

# Marinette County



## 2011 - 2020 Land & Water Resource Management Plan



Land & Water Conservation Division • Land Information Department  
1926 Hall Avenue • Marinette, WI 54143-1717

# **Marinette County Land & Water Resource Management Plan**

**2011 - 2020**

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# Marinette County Land and Water Resource Plan

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## Acronyms

Aquatic Invasive Species – AIS  
Best Management Practices – BMP's  
Land & Water Conservation Division – LWCD  
Land and Water Resources Management - LWRM  
Natural Resources Conservation Service (Federal) – NRCS  
Targeted Runoff Management Program – TRM  
Teaching Outdoor Awareness & Discover Program – TOAD  
University of Wisconsin Extension - UWEX  
Wisconsin Department of Agriculture, Trade, and Consumer Protection – DATCP  
Wisconsin Department of Natural Resources - WDNR

# Chapter 1. Plan Development and Public Participation

The Marinette County Land and Water Resource Management (LWRM) Plan was developed to assist agencies that manage land to protect and improve water resources in Marinette County. Goals established in the plan will help to guide agency initiatives from 2011 through 2020.

## Plan development process

This plan builds on the 1999 nominal group process used by the Upper Green Bay Basin Partnership Team to rank environmental threats to the basin. A Citizens Advisory Committee helped guide development of that LWRM Plan. A technical work group analyzed resource information; considered the citizens advisory group recommendations; and fine-tuned the work plan, information and education strategy, and monitoring and evaluation plan. Also at that time, local resource management staff were surveyed, along with sporting and service groups, farmers, local politicians and others. Marinette County staff continually worked with other agencies and groups to ensure that our efforts met the needs of Marinette County residents and serve to protect the local environment.

The goals and objectives developed under the methodology described above are sound and have changed little since 1999. What has changed has been the intensity of Marinette County Land & Water Conservation Division (LWCD) efforts toward achieving those goals based on direct requests for assistance. Since the last LWRM plan was written, the LWCD has greatly increased efforts related to Aquatic Invasive Species (AIS) in response to landowners, lake groups, and local officials. Marinette County has become one of the top counties in participation in the Targeted Runoff Management (TRM) Program because of farmer requests for help, and to eliminate winter spreading of manure. The needs of educators and service groups, and research that showed its benefits to our youth, led to greatly expanded environmental education programming delivery, primarily through the Teaching Outdoor Awareness and Discovery (TOAD) program.

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 on October 7, 2010 to review the draft LWRM Plan and make recommendations for goals, objectives, and priority actions. A public hearing was held on October 11, 2010 to garner additional public input.

The current plan reflects the continued interaction with WDNR staff and coordination of projects. WDNR staff were directly involved in the creation of this plan through their

technical advice and review of the draft. The 2001 Upper Green Bay Basin Integrated Management Plan continued to be used as a reference tool since little new water quality data has been gathered in Marinette County since 1993. 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**

This plan meets or exceeds the minimum statutory requirements established by Wisconsin Department of Agriculture, Trade and Consumer Protection (DATCP) Administrative Code ATCP 50.12. The County Land & Water Resource Management Planning Program was created through amendments to Chapter 92.10 of the Wisconsin Statutes in Wisconsin Act 27.

The plan must be submitted to the DATCP for review and approval. The Marinette County Board must approve the plan after being presented at a public hearing. The plan must also be submitted to the Wisconsin Land and Water Conservation Board.

## **Performance standards and prohibitions**

Performance standards and prohibitions are an important concept in County Land & Water Resource Management Plans. Through Wisconsin Act 27, the Legislature amended the statutes to allow County Land and Water Conservation Committees to develop and adopt standards and specifications for management practices to control erosion, sedimentation, and nonpoint source water pollution.

The statutes also require the Department of Natural Resources and the Department of Agriculture, Trade, and Consumer Protection to develop performance standards for agricultural and non-agricultural nonpoint pollution sources. These are listed below in Table 1-1. Marinette County's strategy for Department of Natural Resources Administrative Code Chapter NR 151 implementation is discussed in greater detail in Chapter 5.

**Table 1-1. Overview of Agricultural Standards and Associated Conservation Practices**

Performance standard (type of standard covered)	Effective Date	Conservation Practices
Control soil erosion to meet tolerable soil loss (T) calculated by RUSLE II model (cropland)	October 1, 2002	Install contour buffer systems, crop rotation, conservation tillage, no-till planting, contour strip cropping, and contour farming. Related practices: grade stabilization structures, grassed waterways, critical area stabilization, and lined waterways.
Divert clean water from feedlots (Livestock facilities within Water Quality Management Areas)	October 1, 2002	Install roof runoff management systems, earthen diversion and underground outlets
Construct, maintain and proper closure of manure storage facilities to prevent animal waste overflows and leakage.	October 1, 2002	Follow NRCS standards for construction, maintenance and closure using technical standards 313 (Waste storage facility), 360 (Closure of waste impoundments), 634 (waste transfer system)
<p>Manure Management Prohibitions</p> <p>a. No overflow from manure storage facilities.</p> <p>b. No unconfined manure stacks with Water Quality Management Areas.</p> <p>c. No direct runoff from feedlots and manure storage facilities to waters of the state.</p> <p>d. No unlimited access of livestock to shore lands that prevents maintenance of adequate sod cover. (Livestock facilities)</p>	October 1, 2002	<p>Design and construct facilities to technical standards, maintain existing facilities, repair or replace facilities, as needed.</p> <p>a. Relocate manure stacks to more environmentally safe areas. Construct storage facility.</p> <p>b. Install barnyard runoff control systems, roof runoff management systems, wastewater treatment strips, relocate animal feeding facilities.</p> <p>c. Install access roads and cattle crossings, watering facilities, livestock fencing, riparian buffers, prescribed grazing, stream bank protection.</p>
Control nutrient runoff into water of the state (cropland)	Effective in 2003 for new operations, 2005 for land near impaired or exceptional water and 2008 for other existing farms.	Develop and implement annual nutrient management plan for applying all nutrients. All soil tests must be completed by DATCP approved lab. Apply nutrients according to UWEX A-2809 publication. Install conservation practices to reduce runoff and nutrient loading.

# **Chapter 2. Assessment of Water Quality and Resource Conditions**

## **Physical Setting**

The main source for physical setting in Marinette County is the Soil Survey of Marinette County, produced in 1991 by the Soil Conservation Service.

## **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. Winter mean temperatures average 16 degrees Fahrenheit (F). Winter low temperatures average 5 degrees F. The average mean summer temperature is 66 degrees F, with an average high temperature of 79 degrees F. Mean annual precipitation for the region is about 32 inches. The majority falls as rain during April through September. Most runoff occurs in February, March, and April when the land surface is frozen and soil moisture is highest.

## **Topography and Drainage**

The physiography, relief, and drainage of the county are primarily the result of glaciation. Marinette County contains three major physiographic regions: the northwestern section in the Northern Highlands Region; the central section of the county in the Wisconsin Central Plain; and the southeast part of the county in the Eastern Ridges and Lowlands region.

Elevations range from 1400 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 the soil associations in glacial till. They include the Emmet-Charlevoix, Menominee-Emmet, Cunard-Emmet, and Sarona-Keweenaw associations (Map 2-1). The majority of cropland and most farms are located in the southern part of the county on Emmet soils. The 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 the 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**

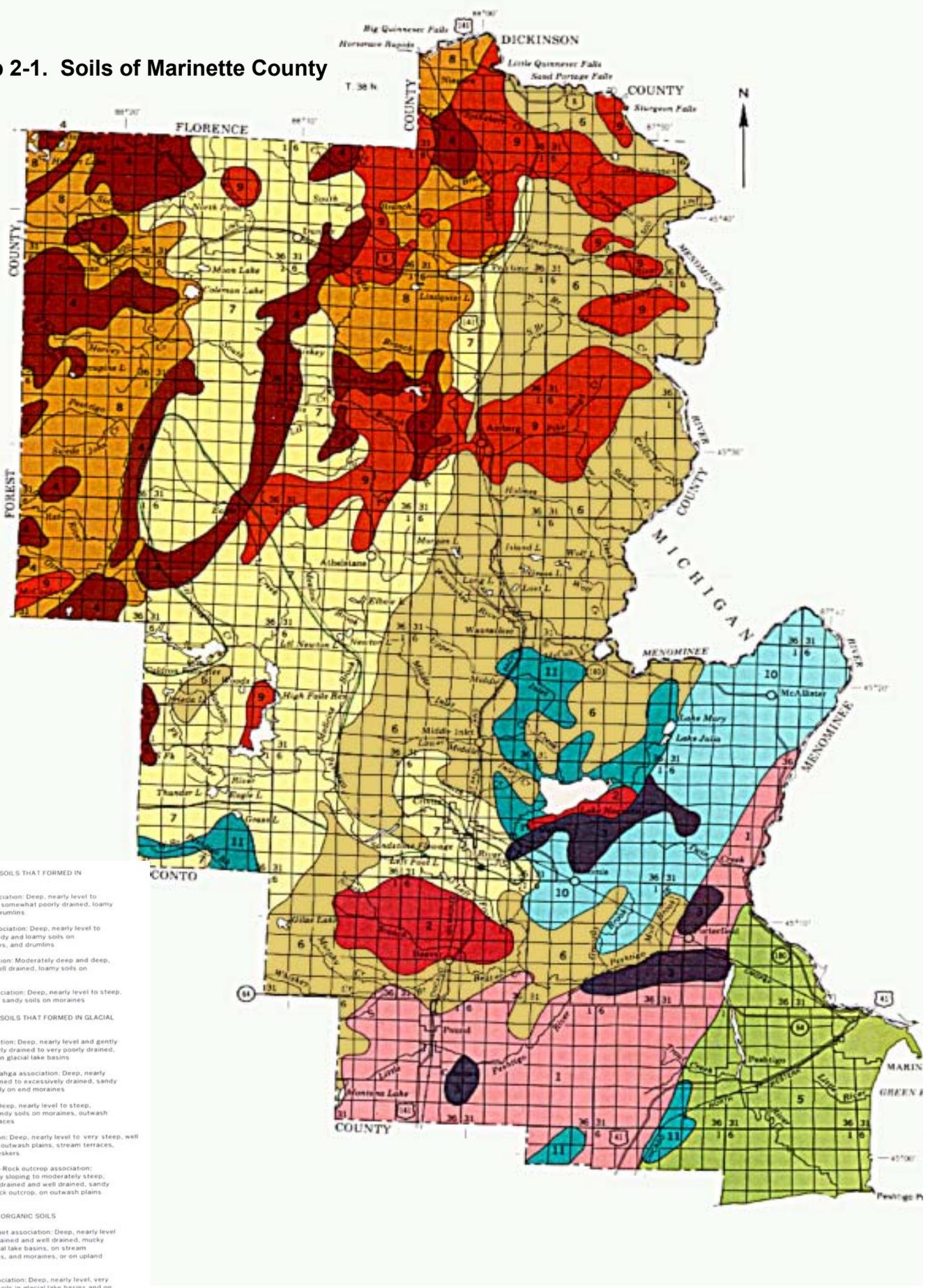
Organic soils make up about 9 percent of the county. The Seelyeville-Markey-Emmet and Seelyeville-Markey associations make up this group. The soils in this group were formed in glacial lake basins, on outwash plains, stream terraces, moraines, and drumlins. Most areas of this group are best suited for 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.

