

2011 Water Quality Management Plan Update

Lake Superior Basin, Wisconsin

December 2011 (2015)

The Marengo River Watershed is located in central Ashland and south central Bayfield counties in the Lake Superior Basin of northern Wisconsin. It is contained within the Bad–Montreal Watershed and covers an area spanning 218 square miles or approximately 139,313 acres. The western third of the Marengo watershed is located within Bayfield County and the eastern two thirds within Ashland County. Parts of ten townships, including: Ashland, Gordon, Grand View, Kelly, Lincoln, Marengo, Morse, Namakagon, Sanborn, and White River are located within the watershed. The northeast corner of the watershed, which includes the mouth of the Marengo River, is located within the reservation of the Bad River Band of the Lake Superior Tribe of Chippewa Indians. There are no incorporated cities or villages within the watershed. Unincorporated villages include: Marengo, Highbridge, Sanborn, and North York. Due to erosion and sedimentation caused by land use, topography, and geologic conditions within the watershed, the Marengo River Watershed has become an important focus area for highlighting “slow the flow,” the key management strategy to reducing sedimentation in Wisconsin’s Lake Superior Basin. A community watershed planning effort, called the Marengo River Watershed Partnership and led by the Bad River Watershed Association (BRWA), began in 2009. The planning effort has identified key issues and concerns and is completing an EPA nine-element Watershed Action Plan to address them. Issues and recommendations identified in this report will contribute to the Watershed Action Plan and the current working draft of the plan is largely excerpted in this report.



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Watershed Details

Population and Land Use

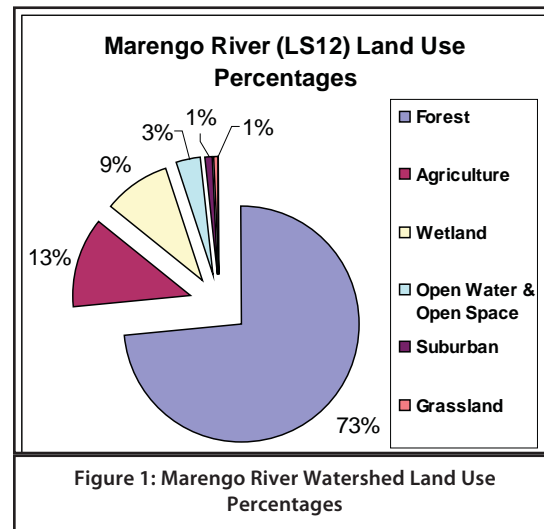
The Marengo River Watershed is primarily rural and most of the human habitation is located in the northern third of the watershed. Bayfield and Ashland County Comprehensive Plan documents contain summary demographic information for each county and the jurisdictions within the county. Data from towns were used to give a general summary of demographic information applicable to the Marengo River Watershed. General trends for the region are an increase in people age 35 and older and a decrease in people less than 35. In general, young people tend to leave the region in search of employment opportunities elsewhere and the resident population continues to age. A regional trend has been the sale of large tracts of industrial forest that are often broken up into smaller chunks of property that are bought by individuals for recreational purposes. The Marengo River Watershed has approximately 1,146 private landowners as of

2009 (BRWA data). Most of the private ownership is in the northern third of the watershed. Many of these are individuals who live outside the area and use the property for recreational opportunities such as hunting and fishing and may build a second home, particularly in waterfront areas.

The southern two-thirds of the watershed fall within the Chequamegon Nicolet National Forest and the mouth of the watershed is within the reservation boundary of the Bad River Band of the Lake Superior Tribe of Chippewa Indians. The northern third of the watershed contains areas cleared for agriculture, with dairy and beef operations the most common farming in these areas. The rugged terrain of the Gogebic Range in the upper watershed gives way to transitional sand/clay and eventually red clay soils in the lower watershed. The watershed is dotted with lakes, wetlands and alongside these a number of forest campgrounds and trails. The North Country Scenic Trail passes through this watershed. The St. Peter’s Dome Area, managed by the U.S. Forest Service, protects a unique geologic feature in an exposed granite dome with shaded cliffs, deep stream gorges, older hemlock forest, and several rare plant species. The Brunswailer River Gorge Special Management Area managed by the U.S. Forest Service features a mile-long river gorge with cascading rapids, granite cliffs, hemlock, white pine, and upland cedar forest and rare plants. In the headwaters area of the Brunswailer River, the U.S. Forest Service manages the Spider Lake Black Ash Swamp Research Natural Area that protects a high quality northern hardwood swamp.

As indicated earlier, according to the National Land Cover Dataset (NLCD) from 2001, forest dominates the landscape in the Marengo River Watershed, covering almost three quarters (73%) of the total area. Farmland and wetland are the next most common land uses in the watershed with 13% and 9% of the total area, respectively. Open water and space, suburban landscapes, and grassland encompass the remaining area in the watershed with three percent, one percent, and six-tenths of one percent of the area, respectively. Urban environments are minimal, accounting for only two-hundredths of one percent of the watershed’s area.

Land Use	Acres	Percent of Area
Forest	102,034.53	73.29%
Agriculture	17,576.09	12.63%
Wetland	12,681.62	9.11%
Open Water & Open Space	4,539.08	3.26%
Suburban	1,469.14	1.06%
Grassland	883.13	0.63%
Urban	31.80	0.02%
Barren	1.11	0.00%
Total Acres in Watershed	139,216.50	



Hydrology

The Marengo River and its watershed have been the focus of several recent studies focused on characterizing its geomorphology and hydrologic condition (Fitzpatrick 2005, Cahow and Fitzpatrick 2005, LSBPT 2007, BRWA 2010). The focus on the Marengo River comes in large part because it is estimated to be the largest contributor of sediment to the Bad River.

