groundwater quality in the watershed	Coordinate a volunteer homeowner funded private well sampling campaign in the watershed; further investigate areas where Nitrates, etc. exceed state standards	UW – Stevens Point, WDNR	Map Created	2019
		Perform targeted investigations of areas with wells known to exceed state standards for nitrates, bacteria, etc.		Map Created	When resources become available
	Locate all abandoned wells in the watershed		NRCS	Map Created	2021

Figure 5-2. 2016 – 2026 Planned Activities and Schedule (Plan Elements 3, 6, 7 and 9)				
Goal	Activity	LWCD Partners and/or Funding Sources	Milestone(s)	Time Frame
Reduce impacts of nonpoint source pollution on human health	Properly decommission abandoned wells	UWEX, WDNR, NRCS	Percentage of abandoned wells decommissioned	50% by 2023, 90% by 2026
	Close unused in-ground manure storage facilities	WDNR, DATCP, NRCS	Two per year	2017 to 2026
	Promote and administer Clean Sweeps to properly dispose of agricultural and home chemicals	DATCP	Clean Sweeps Held	2017, 2021, 2024
	Use the results of well sample analysis to guide future efforts	UWEX, Local NGO's		Ongoing
	Audit implementation of nutrient management plans	DNR, DATCP, UWEX	Audit 10 plans per year	Annually

Figure 5-3. 2016 – 2026 Planned Activities and Schedule (Plan Element 6 and 7)					
Goal	Activity		LWCD Partners and/or Funding Sources	Milestone(s)	Time Frame
Deal with other environmental stressors in the watershed	Prevention, control and eradication of Exotic Invasive Species		WDNR, WRISC, NRCS, Local Gov'ts	One aquatic, and one terrestrial project per year	2016 to 2026
	Prevent and/or repair fish passage problems	Proper Culvert Installations	USFWS, Local Gov'ts	Installation Workshop	2019, 2023
		Repair blockages		One per year	As resources are obtained
	Restore wetland habitat, especially Northern Pike spawning and nursery areas		WDNR, NRCS, USFWS, GLRI	One project per year	As willing landowners and funding are found

Figure 5-4. 2016 – 2026 Planned Activities and Schedule (Plan Elements 3, 6, 7, 8, and 9)						
Goal	Activity		LWCD Partners and/or Funding Sources	Milestone(s)	Time Frame	Estimated Annual Phosphorus and Sediment Reductions
Minimize the risk of acute manure and runoff events and the amount of Phosphorus reaching the Lower Peshtigo River	End winter spreading of manure in the watershed	Apply for a Large Scale Non-TMDL TRM Grant	WDNR, DATCP, NRCS	Approved Application	2017 or when approved	Reductions identified in 9 Element watershed plan
		Install manure storage Facilities		15 Animal Waste Systems	2 Farms Per Year[1]	12,216 lbs. P[3]
		Capture and store contaminated farmstead runoff				1,494 lbs. P
		Implement fully compliant 590 standard nutrient management plans		4,000 ac.	2022[2]	2,960 lbs. P[4] 320 Tons Sed.[5]
				4,000 ac.	2026[2]	2,960 lbs. P 320 Tons Sed.
	Complete and then regularly update soil phosphorus level maps for watershed croplands			Map and revisions	2020, then annually[2]	
	Reduce the impacts of manure hauling on local roads and the risk of spills		Local Gov’ts	Mitigation projects; local ords	Ongoing	
	Enforce the Marinette County Agricultural Performance Standards and Animal Waste Management Ordinance			NA	Ongoing	
	Operation and maintenance inspections		NRCS, WDNR	Visit each farm with installed practices very 3rd year	2016 to 2026	
	Audit Nutrient Management Plan Implementation		DNR, DATCP, UWEX	Audit 10 plans per year for compliance with 590 NM Std.	Annually[2]	

Note: [1] Dependent on the level of cost sharing available.
[2] Dependent on having additional staffing resources. See Figure 6-2 for an estimate.

[3] No manure storage facility contents will be winter spread on crop fields. Based on discovery farms estimates of 1.6 lbs. P/acre leaving crop fields winter spread with manure times the average sized commercial farm in the watershed.

[4] Estimated acres X (Pre Project load – Post project P load from page 51) = 4,000 X (2.34 lb P /ac - 1.60 lb P/ac) = 5,920 Lbs; the STEPL estimated reductions in Phosphorus due to BMP installations.

[5] Estimated acres X (Pre Project load – Post project sediment load from page 51) = 4,000 X (.23 ton Sed /ac - .15 ton Sed/ac) = 320 Tons; the STEPL estimated reductions in Sediment due to BMP installations.

[6]Estimates 15 farms times the average of 99.6 lbs P leaving a feedlot/barnyard without BMPs. Average is from 15 BARNY results from watershed farms

Figure 5-5. 2016 – 2026 Planned Activities and Schedule (Plan Element 5, 7, and 8)					
Goal	Target Audience	Activity	Outcomes	LWCD Partners	Time Frame
Provide information in support of plan goals; make the connection between land use and environmental quality	General Public (Including Producers)	Regular articles about the project in the Northwoods Journal	Two to four articles per year	UWEX, WDNR, NRCS	2016 to 2026
		Use of social media to improve outreach capabilities	Build and maintain Facebook page	WLW	2016 then regular maintenance
		Use of Harmony Arboretum for educational programing	One event per year	UWEX, Local NGO's	2017 to 2026
		Advertise well sampling for homeowners	Up to 150 wells per year sampled	WDNR, DATCP, USFWS	2017 to 2026
		Seek properties suitable for habitat restorations	One project per year		
Improved communication with and between producers; publicize progress and increase producer and landowner acceptance; improve BMP operation and maintenance	Producers	Direct mailing to known producers active in the watershed. If a large scale TRM grant is obtained for the watershed, an additional mailing will be made	Initial mailing and then as appropriate	NRCS, UWEX	2016 and when new grants or resources are found
		Biannual nutrient management workshops	One workshop every two years	DATCP, UWEX	2018, 20, 22, 24, 26
	Producers, local Gov'ts	Tour farms that have implemented practices	One tour per year;	NRCS, UWEX	Annually 2017 - 2022

Appendix D.

MARINETTE COUNTY 2020 ANNUAL WORK PLAN
LOCALLY-IDENTIFIED PRIORITIES

CATEGORY	PLANNED ACTIVITIES WITH BENCHMARKS	PERFORMANCE MEASUREMENTS
Cropland, soil health and/or nutrient management		***Staff hours are tracked for all activities***
Goal 3, Objective B	Cost share **875** acres of nutrient management planning with acreage in the Lower Peshtigo River Watershed prioritized.	*Units of practice(s) installed* *Cost-share dollars spent*
Goal 3, Objective B, C, & D	Obtain nutrient management plans and updates from County producers prioritzing the Lower Peshtigo river Watershed	*# of Plans and updates reviewed* *Acreage covered by reviewed plans and updates*
Goal 3, Objective C	Enforce and administer Chapter 18 of the Marinette County Code of Ordinances prioritizing areas in the Lower Peshtigo River Watershed	
Livestock		***Staff hours are tracked for all activities***
Goal 3 (Control runoff pollution from agricultural lands. Increase natural habitat)**, Objective A**	Install **3** manure storage facilities, **1** manure transfer system, **1** leachate collection system, **3** barnyard runoff control system, and **3** roof at **4** sites.	*Type and units of practice(s) installed* *Amount of cost-share dollars spent* *# lbs of sediment reduced (using any approved method)* *# lbs of P reduced (using any approved method)* *# of livestock facilities in compliance with a performance standard* *# of applications made*
	Apply for 4 TRM grants for 2021 prioritizing grants within the Lower Peshtigo River Watershed	
	Provide technical assistance to partner agencies for installation of BMP's	
Goal 3, Objective C & D	Issue permits for **4** agricultural projects	*# of permits issued*
	Enforce and administer Chapter 18 of the Marinette County Code of Ordinances	
	Respond to **5** citizen and partner agency complaints	

CATEGORY	PLANNED ACTIVITIES WITH BENCHMARKS	PERFORMANCE MEASUREMENTS
	Visit **15** farms to inspect livestock BMP operation in accordance with the NRCS Technical Guide	

MARINETTE COUNTY 2020 ANNUAL WORK PLAN
LOCALLY-IDENTIFIED PRIORITIES

CATEGORY	PLANNED ACTIVITIES WITH BENCHMARKS	PERFORMANCE MEASUREMENTS
Water quality/quantity		***Staff hours are tracked for all activities***
Goal 1 (Help Marinette County citizens make the connection between land use and environmental quality), **Objective D; Goal 2**	Continue to advise Noquebay (LNRD), McCaslin, and Beecher Lake Districts and lake associations	
Goal 2, Objectives A, B, & C	Respond to the availability of new resources, new requests for assistance, or new problems	
Goal 2 (Control runoff pollution from riparian areas and forest lands. Increase natural habitat), **& Goal 3**	Enforce and administer Chapters 10,18, 19, 20, & 21 of the Marinette County Code of Ordinances	*# of plans* *# of permits issued*
	Provide restoration plans for closed Marinette County Forestry Dept. mines	
Goal 1, Objective D; Goal 2, Objective B;	Complete final write-up of Beecher Lake Management Plan	*Final comprehensive management plan is complete*
	Finish Phase I of the Lake Noquebay Nutrient Study and begin Phase II	*Phase I data analysis done; Phase I final report written*

CATEGORY	PLANNED ACTIVITIES WITH BENCHMARKS	PERFORMANCE MEASUREMENTS
	Maximize the number of Private On-site Water Treatment Systems (POWTS) incorporated in County's POWTS maintenance program	*#of systems enrolled* *# of landowners contacted*

MARINETTE COUNTY 2020 ANNUAL WORK PLAN
LOCALLY-IDENTIFIED PRIORITIES

CATEGORY	PLANNED ACTIVITIES WITH BENCHMARKS	PERFORMANCE MEASUREMENTS
Invasive species		***Staff hours are tracked for all activities***
Goal 4 (Manage and/or prevent the spread of invasive exotic species), **Objective A, C, & E**	Driver Assisted Suction Harvester (DASH)	*Use the DASH as needed throughout the county, especially at Lake Lundgren, Little Newton Lake, Dolan Lake, and Thunder Lake*
	Follow up Lake Lundgren Rapid Response Grant Project with monitoring and DASH usage	*Harvest EWM using the DASH as needed; Build and install an educational kiosk at the boat landing; plant survey; EWM recon.reporting*
	Complete the Beecher Lake EWM Control Project Phase 2	*Conduct post project point intercept aquatic plant survey EWM management plan based on winter Drawdown Final report; spot herbicide treatments of EWM*
	Continue to help local units of government and NGO's build capacity	
	Complete Dolan Lake Rapid Response Project	*Utilize enclosures and DASH to control EWM; perform final AP survey of the lake; Final Report complete*
Goal 4, Objective A & B	Continue implementation of a DNR funded grant project to test the efficacy of using enclosures to contain herbicide around EWM beds	*Conduct new test plot trials in May and June*
Goal 4, Objective C, D, & E	Complete Glen Lake Management Plan	*Complete Final Report and present to Association*
Wildlife-Wetlands-Habitat (other than forestry or invasive species)		***Staff hours are tracked for all activities***
Goal 1, Objective A	Continue participation on the County Deer Advisory Committee	
	Oconto County has applied for an NRDA grant to work on Northern Pike spawning habitat and stream passage impediments in the Lower Peshtigo River Watershed, including Marinette County. Marinette staff will assist as needed	*Number of stream passage impediments remediated Acres opened to Northern Pike spawning*
Goal 2, Objective C	Tree planter rental	*Number of trees planted*
Goal 2, Objectives A & B	Respond to: the availability of new resources, new requests for assistance, or new problems	*# of requests responded to # of New issues*
	Complete a Lake Management Plan for Glen Lake	*Completed plan presented to Lake Associiation*