## **Soil Erosion**

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) is occurring on less than one percent of all cropland. Marinette County has received a waiver from the requirement to develop a county-wide cropland soil erosion control plan.

All acreage enrolled in the Farmland Preservation Program and lands implementing a nutrient management plan is covered by a conservation plan which has soil loss controlled to less than "T" values.

Map 2-1. Soils of Marinette County



# 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 Rankings & Discussion

Twelve watersheds are contained completely or partially within Marinette County, as shown in Map 2-2. These watersheds are all part of the Upper Green Bay Basin. Department of Natural Resource watershed rankings were taken from the Upper Green Bay Basin Integrated Management Plan (See Table 2-2). The list was developed to assist the Wisconsin Land and Water Conservation Board in identifying priority watershed and priority lake projects. The rankings were accepted by the Land and Water Board in July of 1998. WDNR watershed rankings are unchanged since no new monitoring was conducted for the Integrated Management Plan published in 2001.

Marinette County watersheds change in physical character and land use from southeast to north. 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. For additional discussion see table 2-1 below.

**Table 2-1. Watershed Discussions and Comments**

Agricultural Watersheds		
Watershed	Discussion	Comments/Recommendations
GB04 Little R.	A completed Priority Watershed. Only a small portion of the watershed lies in Marinette County.	This area will continue to be a focus. We have completed three recent projects. Three Targeted Runoff Management (TRM) projects have been completed
GB07 Lower Peshtigo R.	Trout Cr./Bundy Cr. Subwatershed is the most densely agricultural area of the county.  This watershed contains Harmony Arboretum, an important eco education asset.	Nineteen TRM projects have been completed.  Seven pending TRM projects.
GB08 Little Peshtigo R.	This watershed has the second greatest acreage of farmland in the County. It contains the Villages of Coleman and Pound.	Nine completed TRM projects. Six pending TRM projects.

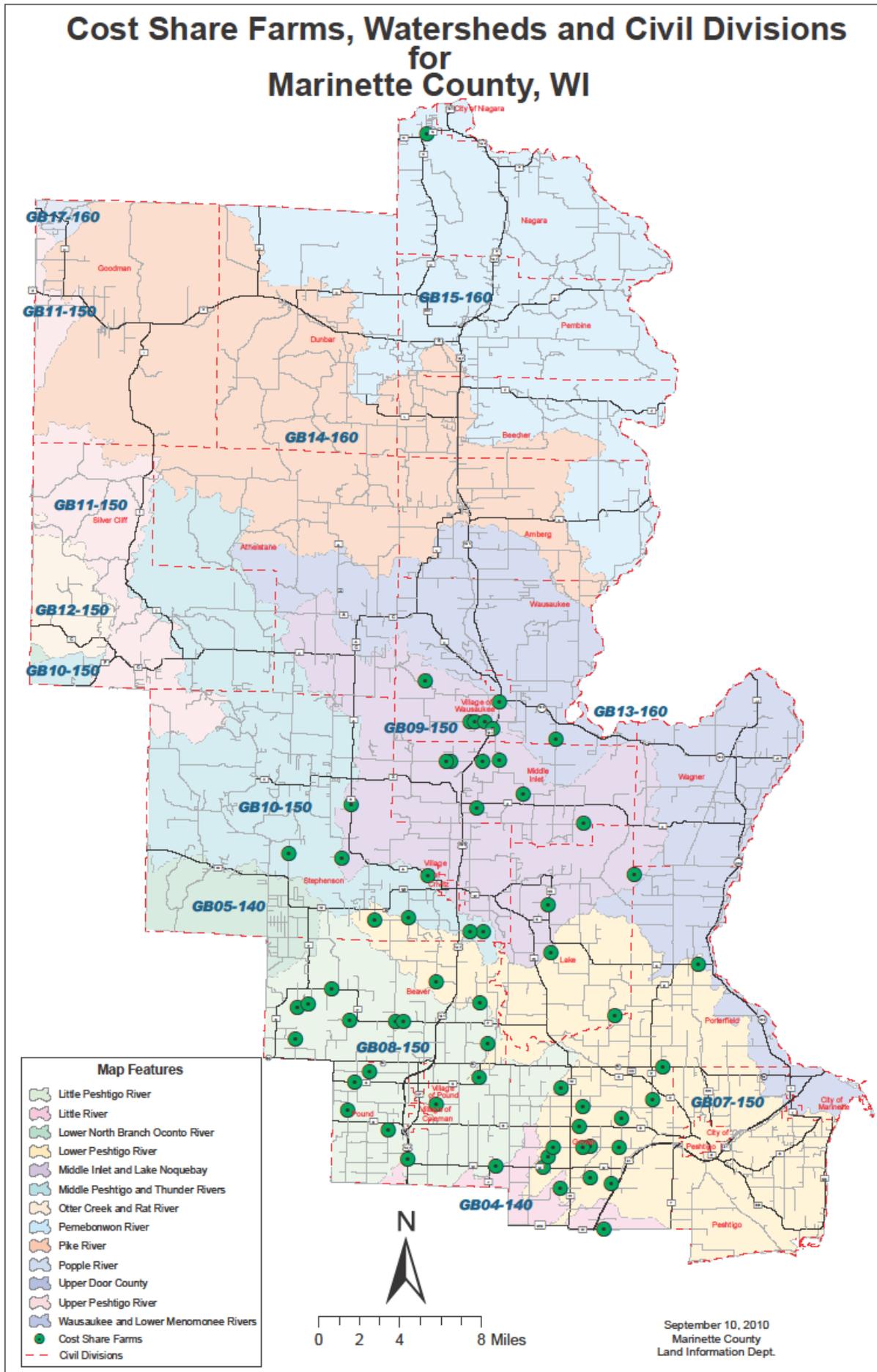
## Transition Watersheds

Watershed	Discussion	Comments/Recommendations
GB09 Middle Inlet Lake Noquebay	<p>A priority watershed, which closed in 2006. Lake Noquebay is one of our most important recreational assets. 33 landowners installed agricultural and developed riparian Best Management Practices (BMP's).</p> <p>This watershed contains ½ of the Village of Crivitz.</p>	<p>We will continue to seek additional resources and partner with the Lake Noquebay Rehabilitation District on lake protection efforts including aquatic plant harvesting, operation of the Lake Noquebay Dam, and AIS prevention and control.</p>
GB10 Middle Peshtigo Thunder R.	<p>A Priority Watershed that closed in 2009. 11 landowners installed agricultural and developed riparian BMP's.</p> <p>This watershed contains much of the Tommy G. Thompson State Park.</p> <p>Camp Bird, a major component in environmental education, is found in this watershed.</p> <p>This watershed contains ½ of the Village of Crivitz.</p> <p>WPS has sold almost 100 riparian lots on the Peshtigo Flowages for private development.</p>	<p>In 2008 we began a long-term study to track the environmental impact of residential development on selected areas of High Falls Flowage.</p>
GB13 Wausaukee Lower Menominee R.	<p>This watershed contains several heavily developed lakes, significant agriculture and the City of Marinette.</p> <p>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.</p>	<p>Work to remediate the Lower Menominee River AOC has restarted. The LWCD is participating in the advisory committee for the AOC Remedial Action plan and has applied for grants on behalf of the group.</p>

## 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.	
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.	
GB12 Otter Cr. & Rat R.	Only a small portion of this watershed lies in Marinette County. Two lakes have Associations.	
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 and will be used to prioritize restoration efforts within the watershed
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 Bible College is located on Camp Lake.	Two pending TRM projects. A road/stream crossing inventory will be conducted in 2011
GB17 Popple R.	Although only 2,600 acres of this watershed lie in the County, it contains our most heavily developed lake.	We will continue to promote shoreline restorations on Hilbert Lake and work with the Hilbert Lake Association.

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



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**Table 2-2. Marinette County Ranking of Current or Potential NPS Impacts**

Watershed	WDNR Ranking <sup>1</sup> S= Stream L= Lake G=Groundwater	Water Quality Projects/ WDNR Upper Green Bay Basin Water Quality Management Plan Comments
GB04 LITTLE RIVER	S- High L- INS, G- Low	Completed Priority Watershed Project; Assessment monitoring recommended for Little R.
GB05 LOWER NORTH BR. OCONTO R.	S- Low, L- INS G- Low	Very small portion of the watershed in southwestern Marinette County.
GB07 LOWER PESHTIGO R.	S- Medium L- INS, G- Low	Trout Cr., Bundy Cr., subwatersheds ranked High; Peshtigo Flowage on 303(d) List <sup>2</sup> .
GB08 LITTLE PESHTIGO R.	S- Medium L- INS, G- Low	Montana & Gilas Nelligan & Little Nelligan Lakes ranked High; Gilas Lake on 303(d) List <sup>2</sup> .
GB09 MIDDLE INLET LAKE NOQUEBAY	S- INS L- High, G- Med	Completed Priority Watershed project; Lake Noquebay on 303(d) List <sup>2</sup> .
GB10 MIDDLE PESHTIGO THUNDER R.	S- Low L- INS, G- High	Completed Priority Watershed project; Caldron & High Falls Flowages on 303(d) List <sup>2</sup> .
GB11 UPPER PESHTIGO R.	S- Low L- INS, G- Low	
GB12 OTTER CR. & RAT RIVER	S- Low, L- INS G- Low	Approximately 10% of watershed is in Marinette County.
GB13 WAUSAUKEE LOWER MENOMINEE R.	S- Low L- INS G- Low	
GB14 PIKE RIVER	S- Low, L- INS G- Low	
GB15 PEMEBONWON MIDDLE MENOMINEE R.	S- Low L- INS G- Low	
GB17 POPPLE RIVER	S- Low, L- INS G- Low	Hilbert Lake - High for protection project

- Note:
1. Rankings of priority for selection as Priority Watershed or Lake Project. INS means insufficient data available to rank the watershed in that category.
  2. List of waters under the Clean Water Act(s. 303(d)) not currently meeting water quality standards.