These studies have revealed evidence of how historical land cover change created unstable stream channel conditions that the Marengo River and other, similar Lake Superior watersheds are still responding to about 100 years later. It is these unstable conditions and current human influences that exacerbate the conditions, which lead to many of the challenges facing the health of these watersheds.

Streams in the Bad River Watershed tend to be characterized as “flashy,” meaning high flows are intense but short

in duration (Robertson 1997). The flashiness of these streams is a result of steep gradients, surficial deposits with high clay content, and land cover characteristics (Robertson 1997, Verry 2001). Many of these characteristics are particularly relevant within an area known as the “soil transition zone,” which corresponds with the shoreline of glacial Lake Duluth. The abandoned shoreline has wave-planned topography developed in sandy unconsolidated deposits. A combination of high relief, clay over sand, and clearing or road development in this area leads to high erosion rates (Fitzpatrick 2005).

The lower portion of the Marengo River displays evidence of sediment overload, likely transported during episodic flood events (Figure 2).

Excessive lateral m

igration and channel instability exist at the confluence of the Marengo and Bad rivers. Increased overbank sedimentation (levee building) disconnects the river from its floodplain and increases flood power to downstream reaches (Fitzpatrick 2005). The overbank sedimentation is primarily sand, presumably eroded from the wave-planned topography in the soil transition zone (Figure 3).

An hydrologic assessment identified the following specific concerns or areas of concern in the Marengo River Watershed:

- Areas with more than 50 or 60% open land or young forest;
- Sand deposition in the lower reaches of the watershed and at the confluence with the Bad River, filling in and channelizing flow and restricting access to floodplains;
- Cropland tillage, rotation, and surface drainage;
- Water channeled by road and ditch systems; and
- Drained wetlands contributing to the overall volume and velocity of water added to the river system during major runoff events.

Ecological Landscapes

Two ecological landscapes occur within the Marengo River Watershed, the Superior Coastal Plain Landscape covering the northern third; and the North Central Forest Landscape covering the southern two thirds of the watershed (Map 2). The Superior Coastal Plain is Wisconsin’s northernmost Ecological Landscape. Its major landform is a nearly level plain of lacustrine clays that slopes gently northward toward Lake Superior. Historically the Superior Coastal Plain was almost entirely forested and included a distinctive mixture of white pine, white spruce, balsam fir, paper birch, balsam poplar, trembling aspen, and white cedar. The North Central Forest has landforms characterized by end and ground moraines with some pitted outwash and bedrock controlled areas. Kettle depressions and steep ridges are found in the northern portion. Soils consist of sandy loam, sand, and silts. The historic vegetation was primarily hemlock-hardwood forest dominated by hemlock, sugar maple, and yellow birch.

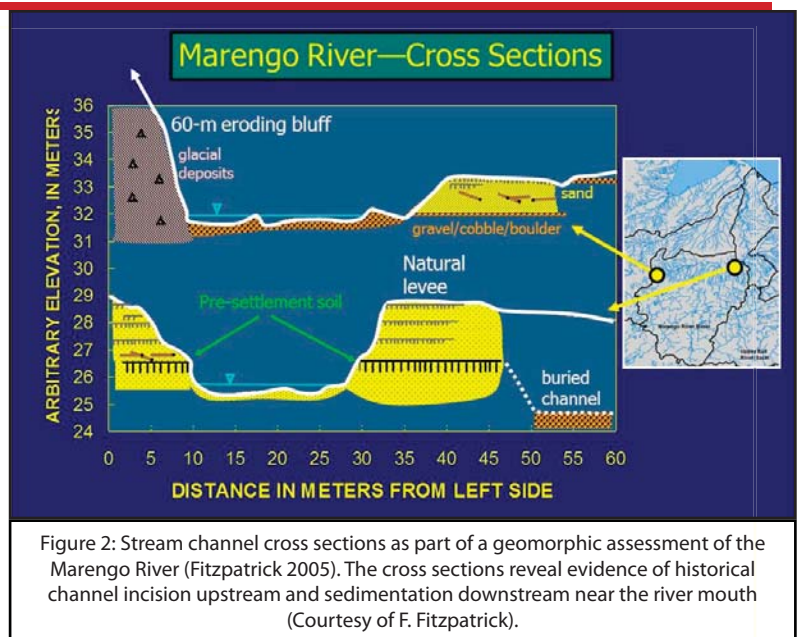


Figure 3: Levee building as a result of sand deposition near the mouth of the Marengo River (photo courtesy of Bad River Natural Resources Department).

Historical Note

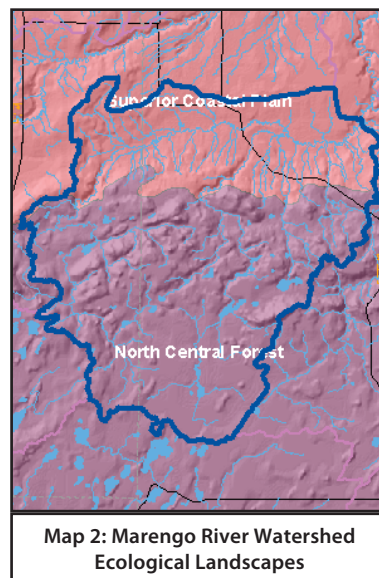
The landscape of northern Wisconsin and the Marengo River Watershed underwent significant change following European settlement of the region and exploitation of the region's rich natural resources in the late 1800's and early 1900's. Government Land Office survey notes indicate that the Marengo River Watershed was 100% forested in the 1850's. Original vegetation consisted primarily of mixed coniferous/deciduous forest (hemlock, sugar maple, yellow birch, white pine, and red pine), boreal forest (white spruce, balsam fir, tamarack, white cedar, and white birch), and wetland areas (Finley 1976).