CATEGORY	PLANNED ACTIVITIES WITH BENCHMARKS	PERFORMANCE MEASUREMENTS
	Work with WDNR fisheries staff on an NRDA grant to control Erosion and provide Lake Sturgeon spawning habitat on the Peshtigo R.	*Apply for NRDA grant funding to control erosion and improve sturgeon spawning habitat on approximately 240' of shoreline*
CATEGORY	**PLANNED ACTIVITIES WITH BENCHMARKS**	**PERFORMANCE MEASUREMENTS**
Watershed Strategies		***Staff hours are tracked for all activities***
Goal 4 Objective B & C	Participation on the **Wild Rivers Invasive Species Coalition (WRISC)**	*# of meetings attended* *Initiatives undertaken*
Goals 2 & 3	Lake Noquebay Nutrient Study	*Conduct tributary and outlet flow and nutrient monitoring; evaluate current lake water quality conditions; determine groundwater inflow/outflow and nutrient loading; apply for Phase II grant funding*
	Bass Lake Alum Treatment **Evaluation**	*Water quality modelling complete; Final Report written*

MARINETTE COUNTY 2020 ANNUAL WORK PLAN
LOCALLY-IDENTIFIED PRIORITIES

CATEGORY	PLANNED ACTIVITIES WITH BENCHMARKS	PERFORMANCE MEASUREMENTS
Other		***Staff hours are tracked for all activities***
Environmental Education Goal 1 Objective A, B, & C	Deliver 250 **Teaching Outdoor Awareness & Discovery (TOAD)** programs to 7,000+ people	*# of programs delivered* *# of attendees*
	Create 2-4 new TOAD programs to highlight emerging conservation issues such as : bats, native pollinators, and the Dark Skies Initiative	*# of programs created and delivered* *# of attendees*
	Promote Native Pollinator Habitat	*Install 3 butterfly/pollinator gardens on private properties; maintain/expand habitat at Harmony Arboretum*
	Sand Lake Conservation Camp for 100 people	*# of attendees*
	Operate, maintain, and improve **Harmony Arboretum** Offer 20+ **Nature and Horticulture Seminars**	*# of attendees* *# of programs delivered* *Improvements made*
	Conservation Poster Contest; 140 posters from six school districts	*# of school districts participating* *# of posters submitted*
	Four Editions of the **Northwoods Journal**; 4,500 pieces per edition	*# of editions* *# of papers*
	Marinette County **Website** and **Facebook** Page	*# of posts*
Environmental Education Goal 1 Objective A; Goal 2	Continue to offer four editions of the **Notes from the Shore** to nine lake groups	*# of lake groups* *# of editions*
Goal 2, Objective D	Continue to provide education on the environmental reasons for shoreland zoning	
Goal 1 Objective A & D	Complete **fish viewing platform** over the Peshtigo River	*Finalize I&E signage; Project complete*
	Incorporate the former Harmony Sportsman's Club land into Harmony Arboretum and TOAD programming	*Number of programs held on the property*
Goal 1 Objective D	Continue to support and participate in the **Wisconsin Envirothon**	
	Continue to help local units of government and NGO's build their capacity	*# of groups assisted*

CATEGORY	PLANNED ACTIVITIES WITH BENCHMARKS	PERFORMANCE MEASUREMENTS
Professional Improvement; Departmental Maintenance and Capacity Building; Outreach	Continue staff participation on **committees and groups**, including: the WLW Professional Improvement, Technical, and Youth Education Committees; staff training	*# of meetings attended*
	Continue staff participation on **committees and groups** in support of regional and statewide associations that improve our ability to serve our constituents and landowners	*# of meetings attended*
Departmental Maintenance and Capacity Building	Complete migration from our current AS400 software to Transcendent Technologies Ascent Land Records and Permitting Software Suite	*Complete migration in 2020*
	Begin the process of moving the entire Land Information Department from the Courthouse to the former Marinette County Jail	*Move completed December 2020*
	Complete update of Land and Water Resources Management Plan	*Plan approved by LWCB*

Appendix E.

MARINETTE COUNTY 2019 ANNUAL WORK PLAN
LOCALLY-IDENTIFIED PRIORITIES

CATEGORY	PLANNED ACTIVITIES WITH BENCHMARKS	RESULTS
Cropland, soil health and/or nutrient management		***Staff hours are tracked for all activities***
Goal 3, Objective B	Cost share 1,125 acres of nutrient management planning	*1,125 acres of nutrient management planning were cost shared*
Goal 3, Objective B, C, & D	Obtain nutrient management plans and updates from County producers	*79 plans and updates turned into DATCP for review* *56,714 acres covered by reviewed plans and updates*
Goal 3, Objective C	Enforce and administer Chapter 18 of the Marinette County Code of Ordinances	
Livestock		***Staff hours are tracked for all activities***
Goal 3 (Control runoff pollution from agricultural lands. Increase natural habitat)**, Objective A**	Install **3** manure storage facilities, **1** manure transfer system, **1** leachate collection system, **1** barnyard runoff control system, and **1** roof at sites.	*Installed 2 Manure Storage System, Manure Transfer System, Manure Storage Roof, and Leachate Runoff Control under TRM $419,607 cost-share dollars spent* *540 lbs of sediment reduced (STEPL)* *3,960 lbs of P reduced (STEPL)* *3 livestock facilities in compliance with a performance standard* *2 TRM application made*
	Apply for 2 TRM grants for 2020	
	Provide technical assistance to partner agencies for installation of BMP's	
Goal 3, Objective C & D	Issue permits for **4** agricultural projects	*3 permits issued*
	Enforce and administer Chapter 18 of the Marinette County Code of Ordinances	
	Respond to **5** citizen and partner agency complaints	*Responded to 6 complaints*
	Visit **15** farms to inspect BMP operation	*4 farms visited*

MARINETTE COUNTY 2019 ANNUAL WORK PLAN
LOCALLY-IDENTIFIED PRIORITIES

CATEGORY	PLANNED ACTIVITIES WITH BENCHMARKS	RESULTS
Water quality/quantity		***Staff hours are tracked for all activities***
Goal 1 (Help Marinette County citizens make the connection between land use and environmental quality), **Objective D; Goal 2**	Continue to advise Noquebay (LNRD), McCaslin, and Beecher Lake Districts and lake associations	
Goal 2, Objectives A, B, & C	Respond to the availability of new resources, new requests for assistance, or new problems	
Goal 2 (Control runoff pollution from riparian areas and forest lands. Increase natural habitat), **& Goal 3**	Enforce and administer Chapters 10,18, 19, 20, & 21 of the Marinette County Code of Ordinances	*83 plans reviewed* *649 permits issued*
	Provide restoration plans for closed Marinette County Forestry Dept. mines	
Goal 1, Objective D; Goal 2, Objective B;	Complete final write-up of Glen Lake Management Plan	*Lake Management plan was completed and submitted Association and WDNR*
	Maximize the number of Private On-site Water Treatment Systems (POWTS) incorporated in County's POWTS maintenance program	*Approximately 4,300 POWTS maintenance notifications sent* *Responded to approximately 400 landowner calls*
	Complete the Shoreland Zoning water body buffer mapping	*Completed*

MARINETTE COUNTY 2019 ANNUAL WORK PLAN
LOCALLY-IDENTIFIED PRIORITIES

CATEGORY	PLANNED ACTIVITIES WITH BENCHMARKS	RESULTS
Invasive species		***Staff hours are tracked for all activities***
Goal 4 (Manage and/or prevent the spread of invasive exotic species), **Objective A, C, & E**	Driver Assisted Suction Harvester (DASH)	*Used the DASH at Lake Lundgren, Little Newton Lake, Dolan Lake, and Thunder Lake*
	Continue the Lake Lundgren Rapid Response Grant Project	*Completed project and submitted Final Report to WDNR.*
	Complete the Beecher Lake EWM Control Project Phase 2	*Completed project and Final report to Beecher Lake District Board and WDNR*
	Continue to help local units of government and NGO's build capacity	*Helped Town of Niagara with changes to local ordinance*
Goal 4, Objective A & B	Begin implementation of a DNR funded grant project to test the efficacy of using enclosures to contain herbicide around EWM beds	*Completed, deployed enclosures on two lakes, took water samples, began analysis*
Goal 4, Objective C, D, & E	Complete Glen Lake Management Plan	*Completed project and submitted Final Report to Association and WDNR*
Wildlife-Wetlands-Habitat (other than forestry or invasive species)		***Staff hours are tracked for all activities***
Goal 1, Objective A	Continue participation on the County Deer Advisory Committee	*Attended all committee meetings and responded to public inquiries*
	Oconto County applied for an NRDA grant to work on Northern Pike spawning habitat and stream passage impediments in the Lower Peshtigo River Watershed, including Marinette County. Marinette staff will assist as needed	*Three culverts replaced* *Five acres opened to Northern Pike spawning*
Goal 2, Objective C	Tree planter rental	*6,000 trees planted*
Goal 2, Objectives A & B	Respond to: the availability of new resources, new requests for assistance, or new problems	*Joined the local Great Lakes One Water committee to explore how to respond to extreme weather events, participated in the update of Marinette County's hazard Mitigation Plan update*
	Complete a Lake Management Plan for Glen Lake	*Completed project and submitted Final Report to Association and WDNR*

CATEGORY	PLANNED ACTIVITIES WITH BENCHMARKS	RESULTS
	Work with WDNR fisheries staff on an NRDA grant to control Erosion and provide Lake Sturgeon spawning habitat on the Peshtigo R.	*Installed control erosion and improve sturgeon spawning habitat on approximately 240' of shoreline*
CATEGORY	**PLANNED ACTIVITIES WITH BENCHMARKS**	**RESULTS**
Watershed Strategies		***Staff hours are tracked for all activities***
Goal 3, Object D; Goal 4 Objective D; Goal 1, Objective B	Complete **Transect Survey** for Marinette County documenting cropland erosion, land use changes, culvert locations, and invasive species	*Did not complete*
Goal 4 Objective B & C	Participation on the **Wild Rivers Invasive Species Coalition (WRISC)**	*4 meetings attended* *Watercraft inspectors educated boaters and washed AIS off watercraft, began Clean Play Go initiative, AIS display at County Fair*
Goals 2 & 3	Lake Noquebay Nutrient Study	*Conducted tributary and outlet flow and nutrient monitoring; evaluated current lake water quality conditions; determined groundwater inflow/outflow and nutrient loading; successfully applied for Phase II grant funding*
	Bass Lake Alum Treatment ***Evaluation***	*Monitored current water quality conditions; conducted inlet flow and nutrient load monitoring; continued lake and tributary monitoring*

MARINETTE COUNTY 2019 ANNUAL WORK PLAN
LOCALLY-IDENTIFIED PRIORITIES

CATEGORY	PLANNED ACTIVITIES WITH BENCHMARKS	RESULTS
Other		***Staff hours are tracked for all activities***
Environmental Education Goal 1 Objective A, B, & C	Deliver 230 **Teaching Outdoor Awareness & Discovery (TOAD)** programs to 7,000+ people	*268 programs delivered* *8,187 attendees*
	Create 2-4 new TOAD programs to highlight emerging conservation issues such as : bats, native pollinators, and the Dark Skies Initiative	*3 school and one Goodwill Office Native Pollinator gardens, winter outdoor recreation programs created and delivered*
	Sand Lake Conservation Camp for 100 people	*77 children and 22 adults attended*
	Operate, maintain, and improve **Harmony Arboretum** Offer 20+ **Nature and Horticulture Seminars**	*374 attendees* *24 programs delivered* *New shade garden built, surfaced path installed to improve accessibility, revamped Pioneer Cabin, installed Kestral box*
	Conservation Poster Contest; 140 posters from six school districts	*3 school districts participating* *73 posters submitted*
	Four Editions of the **Northwoods Journal**; 4,500 pieces per edition	*4 of editions* *9,300 papers delivered*
	Marinette County **Website** and **Facebook** Page	*1,419 Facebook posts,*
Environmental Education Goal 1 Objective A; Goal 2	Continue to offer four editions of the **Notes from the Shore** to nine lake groups	*9 lake groups* *4 of editions*
Goal 2, Objective D	Continue to provide education on the environmental reasons for shoreland zoning	
Goal 1 Objective A & D	Complete **fish viewing platform** over the Peshtigo River	*Viewing Platform open to public*
	Incorporate the former Harmony Sportsman's Club land into Harmony Arboretum and TOAD programming	*Entered into an agreement with the Town of Grover to use their property in conjunction with Harmony*
Goal 1 Objective D	Continue to support and participate in the **Wisconsin Envirothon**	*Education Specialist developed the Wildlife Quiz and proctored it at the event*
	Continue to help local units of government and NGO's build their capacity	*Helped: Town of Athelstane improve a boat landing, Town of Niagara with an ordinance update*
Professional Improvement;	Continue staff participation on **committees and groups**, including: the WLW Professional	*20 meetings attended by four different staff*