## **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 Wisconsin Public Service lands adjoining the Peshtigo River Flowages, ninety-one miles, or twenty-eight percent are publicly held.

In 2007, Marinette County received a grant from the WDNR Lakes program to begin long term monitoring of changes in land use and corresponding changes in the biological community, including: birds, amphibians, terrestrial vegetation, and aquatic vegetation at selected locations. Simpson Lake and Shannon Lake, which have recently been subdivided and will eventually be fully ringed by developed lots, were chosen for monitoring. Sections of High Falls Flowage that have been divided into lots will undergo the same procedure outlined above for side-by-side comparison with undeveloped reference areas.

## **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.

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 Rivers are the two largest in the county. 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 is an Area of Concern designated by the US Environmental Protection Agency. 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.

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 20.2 percent, are publically owned and free from development. Almost seventy percent of all stream and river frontage is privately owned.

In recent years, changes in land use, and long term drought, have led to water quantity issues as well as quality issues. In early summer of 2010 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 56 years. The Average Annual Mean flow, which averages in the daily high and low flows for the entire monitoring period, was 890 Cubic Feet per Second (CFS). In 2009 the Annual Mean Flow in 2009 was 526 CFS, the lowest ever recorded. The Menominee River has been monitored for even longer, 64 years. The Annual Mean Flow over that period is 3,251 CFS. In 2009 it was 1,909 CFS, also the lowest on record.

These low flows and lake water levels have affected access to lakes and rivers. Some boat landings are completely dry. Large woody habitat (fallen trees) is often completely out of the water. It might seem counter intuitive, but these low flows and high temperatures have generally been a boon to the growth of aquatic plants. This in turn is causing a spike in complaints regarding navigation and recreation.

## **Groundwater**

Groundwater is the main source of drinking water in Marinette County. Groundwater is stored underground in pore spaces and cracks within the soil and 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.

Marinette County has been working with the Natural Resources Conservation Service to promote and cost share nutrient management and well decommissioning. In 2005 well decommissioning was added to the Marinette County Cost Share Program.

## **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)**

Thirty Marinette County lakes and streams contain Aquatic Invasive Species (AIS). The Wisconsin Legislature, through the WDNR Lakes Program, has provided significant financial resources for aquatic plant management planning, rapid response to early infestations, and for herbicide treatments.

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 more than a dozen aquatic plant related projects, including management plans for Thunder Lake, Beecher Lake, Sandstone Flowage, Lake Noquebay, McCaslin Lake, and Peshtigo Flowage. In 2009 the LWCD hired a full time Aquatic Invasive Species Coordinator to improve our outreach and education efforts, leading to increased capability to control aquatic invasive species.

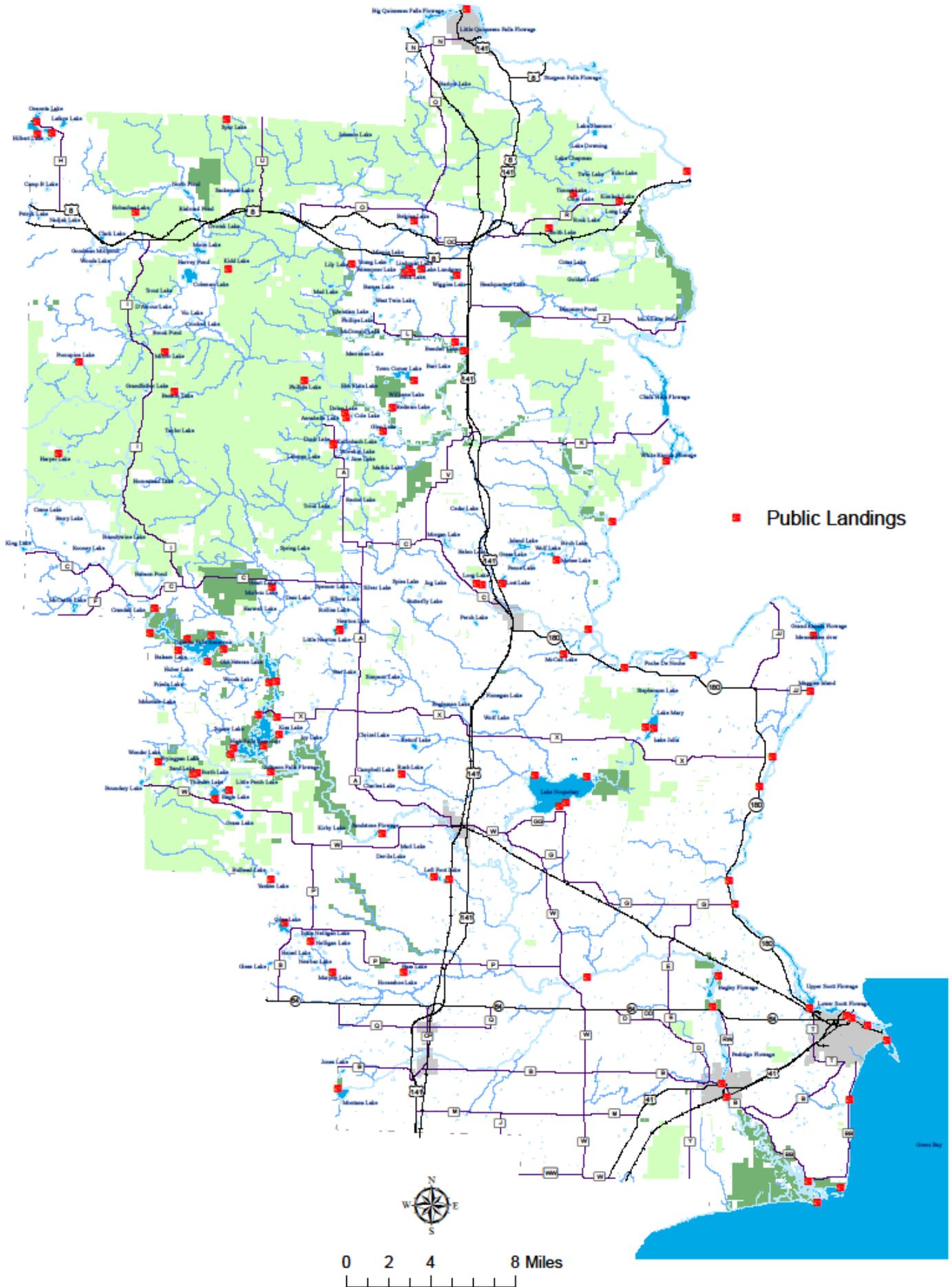
With the growing popularity of water gardens, the likelihood of noxious AIS arriving in Marinette County along with out of state plants grows exponentially. *Hydrilla verticillata*, called by some the “world’s worst weed,” has already made an appearance in a Marinette County private pond. The LWCD will continue to work closely with the WDNR Lakes and AIS Programs to move quickly and eradicate these noxious plants. We will also continue to focus on boater and landowner education to increase public awareness of the threat posed by these plants, how to recognize them and how to prevent their spread.

Map 2-3 shows the locations of the boat landings in Marinette County. Boats and trailers that are moved from water body to water body are a known vector for the transport of fragments of plants such as Eurasian water milfoil (EWM). Until the EWM fragments are totally dry and dead, they remain viable and will 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. Because of this the LWCD and WDNR monitor boat landings for new infestations. Map 2-4 shows water bodies known to contain AIS and Table 2-3 lists the infested water bodies and what AIS they contain.

*Phragmites australis*, or Common Reed, has become a particular nuisance for property owners in the City of Marinette and Town of Peshtigo along the shore of Green Bay. This plant grows to be more than 12 feet tall and forms colonies so dense they are almost impossible to move through. They block views of the water and impede access. This plant has been in Marinette County for many years but has only recently become a major problem. It is a plant that spreads primarily through the growth of underground rhizomes. Just a fragment of a rhizome can start a new colony. Marinette County has been tracking the spread of this plant and working with state and federal agencies to control it.

Although the majority of the *Phragmites* infestations are along Green Bay and in Peshtigo Harbor, it is also moving inland. Isolated colonies can be found in road ditches and wetlands across the southern half of the county.