Forests played a key role in slowing the rate of runoff to watershed streams from rain and snowmelt events, particularly in the northern, clay portion of the watershed where soil infiltration rates are naturally slower. The forests slowed the rate of snowmelt in spring and provided abundant wood to streams that helped create excellent habitat for native aquatic species like brook trout (*Salvelinus fontinalis*, WDNR and USFWS 2007).

After the decline in logging, major agricultural development in the region occurred from 1895 to 1920 (Mahaffey and Bassuk, 1978). Agricultural activity peaked in the mid-1920's to mid-1930's, with much of the upland areas consisting of cropland (forage crops and some corn) and pasture for dairy cattle (Fitzpatrick et al. 1999). Field drainage networks helped to rapidly channel water off the land and into streams.

Logging and agriculture also led to an extensive transportation network in the Lake Superior region. Road and rail grades can damage watersheds by blocking passage for aquatic species, combining drainages, and accelerating surface runoff (WDNR & USFWS 2005). The combination of forest removal and agricultural development had a tremendous effect on the landscape and stream channels of the Lake Superior Basin that is still being felt today.

Evidence indicates that watersheds have recovered to some extent (Fitzpatrick et al. 1999). However, legacy effects from past land use, often exacerbated by current human activity, limits the terrestrial and aquatic habitat potential of these watersheds, including the Marengo. Despite this, the Marengo and other Lake Superior Basin watersheds in Wisconsin still retain many high quality habitats and areas of habitat potential.



Watershed Condition

Priority Issues

The most widespread challenges facing the Marengo River Watershed (and many other watersheds in the Lake Superior Basin of Wisconsin) are related to the altered and unstable hydrologic system caused by past land uses. The sources of these challenges are part of a natural watershed response to disturbance, but in many cases are being exacerbated by current human activity. They prevent the watershed from achieving its full habitat potential and improving its resilience to climate change and other potential disturbances. Improving the unstable hydrologic system, reducing sediment loads, and establishing a more stable and resilient Marengo River Watershed will take time. While these challenges are widespread and require management responses on a watershed scale, the sources of other challenges such as pathogen and nutrient concerns are more localized. Better implementation of human and livestock waste management practices will be required to see improvement. Improvement for these localized concerns is more readily achievable in the short term and much good work has already been done. Success will be related to the willingness of the watershed community to embrace and implement solutions that meet these challenges. Several specific priorities for the watershed are outlined below.

1. Upper watershed streams are mostly within the Chequamegon-Nicolet National Forest and are in relatively stable condition. Protection of these conditions, as well as some localized road/stream improvement, eroding stream-banks, dam removal, and in-stream habitat improvement projects are known and should occur to improve and maintain these stable conditions.

2. Several reports from fisheries surveys of the lower Marengo in the 1960's and more recently in 2008 and 2009, to E. Epstein's report in the mid-1990's, to USGS geomorphic assessment work, have identified the tremendous sand load carried by the Marengo as an issue affecting aquatic habitat. We know that a combination of past land use (cut-over & intensive agriculture), current land use (agriculture and road drainage, synchronized snowmelt from open lands), and the nature of the highly erodible sand over clay soils in this watershed are reasons for the sedimentation problems. While much of the sedimentation is natural, estimates by USGS indicate sediment loads are two to three times greater today than they were pre-European settlement to the region. Reducing the rate of sedimentation to Marengo Watershed streams in the long-term is best accomplished by reducing the rate of surface water runoff through "slow the flow" projects, primarily in the soil transition zone (~elevations 1,050 ft. - 750 ft.) and clay plain (~elevations <750 ft.) areas of the watershed. Examples include: native upland and riparian tree planting, wetland creation/restoration, improving road/stream interactions, agricultural drainage. In addition, in-stream efforts to stabilize eroding stream bluffs, levee scrapes to increase floodplain connection, and creating channel roughness, particularly in headwater streams, will all help to maximize the aquatic habitat potential and increase the stability and resilience of this generally high quality watershed.
3. High bacteria counts in the lower reaches of the mainstem Marengo River and some of the unnamed and named tributaries to the lower Marengo are due to human and livestock waste management issues. BRWA data highlights one of these areas impacted by livestock waste and one where the source is likely human waste. A combination of targeted agricultural BMP implementation and septic system updates/sanitary district development in these areas is needed to reduce high bacteria counts and likely nutrient inputs associated with the waste management issues.
4. From Jim Cox, DNR Mercer office: The Marengo, Brunsweller, Silver Creek, and Trout Brook (probably both Billy creeks and possibly a couple of small, unnamed perennial tributaries in the same area) are spawning streams for Lake Superior rainbows as was evident from the numbers of small rainbows we caught there in 2007 and 2008. Preserving and improving spawning habitat should be a high priority.
5. There is a cluster of small, coldwater tributaries that includes Troutmere Creek and four to six unnamed streams in the 4 Corners area that have excellent IBI scores and should be priorities for further habitat assessment and improvement projects, trout classifications, and consideration as Outstanding or Exceptional Resource Waters.
6. Identifying other perennial streams without data and assessing their condition through temperature and fish assessments should be priorities.

Water Quality Goals

The most widespread challenges facing the Marengo River Watershed (and many other watersheds in the Lake Superior Basin of Wisconsin) are related to the altered and unstable hydrologic system caused by past land uses. The sources of these challenges are part of a natural watershed response to disturbance, but in many cases are being exacerbated by current human activity. They prevent the watershed from achieving its full habitat potential and improving its resilience to climate change and other potential disturbances. Improving the unstable hydrologic system, reducing sediment loads, and establishing a more stable and resilient Marengo River Watershed will take time. While these challenges are widespread and require management responses on a watershed scale, the sources of other challenges such as pathogen and nutrient concerns are more localized. Better implementation of human and livestock waste management practices will be required to see improvement. Improvement for these localized concerns is more readily achievable in the short term and much good work has already been done. Success will be related to the willingness of the watershed community to embrace and implement solutions that meet these challenges.