CATEGORY	PLANNED ACTIVITIES WITH BENCHMARKS	RESULTS
Departmental Maintenance and Capacity Building; Outreach	Improvement, Technical, and Youth Education Committees; staff training	
	Continue staff participation on **committees and groups** in support of regional and statewide associations that improve our ability to serve our constituents and landowners	*3 meetings attended*
Departmental Maintenance and Capacity Building	Develop a RFP to hire a hire a contractor to facilitate migration from our current AS400 software to a modern land records management system	*Vendor chosen, land records software update almost complete*
	Begin the process of moving the entire Land Information Department from the Courthouse to the former Marinette County Jail	*Move was delay until November 12, 2020*

Appendix F. WDNR monitoring results from selected Marinette County lakes

GB08 Little Peshtigo (HUC 0403010505)

1. **Bass Lake -**
   The average summer (July-Aug) secchi disk reading for Bass Lake - Deep Hole (Marinette County, WBIC: 521400) was 11.25 feet. The average for the Northeast Georegion was 9.8 feet.
   Chemistry data was collected on Bass Lake - Deep Hole. The average summer Chlorophyll was 3.4 µg/l (compared to a Northeast Georegion summer average of 9.6 µg/l). The summer Total Phosphorus average was 20.3 µg/l. Lakes that have more than 20 µg/l and impoundments that have more than 30 µg/l of total phosphorus may experience noticable algae blooms. The overall Trophic State Index (based on chlorophyll) for Bass Lake - Deep Hole was 44. The TSI suggests that Bass Lake - Deep Hole was **mesotrophic**. Mesotrophic lakes are characterized by moderately clear water, but have an increasing chance of low dissolved oxygen in deep water during the summer.

2. **Gilas** - The average summer (July-Aug) secchi disk reading for Gilas Lake - Deep Hole (Marinette County, WBIC: 523300) was 11.5 feet. The average for the Northeast Georegion was 9.6 feet. Typically the summer (July-Aug) water was reported as **CLEAR** and **BROWN**. This suggests that the Secchi depth may have been mostly impacted by tannins, stain from decaying matter. Tannins are natural and not a result of pollution. Tannins can be distinguished from suspended sediment because the water, even though it's brown, it looks clear, like tea. Though tannins are not harmful per se, they are often not perceived as aesthetically pleasing as clear water. Tannins can also be important for decreasing light penetration into the water and decreasing algal growth.
   Chemistry data was collected on Gilas Lake - Deep Hole. The average summer Chlorophyll was 3.2 µg/l (compared to a Northeast Georegion summer average of 9.7 µg/l). The summer Total Phosphorus average was 15.3 µg/l. Lakes that have more than 20 µg/l and impoundments that have more than 30 µg/l of total phosphorus may experience noticable algae blooms. The overall Trophic State Index (based on chlorophyll) for Gilas Lake - Deep Hole was 44. The TSI suggests that Gilas Lake - Deep Hole was **mesotrophic**. Mesotrophic lakes are characterized by moderately clear water, but have an increasing chance of low dissolved oxygen in deep water during the summer. The summers of 2001 and 2017 showed Eutrophic Conditions.

3. **Montana –** I do not have any current water quality monitoring data, but the data from 1993 and 2001 indicates eutrophic conditions.

GB09 Middle Inlet Lake Noquebay (HUC 0403010503)

1. **Big Newton** - The average summer (July-Aug) secchi disk reading for Big Newton Lake - Deep Hole (Marinette County, WBIC: 498800) was 20.5 feet. The average for the Northeast Georegion was 9.7 feet. Typically the summer (July-Aug) water was reported as **CLEAR** and **BLUE**. Chemistry data was collected on Big Newton Lake - Deep Hole. The average summer Chlorophyll was 1.7 µg/l (compared to a Northeast Georegion summer average of 7.3 µg/l). The summer Total Phosphorus average was 13.4 µg/l. Lakes that have more than 20 µg/l and impoundments that have more than 30 µg/l of total phosphorus may experience noticable algae blooms. The overall Trophic State Index (based on chlorophyll) for Big Newton Lake - Deep Hole was 39. The TSI suggests that Big Newton Lake - Deep Hole was **oligotrophic**. This TSI suggests deeper lakes still oligotrophic, but bottom water of some shallower lakes will become oxygen-depleted during the summer.

2. **Little Newton -** The average summer (July-Aug) secchi disk reading for Little Newton Lake - Deep Hole (Marinette County, WBIC: 502300) was 9 feet. The average for the Northeast Georegion was 9.6 feet. Typically the summer (July-Aug) water was reported as **CLEAR** and **GREEN**. The green normally suggests a lake impacted by algae. However, since recent summer chlorophyll readings average less than 9 ug/l, this lake may have been impacted by another factor, such as suspended marl. Chemistry data was collected on Little Newton Lake - Deep Hole. The average summer Chlorophyll was 2.4 µg/l (compared to a Northeast Georegion summer average of 9.7 µg/l). The summer Total Phosphorus average was 17.1 µg/l. Lakes that have more than 20 µg/l and impoundments that have more than 30 µg/l of total phosphorus may experience noticable algae blooms. The overall Trophic State Index (based on chlorophyll) for Little Newton Lake - Deep Hole was 41. The TSI suggests that Little Newton Lake - Deep Hole was **mesotrophic**. Mesotrophic lakes are characterized by moderately clear water, but have a increasing chance of low dissolved oxygen in deep water during the summer.

3. **Lake Noquebay -** The average summer (July-Aug) secchi disk reading for Lake Noquebay - Deep Hole (Marinette County, WBIC: 525900) was 6.75 feet. The average for the Northeast Georegion was 9.6 feet. Chemistry data was collected on Lake Noquebay - Deep Hole. The average summer Chlorophyll was 6 µg/l (compared to a Northeast Georegion summer average of 9.7 µg/l). The summer Total Phosphorus average was 19.4 µg/l. Lakes that have more than 20 µg/l and impoundments that have more than 30 µg/l of total phosphorus may experience noticable algae blooms. The overall Trophic State Index (based on chlorophyll) for Lake Noquebay - Deep Hole was 48. The TSI suggests that Lake Noquebay - Deep Hole was **mesotrophic**. Mesotrophic lakes are characterized by moderately clear water, but have an increasing chance of low dissolved oxygen in deep water during the summer.

4. **Mary Lake -** The average summer (July-Aug) secchi disk reading for Mary Lake - Deepest Part (Marinette County, WBIC: 530500) was 8.17 feet. The average for the

Northeast Georegion was 9.6 feet. Typically the summer (July-Aug) water was reported as **YELLOW**. Chemistry data was collected on Mary Lake - Deepest Part. The average summer Chlorophyll was 3.2 µg/l (compared to a Northeast Georegion summer average of 9.7 µg/l). The summer Total Phosphorus average was 13.1 µg/l. Lakes that have more than 20 µg/l and impoundments that have more than 30 µg/l of total phosphorus may experience noticable algae blooms. The overall Trophic State Index (based on chlorophyll) for Mary Lake - Deepest Part was 43. The TSI suggests that Mary Lake - Deepest Part was **mesotrophic**. Mesotrophic lakes are characterized by moderately clear water, but have an increasing chance of low dissolved oxygen in deep water during the summer. **1997 and 2004 indicated eutrophic conditions.**

GB 09 Middle Peshtigo (HUC 0403010504)

1. **Thunder Lake -** The average summer (July-Aug) secchi disk reading for Thunder Lake - Deep Hole (Marinette County, WBIC: 533600) was 13 feet. The average for the Northeast Georegion was 9.6 feet. Typically the summer (July-Aug) water was reported as **CLEAR** and **BLUE**. The overall Trophic State Index (based on secchi) for Thunder Lake - Deep Hole was 40. The TSI suggests that Thunder Lake - Deep Hole was **oligotrophic**. This TSI suggests deeper lakes still oligotrophic, but bottom water of some shallower lakes will become oxygen-depleted during the summer.

2. **Caldron Falls** – **Only have secchi readings for Caldron, which bounce between mesotrophic and eutrophic**. The average summer (July-Aug) secchi disk reading for Caldron Falls Reservoir - Deep Hole (Marinette County, WBIC: 545400) was 6 feet. The average for the Northeast Georegion was 9.8 feet. Typically the summer (July-Aug) water was reported as **CLEAR** and **BROWN**. This suggests that the Secchi depth may have been mostly impacted by tannins, stain from decaying matter. Tannins are natural and not a result of pollution. Tannins can be distinguished from suspended sediment because the water, even though it's brown, it looks clear, like tea. Though tannins are not harmful per se, they are often not perceived as aesthetically pleasing as clear water. Tannins can also be important for decreasing light penetration into the water and decreasing algal growth. The overall Trophic State Index (based on secchi) for Caldron Falls Reservoir - Deep Hole was 51. The TSI suggests that Caldron Falls Reservoir - Deep Hole was **eutrophic**. This TSI usually suggests decreased clarity, fewer algal species, oxygen-depleted bottom waters during the summer, plant overgrowth evident, warm-water fisheries (pike, perch, bass, etc.) only.

   However, since your lake's water clarity was not predominately impacted by algae, your lake's trophic state might be different than the secchi TSI suggests. TSI is a value to measure nutrient enrichment. On your lake, to determine the true trophic state, you would need to measure chlorophyll. A limited number of grants are available to expand your monitoring to this level if you are interested (contact your Region Coordinator for more info).

GB14 Pike River (0403010806)

1. **Lily Lake -** The average summer (July-Aug) secchi disk reading for Lily Lake - Center (Marinette County, WBIC: 619800) was 23.5 feet. The average for the Northeast Georegion was 9.8 feet. Typically the summer (July-Aug) water was reported as **CLEAR** and **BLUE**. With this particular lake, it is important to note that the Secchi disc hit the bottom of the lake for 3 of the Secchi readings during the 2019 monitoring season. This indicates that the water clarity was actually greater than the Secchi readings imply.
   Chemistry data was collected on Lily Lake - Center. The average summer Chlorophyll was 3.7 µg/l (compared to a Northeast Georegion summer average of 9.6 µg/l). The summer Total Phosphorus average was 10.1 µg/l. Lakes that have more than 20 µg/l and impoundments that have more than 30 µg/l of total phosphorus may experience noticable algae blooms. The overall Trophic State Index (based on chlorophyll) for Lily Lake - Center was 45. The TSI suggests that Lily Lake - Center was **mesotrophic**. Mesotrophic lakes are characterized by moderately clear water, but have an increasing chance of low dissolved oxygen in deep water during the summer.

Peshtigo Brook (HUC0403010403)

1. **Yankee Lake -** The average summer (July-Aug) secchi disk reading for Yankee Lake - Deep Hole (Marinette County, WBIC: 440100) was 6.69 feet. The average for the Northeast Georegion was 9.7 feet. Typically the summer (July-Aug) water was reported as **CLEAR** and **BROWN**. This suggests that the Secchi depth may have been mostly impacted by tannins, stain from decaying matter. Tannins are natural and not a result of pollution. Tannins can be distinguished from suspended sediment because the water, even though it's brown, it looks clear, like tea. Though tannins are not harmful per se, they are often not perceived as aesthetically pleasing as clear water. Tannins can also be important for decreasing light penetration into the water and decreasing algal growth. The overall Trophic State Index (based on secchi) for Yankee Lake - Deep Hole was 50. The TSI suggests that Yankee Lake - Deep Hole was **mesotrophic**. Mesotrophic lakes are characterized by moderately clear water, but have an increasing chance of low dissolved oxygen in deep water during the summer. However, since your lake's water clarity was not predominately impacted by algae, your lake's trophic state might be different than the secchi TSI suggests. TSI is a value to measure nutrient enrichment. On your lake, to determine the true trophic state, you would need to measure chlorophyll. A limited number of grants are available to expand your monitoring to this level if you are interested (contact your Region Coordinator for more info). **Recent historical data suggests Yankee is teetering between mesotrophic and eutrophic**.