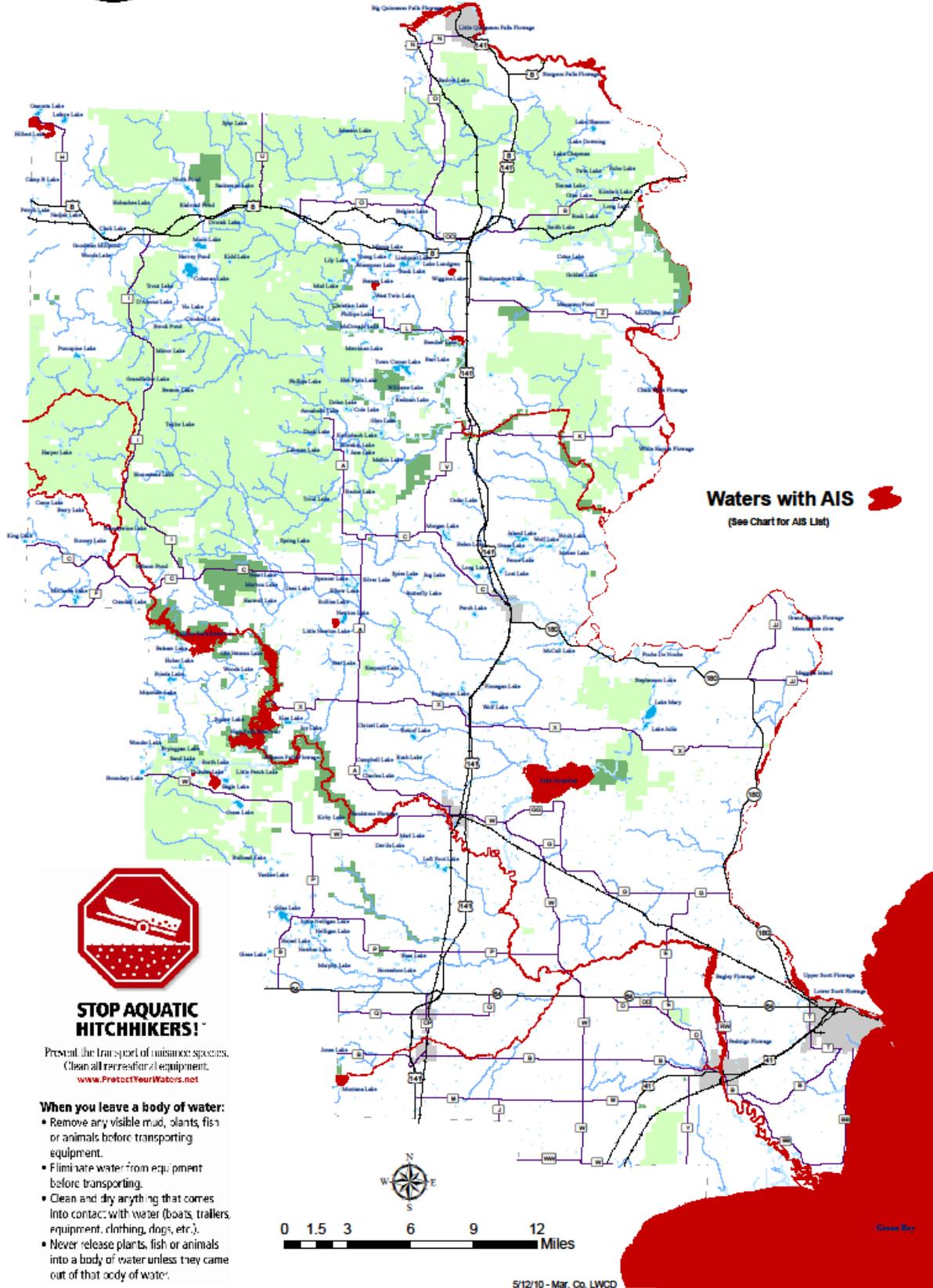
# Map 2-3. Boat Landings of Marinette County



Map 2- 4 Marinette County Waters with AIS



# Marinette County Aquatic Invasive Species



**STOP AQUATIC HITCHHIKERS!**

Prevent the transport of nuisance species.  
Clean all recreational equipment.  
[www.ProtectYourWaters.net](http://www.ProtectYourWaters.net)

**When you leave a body of water:**

- Remove any visible mud, plants, fish or animals before transporting equipment.
- Eliminate water from equipment before transporting.
- Clean and dry anything that comes into contact with water (boats, trailers, equipment, clothing, dogs, etc.).
- Never release plants, fish or animals into a body of water unless they came out of that body of water.

**Table 2-3. Marinette County Water Bodies with AIS Present**

Water Body	Eurasian Water Milfoil	Zebra Mussel	Rusty Crayfish	Banded Mystery Snail	Chinese Mystery Snail	Curly Leaf Pondweed
Bagley Flowage	x	x				
Barnes Lake	x					
Beaver Creek			x			
Beecher Lake	x					
Caldron Falls Reservoir	x					
Chalk Hill Flowage	x	x				
Grand Rapids Flowage	x					
Green Bay (Source Waters)	x	x	x	x	x	x
High Falls Reservoir	x		x			
Hilbert Lake			x			
Johnson Falls Flowage			x			
Lake Noquebay		x		x		
Little Newton Lake	x					
Little Peshtigo River			x			
Menominee River	x	x	x			
Montana Lake	x					
Peshtigo Flowage	x	x				
Peshtigo River	x	x	x			
Pike River			x			
Rat River			x			
Sandstone Flowage	x					
Scott Flowage, Lower	x					x
Scott Flowage, Upper	x					x
South Branch Little Pople River			x			
Thunder Lake	x					
Twin Bessies	x					
Upper Lake	x					
White Rapids Flowage	x	x				
Wiggans Lake					x	
<b>Totals</b>						
<b>29</b>	<b>20</b>	<b>8</b>	<b>11</b>	<b>2</b>	<b>2</b>	<b>3</b>

As of May 2009 - WI DNR x=present

## **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 the 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. However, garlic mustard, a scourge of upland mesic forest, has already been found in two Marinette County locations. In cooperation with UW- Extension and WDNR Forestry staff, these infestations are currently under control.

With the full operation of the Tommy G. Thompson State Park impending, and with thousands of campers from across Wisconsin visiting there, the introduction of Garlic Mustard and other 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 350,00 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 Table 2-4 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.

**Table 2-4. Land Uses in Marinette County**

Land Use	Acres	Comments
Agricultural	158,000	Farms currently in operation or rented out
Forestry	698,000	237,000 acres county forest 461,000 acres private forest
Incorporated	10,440	Includes 7 incorporated areas
Roads & Rights of Way	15,422	State, County, Town, & County Forest
Surface Water	21,000	Lakes & Streams
Wetland	186,000	39,000 acres open marsh 147,000 acres wooded swamp
Total Land Area	890,000	Categories do not add up due to overlap

1991 WISCLAND data, no newer WISCLAND data exists as of January 2005

Marinette County continues to be fragmented into increasingly smaller parcels as larger holdings are sold off for recreational land and subdivisions. There were 49,905 parcels in Marinette County in 1999. That number has increased by 5,899 to a total of 55,804 parcels in 2010, an 11.8% change in twelve years. Fragmentation is the least in the northernmost Towns and is the greatest in the Town of Peshtigo.

New development is occurring disproportionately near lakes and rivers. The 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.

In response to recent growth and state legislation, several Towns have developed or are 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.

In February of 2010 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.”*

Although strides have been made, 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 contains approximately 111,600 acres of farmland (based on 1991, WISCLAND land cover data). Two watersheds, the Lower Peshtigo River and the Little Peshtigo River, contain almost 72% of that total. Those two watersheds are the main focus of recent TRM program funded projects. Twenty-six TRM projects have been completed or are pending in the Lower Peshtigo River Watershed. An additional fifteen TRM projects have been completed or are pending in the Little Peshtigo River Watershed. Refer back to Map 2-2 on page 12 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 that are 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 runoff pollution from agricultural sources. Most of the operating farms in those two watersheds have already installed and implemented BMP's for water quality. Nutrient management planning and well decommissioning will continue to be emphasized as well. Acute runoff pollution or pollution of environmentally sensitive areas will be corrected regardless of location within the county.

Cropland soil erosion is not a serious problem in Marinette County. Most of the cultivated acreage is located on gently sloping soils in the southern part of the county. Dairy crop rotations are common. 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), is 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. However, the LWCD will deal with the few locations in the county where acute erosion is occurring.

Periodically the LWCD has conducted the Erosion Transect Survey. The survey covers 534 points and 315 miles. To date, the survey supports the findings of the Northern Cropland Study. Cropland erosion is not a significant problem in Marinette County.

Nutrient and pesticide management is a key component of the implementation strategy to reduce runoff pollution. Phosphorus is a primary contaminant of surface waters where it is the limiting aquatic plant and algae growth. One pound of phosphorus has been shown to promote of 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.

Groundwater quality in Marinette County is generally considered good. However, the aquifers are shallow and surface soils are sandy. Nitrate+nitrite and Triazine well sample analytical results show that groundwater is being impacted by human activities in a limited way. Most municipalities in the county have no Wellhead Protection Plan to protect their water supply. There are many unsealed abandoned wells. Many rural inhabited structures rely on shallow sand point wells for their drinking water. These practices lead to increased risk of groundwater contamination.

Soils in the southern agricultural area of Marinette County are generally heavier, containing higher percentages of silt and clay. Soil testing shows that many fields contain excessive phosphorus levels. The nature of the soils, winter spreading of manure, fertilizer inputs in excess of crop needs, and a lack of shoreline buffers all contribute to runoff pollution of surface waters.

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.

**Goal #3: Control runoff pollution from agricultural lands and increase natural habitat.**

Objectives:

- A. Provide technical assistance and cost sharing for constructed or somewhat permanent agricultural BMP's
- B. Provide technical assistance and cost sharing for planning and implementation of cropland BMP's.
- C. Implement the Marinette County Animal Waste Management Ordinance.
- D. Implement the priority farms strategy.

**Goal #4: Manage and/or Prevent the Spread of Invasive Exotic Species**

Objectives:

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

**Identification of Priority Farms**

It has long been county policy to place greater importance on putting conservation practices on the land than on planning and monitoring. When the staff and financial resources are in place to facilitate the labor-intensive groundwork that makes county-wide farm prioritization possible, the strategy will focus on those farms within Water Quality Management Areas of our Agricultural and Transition watersheds. Farms with large numbers of livestock or known manure management problems as well as acute runoff and erosion situations that affect ORW/ERW's will also be considered priority. In all areas of Marinette County, citizen complaints and assistance to other agencies and local government will be given high consideration.

Identification of priority farms will be done using field data and existing records. Critical sites designated by the WDNR, farms subject to a WDNR Notice of Intent, and farms whose lands drain to 303(d) listed waters will be given precedence. The County GIS will be used to create a database to track status and monitoring of all priority farms. Priority farms will be targeted for cost sharing and technical assistance to help comply with the agricultural performance standards and prohibitions.

# Chapter 4. Planned Activities

The activities listed in the following tables represent 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 LWCD. 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. **Current high priority activities are in bold.** Benchmarks, based on analysis of the most recent year for which complete data is available, *are in italics.*

Volunteers are a key, and under reported, resource that determines the LWCD ability to deliver programs. Local groups such as the Northern Lights Master Gardeners, the Chappee Rapids Chapter of the Audubon Society, and Lake Districts and Associations are integral to many of our initiatives, providing both personnel and financial resources. Many LWCD educational programs would not be possible if agency staff, both active and retired, did not volunteer to help.