The people that live, work, and play here recognize this and the Marengo River Watershed Partnership (MRWP) was formed as a way for watershed residents, local government leaders, and natural resource professionals to express things they value about the watershed, concerns they have about its health, and to identify actions needed to maintain and improve the health of the watershed for future generations.

The MRWP developed a vision statement that reads: "We would like to see a Marengo River Watershed that has clean, flowing water; supports healthy, diverse, and resilient plant and animal communities free of invasive species; and is a vital community of watershed stewards who take actions to care for the watershed, while enabling a productive livelihood."

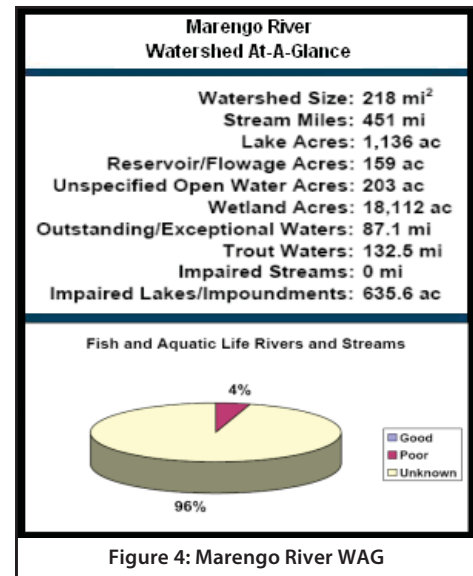
To achieve this vision the Marengo River Watershed Action Plan provides a framework to accomplish the following goals:

- Goal #1: The hydrologic system in the Marengo River Watershed is stable and resilient.
- Goal #2: Safe water and healthy, productive soil are available and maintained for all human and wildlife uses.
- Goal #3: The Marengo River Watershed has diverse, healthy, and resilient native communities of plants and animals and their habitats on land and in water.
- Goal #4: Citizens of the Watershed are active and engaged in maintaining the integrity of the watershed.

Challenges include stresses or issues and concerns that prevent watershed goals from being met. Challenges specific to the Marengo River Watershed and their sources, primarily runoff pollution, were identified and prioritized by the MRWP based on their “severity” and “scope.” The challenges are: 1) Unstable hydrologic system; 2) excess sediment; 3) excess nutrients; 4) high bacteria counts; 5) loss of aquatic habitat; and 6) terrestrial habitat fragmentation and alteration.

Overall Condition

Twenty-five miles of Exceptional Resource Waters can be found along stretches of Hawkins Creek, Spring Brook, Troutmere Creek, and several unnamed tributaries of Marengo River. Another 62 miles of Outstanding Resource Waters can be found along stretches of Brunsweler River and Marengo River. A 10-mile segment of the Brunsweler River was designated by the Wisconsin State Legislature as the “Martin Hanson Wild River” in the spring of 2009 to honor the late conservationist. There are also extensive lengths of trout waters, totally over 132 miles. Hawkins Creek, Troutmere Creek, and several unnamed Tributaries to the Marengo River contribute over 25 miles of Class I trout streams. A total of 56 miles of Class II trout streams are spread along segments of the Marengo River, Billy Creek, Trout Brook, McCarthy Creek, Morgan Creek, Blaser Creek, Silver Creek, Frames Creek, Waboo Creek, Brunsweler River, and Whisky Creek. The remaining 52 miles of trout streams are classified as Class III and are located on Trout Brook, Whisky Creek, Silver Creek, Brunsweler River, and Marengo River. No streams within the watershed are listed for impairments, but English Lake, Lake Three, Mineral Lake, Potter Lake, and Spider Lake are all listed for elevated mercury levels due to atmospheric deposition (see Figure 4).



River and Stream Condition

According to the WDNR’s Register of Waterbodies (ROW) database, there are over 451 miles of streams and rivers in the Marengo River Watershed; 163 of these miles have been entered into the WDNR’s assessment database. Of these 163 miles, four percent are not meeting Fish and Aquatic Life uses and are considered to be in “poor” condition and are listed as impaired. The condition of the remaining stream miles is not known or documented. Additional uses for which the waters are evaluated include Fish Consumption, General Uses, Public Health and Welfare, and Recreation. As Table 2 shows, these uses have not been directly assessed for the watershed. However, general fish advice for the potential presence of mercury is in place for all waters of the state.

Use	Not Supporting	Not Assessed	Total Size
Fish Consumption		162.51	162.51
Fish and Aquatic Life	7.01	155.5	162.51
General		162.51	162.51
Public Health and Welfare		162.51	162.51
Recreation		162.51	162.51

Billy Creeks

There are two Billy creeks tributary to the Marengo River in T46N R3W. The longer of the two drains a largely cleared area and enters the river in Section 32. The other enters the river in Section 35. This latter stream is considered a Class II trout fishery stream for brook trout. Wisconsin Trout Streams has incorrectly identified the stream's location. The trout stream also drains lands cleared for agriculture. During survey work conducted as part of the coastal wetlands evaluation, the Billy Creek at Section 32 was found to contain no rare species of macroinvertebrate and overall taxa richness was moderate (5-24 species) (Epstein 1997).