GB 12 Otter Creek and Rat River (HUC 0403010501)

1. **Crane Lake -** The average summer (July-Aug) secchi disk reading for Crane Lake - Deep Hole (Marinette County, WBIC: 499800) was 5 feet. The average for the Northeast Georegion was 9.7 feet. Typically the summer (July-Aug) water was reported as **CLEAR** and **BROWN**. This suggests that the Secchi depth may have been mostly impacted by tannins, stain from decaying matter. Tannins are natural and not a result of pollution. Tannins can be distinguished from suspended sediment because the water, even though it's brown, it looks clear, like tea. Though tannins are not harmful per se, they are often not perceived as aesthetically pleasing as clear water. Tannins can also be important for decreasing light penetration into the water and decreasing algal growth. Chemistry data was collected on Crane Lake - Deep Hole. The average summer Chlorophyll was 13.1 µg/l (compared to a Northeast Georegion summer average of 7.3 µg/l). The summer Total Phosphorus average was 14.1 µg/l. Lakes that have more than 20 µg/l and impoundments that have more than 30 µg/l of total phosphorus may experience noticable algae blooms. The overall Trophic State Index (based on chlorophyll) for Crane Lake - Deep Hole was 54. The TSI suggests that Crane Lake - Deep Hole was **eutrophic**. This TSI usually suggests decreased clarity, fewer algal species, oxygen-depleted bottom waters during the summer, plant overgrowth evident, warm-water fisheries (pike, perch, bass, etc.) only.

GB17 Popple River (HUC 0403010801)

1. **Hilbert Lake -** The average summer (July-Aug) secchi disk reading for Hilbert Lake - Deep Hole (Marinette County, WBIC: 501200) was 12.5 feet. The average for the Northeast Georegion was 9.7 feet. Chemistry data was collected on Hilbert Lake - Deep Hole. The average summer Chlorophyll was 2.7 µg/l (compared to a Northeast Georegion summer average of 7.3 µg/l). The summer Total Phosphorus average was 8.5 µg/l. Lakes that have more than 20 µg/l and impoundments that have more than 30 µg/l of total phosphorus may experience noticable algae blooms. The overall Trophic State Index (based on chlorophyll) for Hilbert Lake - Deep Hole was 42. The TSI suggests that Hilbert Lake - Deep Hole was **mesotrophic**. Mesotrophic lakes are characterized by moderately clear water, but have an increasing chance of low dissolved oxygen in deep water during the summer.

Appendix G. WDNR Stream Narratives – Lower Peshtigo River TWA WQM Plan 2017

Peshtigo River, WBIC: 515500

The Peshtigo River flows approximately 136 miles from its headwaters in Forest County southeast through Marinette County before its confluence with Green Bay. The portion within the Lower Peshtigo River Watershed is approximately 17 miles from the outlet of Lake Noquebay to Potato Rapids flowage and another 11.5 miles from the dam at the Peshtigo Flowage to the Bay of Green Bay. Two hydroelectric dams are located on the River, the Potato Rapids Dam and the Peshtigo Dam. Potato Rapids dam has a hydraulic head of 14 ft. and impounds 281 acres of the Peshtigo River to create the Potato Rapids Flowage. The Potato Rapids Flowage is relatively shallow with almost entirely natural shorelines with little development.

The Peshtigo Dam has a hydraulic head of 12 ft. and impounds 232 acres of the Peshtigo River to create the Peshtigo Flowage which extends to the tail waters of the Potato Rapids Dam. The Peshtigo Flowage is relatively shallow with most of the shoreline in residential development. The Peshtigo River from Green Bay up to the first dam provides seasonal runs of fish including Trout, Salmon, Walleye, Muskellunge, Northern Pike, Lake Sturgeon, and Suckers. The Lower Peshtigo River watershed has generally good to excellent water quality. Various chemical parameters are sampled quarterly from a Long Term Water Chemistry site on the Peshtigo River in Peshtigo. Total Phosphorous concentrations meet state water quality standards and other parameters such as Orthophosphate, Total Suspended Solids, Chlorophyll A, and Ammonia- Nitrogen have been showing downward trends since the mid 1970's. Other parameters such as Nitrate-Nitrite Nitrogen, Total Kjeldahl Nitrogen, and Chlorides have been slowly increasing during this same time period but still are below concentrations that may lead to impairments. Biological sampling near the Long Term Trend water chemistry location was conducted by assessing the Non-wadeable Macroinvertebrate IBI and Non-wadeable fish IBI scores which both rated as excellent. Wadeable Fish IBI scores also rated as excellent upstream of CTH W and upstream of the confluence of Left Foot Creek while the macroinvertebrate score rated as Good. The main goal for continued protection of the Lower segment of the Peshtigo River should prioritize the protection of ecosystem diversity and critical habitats. This can largely be accomplished by identifying critical sites for stream bank protection, in-stream habitat improvement, proper road crossing installations, shoreline corridor protection though support of the local shoreline ordinance, and the continued protection of adjacent wetlands.

Gravelly Brook, WBIC: 517100

Gravelly Brook, in the Lower Peshtigo River Watershed, is a 7.71 mile cool-warm mainstem Tributary to the Peshtigo River. There is very little agriculture in this sub-watershed with limited rural development. There is one small seasonal campground on a man-made private lake. Extensive wooded wetlands consisting of cedar swamp and upland mixed northern hardwood forest provide protection to this stream from the headwaters down to the confluence of the Peshtigo River. The stream has good

gradient and flow that supports a moderately diverse but excellent fish community up to 13 species. The most notable observations were the number of young of the year Burbot. While other tributaries to the Peshtigo River provide spawning and nursery habitat for Burbot, Gravelly Brook provides far and above the most suitable habitat for this top predatory species. It is was also important to note that three species of intolerant species find suitable conditions in Gravelly Brook, Rock Bass, Mottled Sculpin, and Lamprey Ammocoetes, most Likely Northern Brook Lamprey. The stream appears to be limited by legacy fine sediment in the form of sand from historic logging impacts dating back to the late 1800's. These fine sediments continue to limit habitat availability in the mid to upper reaches of the stream and habitat rated as fair to good.

Left Foot Creek, WBIC: 524500

Left Foot Creek, in the Lower Peshtigo River Watershed, is a 7.98 mile stream that originates within an Unnamed Spring and flows through Devils Lake and Left Foot Lake on its'way towards the confluence of the Peshtigo River. The upper 2.5 miles from the Unnamed Spring to the confluence of Left Foot Lake is managed as a Class II trout stream. This segment was modeled as a cool-cold headwater stream but the fish community assemblage was representative of a cool-warm headwater stream. No Coldwater species were encountered but this segment achieved a good rating. As the stream exits Left Foot Lake, the natural community was verified as a cool-warm mainstem. There were 18 different species of fish which rated this segment of stream in the excellent category.

Lamprey Ammocoetes, Mottled Sculpin, Northern Hog Sucker, and Rock Bass all comprised the intolerant species observed within this segment of stream. Generally habitat scores ranged from fair to good with lack of fish habitat and extensive fines as limiting factors. Stream buffers are well established however the upper portion of this sub-watershed is dominated by agriculture land use. This area of the sub-watershed lies within the Northeast Sands ecological landscape and center pivot irrigation utilizing high capacity wells are on the rise. Surprisingly enough, this segment of the Left Foot Creek scored the highest rating of excellent for the macroinvertebrate IBI within the entire Lower Peshtigo River Watershed. The remainder of Left Foot Creek rated in the good to excellent range. Overall Left Foot Creek displays excellent water quality but may be subject to environmental degradation due to land use, development, and agricultural practices in the watershed.

Mud Brook, WBIC: 516900

Mud Brook, in the Lower Peshtigo River Watershed, is a 7.38 mile cool-warm headwater tributary stream to the Peshtigo River that transitions from a headwater stream to a main-stem stream for approximately the last mile as it approaches the Peshtigo River. Near this transition, a small dam and impoundment once existed on Mud Creek that pre-dates the Department's records and likely served some purpose during the logging era or the Chicago, Milwaukee, St. Paul and Pacific Railroad. Mud Creek below this transition had a moderately diverse fish community of transitional species and scored in the good range while above this transition the fish community was poor with decreased diversity and dominance by Central Mudminnows and young-

of-the-year Burbot. Land use in the sub-watershed is generally forested with more agricultural dominated lands within the mid-segments of the stream. Two small gravel pits are located within the sub-watershed in close proximity to Mud Brook and their impact on overall stream conditions is unknown. Lack of pools, riffles, extensive fines, and limited fish habitat were factors impacting the overall habitat scores. Nutrients in the form of Total Phosphorous meet state standards and do not appear to be impacting the macroinvertebrate community which rated as fair. Although the lower portions of Mud Brook appear to be in stable condition, the upper reaches may be limited by unknown impairments.

Peterman Brook, WBIC: 525400

Peterman Brook, in the Lower Peshtigo River Watershed, is a 6.38 mile diverse cool-cold headwater tributary to the Peshtigo River. There is a 1.1 mile long segment currently listed as a class II trout stream and Brook Trout were most recently surveyed in this segment in 2010. Peterman Brook rated good on both the fish and macroinvertebrate index but display some limitations in habitat by lack of cover for fish, absence of pools and extensive fines. Land use practices such as online ponds, wetland fill, ditching, and conventional agricultural practices in the mid to upper segments of the watershed continue to threaten the overall stream conditions.

Little River, WBIC: 583200

Little River, in the Lower Peshtigo River Watershed, is a 7.24 mile Tributary to bay of Green Bay and Lake Michigan. The lower 1.4 miles of the Little River is affected by seiche effect from the Bay and water levels fluctuate greatly based on wind patterns. This segment is consistent with a cool-warm main-stem based on the fish community assemblage and is rated good. The macroinvertebrate community rated as poor but appears to be affected by factors other than Total Phosphorous concentrations as these values were within the range that meets state water quality standards. The upper 5.84 miles of the Little River has a cool-cold headwater natural community where Mottled Sculpin dominated the fish community. One other species to note that has become naturalized within the community is the Round Goby. Numbers of Round Goby do not appear to be limiting the potential of this stream however it appears that Round Goby consisted of anywhere between 3-20% of the overall fish community which could have adverse effects in the upper cool-cold headwater segment of the river where they may out compete native fishes for space and resources.

Sucker Brook, WBIC: 516000

Sucker Brook, in the Lower Peshtigo River Watershed, is a 9.10 mile Tributary to Trout Creek. Agriculture is the dominant land use within the watershed of this stream with scattered rural development and wetlands. This stream has seen significant hydrologic modifications in the form of ditching, straightening, and realigning to facilitate agricultural production. Old open gravel pit quarries have been abandoned and are now ponds located in the lower half of the sub-watershed. Sucker Brook is cool-warm transitional headwater that has a poor fish community. It is mainly comprised of Central Mudminnows and Northern Pike and had one of the lowest diversities of any stream

within the entire Lower Peshtigo River watershed especially when considering its size. Macroinvertebrate scores were in the low fair range but total phosphorous concentrations sampled in
2015 indicate the site is clearly meeting water quality criteria. It is likely the most limiting factor affecting the quality of Sucker Brook is habitat and overall stream conditions. Land use practices such as online ponds, field tiling, wetland filling, ditching, and conventional agricultural in the mid to upper reaches continue to threaten the overall stream conditions.