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 a year from now. 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. Terrestrial exotic species are one example of this scenario. Species like Garlic Mustard and Japanese Knotweed are still in the early stages of county infestation and now is the time to deal with them. Unfortunately there are not resources in place to do so. When the resources become available the LWCD will make every effort to utilize them.

Work Plan 2011-2015

Activity	# of Staff Hours
<b>Goal 1 – Help Marinette County citizens make the connection between land use and environmental quality.</b>	
<b>Objective A – Promote the appreciation and stewardship of local natural resources and build awareness of local natural resource problems.</b>	
<b>Continue to offer four editions of the Northwood Journal each year, create press releases and displays as necessary and maintain and expand the Land Information Department website.</b>	400
Continue the Environmental Poster Contest	100
<b>Explore alternate means and technologies for delivering environmental programming</b>	120
Continue the Exhibit and displays at the Marinette County Fair and alter to meet resource needs and to reflect current environmental issues	120
Continue administration and operation of Harmony Arboretum including the demonstration areas, interpretive trails, and Nature and Horticulture Seminar Series	200
<b>Objective B – Support and promote land management practices that reduce runoff pollution and increase natural habitat</b>	
Continue to offer our Shoreland Zoning, Guide to Restored Natural Shorelines, and other brochures in support of our local environmental ordinances	40
Collaborate with the Marinette County UW-Extension to offer nutrient management training	20
<b>Objective C - Provide general, targeted, and experiential environmental education programs to individuals and groups of all ages.</b>	
<b>Continue to offer the TOAD program as needed and expand its scope as interest and resources allow (170 programs delivered to 5,058 individuals) See Chapter 6 for additional detail.</b>	1600
<b>Continue to offer the Environmental Field Day for 4<sup>th</sup> Graders. Expand to include more schools and additional grades if possible (380 attendees)</b>	100
<b>Continue to offer Sand Lake Conservation Camp for 6<sup>th</sup> to 8<sup>th</sup> Graders (80 attendees)</b>	360
Continue to help Peshtigo Elementary School staff teach kayaking, canoeing, and fishing	60
Continue to promote and create interpretive nature trails and viewing areas such as the Pond Road observation Deck and the Goodman and McClintock Parks connector trail	120
<b>Objective D – Provide organizational and planning assistance to landowners, groups, and local government as requested</b>	
<b>Continue to apply for grants and external funding to build LWCD capacity and to assist partner organizations</b>	60
<b>Continue to offer the <i>Notes From the Shore</i> newsletter template to lake associations and districts (4 editions for 9 lake groups)</b>	30
Continue to attend training to stay current on the latest research and teaching methods	80
<b>Continue to create Lake Management plans as requested</b>	300

Work Plan 2011-2015

Activity	# of staff hours
<b>Goal 2 – Control runoff pollution from riparian areas and forest lands. Increase natural habitat.</b>	
<b>Objective A – Provide technical assistance and cost sharing to restore wetland and shoreline habitat, stabilize eroding shorelines, and reestablish littoral zone vegetation and aquatic habitat.</b>	
<b>Continue to work with United States Fish and Wildlife Service to locate, map, and prioritize passage blockages on Marinette County streams</b> ( <i>Map the Pemebonwon River and its tributaries in 2011</i> )	120
Install as many habitat projects as landowner interest and funding allow.	100
Create erosion control and storm water runoff plans for the Marinette County Highway Dept. and Town governments	300
Continue the partnership with the DNR Forestry program to rent tree planters to County landowners ( <i>plant 30,000 trees</i> )	20
<b>Objective B – Provide technical assistance and cost sharing for BMP's on developed riparian areas to protect water quality.</b>	
Restore natural buffers on two developed riparian lots per year through the Marinette County Cost Share Program	80
Provide designs and installation assistance repair of boat landings, and eroding private and public lots	100
<b>Objective C – Administer the Marinette County Shoreland - Wetland Zoning, Private Sewage System, Nonmetallic Mining Reclamation, and Flood Plain Zoning Ordinances</b>	
<b>Research, survey, and create management plans for conditional use permits, remediation, and restorations</b>	200
<b>Continue long term studies of selected areas of High Falls Flowage, Shannon Lake, and Simpson Lake to monitor the impacts of shoreline development</b>	120
Continue to attend training and workshops such as the Wisconsin Association of Lakes Convention, North American Lake Management Society Convention, etc. to stay current on the latest science, protection, and restoration techniques	160
Find partners and resources to perform appropriate resource monitoring.	

Work Plan 2011-2015

Activity	# of staff hours
<b>Goal 3 – Control runoff pollution from agricultural lands. Increase natural habitat.</b>	
<b>Objective A – Provide technical assistance and cost sharing for constructed or somewhat permanent agricultural BMPs.</b>	
<b>Install as many animal and milk house waste facilities, barnyard runoff control practices, etc. that financial resources and landowner interest allow</b> <i>(3 Manure Storage Systems, 2 Milking Ctr. Waste Control Systems, 2 Waste Transfer Systems, 2 Barnyard Runoff Control Systems)</i>	1300
<b>Apply for as many Targeted Runoff Management project grants as requested by landowner or required by violations of NR151</b> <i>(develop 4 applications)</i>	280
Properly decommission as many abandoned wells as can be found and paid for	20
Continue to attend training and participate on the WALCE Technical and Professional Improvement Committees	90
<b>Objective B – Provide technical assistance and cost sharing for planning and implementation of cropland BMPs.</b>	
Cost share as many acres of nutrient management planning as funding allows	20
Periodically perform the erosion transect survey	80
<b>Objective C – Implement the Marinette County Agricultural Performance Standards and Animal Waste Management Ordinance</b>	
Enforce the ordinance as needed	200
Perform compliance checks on installed BMPs	100
<b>Objective D – Implement a priority farm strategy</b>	
<b>Visit every farm still within its cost share agreement Operation and Maintenance period every year</b>	200
Continue improvements and data entry to the Marinette County GIS	80
Each year audit implementation of 20% of cost shared nutrient management plans	100
Continue to monitor remaining FPP contracts	20
Participate on WALCE, State, and Federal technical advisory committees	40
Find partners and resources to perform water quality monitoring to prioritize conservation efforts, set TMDLs where appropriate, and develop phosphorus indices. Specifically a phosphorus budget and TMDL should be developed for Lake Noquebay and TMDL's should be set for phosphorus in the Little Peshtigo (GB08) and Lower Peshtigo (GB07) Watersheds.	200

Work Plan 2011-2015

Activity	# of staff hours
<b>Goal 4 – Manage and/or prevent the spread of invasive exotic species</b>	
<b>Objective A – Provide technical assistance and cost sharing for the prevention and control of exotic species infestations</b>	
<b>Continue participation in the WDNR Great Lakes Restoration Initiative project to control phragmites along Green Bay (spray 800 acres of phragmites)</b>	400
When it becomes County policy again, administer the DNR Gypsy Moth Suppression Program <sup>1</sup>	120
<b>Continue to create AIS management and control plans for County lakes (2 plans)</b>	800
Continue to assist lake groups and local units of government with innovative control measures, and educational initiatives	500
<b>Objective B – Increase interagency communication and cooperation</b>	
Continue participation in the Wild Rivers Invasive Species Coalition	200
<b>Continue to help the DNR with Aquatic Invasive Species (AIS) by applying for AIS Rapid Response Grants</b>	200
<b>Work with staff at the Tommy G. Thompson State Park to prevent and/or control infestations of exotic invasive species</b>	40
Maintain resources and program capacity to respond to infestations before they become impossible to control	100
Develop resources to respond to aquatic and terrestrial invasive species infestations while they can still be eradicated	100
<b>Objective C – Increase the involvement of nongovernmental organizations in exotic species management</b>	
<b>Continue to work with Sandstone and Peshtigo Flowages and Thunder, Little Newton, Big Newton, McCaslin, and Beecher Lakes on aquatic plant management issues</b>	200
Continue to publish articles in the <i>Northwoods Journal</i> , local newspapers, and the County website on AIS issues	60
Continue to encourage and assist lake associations to become districts to facilitate better exotic species control	40
<b>Objective D – Educate the public and decision makers about prevention and control of exotic invasive species</b>	
Continue annual display at the Marinette County Fair	80
Continue assistance to Town Boards that want to manage AIS	40
Maintain capacity and resources to utilize external funding	
<b>Objective E - Promote and assist volunteer monitoring of exotic species</b>	
<b>Continue to hold Clean Boats, Clean Waters work shops</b>	80
When resources become available, find and train volunteers to recognize and report terrestrial invasive species infestations	

<sup>1</sup> Note: If the GMSP reaches its former peak activity levels again, this figure could become 400 hours

## 2011 Work Plan Budget

The tables above are based upon estimates of what will be the main efforts of the Land & Water Conservation Division, based on current knowledge of citizen and resource needs. However, recent history has shown us new issues and new funding opportunities frequently occur. Below are three examples.

In 2000 a combination of circumstances allowed for the creation of an Education Specialist position. At that time the thought was that this position would be a generalist assistant to the existing staff and provide educational programming as filler. It quickly became obvious that the interest in, and the need for, environmental education, demanded a change to that plan. It has come to pass that in the last few years that not only is the Education Specialist working solely on environmental education, but most of our staff have to pitch in to meet the demand.

In 2007, *Hydrilla verticillata*, particularly bad AIS made its first Wisconsin appearance in a private Marinette County pond. In response, WDNR Lakes Program requested that the LWCD take the lead on eradicating this plant by applying for an AIS Rapid Response Grant. Fortunately we had the staff resources to respond positively to the request, and led to a successful eradication effort.

In 2009, the USEPA announced a new Great Lakes Restoration Initiative that would provide funding for a broad spectrum of environmental projects. Once again, fortunately the LWCD had the staff in place to facilitate a partnership with the WDNR to take advantage of this opportunity to help hundreds of Marinette County landowners along the shore of Green Bay that were struggling to deal with *phragmites australis*.