Brunswailer River

This stream has a number of warmer lakes of glacial origin in its headwaters and feeders, making the upper reaches more suitable for warmer water forage communities. As it passes along valleys at the feet of the Gogebic Range, the water quality and river characteristics change markedly. The principal tributaries contributing to the river's flow are Spider Creek, Hell Hole Creek, Camp Six Creek and several unnamed streams. Trout streams include McCarthy Creek, Spring Brook, Trout Brook and unnamed streams. Monitoring data at Brunswailer River- Springbrook Road from 2007 is considered Fair for this cool-warm mainstem stream. Two monitoring stations associated with upstream portions of Brunswailer Creek, mile 4.2 to 9.53, were monitored between 2007 to 2009. Results indicated 'excellent' conditions for two stations in both years

Below the outlet of Beaver Dam Lake, spring water raises the water quality to that of a medium quality brook, brown, and rainbow trout stream down to the confluence with Spring Brook. From this point to Highway 13 the trout habitat deteriorates due to unstable bottom conditions and erosion in the red clay area. A few migratory rainbow trout are present between Highway 13 and the confluence with the Marengo River, but mostly the stretch from Highway 13 to the mouth is considered a warm water sport fishery including muskellunge, smallmouth bass, perch, bluegills, black crappies, rock bass, pumpkinseeds, and a variety of forage species. This stream changes from a warm water drainage stream to a rocky hard-bottomed high-gradient stream in its midsection and finally back to a warmer low-gradient stream at its outlet. Extreme water level fluctuations make habitat management difficult. A large portion of the river flows through the Chequamegon National Forest and other forest lands where potential exists for logging activities. The river is considered highly scenic, but not very navigable due to the rugged river bed. During survey work conducted as part of the coastal wetlands evaluation one rare species of macroinvertebrate was found and overall taxa richness was moderate (5-24 species) (Epstein 1997). At survey sites, livestock, barnyards and cropland are considered threats.

Water quality indicators included significant aquatic plants, and slime and iron bacteria to a lesser extent. In 2009, approximately a ten-mile section of the Brunswailer River located within the Chequamegon National Forest was designated as a State Wild River. This stretch of the river, from the point at which the Brunswailer River leaves the southwest quarter of the southwest quarter of Section 22, Township 44 north, Range 4 west downstream to the point at which the Brunswailer River crosses the boundary of the Chequamegon National Forest in the northwest quarter of Section 22, Township 45 north, Range 4 west, is named for Martin Hanson, a prominent conservationist who championed the Brunswailer Wild River proposal until his passing in 2008. This same stretch of river is designated as a Federal Wild and Scenic River, as well, excluding the section from Mineral Lake to Beaver Dam Lake.

Camp Six Creek

This small tributary flows into Mineral Lake in the Brunswailer River system. It drains a dense shrub swamp. During survey work conducted as part of the coastal wetlands evaluation no rare species of macroinvertebrate were found and overall taxa richness was low (0-4 species) (Epstein 1997).

Hawkins Creek

This stream originates from springs at the base of the highest point in Bayfield County and flows north to Morgan Creek. The stream has a high gradient of some 100 feet per mile. Once it enters Section 1 T45N R5W, it becomes a Class I trout water and is classified an Exceptional Resource Water. The stream bottom is primarily rubble, sand, and gravel with an occasional boulder. Bordering streambank vegetation is mixed upland hardwoods. During survey work conducted as part of the coastal wetlands evaluation one rare species of macroinvertebrate was found and overall taxa richness was high (25 species or more) (Epstein 1997). Two Hawkins Creek monitoring stations were monitored in 2008. Hawkins Creek 106 meters downstream Snake Trail Road indicated "poor" conditions and 15 meters upstream of Forest Road 383 B was indicated as "fair".

Marengo River

The Marengo River curves through a region of lakes, wetlands, forest, and high hills in the Gogebic Range, then flows down into a region of red clay soils and lands cleared for agriculture, before flowing into the Bad River Indian Reservation to meet the Bad River. The river drains more than 80 square miles of Bayfield County before crossing into Ashland County. Only one impoundment exists on the river. This five-foot-tall concrete overflow dam is at the head of a scenic rapids and falls area. About a mile below, a privately held abandoned granite quarry is part of a scenic area.

The Marengo is a trout water, with the portion above Marengo Lake supporting a Class II trout fishery and the reaches below the lake supporting a Class III trout fishery. Migrating sea lamprey from Lake Superior historically have spawned in the lower reaches of the Marengo River. Due to rapid runoff from its rather impervious soils, steep hills, and rock outcroppings, the river experiences three-to-four-foot flood crests. Most of the stream is quite open with the only good cover found in deep pools. Stream bottom types vary, with muck and sand predominating in the extreme upper stream areas, rubble, gravel and boulders through the middle portion, while the lower reach is almost entirely unstable sand. Extensive beaver activity deteriorates trout habitat along the upper shrub-marsh areas. Muskrats also use the river as do nesting and migratory waterfowl. As the river passes into Ashland County, the stream passes through large stretches of agricultural lands and the clear water becomes turbid due to streambank pasturing. There are a number of quarries in this watershed, as well as the potential for logging activities.

The variety of jurisdictions overseeing land uses can mean variability in management practices. Past documentation indicates an effluent ditch near the community of Marengo carries septage to the river. The impact of this is unknown, and it is unknown if this ditch is open to human access or poses a risk to wild and domestic animals. The Great Lakes Indian Fish and Wildlife Commission released a survey report on purple loosestrife in the Bad River Watershed. The report documents significant loosestrife infestations, the worst of which is around High Bridge and portions of the Marengo River. During survey work conducted as part of the coastal wetlands evaluation one rare species of macroinvertebrate was found and overall taxa richness was moderate (5-24 species) (Epstein 1997). At the survey site in Bayfield County, significant pollutant sources were identified from point sources, construction activities, livestock, barnyards, and cropland. Significant silting may be affecting habitat quality.

The Marengo River was assessed during the 2014 listing cycle; biological sample data (i.e. macroinvertebrate or fish Index of Biotic Integrity (fIBI) scores) clearly met 2014 WisCALM listing thresholds for the Fish and Aquatic Life use. Five monitoring sites on the Marengo River were monitored for biological data in the past five years (2008 through 2012). Fish IBI data on 2008 through 2013 indicated a mix of fair, good and excellent values at three different stations. A macroinvertebrate value indicated "excellent" condition was also collected.