Trout Creek, WBIC: 515900

Trout Creek, in the Lower Peshtigo River Watershed, is a 6.62 mile Tributary to the Peshtigo River. This stream originates as a spring in a small wetland complex and flows through agriculturally dominated lands prior to the confluence of Bundy Creek. This headwater section is considered a cool-warm headwater with a poor fish community with only Central Mudminnow and White Suckers observed. The macroinvertebrate IBI scored in the fair category but based on total phosphorous data collected may exceed state water quality criteria. Land use is likely causing environmental degradation in the upper reaches of this stream. The lower reaches of this stream is highly influenced by the contribution of Bundy Creek and the proximity to the Peshtigo River. This site may meet state water quality criteria for Total Phosphorous but has a degraded biological community when assessing the macroinvertebrate index of biotic integrity. Although the lower reaches gain considerably in size and flow, the natural community is still considered a cool-warm headwater. The fish community is considered fair and dominated by Central Mudminnow during most surveys. The lower reaches contain suitable habitat for northern Pike spawning and nursery habitat and likely help support the Northern Pike population within the Peshtigo Flowage and Peshtigo River. One surprising find during a survey was the abundance of Mottled Sculpin, an intolerant, coldwater species. Although no species of trout have ever been encountered during various years of surveys on Trout Creek, some local residents report the stream was named to reflect trout that once existed in the system. It is difficult to ascertain if Trout Creek ever harbored a population of Brook Trout or if during years of advantageous conditions, Brook Trout migrated down from coldwater streams in the Mid-Peshtigo River watershed to Trout Creek. Current land use, habitat conditions, and marginal water quality conditions are likely not conducive for Brook Trout to become established.

Bundy Creek, WBIC: 516100

Bundy Creek, in the Lower Peshtigo River Watershed, is a 12.98 mile Tributary to Trout Creek. This stream originates by the convergence of surface water flows in the upper segment before additional contributions of surface water and ground water near Town Hall Road. Fish habitat above Town Hall Road is limited by flow and during dry periods flow is often intermittent. Very few fish were collected in the upper reaches during surveys in 2014 and 2015. Surveys from the mid to lower reaches of the stream were supported by adequate flow and habitat to support a low diversity, Cool-Warm headwater community that scored fair for the Fish IBI. Bundy Creek provides excellent spawning and nursery habitat for Northern Pike as this surpassed by far all other

streams in the Lower Peshtigo River for young of the year Northern Pike. Mottled Sculpin, a coldwater intolerant species, was observed at two sites in the mid reaches of the stream. The dominant land use within the Bundy Creek sub-watershed is agriculture but limited agricultural practices such as dredging, straightening, or re-alignment have not occurred to the extent and degree as they have in other parts of the Lower Peshtigo River watershed. The lack of hydrologic modifications have left the habitat scores variable from the upper to lower reaches with scores ranging from lower fair to higher good. Fine sediment and lack of fish habitat are a general theme limiting habitat scores on Bundy Creek. With the intensive agriculture that is present in the sub-watershed, it was anticipated that Total Phosphorus concentrations may exceed standards but concentrations were within the “may meet” criteria. The macroinvertebrate IBI scores ranged from Fair to Good. With the extensive agriculture in the watershed, buffers, nutrient management, and soil health should all be high priorities to prevent water quality declines in Bundy Creek.

Unnamed Tributary to Lake Michigan, WBIC: 3000624

The Unnamed Tributary to Lake Michigan is a 3.54 mile tributary that drains into Green Bay. This small cool-warm headwater stream has been highly altered for agricultural purposes including dredging, straightening, and realigning dating back prior to 1938. These hydrologic modifications lead to a poor fish community, fair macroinvertebrate community, and a low fair habitat score. It is not surprising that the stream does not have any resemblance of riffle, run, and pool morphology, is void of fish habitat, and is dominated by excessive fines. Current land use within the drainage for this stream has changed over the years toward more undisturbed forested land uses since small tract farms are less prevalent in this streams watershed. What little agricultural land remains appears to be in cash crop operations. This stream would benefit from channel restoration but this may not pose to be a feasible alternative since forested wetlands have recaptured most of the stream corridor. It is likely the stream may remain in its current state for many years to come as the straightened ditches continue to provide limited habitat for aquatic life.

Unnamed Tributary to Lake Michigan, WBIC: 498000

The Unnamed Tributary to Lake Michigan is a 6.01 mile tributary that drains into Green Bay. This small stream was modeled as Coldwater and has been highly altered for agricultural purposes including dredging, straightening, and realigning dating back prior to 1938. These hydrologic modifications to improve drainage of wet soils lead to a poor fish community, fair to Good macroinvertebrate community, and a fair habitat score. The current land use is intensive cash crop grain agriculture in all but the uppermost reaches of the stream. Small tracts of agricultural acreage in this streams’ watershed has reverted back to forested and shrub-carr wetland. For all practical purposes intensive agriculture continues and relies on this stream for proper drainage to make farming more productive in the wet soils.

Nutrients in the form of Total Phosphorous does not appear to be a contributing factor to the condition of the stream based on monitoring results meeting water quality criteria. Stream conditions are directly correlated to historic hydrologic modifications and land

use that minimize stream buffers, limit stream morphology, reduce fish habitat, and allow for depositions of fine sediments. The modeled natural community of this stream may be more representative of a cool-cold or cool-warm headwater stream but based on the percent of tolerant individuals and lack of intolerant individuals a new natural community classification will not be proposed. This stream and the adjacent land border the project area for Green Bay West Shores- Peshtigo Unit. It is currently not within the project boundary but the inclusion of this stream and adjacent land should be considered within the acquisition boundary. This stream provides unique connectivity to Green Bay for fish species and ample opportunities exist for restoration projects that could improve wetlands and provide numerous opportunities for Northern Pike spawning habitat.

Unnamed Tributary to Lake Michigan, WBIC: 497900

The Unnamed Tributary to Lake Michigan is a 3.24 mile tributary that drains into Green Bay. This small cool-warm headwater stream has been historically altered and currently flows along CTH Y as a roadside ditch. The origin of this hydrologic modification does not appear to be for agricultural purposes but appears to have originated from the construction of the County highway after 1938. Even with this hydrologic modification and flowing along CTH Y within a roadside ditch, the habitat rated as good however the fish community IBI rated as fair and the macroinvertebrate IBI as poor. It would appear that impacts and degradation to the stream would from a pollutant other than Total Phosphorous as sample results indicate the stream is meeting the state water quality criteria. The lower reaches of this stream currently provide good spawning and/or nursery habitat for two species of interest in Green Bay, the North Pike and Yellow Perch.

Unnamed Tributary to Left Foot Creek, WBIC: 524600

The Unnamed Tributary is a 4.13 mile tributary Left Foot Creek. This small cool-warm headwater tributary stream had a poor rating for the fish IBI, a fair rating for the macroinvertebrate IBI with an overall good habitat rating. The mid to lower segment of this stream flows through relatively undisturbed cedar swamp wetlands with an only a small portion adjacent to high intensity agriculture. The upper segment of this stream originates as convergence of upland drainage within agricultural land use. The potential of this stream may be limited by factors attributable to adjacent land use, intermittent flows, or a combination of both.

Unnamed Tributary to Left Foot Creek, WBIC: 524800

The Unnamed Tributary is a 3.03 mile tributary Left Foot Creek. This small coldwater tributary stream had a poor rating for the fish IBI, good rating for the macroinvertebrate IBI and with an overall habitat rating of fair. The upper segment of this stream originates as convergence of upland drainage within agricultural land use and through a mix of wetland types as it approaches Left Foot Creek. The headwaters of this stream are likely affected from center pivot irrigation in that pivot well heads are located along the stream thread at the headwaters. Online ponds in the mid reaches may have been constructed within or in close proximity to springs which may be further limiting the

potential of this small stream to support coldwater species. Only two species of tolerant transitional species were observed during the surveys which may indicate the modeled natural community may be inaccurate or the potential of the stream is limited based on watershed land use impacts.

Unnamed Tributary to Peshtigo River, WBIC: 5008966

The Unnamed Tributary is a 3.07 mile tributary to the Peshtigo River. This small cool-cold headwater stream had a poor rating for the fish IBI, a fair rating for the macroinvertebrate IBI and with an overall habitat rating of good. This stream has been straightened and realigned and flows almost entirely through the developed City of Peshtigo. This stream met the water quality criteria for Total Phosphorous but is likely limited by hydrologic alterations and other non-point source impacts within the developed areas of the City. It is unlikely removing hydrologic modifications will be made to this stream based on the location of infrastructure of the City. Improvements to storm water quality and quantity, stream buffers, and other urban non-point sources will begin removing barriers limiting the potential of this stream.

Unnamed Tributary to Peshtigo River, WBIC: 516300

The Unnamed Tributary is a 5.05 mile tributary to the Peshtigo River. This small cool-warm headwater stream had a fair rating for both the Fish IBI and the macroinvertebrate IBI and had an overall rating of fair bordering on poor for habitat. The lower 0.65 miles of stream are a well buffered meaning stream however the remainder of the stream was straightened, realigned and ditched prior to 1938.

Comparing land use in 1938 to current conditions, agricultural acreage in the watershed has been drastically reduced and much of this acreage has been reverted back to undisturbed forested, field, or wetland condition. Total Phosphorous concentrations are meeting the water quality criteria and are not limiting the potential of this stream. There may be some other unknown pollutant that that is limiting the potential of this stream but it is likely the most significant impact to this stream is from the historic hydrologic alteration, degraded habitat, and lack of cover for fish. Habitat improvements within this stream may provide additional spawning and nursery habitat for Northern Pike and Burbot that were surveyed within this stream and lead to improvements to the fish and macroinvertebrate IBI scores.

Unnamed Tributary to Peshtigo River, WBIC: 5008538

The Unnamed Tributary is a 1.95 mile tributary to the Peshtigo River. This small cool-warm headwater stream had a poor fish IBI rating, a fair macroinvertebrate rating, and overall habitat was rated as good. The headwaters of this stream originate by the convergence of upland drainage within agricultural land use. The stream then flows through forested woods and wetlands before entering the Porterfield Music Festival grounds and campground. Historic straightening, dredging and realigning of the stream for agricultural purposes in the mid to upper reaches are likely limiting the potential of this stream. One interesting thing to note was this tributary was the only stream in the Lower Peshtigo River watershed where a single Brook Trout was

surveyed. Antidotal reports of Brook Trout were reported by local residents so there may be some conditions Brook Trout find conducive in this tributary to the Peshtigo River. Habitat was rated as good however historic conditions from hydrologic modifications likely limit the potential of this stream. Based on continuous temperature reading of this stream, the temperature was more than adequate to support coldwater species.

Unnamed Tributary to Peshtigo River, WBIC: 5008721

The Unnamed Tributary is a 2.61 mile tributary to the Peshtigo River. This small cool-warm headwater stream had a poor fish IBI rating, a fair macroinvertebrate rating, and overall habitat was rated as good. The headwaters of this stream originate by the convergence of upland drainage within agricultural land use. The stream continues on flowing though upland and wetland forest before its convergence with the Peshtigo River. This stream likely provide suitable spawning and nursery habitat for Burbot and Northern Pike.

Unnamed Tributary to Peshtigo River, WBIC: 515600

The Unnamed Tributary is a 2.43 mile tributary to the Peshtigo River. This small cool-cold headwater stream had a poor fish IBI rating, a poor macroinvertebrate rating, and overall habitat was rated as good. The headwaters of this stream originate by the convergence of upland drainage within industrial land use in the City of Peshtigo. The stream then travels under US Hwy 41 and multiple borrow pits now converted to ponds. The remainder of the stream flows thorough forested and light residential land use prior to its confluence with the Peshtigo River. Hydrologic modifications are limited to the headwaters of this stream and may not significantly limit its potential. Flow appears to be the greatest limiting factor within this stream as total phosphorous concentrations met water quality criteria and continuous temperature readings were below the cold water criteria. The number of species was low which would be expected in a cold water stream however no cold water or intolerant species were surveyed. One interesting thing to note was in 2014 three Steelhead were surveyed that likely found conducive conditions in the stream likely following stocking in the Peshtigo River.

Unnamed Tributary to Peshtigo River, WBIC: 5008359

The Unnamed Tributary is a 2.19 mile tributary to the Peshtigo River. This small cool-cold headwater stream had a poor fish IBI rating, a fair macroinvertebrate rating, and overall habitat was rated as good. The headwaters of this stream originate in afforested wetland complex and land use throughout the majority of its watershed is undeveloped. It is likely during wet years this stream provides spawning and nursery habitat for Northern Pike. The only other species observed are tolerant pioneer species. Continuous temperature readings indicate this stream meets cold water criteria however no cold water species were surveyed. With the undeveloped state of this small stream's watershed it is unclear why no coldwater, intolerant species were observed when temperature conditions are conducive and the habitat availability is present. Some unknown factors may be limiting this streams potential.