In 2009, the most recent year that staff data is available, the five full-time, one project, and one limited term staff of the Marinette County Land & Water Conservation Division spent 13,013 hours on delivery of various programs, administration, and supporting activities. It is because we have the trained staff in place that we can respond to a changing environmental landscape and rapidly appearing, and disappearing, funding sources.

The efforts described in the work plan above are based on the assumption that our local staffing levels are maintained. For 2011 Marinette County is scheduled to receive approximately \$153,854 from the Department Agriculture, Trade, and Consumer Protection, approximately \$45,000 from the Department of Natural Resources, and \$2,000 from the Conservation on the Land Internship Program for staff and support costs. Marinette County is providing \$458,000 for staff and support.

Table 4-1 below describes the current external funding sources for 2011. As has been the case for several years, new needs and opportunities will surely occur in the coming months.

**Table 4-1. Major Grant Funded Projects and Initiatives Planned or Ongoing in 2011**

Program	External Funding Amount	Source	Notes
Targeted Runoff Management	\$1,050,000	WDNR	Does not reflect the actual cost of the seven projects planned for 2011, but the cost-sharing cap.
Great Lakes Restoration Initiative	\$808,626	USEPA	Partnership with DNR to control <i>Phragmites australis</i> along Green Bay and Lake Michigan. This funding is not just for Marinette County.
LWRM Plan Implementation	\$60,931	DATCP	Reflects the amount of cost share funding available, not the amount needed.
Aquatic Invasive Species Coordinator Grant Project	\$200,000	WDNR Lakes Pgm	This multi-year Grant funds a Coordinator to increase the LWCD's ability to control AIS infestations, provide public outreach, and utilize external funding.
Beecher Lake EWM Control Project	\$22,566	WDNR Lakes Pgm	Project to control Eurasian water milfoil in Beecher Lake
Lake Protection Program	\$5,000	WDNR Lakes Pgm	Project to update the Marinette County Shoreland Zoning Ordinance to comply with changes to NR115.
Thunder Lake Aquatic Plant Management Project	\$3,000	WDNR Lakes Pgm	Update to the Thunder Lake Aquatic Plant Management Plan to meet WDNR requirements.
Peshtigo Flowage Aquatic Invasive Species Planning Grant	\$9,180	WDNR Lakes Pgm	
External Funding Total	\$2,159,303		

# 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 (September 2002) 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 21.01 (December 2003) Shoreland-Wetland Zoning (3)

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

**MARINETTE COUNTY CODE OF ORDINANCES CHAPTER 20.02 (*April 2001*)**

**NONMETALLIC MINING RECLAMATION ORDINANCE** 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.

**MARINETTE COUNTY CODE OF ORDINANCES CHAPTER 18.01 (*May 2006*)**

**AGRICULTURAL PERFORMANCE STANDARDS AND ANIMAL WASTE MANAGEMENT (3)**

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.

**MARINETTE COUNTY CODE OF ORDINANCES Chapter 25.04 (*June 2004*)**

**CONSTRUCTION AND EFFECT OF ORDINANCES (4)** Ordinance enforcement by citation for Chapter 18 and 21 Marinette County Code. This Ordinance identifies the citation method of enforcement specified in § 66.119 Wis. Stats.

**MARINETTE COUNTY CODE OF ORDINANCES Chapter 23.01 (*June 2003*) LAND**

**DIVISION AND SUBDIVISION REGULATIONS (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. This ordinance will be adjusted in 2011 to comply with the revisions to NR115 promulgated in January 2010.

**MARINETTE COUNTY CODE OF ORDINANCES Chapter 15.02 (*Dec 2008*) PRIVATE**

**SEWAGE SYSTEMS** 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.

**MARINETTE COUNTY CODE OF ORDINANCES Chapter 17.02 (*Jun 2005*) ZONING**

**CODE** 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.

The full texts of the Marinette County Ordinances listed above may be viewed at [www.marinettecounty.com](http://www.marinettecounty.com).

Under subchapter III of NR 216, Wis. Adm. Code, a notice of intent shall be filed with the DNR by any landowner who disturbs one or more acres of land. This disturbance can create a point source discharge of storm water from the construction site to waters of the state and is therefore regulated by DNR. Agriculture is exempt from this requirement for activities such as planting, growing, cultivating and harvesting of crops for human or livestock consumption and pasturing or yarding of livestock as well as sod farms and tree nurseries. Agriculture is not exempt from the requirement to submit a notice of intent for one or more acres of land disturbance for the construction of structures such as barns, manure storage facilities or barnyard runoff control systems. (See s. NR 216.42(2), Wis. Adm. Code.) Furthermore, construction of an agricultural building or facility must follow an erosion and sediment control plan consistent with s. NR 216.46, Wis. Adm. Code and including meeting the performance standards of s. NR 151.11, Wis. Adm. Code.

An agricultural building or facility is not required to meet the post-construction performance standards of NR 151.12, Wis. Admin. Code. (07/31/08 MAL)

## **Agricultural Performance Standards and Prohibitions Implementation Strategy**

Marinette County enforces a number of local ordinances to protect the environment, public health and safety, local economy, etc. A main focus of the Land and Water Conservation Division is to implement the NR151 Agricultural Standards and Prohibitions as outlined under Goal 3. 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**

When the relationship of workload to resources becomes favorable, prioritize farms for installation of BMPs list based upon ATCP 50.12(2)(f) and other state and local criteria.

Inform and educate landowners/operators about performance standards and prohibitions

Conduct compliance status 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 landowners/operators to achieve compliance with performance standards and prohibitions

Develop cost-share agreements with landowners/operators and provide them with technical assistance to achieve compliance with performance standards & prohibitions

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.

Appeals process, compliance provisions and entire text of Marinette County Ordinances can be found at the Marinette County Web site [www.marinettecounty.com](http://www.marinettecounty.com) or at:

Land Information Department  
Courthouse, 1926 Hall Ave.  
Marinette, WI 54143-1717.

# 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 Marinette County I&E strategy is based on a quote from a Senegalese ecologist.

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*

In the I&E strategy, objectives for each goal have been detailed. The strategy also lists important messages and recommended activities to deliver those messages. New messages and activities may be developed as the plan is implemented. Implementation of the I&E strategy will be evaluated and modified along with other components of the work plan 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.

The I&E strategy focuses on four main elements.

**Knowledge:** People must understand how land use affects water quality and quality of life. They need to be given the information necessary to understand the cause and effect of land use decisions on the environment and become good stewards of our land and water resources. Refer back to the quote above.

**Skills:** People need skills to correct runoff pollution problems, protect and enhance habitat, and prevent the spread of exotic invasive species. They must be supported with tools, resources, equipment, and expertise.

**Motivation:** Some individuals need moral or financial incentives to change their actions. They need to see what is in it for them in the form of higher property values, more fish and game, or better quality of life.

**Feedback:** To stay excited about their efforts, people need positive, ongoing feedback. Positive feedback (both from and to citizens) will maintain momentum and increase participation. Recognition is a key component of feedback. Also, follow up monitoring of installed projects and habitat restorations to measure results for publication.

## Audience

Components of the I&E program will reach all age groups that live and work 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. **Forestry Audience:** Predominantly forest landowners, but also loggers, consulting and industrial foresters, and users and consumers of county forest resources.
4. **Institutional Audience:** Lake associations and districts, local government, sporting and environmental groups, business associations, chamber of commerce, news media, service clubs, and churches.
5. **Commercial Audience:** Contractors, developers, realtors, well drillers, resort owners, stores and shops, and guides.
6. **Urban Audience:** Permanent and seasonal residents of cities, villages, or concentrated rural areas (subdivisions).
7. **Educational Audience:** Teachers, students, school administrators.

## 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 LWCD will take lead responsibility for the implementation of the information and education strategy. UWEX and WDNR provide supporting assistance. The LWCD will work with and seek additional support from local units of government,

sporting and environmental organizations, lake districts and associations, and other community groups and businesses.

## Information & Education Goals

Several specific messages and activities in support of resource goals described in Chapter 3 can be found on the following pages.

### **Goal #1: Help Marinette County citizens make the connection between land use and environmental quality.**

Marinette County residents and visitors of all ages must be constantly reminded about the role they play in the environment and their effect on the natural world. They must be given a greater understanding and appreciation of nature. However, LWCD's main focus is on the children of Marinette County. LWCD I&E programming builds on the tenets of 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. This type of programming is not just for show and tell or 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 decline in the past decade 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 that the current generation of children may be the first since World War II to die at an earlier age than their parents.

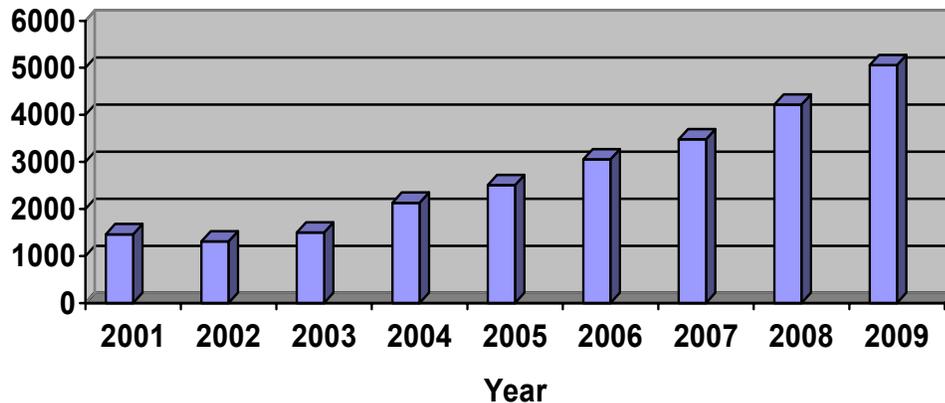
Factoring out other variables, studies in California and nationwide have shown that schools using outdoor classrooms and other forms of experiential education produce significant student gains in social studies, science, language arts, and math. One 2005 study by the California Department of Education 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 well being, 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 collection of mammal *Skins and Skulls*, *Birds-on-a Stick*, and trailer collection of canoes and paddling equipment.