McCarthy Creek

This Class II trout stream flows into the Brunsweler River. Old data reported the stream's ability to support trout had been inhibited by beaver activities. The creek is primarily a sand and silt stream with a few gravel-bottomed riffle areas used for spawning. Much of the stream is within the Chequamegon National Forest. During survey work conducted as part of the coastal wetlands evaluation no rare species of macroinvertebrate were found and overall taxa richness was moderate (5-24 species) (Epstein 1997). Impoundment was a significant factor affecting habitat quality.

Morgan Creek

Morgan Creek is an eight-mile long tributary to the Marengo River in Chequamegon National Forest in Ashland and Bayfield Counties. The stream has been identified as a cold Class II Trout water. Two monitoring stations associated with Morgan Creek were monitored between 2007 and 2013. FIBI values at Morgan Station #2 indicated "fair" conditions and an tributary to Morgan Creek (T45N R4W S30) was found to be excellent.

Silver Creek (T46N R3W S34)

This stream flows north into the Marengo River. Rainbow trout are most abundant and reproduce well in this stream. Brook trout are common as well. Some migratory trout and salmon activity occurs. Although the water quality has traditionally been good, a combination of extreme water level fluctuations, beaver activity, and streambank pasturing threatens water quality. This upstream portion of Silver creek was monitored for the fish IBI at tributary to Silver Creek at CTH C with a value of 90 in 2010 which is considered excellent on this cold water stream.

Spring Brook

This is a Class I trout feeder that flows into the Brunswailer River in Ashland County. The stream originates in Beaver Lake and picks up spring water before flowing through Seitz Lake, which also contributes spring water. The stream's tributaries also support trout. Brook trout are numerous. Near the stream's outlet, a few warmer water species exist, including perch, bluegills, and pumpkinseeds. Fish IBI values (2013) at Spring Brook upstream Wolanek Rd was indicated as fair. A three-foot water control structure occurs where a federal fish hatchery once operated. While the dam still exists, there is no flowage behind and this is a high stream gradient riffle area. Most of the streambank is in upland hardwoods, with some tag alder swamp borders. The stream has a number of gravel spawning areas; in-stream cover was improved in the 1960's by resource management projects. Muskrat and nesting ducks are present in the upper reaches. A good portion of streambank is in Chequamegon National Forest ownership.

Trout Brook

Trout Brook flows north from the outlet of English Lake and into the Brunswailer River on the Bad River Indian Reservation, just before the Brunswailer's confluence with the Marengo. This stream supports a population of brook, brown and rainbow trout. Several small feeders also support trout. A granite quarry beside the stream near English Lake caused a small impounded area behind granite debris. Downstream springs help maintain the cold water necessary for trout. Water level fluctuations can be problematic. The upstream reaches are in upland hardwood, while the lower half is mostly pastured. A private fish hatchery has operated on a small feeder stream. During survey work conducted as part of the coastal wetlands evaluation one rare species of macroinvertebrate was found and overall taxa richness was moderate (5-24 species) (Epstein 1997). Two stations on the lower portion of the stream have been monitored for biological data (fish IBI) in 2007. Results indicate the stream is in "fair" condition. The upper portions of the stream were also monitored 2007, with fair and poor values indicated.

Troutmere Creek

This small tributary to the Marengo River should support a Class I trout fishery and is classified as an Exceptional Resource Water. Brown trout are common and some areas support spawning trout from the Marengo River. Bottom conditions tend to be unstable. Much of the streambank is pastured and bank vegetation is mostly grass and wooded upland. It flows primarily through privately held lands (From: Turville-Heitz, Meg. 1999. Lake Superior Basin Water Quality Management Plan. Wisconsin Department of Natural Resources, Madison, WI). Macroinvertebrate monitoring at Troutmere Creek 120 meters downstream of Wildcat Rd (mIBI) was 7.21, which indicates good aquatic health.

Unnamed Tributary to Marengo River T44N R5W S16 (NWNE)

Five unnamed tributaries to the Marengo River are Class I trout streams and are Exceptional Resource Waters. These streams are all incorrectly located in Wisconsin Trout Streams based on their headwaters, not their outlets.

- The tributary listed as T44N R5W S17 is in Section 16 NWNE and is a small spring stream populated by brook and brown trout with a stable bottom of rubble, gravel, boulders, and sand. Bank vegetation is upland hardwood.
- The stream listed as T44N R5W S20 is in Section 16 NESE and is a small spring-fed stream with brook and brown trout. Sculpins are abundant. The trout are stunted, which may indicate a lack of in-stream food sources. Cover is good and stable rubble, boulder, gravel, and sand make up its bottom. The bank is vegetated by upland hardwoods. Both of the preceding streams flow mostly within Chequamegon National Forest lands.
- The stream listed as T44N R5W S21 is in Section 15 according to 1984 1:24,000 scale topographic maps, though Surface Waters of Bayfield County identifies the stream as entering in Section 16. This stream is a small brook trout water flowing north along the west side of the old Grandview Quarry. Adjacent to the quarry, stream bottom types are mainly sand, gravel, and crushed granite. Above the quarry, little granite is present. Most of the streambanks are in private ownership.

Waboo Creek

This small, spring-fed brook trout stream flows into Spring Brook. It is considered a Class II trout stream and serves as a spawning area for Spring Brook. Much of the adjacent streambank is tag alder swamp. During survey work conducted as part of the coastal wetlands evaluation no rare species of macroinvertebrate was found and overall taxa richness was low (0-4 species) (Epstein 1997).

Whiskey Creek

The unnamed Whiskey Creek tributary at T44N R5W S13 is a Class I trout stream and Exceptional Resource Water. The stream is incorrectly identified by its headwaters, not mouth, in Wisconsin Trout Streams. This stream supports a brook

trout fishery as it flows through mature hardwood forest to Whisky Creek. Whisky Creek is a broad sluggish drainage stream as it leaves Ashland County, but where the feeder converges the water quality improves. The entire stream flows through the Chequamegon National Forest. During survey work on Whisky Creek conducted as part of the coastal wetlands evaluation no rare species of macroinvertebrate were found and overall taxa richness was moderate (5-24 species) (Epstein 1997). Macroinvertebrates were significant at the survey site.