Unnamed Tributary to Trout Creek, WBIC: 5008962

The Unnamed Tributary is a 3.75mile tributary to the Trout Creek. This small cool-warm headwater stream had a fair fish IBI rating, a fair macroinvertebrate rating, and overall habitat was rated as fair. The headwaters of this stream originate in afforested wetland complex and it flows through a mix of forested and agricultural land use. The majority of the stream was ditched, straightened, and realigned prior to 1938 for agricultural purposes. For all practical purposed very little land use change has occurred is this watershed since these hydrologic modifications were completed. This stream was sampled and has elevated levels of Total Phosphorus that may exceed water quality criteria. Total Phosphorous and degraded habitat from hydrologic modification are likely limiting the potential of this stream.

Appendix H. Marinette County AIS by Watershed

Water-shed	Waterbody Name	Waterbody ID Code (WBIC)	Invasive Species
GB07 Lower Peshtigo River	Green Bay	70	Eurasian Water-Milfoil
	Unnamed	5008538	Japanese knotweed (Fallopia japonica), Purple Loosestrife, Rusty Crayfish
	Unnamed	5008721	Rusty Crayfish
	Peshtigo River	515500	Aquatic forget-me-not (Myosotis scorpioides), Banded Mystery Snail, Chinese Mystery Snail, Eurasian Water-Milfoil, Freshwater Jellyfish, Hybrid Eurasian / Northern Water-Milfoil, Narrow-leaf cattail (Typha angustifolia), Rusty Crayfish, Zebra Mussel
	Trout Creek	515900	Purple Loosestrife
	Peshtigo Flowage	515800	Banded Mystery Snail, Eurasian Water-Milfoil, Hybrid Eurasian / Northern Water-Milfoil, Purple Loosestrife, Zebra Mussel
	Bagley Flowage	516800	Eurasian Water-Milfoil, Zebra Mussel
	Little River	583200	Round Goby
GB08 Little Peshtigo River	Little Peshtigo River	517400	Rusty Crayfish
	Montana Lake	518300	Chinese Mystery Snail, Eurasian Water-Milfoil
	Beaver Creek	520100	Rusty Crayfish
	Bass Creek	521300	Narrow-leaf cattail (Typha angustifolia)
	Bass Lake	521400	Chinese Mystery Snail, Narrow-leaf cattail (Typha angustifolia), Phragmites (non-native)
	Murphy Creek	522100	Aquatic forget-me-not (Myosotis scorpioides), Chinese Mystery Snail, Narrow-leaf cattail (Typha angustifolia), Zebra Mussel
	Nelligan Lake	523000	Aquatic forget-me-not (Myosotis scorpioides), Chinese Mystery Snail, Narrow-leaf cattail (Typha angustifolia)

	Little Nelligan Lake	523100	Aquatic forget-me-not (Myosotis scorpioides), Chinese Mystery Snail, Narrow-leaf cattail (Typha angustifolia)
	Gilas Lake	523300	Chinese Mystery Snail, Narrow-leaf cattail (Typha angustifolia), Zebra Mussel
	Left Foot Lake	524700	Banded Mystery Snail, Purple Loosestrife
GB09 Middle Inlet Lake Noquebay	The Outlet	525500	Rusty Crayfish
	Lake Noquebay	525900	Aquatic forget-me-not (Myosotis scorpioides), Banded Mystery Snail, Narrow-leaf cattail (Typha angustifolia), Phragmites (non-native), Rusty Crayfish, Zebra Mussel
	Upper Inlet	530100	Banded Mystery Snail
	Lake Mary	530500	Banded Mystery Snail, Eurasian Water-Milfoil
GB10 Middle Peshtigo River	Unnamed	498000	Purple Loosestrife
	Newton Lake	498800	Banded Mystery Snail
	Little Newton Lake	502300	Banded Mystery Snail, Eurasian Water-Milfoil, Purple Loosestrife
	Boundary Lake	499000	Banded Mystery Snail, Ornamental water lilies (non-native Nymphaea sp.) , Phragmites (non-native)
	Eagle Lake	500200	Banded Mystery Snail, Phragmites (non-native)
	King Lake	501700	Phragmites (non-native)
	Twin Bessies	504800	Eurasian Water-Milfoil
	Sandstone Flowage	531300	Eurasian Water-Milfoil, Hybrid Eurasian / Northern Water-Milfoil, Zebra Mussel
	Johnson Falls Flowage	533300	Aquatic forget-me-not (Myosotis scorpioides), Banded Mystery Snail, Eurasian Water-Milfoil, Freshwater Jellyfish, Narrow-leaf cattail (Typha angustifolia), Rusty Crayfish
	Thunder Lake	533600	Aquatic forget-me-not (Myosotis scorpioides), Banded Mystery Snail, Eurasian Water-Milfoil
	High Falls Reservoir	540600	Banded Mystery Snail, Chinese Mystery Snail, Curly-Leaf Pondweed, Eurasian Water-Milfoil, Flowering Rush, Rusty Crayfish, Zebra Mussel
	Caldron Falls Reservoir*	545400	Banded Mystery Snail, Curly-Leaf Pondweed, Eurasian Water-Milfoil, Phragmites (non-native), Zebra Mussel
	Lost Lake	587900	Phragmites (non-native)
	Unnamed	532200	Phragmites (non-native)
GB12 Otter Cr.	Rat River	550600	Rusty Crayfish
	Unnamed Trib.	5530254	Phragmites (non-native)
GB13 Wausauk ee Lower	Unnamed Pond	3000631	Yellow Floating Heart
	Long Lake	587800	Phragmites (non-native)
	Menominee River	609000	Aquatic forget-me-not (Myosotis scorpioides), Curly-Leaf Pondweed, Hybrid Eurasian / Northern Water-Milfoil, Narrow-leaf cattail (Typha

			angustifolia), Rusty Crayfish
	Scott Flowage	609200	Curly-Leaf Pondweed, Eurasian Water-Milfoil
	Upper Scott Flowage	609400	Banded Mystery Snail, Curly-Leaf Pondweed, Eurasian Water-Milfoil
	Grand Rapids Flowage	610700	Eurasian Water-Milfoil, Zebra Mussel
	Wolf Creek	613900	Banded Mystery Snail, Chinese Mystery Snail, Narrow-leaf cattail (Typha angustifolia), Purple Loosestrife, Zebra Mussel
	Wolf Lake	614200	Banded Mystery Snail, Chinese Mystery Snail, Narrow-leaf cattail (Typha angustifolia), Purple Loosestrife, Zebra Mussel
GB14 Pike River	Barnes Lake	584000	Eurasian Water-Milfoil
	Dolan Lake	585500	Eurasian Water-Milfoil
	Pike River	615700	Rusty Crayfish
	Beecher Creek	616800	Banded Mystery Snail
	Beecher Lake	617000	Banded Mystery Snail, Eurasian Water-Milfoil, Purple Loosestrife
	Upper Lake	617100	Banded Mystery Snail, Eurasian Water-Milfoil
	Glen Lake	627200	Banded Mystery Snail, Chinese Mystery Snail, Purple Loosestrife
	Coleman Lake	632800	Eurasian Water-Milfoil, Hybrid Eurasian / Northern Water-Milfoil
GB15 Pemebonwon & Menominee Rivers	Lundgren Lake	588200	Aquatic forget-me-not (Myosotis scorpioides), Banded Mystery Snail, Eurasian Water-Milfoil
	Wiggins Lake	617300	Banded Mystery Snail, Chinese Mystery Snail
	Rosebush Lake	634300	Eurasian Water-Milfoil, Zebra Mussel
	Chalk Hill Flowage	634500	Eurasian Water-Milfoil, Hybrid Eurasian / Northern Water-Milfoil, Zebra Mussel
	Timms Lake	639800	Chinese Mystery Snail, Narrow-leaf cattail (Typha angustifolia), Phragmites (non-native)
	Lindquist Lake	643800	Banded Mystery Snail
	Little Quinnesec Falls Flowage	647300	Aquatic forget-me-not (Myosotis scorpioides), Eurasian Water-Milfoil, Hybrid Eurasian / Northern Water-Milfoil, Narrow-leaf cattail (Typha angustifolia), Rusty Crayfish
GB17 Popple R.	Hilbert Lake	501200	European marsh thistle, Hybrid Cattail, Phragmites (non-native), Rusty Crayfish
	South Branch Little Popple River	648600	Rusty Crayfish
	Unnamed	4000021	Graceful Cattail

Appendix I. Current Conservation Practices, Cost Share Type, and Units

PRACTICE or ACTIVITY	ATCP 50 Reference	Fund Sourc	Units of Measurement
Land taken out of agricultural production Cost-share contract must list the new or existing farm practice that takes land out of production	50.08(3)	Bond	Acres
Riparian land taken out of agricultural production (CREP Equivalent) (Cost-share contract must list the new or existing farm practice that takes land out of production)	50.08(4), 50.42(1)	Bond	Acres
Manure storage systems	50.62	Bond	Number
Manure storage closure	50.63	Bond	Number
Barnyard runoff control systems (specify components including heavy use area protection)	50.64	Bond	Number
Access road	50.65	Bond	Linear Ft.
Trails and walkways	50.66	Bond	Linear Ft.
Contour farming	50.67	SEG[1]	Acres
Cover and green manure crop	50.68	SEG[1]	Acres
Critical area stabilization	50.69	Bond	Number
Diversions	50.70	Bond	Linear Ft.
Field windbreaks	50.71	Bond	Linear Ft.
Filter strips	50.72	Bond	Acres
Feed storage runoff control systems	50.705	Bond	Number
Grade stabilization structures	50.73	Bond	Number
Livestock fencing	50.75	Bond	Linear Ft.
Livestock watering facilities	50.76	Bond	Number
Milking center waste control systems	50.77	Bond	Number
Nutrient management for cropland or pasture	50.78	SEG[1]	Acres

[1] While DATCP awards SEG funds primarily to cost-share nutrient management plans, a county may use a limited portion of the its award (cumulative expenditures may not exceed 25 percent of a county's annual cost-share allocation unless otherwise allowed in the allocation plan for that year) if the following conditions are met:

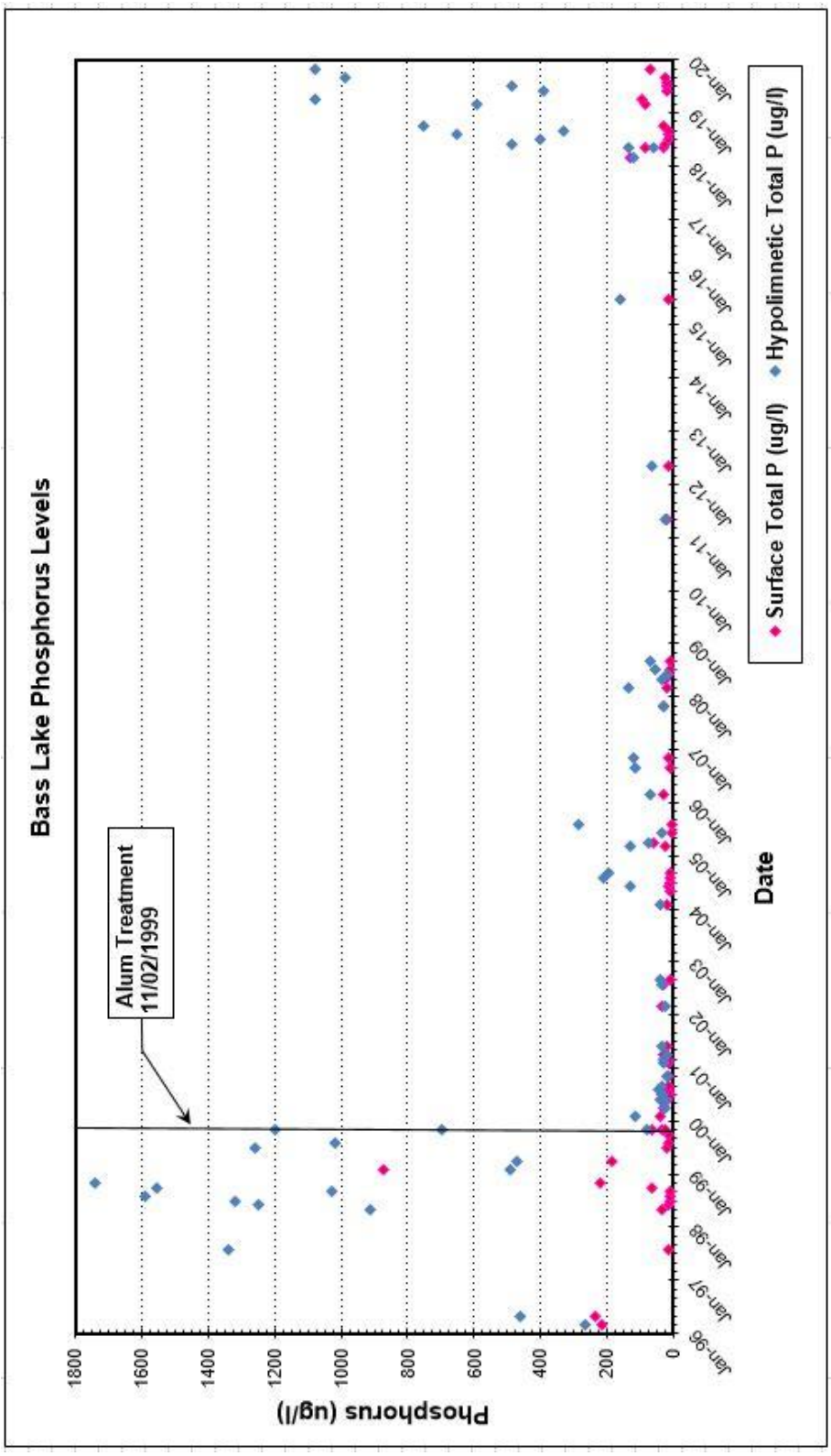
(1) The landowner agrees to remain in compliance with the soil erosion control standard (NR 151.02) and the nutrient management standard (NR 151.08) for as long as the land is farmed;

(2) The landowner submits a nutrient management plan checklist covering the cropland where the soft practice is installed; and

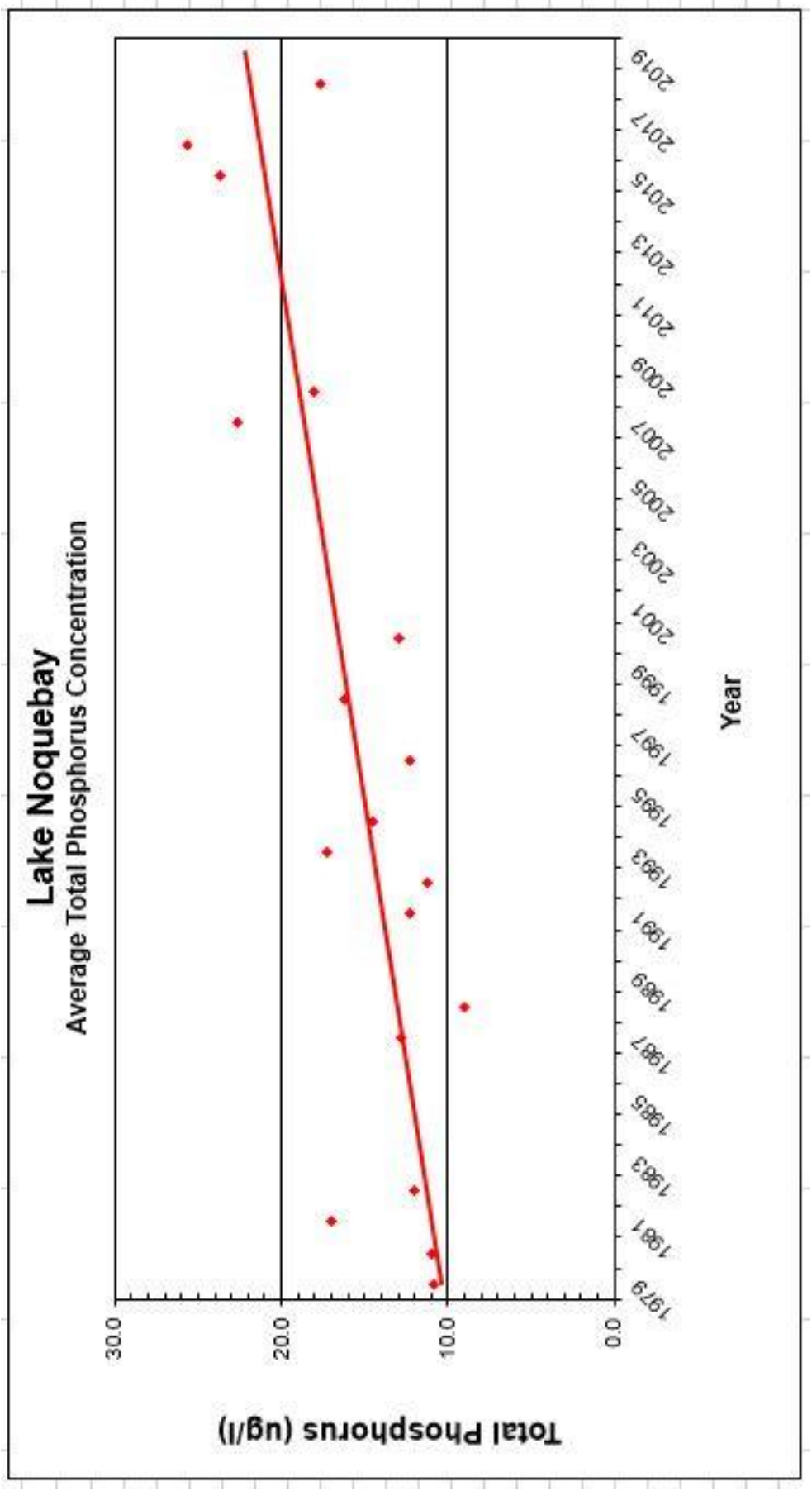
The county documents that cover crop or other cost-shared "soft" practice is required to meet "T" or other requirement of the NRCS 590 standard, and is the most cost-effective approach to meeting the NRCS 590 requirement.

PRACTICE or ACTIVITY	ATCP 50 Reference	Fund Source	Units
Pesticide Management Plans	50.79		
1. Management Plans	50.79(1)	No Funds Available	Number
2. Structures (as described in the plan for structure's design)	50.79(2)	Bond	Number
Prescribed Grazing	50.80		
1. Management Plan	50.80(1)	No Funds Available	Number
2. Fencing (not permanent)	50.80(2)	No Funds Available	Linear Ft.
3. Fencing (permanent)	50.80(3)	Bond	Linear Ft.
4. Establish Permanent Pasture (seeding)	50.80(4)	Bond	Acres
Relocating or abandoning animal feeding operations	50.81	Bond	Number
Residue Management	50.82	SEG[1]	Acres
Riparian Buffers	50.83		
1. Installation (including land out of production and first 10 years of maintenance)	50.83(1)	Bond	Acres
2. Mowing and maintenance beyond initial 10 year period	50.83(2)	No Funds Available	Acres
Roofs	50.84	Bond	Number
Roof Runoff Systems	50.85	Bond	Number
Sediment Basins	50.86	Bond	Number
Sinkhole Treatment	50.87	Bond	Number
Stream Bank and Shoreline Protection	50.88	Bond	Linear Ft.
Stream Crossing	50.885	Bond	Linear Ft.
Strip-Cropping	50.89	SEG[1]	Acres
Subsurface Drains	50.90	Bond	Number
Terrace Systems	50.91	Bond	Linear Ft.
Underground Outlet	50.92	Bond	Number
Waste Transfer Systems	50.93	Bond	Number
Wastewater Treatment Strips	50.94	Bond	Linear Ft.
Water and Sediment Control Basins	50.95	Bond	Number
Waterway Systems	50.96	Bond	Acres
Well Decommissioning	50.97	Bond	Number
Wetland Restoration	50.98	Bond	Acres
Engineering services provided in connection with a completed cost-share practice for which bond revenue may be used (also refer to 50.40(7)).	50.34(4)	Bond	
Other practices with DATCP's written approval	50.40(3)(a)		

Appendix J. Bass Lake Phosphorus Levels



Appendix K. Lake Noquebay Phosphorus Levels



Appendix L. Marinette County Natural Hazards Mitigation Plan – Chapter 4 Mitigation Strategy

INTRODUCTION

As defined by the Disaster Mitigation Act of 2000, mitigation is a "sustained action that reduces or eliminates long-term risk to people and property from natural hazards and their effects." Mitigation planning is the systematic process of learning about the hazards that can affect the planning area, setting clear goals, identifying appropriate actions, and following through with an effective mitigation strategy. Mitigation encourages long-term reduction of hazard vulnerability and can reduce the enormous cost of disasters to the government and property owners. Mitigation can also protect critical community facilities and infrastructure; reduce exposure to liability; and minimize community disruption.

The mitigation strategy outlines the general goals to be achieved through the implementation of the Marinette County hazard mitigation plan. From the identified hazard mitigation goals, a mitigation strategy was developed to identify specific projects and activities that could help achieve the County's hazard mitigation goals to make them safer and better prepared for disasters.

This chapter includes a discussion of the mitigation efforts that are currently underway, the County's plan to implement the mitigation actions, an assessment of the County's pre- and post-disaster hazard management policies, programs, and capability to mitigate hazards, and an evaluation of the current and potential sources of federal, state, or private funding to implement mitigation activities.

MITIGATION GOALS

The following mitigation goals are intended to be used by public officials and emergency response personnel as general guidelines to mitigate the hazards identified in Chapter 3. These goals are broad in order to apply to all of the hazards addressed in the plan.

Goal #1: Implement policies, procedures and projects designed to reduce or eliminate the impacts of natural hazards on people and property.

Goal #2: Collect and utilize data, and conduct necessary studies, in order to provide the information needed to improve policymaking and to identify appropriate mitigation projects.

Goal #3: Improve planning processes in order to reduce the impact of natural hazards on people and property.

Goal #4: Enhance enforcement capabilities in order to reduce the impacts of natural hazards on people and property.

Goal #5: Enhance the use of natural resource protection measures as a means to reduce the impacts of natural hazards on people and property.

Goal #6: Obtain additional resources necessary to reduce the impact of natural hazards on people and property.

Goal #7: Provide training, and enhance education and outreach efforts describing the potential effects of natural hazards and the means to reduce their impact.

Appendix M. Public Hearing Notice and Public Hearing Minutes

MINUTES

DEVELOPMENT COMMITTEE

Tuesday, January 5, 2021 9:00 a.m. First Floor Conference Room Resource Center, 1925 Ella Ct

Members Present: Supervisors Penny Chaikowski, Robert Holley, Thomas Mandli, Bonnie Popp participated via phone, Ted Sauve, and Clancy Whiting.

Excused: Mary Noll, USDA-FSA Representative

Others Present: Tina Barnes, Property Lister; Nancy Crevier, Extension; Aleta DiRienzo, LID-LWC; Aimee Elkins. 4-H; John Guarisco, County Board Chair; John Lefebvre, Administrator; Gale Mattison, Corporation Counsel; Jeff Maroszek, USDA-NRCS; Tim Oestreich, Asst. Land Information Director; Autumn Rockhill, Development/Tourism and Sarah Topp, County Conservationist.

1. CALL TO ORDER

Meeting called to order at 9:00 a.m. by Chair Sauve.

2. APPROVAL OF AGENDA

MOTION (Holley/Mandli) to approve the agenda as presented. Motion carried. No negative vote.

3. APPROVAL OF MINUTES

MOTION (Mandli/Chaikowski) to approve the minutes of the December 8, 2020 meeting. Motion carried. No negative vote.

4. CORRESPONDENCE

- The agenda for the Lake Michigan Land & Water Conservation Association Virtual Meeting on Friday, January 8, 2021 is attached. Tim advised the committee that the Jury Assembly Room has been reserved for any committee attendance.