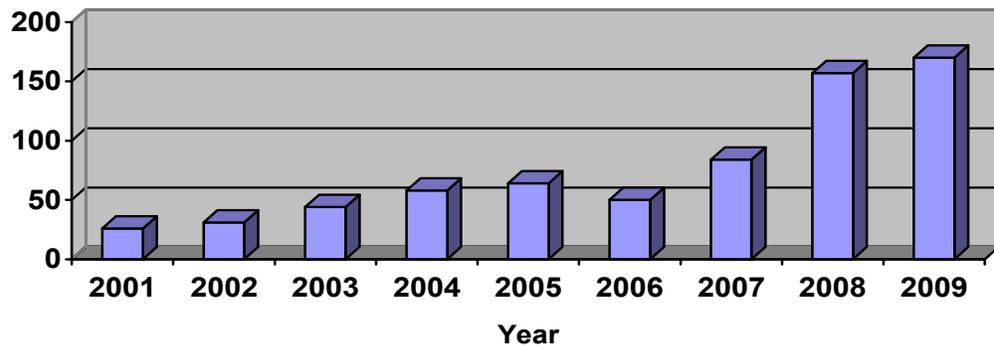
The TOAD program is an excellent tool for combating nature deficit disorder. It is also a way to let kids know about the wonders of nature and that they can have as much fun outside as inside. Children that know and love nature, rather than fear it, grow up to make environmentally friendly decisions. Since its creation, the TOAD program has continued to grow in popularity and expend in breadth. Figure 6-1 below shows the growth in the TOAD program.

**TOAD Program Attendance Numbers 2001-2009**



2001	–	1461	
2002	–	1307	
2003	–	1496	
2004	–	2131	
2005	–	2507	
2006	–	3053	
2007	–	3482	
2008	–	4217	
2009	–	<u>5058</u>	- excludes county fair attendance, DAR & Kiwanis days (680) –
didn't have	Total	24,712	those events in 2008, so excluded to keep comparable

### Number of TOAD Programs Presented 2001-2009



2001 – 26  
 2002 – 31  
 2003 – 44  
 2004 – 58  
 2005 – 64  
 2006 – 50 (Note: drop in programs presented due to absence of I&E Specialist Oct.-  
 Dec. '06)  
 2007 – 84 (Note: no replacement I&E Specialist until end of March '07)  
 2008 – 157  
 2009 – 170 (not including Kiwanis & DAR events, PELC canoe, Cons. Camp, EFD, or  
 fair)  
 684 total as of 12-23-09

### Messages

- C Stewardship for Land and Water Resources is everyone's responsibility. What we do on the land affects our water quality.
- C Land and water resources are valuable to us in their natural state.
- C Nonpoint source pollution is the number one threat to water quality in Marinette County.
- C Healthy habitat is the key to flourishing fish and wildlife populations.
- C Habitat loss and fragmentation are harming fish and wildlife populations.
- C Wetlands provide critical fish and wildlife habitat, protect water quality, and limit flooding.
- C Agriculture and environmental stewardship can benefit each other.

### Goal #2: Control runoff pollution from riparian areas and forest lands. Increase natural habitat.

In addition to general environmental education, the LWCD will also offer targeted education programming in support of our technical assistance and cost sharing programs, habitat restoration, exotic species control, ordinance enforcement, and whatever new environmental threats materialize.

### **Messages**

- C Natural vegetated buffers and BMP's for water quality can improve the quality of life for shoreline property owners.
- C Forestry BMP's help preserve water quality while maintaining soil fertility and land values.
- C Cost sharing is available for some BMP's.
- C The Land & Water Conservation Division and other agencies can provide the tools and training to protect water quality.
- C Shoreland Zoning regulations are necessary to protect fish and wildlife habitat and natural scenic beauty.

### **Goal #3: Control runoff pollution from agricultural lands and increase natural habitat.**

### **Messages**

- C Best Management Practices (BMP's) help preserve ground and surface water quality while increasing farm efficiency and reducing costs.
- C Agricultural BMP's help preserve water quality while maintaining soil fertility and land values.
- C Cost sharing is available for some BMP's.
- C The Land & Water Conservation Division and other agencies can provide the tools and training to protect water quality.

### **Goal #4: Manage and/or Prevent the Spread of Invasive Exotic Species**

Because the threat of exotic invasive species is still relatively new, a significant amount of our effort is based on explaining why we should worry about them. Unlike many of our other environmental threats, we also must help the public identify the plants and animals the we must be on the look out for. Many exotic species have native look a likes.

### **Messages**

- C Invasive exotic species have the ability to invade natural systems and dominate or eliminate native plants and animals.
- C Certain exotic species have become a threat to natural areas in Marinette County.
- C Many invasive exotic species on the horizon have the potential to become a threat to the resources of the county.
- C Help to manage and prevent the spread of these species is available through the Land Information Department and WDNR.

# Chapter 7. Coordination

The voluntary components of this plan rely on State, Federal, and to a lesser degree, County cost share programs. 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, 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.

Marinette County staff will design, implement, and oversee the construction of the majority of the Best Management Practices identified in the plan. Engineering assistance and job approval will be coordinated with the DATCP and NRCS area staff. Ordinance enforcement and regulatory compliance with the NR151 Performance Standards will be coordinated between the Land Information Department and the Marinette County Corporation Counsel.

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

## 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, water quality and quantity, 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 solution to problems. 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.

Exotic species also know no boundaries. Working to control their spread and eradicate exotic species where possible necessitates working with entities and agencies outside of Marinette County. The Marinette County LWCD will continue relationships across political boundaries, and seek new relationships, to improve the efficacy of prevention and control activities.

# Chapter 8. Monitoring and Evaluation

Lack of current data for water quality, land use, etc. has been a long-term problem, exacerbated by the extreme budget problems across the state and local agencies. It is no coincidence that almost no water quality monitoring has been done in Marinette County since the early 1990's. There simply has not been the staff or financial resources.

At the County level we have tried to follow up on projects, especially habitat restorations, to measure outcomes. At some of the sites this was done, the data has been quite compelling. Bass Lake in the Town of Beaver is a good example. Bass Lake is one of the deepest lakes in the County and at one time supported trout. However, by the 1970's the trout were eradicated by poor water quality caused by extremely high phosphorus loads reaching the lake. By the 1980's fish kills due to low dissolve oxygen were a regular occurrence and a once productive and popular fishery was gone.

In 1998 County staff secured one of the first TRM grants in Wisconsin and worked with the two farmers in Bass Lake's small watershed to install state-of-the-art runoff control practices that significantly reduced phosphorus entering the lake. Stewardship funds were used to place 2,000 feet of Bass Lake shoreline and 55 acres of cropland under permanent easement, and then a DNR Lakes Protection Grant helped pay for treating the lake with alum in 1999 to prevent the phosphorus buried in lakebed sediments from re-entering the water column and causing water quality problems. The U.S. Fish & Wildlife Service also helped install sediment basins and restored wetland areas to help filter out pollutants.

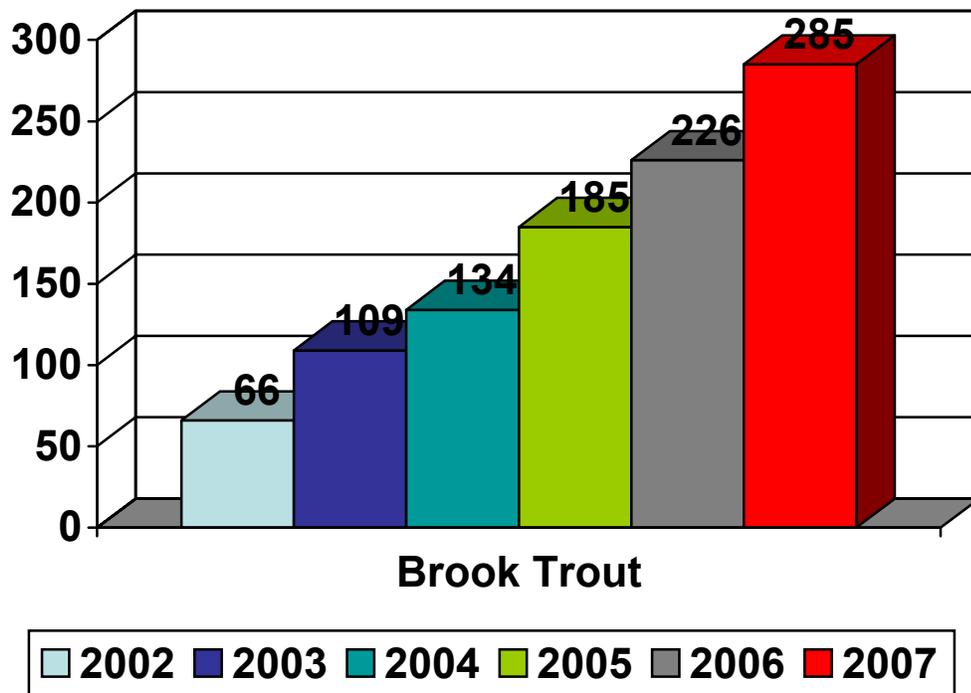
The combined impact of these efforts reduced the average in-lake phosphorus concentrations from 490 µg/L to 10 µg/L. Without the high concentration of phosphorus to feed on, heavy blue-green algae blooms no longer cover the lake, water clarity continues to improve, and no fish kills have been noted since the alum treatment. As the word has gotten out, Bass Lake continues to gain popularity with anglers.

Bass Lake had been listed on the Federal 303(d) list of impaired waters. The LWCD, under contract with the WDNR, performed validation monitoring to support its removal from the list. The monitoring effort, which began prior to 1998, included the installation of a weir and stilling well on the small creek that drained the adjoining farms to establish phosphorus loads to the lake. It also necessitated dozens of sampling visits to the lake to take water samples, establish stream flow rates, and to perform maintenance. Many hours more were spent compiling analyzing the data. Thousands of dollars were spent on water sample analysis. In total hundreds of hours were spent on the effort.