Lake Health

The WDNR’s ROW database shows that there are over 1,135 acres of lakes and ponds, 159 acres of flowages and impoundments (from Beaverdam Lake and Lake Three), and another 203 acres of unspecified open water in the Marengo River Watershed. Of these, over fourteen hundred acres are entered into the state’s assessment database. Most of these waters (85%) are indicated as supporting Fish and Aquatic Life uses. A couple hundred acres have not been assessed for Fish and Aquatic Life use. In addition, almost half (45%) of the lake acres entered into WDNR database within the Marengo River Watershed are indicated as not supporting Fish Consumption use, and the remaining lake acres have not been assessed for Fish Consumption use.

Table 3: Designated Use Support Summary for Marengo River Watershed Lakes (all values in acres)

Use	Supporting	Fully Supporting	Not Supporting	Not Assessed	Total Size
Fish Consumption			635.56	768.67	1,404.23
Fish and Aquatic Life	1,136.44	61.4		206.39	1,404.23
General				1,404.23	1,404.23
Public Health and Welfare				1,404.23	1,404.23
Recreation				1,404.23	1,404.23

There are 20 named lakes or impoundments within the Marengo River Watershed and many other unnamed ponds and wetland areas. The lakes and impoundments all occur within the southern two-thirds of the watershed associated with the North Central Forest Ecological Landscape. Named lakes over ten acres in size include (in order of descending surface area): English Lake, Mineral Lake, Marengo Lake, Spider Lake, Moquah Lake, Tea Lake, Coffee Lake, Indian Lake, Beaver Lake, Potter Lake, Bass Lake, Olson Lake, Long Lake, Seitz Lake, and Spruce Lake.

Loon populations are currently being monitored by volunteers in the following watershed lakes through Northland College’s Loon Watch Program: Bass Lake, Beaver Lake, Beaverdam Lake, Coffee Lake, English Lake, Lake Three, Marengo Lake, Mineral Lake, and Tea Lake (Northland College 2010). Mineral Lake is one of WDNR’s Citizen Lake Monitoring Network, Lakes Baseline and Trends Monitoring sites. Some of the lakes in the Marengo River Watershed are managed by WDNR for walleye or muskellunge.

Wetland Health

Wetland Status

The Marengo River Watershed is located in central Ashland and south central Bayfield counties in the Lake Superior Basin of northern Wisconsin. An estimated 11% of the current land uses in the watershed are wetlands. Currently, about 68% of the original wetlands in the watershed are estimated to exist. Of these wetland acres, the majority are forested wetlands (77%) and scrub wetlands (19%).

Wetland Condition

Little is known about the condition of the remaining wetlands, but estimates of reed canary grass (RCG) infestations, an opportunistic aquatic invasive wetland plant, into different wetland types has been estimated based on satellite imagery. This shows reed canary grass dominates 3% of the existing forested wetlands and 8% of the remaining shrub wetlands (See Figure 5). Reed canary grass domination inhibits successful establishment of native wetland species.

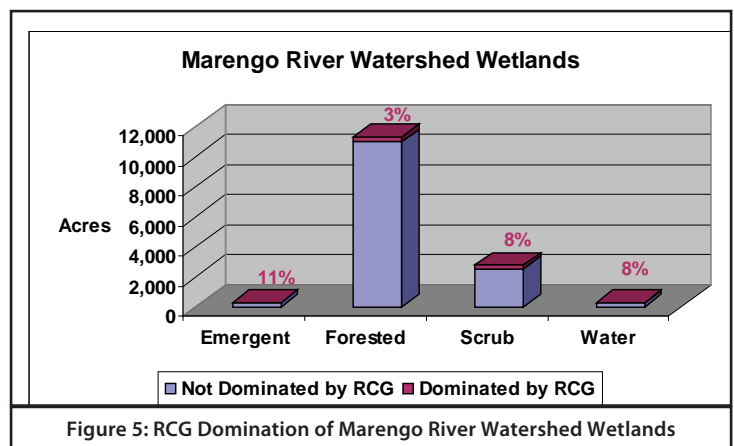


Figure 5: RCG Domination of Marengo River Watershed Wetlands

Wetland Restorability

Of the 6,791 acres of estimated lost wetlands in the watershed, approximately 97% are considered potentially restorable based on modeled data, including soil types, land use, and land cover (Chris Smith, DNR, 2009).

Groundwater

Groundwater is an important resource in the Marengo River Watershed that is not very well understood. Groundwater feeds many streams, seeps, wetlands, and lakes and is essential for supporting trout populations in over 130 miles of designated trout streams in the watershed. Understanding groundwater contributions to base-flow in streams is important to identifying and managing aquatic habitats.



Forested Wetlands (Photo courtesy of WDNR)

Residents of the Marengo River Watershed rely on private wells for their drinking water needs. There are no municipal water systems currently within the watershed (UW-Extension and USGS 2008). Areas associated with clay surficial deposits in the northern third of the watershed tend to have low susceptibility to groundwater contamination, while areas in the southern two-thirds (associated with sand and sand/gravel surficial deposits) tend to have higher susceptibility to groundwater contamination.