5. REPORTS OF OUTSIDE AGENCIES
   - Aimee Elkins, 4-H Program Educator – spoke highly of the volunteers

throughout the 4-H programming. The Marinette County Clubs have been very creative to keep the kids interested and to attend meetings. One club had a drive-in club meeting. Programs made available for the 4-H members during the pandemic included, “Going on a Fair Hunt”, “Summer Camp in a Bag”, “Thanksgiving craft” and “Holiday craft”. A new club within the City of Marinette is starting up. There hasn’t been one within the city limits for years.

6. REPORTS BY DEPARTMENTAL STAFF

 Introduction of County Conservationist. Introduced to the Committee was Sarah Topp, County Conservationist. She is replacing Greg Cleereman who retired. Tina Barnes, Property Lister ~ reported on how getting the taxes ready with the new software proceeded. There were a few issues but were worked out with the software company and taxes were printed on time.

7. ADMINISTRATOR’S APPOINTMENT FOR LAND INFORMATION DIRECTOR

John Lefebvre, Administrator informed the Committee that he is appointing Tim Oestreich as the Land Information Director at January’s County Board Meeting.

8. DECEMBER SCHEDULE OF PAID INVOICES

The December Schedule of Monthly Paid Invoices – Development ~ $2,863.20 was presented to the committee.

9. OPEN PUBLIC HEARING AT 9:30 AM TO ACCEPT PUBLIC COMMENT ON THE 2021 - 2031 LAND & WATER RESOURCES MANAGEMENT PLAN

MOTION (Whiting/Holley) to open the Public Hearing regarding the Update of the Marinette County Land & Water Resource Management Plan for accepting Public Comment. Motion carried. No negative vote.

10. ACCEPT PUBLIC COMMENT

No in-person comments made. Public Comment accepted from a survey that was on the Marinette County Website. Asst. Land Information Director read the comments to the Committee. The results are in Appendix A. After the comments were read Chair Sauve called three times for any more public comment.

11. CLOSE PUBLIC HEARING

MOTION (Mandli/Holley) to close the Public Hearing at 9:45am. Motion carried. No negative vote.

12. LAND & WATER RESOURCES MANAGEMENT PLAN

Committee discussed the plan and Supervisor Holley noted the following:

- Page 12 – Legend to the map is too small to read. Place on another page
- Page 15 – Chart doesn't mention the rivers or streams in the Town of Beaver
- Could all the acronyms listed in the document be on a page that people reading the document could go to for definitions

MOTION (Holley/Mandli) to have the plan move onto the Land & Water Resources Board with the comments and changes attached. Motion carried. No negative vote.

13. ADDENDUM(S)

None

14. FUTURE AGENDA ITEMS

- Land & Water Resource Management Plan
- Presentation of Ascent Software

15. SCHEDULE NEXT MEETING

The next meeting scheduled Tuesday, February 9, 2021 at the Resource Center for 9:00 am.

16. ADJOURNMENT

MOTION (Mandli/Whiting) to adjourn at 10:00 a.m. Motion carried. No negative vote.

Respectfully Submitted

Aleta DiRienzo Database Specialist/Program Assistant

Appendix N. Responses to Marinette County Website Survey

LAND AND WATER RESOURCES PLAN SURVEY

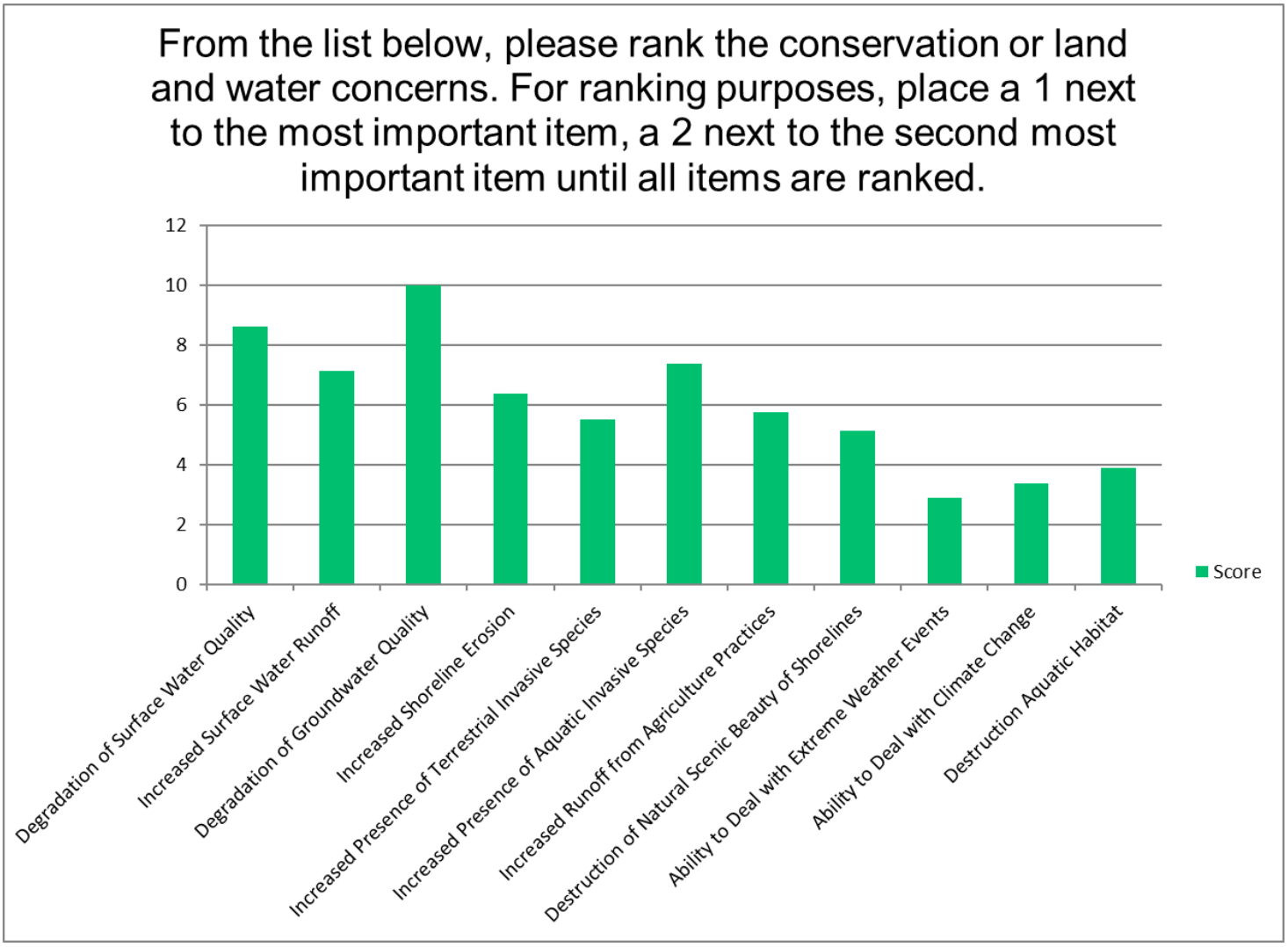
The State of Wisconsin Statute and Administrative Code requires that in order for Marinette County to utilize State funding or conservation activities, the activities must be identified in the County Land and Water Resources Plan. Periodically the County is required to update and revise the plan. The County is currently in the process of amending its plan which will guide its conservation effort for the next 10 years.

Part of the revision process is to seek input from citizens, landowners and stake holders regarding land and water conservation issues. So in addition to offering a public meeting for interested

From the list below, please rank the conservation or land and water concerns. For ranking purposes, place a 1 next to the most important item, a 2 next to the second most important item until all items are ranked.

Degradation of Surface Water Quality
Increased Surface Water Runoff
Degradation of Groundwater Quality
Increased Shoreline Erosion
Increased Presence of Terrestrial Invasive Species
Increased Presence of Aquatic Invasive Species
Increased Runoff from Agriculture Practices
Destruction of Natural Scenic Beauty of Shorelines
Ability to Deal with Extreme Weather Events
Ability to Deal with Climate Change
Destruction Aquatic Habitat

Question 1


From the list below, please rank the conservation or land and water concerns. For ranking purposes, place a 1 next to the most important item, a 2 next to the second most important item until all items are ranked.
12
10
8
6
4
2
0
Score
Degradation of Surface Water Quality
Increased Surface Water Runoff
Degradation of Groundwater Quality
Increased Shoreline Erosion
Increased Presence of Terrestrial Invasive Species
Increased Presence of Aquatic Invasive Species
Increased Runoff from Agriculture Practices
Destruction of Natural Scenic Beauty of Shorelines
Ability to Deal with Extreme Weather Events
Ability to Deal with Climate Change
Destruction Aquatic Habitat

Question 2

Are there any other issues that should be added to the list?

Answered	**15**
Skipped	**1**

Respect for the world around.
no
No
no
public education about importance of natural resources, habitat, prevention measures, etc.
well water testing
n/a
no

no
Water quality, PFOS and mine issues.
Specific PFAS along with the back 40 project impact to the Menominee river and the great lakes
No
No
Monitor effects of back forty mine on Menominee River
Fluoride added to drinking water

Question 3

For any conservation issue you've identified that should be added to the list, please provide a brief explanation of your concern.
Answered
Skipped

none
too many people ignore the problems we face with habitat loss, water quality, and other environmental issues. Also denial of science and climate issues is a problem.

PFAS are the hot topic but there are a host of other contaminants I feel should be monitored

n/a
na

Contamination of our drinking and recreational waterways is detrimental to not only Marinette County, but the Great Lakes and all surrounding communities dependent on these water sources.

I think the biggest issue that immediately is impacting our local drinking water and the whole fresh water "Great Lakes" system is PFAS. Many agencies are looking into, so maybe that is why it is not address with as much importance in the plan as other issues. ButI feel attention to this issue should be increased in the plan. The back Forty project has the potential to greatly affect the largest amount of fresh water in the world if an accident occurs when mining. I am not sure how addressing this concern can be including in the plan without becoming too polictical, but it is a subject to definitely talk about.

Na
Potential pollution
Health effects of additives to drinking water

Question 4

What conservation issue will have the greatest impact on the County in the next 1 to 3 years?	
Answered	16
Skipped	0

Climate change.
High ground water table
Negative impact of beaver dams ruining trout habitat because dams warm stream temperature.
climate change
climate change issues that affect everything else
groundwater quality
PFAS
High water levels leading to increased erosion
Surface run off
public use and overuse of resources
Water quality.
PFAS
Terrestrial invasives
Habitat protection
Shoreline development
Ag runoff causing water pollution/issues, invasive species altering natural habitats.

Question 5

What conservation issue will have the greatest issue on the County in 3 to 5 years?	
Answered	16
Skipped	0

Misuse of natural resources.
Ground water.
Using road culverts that are too small.
climate chnge
climate change, again
groundwater quality
groundwater quality
Terrestrial invasive species
Invasive species
As a home owner on the Peshtigo River, shore erosion and water level management
Water quality.
Still think PFAS and the possibility of the Mine
Aquatic invasives
Invasive species
Groundwater degradation
Drinking/groundwater contamination

Question 6

What conservation issue will have the greatest impact on the County 5 years and beyond?	
Answered	**16**
Skipped	**0**

Climate change
More intense and frequent weather events.
Invasive species
climate change
again, climate change....
groundwater quality
n/a
Extreme weather events
Pfas and nitrates in water
increased public use
Water quality.
Back forty mine if it starts up
Nitrates and PFOS in groundwater.
Climate change and invasive specie ;
Groundwater degradation
Soil erosion/nutrient depletion

Question 7

Do you have a question related to the Land and Water Resources Management Plan or the Planning process? Responses will be posted to the County website.

Answered	**13**
Skipped	**3**

No
no
not at this time
No
n/a
no

no
Not at this moment.
When will the new NCRS agent start?

No
No
No

Question 8

This survey is anonymous. However, you may provide your contact information below in case the County has any questions about your response. Be aware that if you do provide your contact information it will become part of public record.

Answered	**4**
Skipped	**12**

Sandi Brumbaugh, barefeet46@gmail.com

Land owner
davekleein44@msn.com 715-927-7989 Newton lake resident

n/a