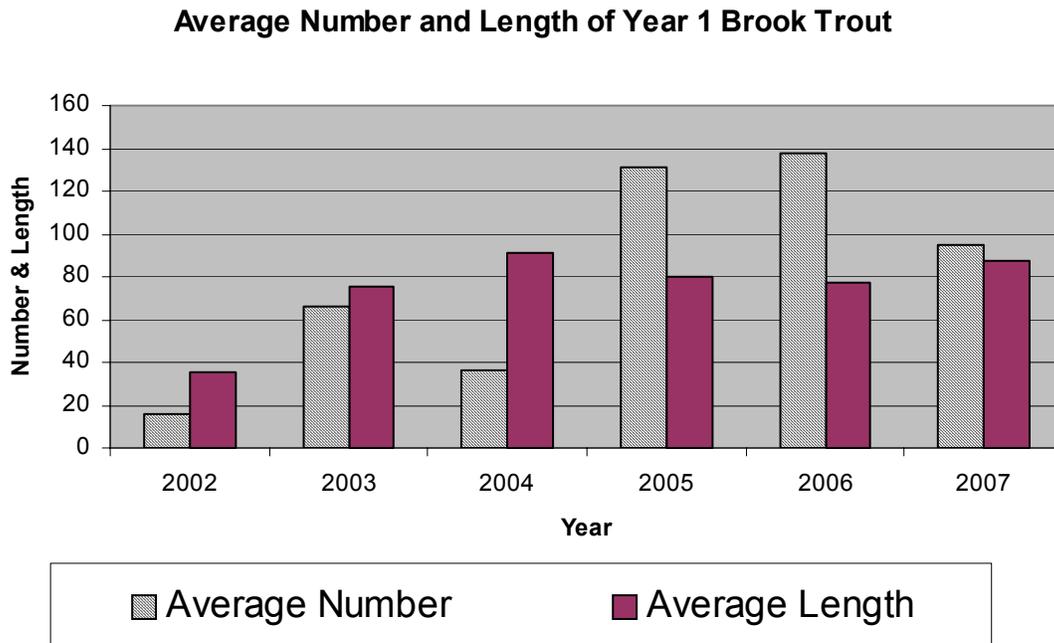
A second project that was closely monitored was an NR-243 project to remove cattle from a stretch of the South Branch of Beaver Creek. The practices installed at the site were exclusion fencing along the creek and a cattle crossing. Five years of follow-up electro-fishing with the help of the US Fish and Wildlife Service showed the dramatic response of the Brook Trout to the habitat work.

The following two graphs say it all. Figure 8-1 shows the 431% increase in the total number of trout captured by shocking in the stretch of stream that was fenced. Figure 8-1 shows the impacts on the growth rates of 1 year old trout in the same stretch. Growth rates are important to anglers that want trout large enough to keep. Also, as trout size increase, predation decreases.

Figure 8-1. Number of total Brook Trout Captured



For the years shown the Figure 8-2 compares the numbers and size distribution of year old trout. **The Y-axis is the number of fish and their average length in millimeters (25.4mm/ Inch).**



Analysis of the graph shows the need for multi-year data gathering and the need to consider external factors to better determine trends. Compare the curves for 2002 and 2005. Numbers of 1-year-old trout and their average size underwent a huge improvement. However, if data gathering had stopped in 2004, the conclusions may have been quite different. The water temperature during the shocking that year was very low compared to other years. It was the judgment of the USF&WS staff that the very cold-water temperatures were the cause of the poor catch and did not reflect the actual trout numbers. This was confirmed in 2005 when the trout numbers rebounded, and in years since.

We feel that the data above unequivocally show the success of these projects. However, the high cost of monitoring a lake for a decade or shocking a stream for five years, make it critical to choose research targets carefully.

Bass Lake had only two farms in its 488-acre watershed, making it possible to adequately monitor all pollution sources. Beaver Creek is a relatively small stream. Its watershed is impacted by agriculture, but not nearly to the extent that other streams in

the state are. This meant that the response of Brook Trout to the return of shoreline habitat was not held back by poor water quality immediately up or down stream.

The Upper Green Bay Basin Integrated Management Plan of February 2001 cited 89 Stream Table References. The average age of the references is now 24 years. There has been no replacement to the Basin Plan of 2001 and almost no new data, except a scattering of fisheries reports, at least for Marinette County.

The resources to perform countywide systematic water quality data are unlikely to be forthcoming in the foreseeable future. Given that reality we are forced to study the results of research done in other areas and assume they apply to our landscape. As noted in other parts of this plan, the Marinette County LWCD has done monitoring that was realistic for our staff and resources to perform. We will continue to seek out situations similar in size and scope to those discussed above, where monitoring makes sense.

Counting the number of BMPs for water quality installed, acres no longer winter spread with manure, etc. will continue to be done and tracked. We believe that the science in support of ending winter spreading of manure has been well enough established that we need not replicate it in Marinette County. The same is probably true for restoring naturally vegetated buffers, returning large woody habitat to riparian areas, and controlling exotic invasive species. One way to measure the success of our agricultural programs is the number of producers that would like to participate. In most years the interest in our programs exceeds the amount of cost sharing available.

Lake Noquebay was the target of a successful priority watershed project whose main goal was the reduction of phosphorus delivery. The lake has also been continuously mined of phosphorus through the extensive harvesting of aquatic plants since 1978. Despite these efforts, phosphorus levels continue to rise in the lake. The lake needs to have a phosphorus budget developed to determine the actual sources of the phosphorus and to set the Total Maximum Daily Load for this nutrient. Knowing the phosphorus sources and quantifying the amount of phosphorus coming from each source will allow for accurate targeting of resources to maximize pollution reduction and cost effectiveness.

Many of the LWCD education programs seek long term behavioral changes so that people make land use and other decisions that have 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? Therefore the main measure of success remains the continued growth in the popularity of our programs.

The LWCD continually seeks feedback and comments on educational programs. We are also working on developing methods and techniques that will help us learn what knowledge and understanding people are taking away from our programs and how to deliver specific messages.

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

- All of the aquatic plant management plans written by the LWCD have a pre and post herbicide treatment monitoring.
- The GLRI phragmites control grant we are part of has a monitoring component.
- The Gypsy Moth defoliation is monitored each year as part of the Suppression Program.
- We continue to monitor the boat landings of Marinette County for the spread of AIS.
- We continue to train citizens to monitor for AIS under the Clean Boats, Clean Waters program
- Marinette County has joined the Wild River Invasive Species Coalition in part to garner additional personnel and financial resources for monitoring the spread of invasive species and locating initial infestations

## Appendix A. Land Cover Classifications by Watershed

LAND CLASS	Little River GB04		Lower North Branch Oconto GB05		Lower Peshtigo GB07		Little Peshtigo GB08	
	Acres	% Cover	Acres	% Cover	Acres	% Cover	Acres	% Cover
Barren	7	0.1	58	0.3	449	0.4	283	0.4
Forage	2,386	25.3	461	2.3	21,606	17.5	18,545	26.3
Row Crop	2,821	30.0	371	1.8	21,855	17.7	17,092	24.2
Unknown Ag.	0	0.0	69	0.3	1,123	0.9	0	0.0
Forest	863	9.2	11,402	56.1	32,342	26.2	14,212	20.1
Grassland/Shrubs	104	1.1	2,276	11.2	4,904	4.0	1,925	2.7
Open Water	0	0.0	143	0.7	1,348	1.1	561	0.8
Wetland	3,231	34.3	5,539	27.3	39,025	31.7	17,989	25.5
Urban	0	0.0	0	0.0	617	0.5	0	0.0
<b>TOTAL</b>	<b>9,412</b>	<b>100.0</b>	<b>20,320</b>	<b>100.0</b>	<b>123,269</b>	<b>100.0</b>	<b>70,608</b>	<b>100.0</b>
State	0		0		4,622	3.8	1,251	1.8
County	540	5.7	10,560	51.97	6,788	5.5	0	
LAND CLASS	Middle Inlet Lake Noquebay GB09		Middle Peshtigo Thunder GB10		Upper Peshtigo GB11		Otter Creek & Rat River GB12	
	Acres	% Cover	Acres	% Cover	Acres	% Cover	Acres	% Cover
Barren	918	0.9	836	0.9	32	0.1	1	0.0
Forage	148	0.1	296	0.3	173	0.4	55	0.4
Row Crop	43	0.0	140	0.1	0	0.0	0	0.0
Unknown Ag.	9,332	9.4	3,052	3.1	68	0.2	0	0.0
Forest	45,318	45.5	62,694	64.2	30,787	75.5	11,074	88.5
Grassland/Shrubs	11,743	11.8	14,677	15.0	2,291	5.6	199	1.6
Open Water	3,452	3.5	3,680	3.8	1,430	3.5	72	0.6
Wetland	28,209	28.3	12,239	12.5	5,995	14.7	1,118	8.9
Urban	406	0.4	108	0.1	0	0.0	0	0.0
<b>TOTAL</b>	<b>99,569</b>	<b>100.0</b>	<b>97,721</b>	<b>100.0</b>	<b>40,775</b>	<b>100.0</b>	<b>12,520</b>	<b>100.0</b>
State	1,569	1.6	176	0.2	4	0.0	35	0.3
County	9,127	9.2	26,497	27.1	20,922	51.3	3,280	26.2

Land Cover Classifications by Watershed (cont.)

LAND CLASS	Wausaukee & Lower Menominee GB13		Pike River GB14		Pemebonwon & Middle Menominee GB15		Popple River GB17	
	Acres	% Cover	Acres	% Cover	Acres	% Cover	Acres	% Cover
Barren	1,198	1.0	559	0.3	1,196	0.8	0	0.0
Forage	714	0.6	338	0.2	0	0.0	26	1.0
Row Crop	1,172	1.0	0	0.0	0	0.0	0	0.0
Unknown Ag.	6,214	5.2	896	0.5	2,618	1.8	0	0.0
Forest	55,589	46.5	124,731	71.1	94,937	66.8	2,101	80.9
Grassland/Shrubs	16,702	14.0	13,679	7.8	9,907	7.0	33	1.3
Open Water	2,620	2.2	2,212	1.3	2,870	2.0	353	13.6
Wetland	33,403	27.9	32,783	18.7	30,211	21.2	83	3.2
Urban	1,920	1.6	252	0.1	462	0.3	0	0.0
TOTAL	119,532	100.0	175,449	100.0	142,202	100.0	2,596	100.0
State	703	0.6	6,868	3.9	630	0.4	1	0.0
County	11,173	9.3	84,280	48.0	61,253	43.1	0	0.0