Data from an online resource titled: Protecting Wisconsin's Groundwater through Comprehensive Planning (UW-Extension and USGS 2008, <http://wi.water.usgs.gov/gwcomp/>) gives the following statistics:

- 100% of 103 private well samples collected in Bayfield County and 56 in Ashland County from 1990-2006 met the health-based drinking water limit for nitrate-nitrogen.
- A 2002 study estimated that 25% of private drinking water wells in the region of Wisconsin that includes Bayfield County and 12% in the region that includes Ashland County contained a detectable level of an herbicide or herbicide metabolite. Pesticides occur in groundwater more commonly in agricultural regions, but can occur anywhere pesticides are stored or applied (Vanden Brook et al. 2002).
- Neither Ashland nor Bayfield County has adopted an animal waste management ordinance, generally designed to protect surface and groundwater resources.

WDNR's Remediation and Redevelopment (RR) Program oversees the investigation and cleanup of environmental contamination and the redevelopment of contaminated properties. The RR Program provides information about contaminated properties and other activities related to the investigation and cleanup of contaminated soil or groundwater in Wisconsin through its Bureau for Remediation and Redevelopment Tracking System (BRRTS) database (WDNR 2010e).

The database lists one leaking underground storage tank (LUST) site in the Marengo River Watershed that is classified as "open," meaning "contamination has affected soil, groundwater, or more and the environmental investigation and cleanup need to begin or are underway." Cleanup at this site is expected to begin in 2011. The other six sites are classified as "closed," meaning "contamination has affected soil, groundwater, or more but the environmental cleanup has been completed and approved".

Point and Nonpoint Sources

Excess Sedimentation

Excess sedimentation is the most widespread nonpoint source pollution challenge in Wisconsin's Lake Superior Basin. Sedimentation affects basin streams by covering up important fish spawning areas for species such as brook trout and lake sturgeon and by altering stream hydrologic function that contributes to habitat degradation and makes streams less able to buffer effects from extreme flood events.

The cause of much of the sediment affecting the health of the Marengo River (and other watersheds of Wisconsin's Lake Superior Basin) can be traced back to extensive logging and farming activities around the turn of the 20th century. This

large-scale land cover conversion caused streams to become unstable, overloaded them with sediment, and reduced the quality of habitat for aquatic species such as trout and sturgeon. These impacts on the Marengo River Watershed are still being felt today. Current estimates suggest sediment loading is about two to three times greater today than pre-European settlement (Fitzpatrick et al. 1999). While this instability is part of a natural watershed response to disturbance, in many cases, it is being exacerbated by current human activity. This slows the pace of watershed recovery and limits the ability of watershed ecosystems to be resilient to future changes such as those from climate change and the potential for large-scale iron mining in the east-central portion of the watershed.

Geomorphic investigations by the USGS and Bad River Tribe identified the Marengo River Subwatershed as a likely key sediment contributor to the Bad River because of its geology and watershed position (Cahow and Fitzpatrick 2005). The vast majority of the sediment loading is due to episodic transport events, such as those associated with spring snowmelt and runoff. The BRWA conducted a volunteer survey of stream bank and valley erosion along the “High Sedimentation Area” identified in the Marengo Test Case in the fall of 2009 and spring of 2010. The survey documented 97 erosion sites, which were estimated to contribute about 11,000 tons of sediment annually to the Marengo River (Fitzpatrick 2010, Figure 6).

Road and agricultural drainage systems are an important and poorly understood impact to hydrologic function and as a source of sediment to Marengo River Watershed streams. Both of these types of drainage systems create hydrologic connectivity between uplands and river systems. Harr (1975) showed that when the amount of total road right-of-way area exceeds 12% of a watershed area, peak flows increased significantly. Extra sediment can come from a road failure or from a regularly eroding stream crossing. There are 406 known crossings in the Marengo River Watershed. Crossings within the soil transition zone are particularly susceptible to failure (Figure 7).

In addition to these concerns, work by the United States Forest Service showed that when the amount of open land and/or young forest (age class 0 to 15 years) in central and upper Midwest watersheds of a certain size and average slope exceeds 60%, runoff rates increase and stream channels become unstable (Verry 2006). These conditions are of particular interest in Wisconsin’s

Lake Superior Basin because of steep topography, erodible soils, and land that was cleared for timber and agriculture around the turn of the 20th Century. Figure 8 (next page) depicts percentage of open land and/or young forest within “hydrologic units” in the Marengo River Watershed from DNR’s 2008 Lake Superior Watershed Open Land Classification and Percentages project (Community GIS 2009).

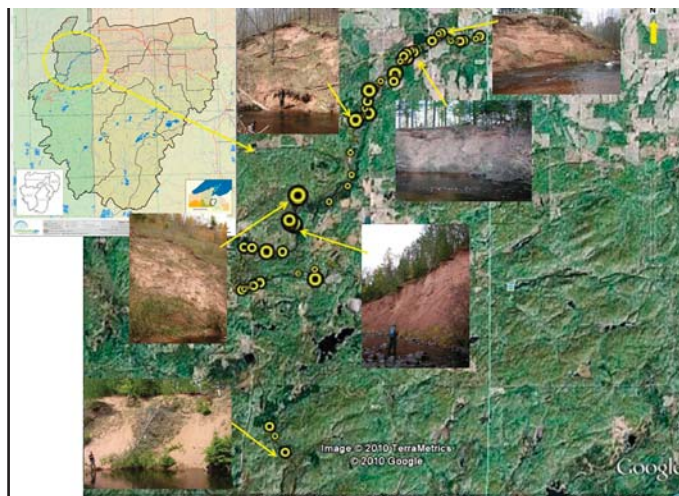


Figure 6: Bad River Watershed Association “Get to Know Your Watershed” survey stream bank erosion locations and example pictures of some erosion sites. The size of the dots is based on the area (in ft²) of the eroding stream bank. The surveys were conducted in the high sedimentation area of concern identified in the Marengo Test Case (LSBPT 2007). Erosion photos by Bad River Watershed Association. Aerial photo from Google Earth and USDA Farm Service Agency.



Figure 7: Examples of failed culverts in the soil transition zone of the Marengo River Watershed. Left photo by Diane Daulton, right photo by Bad River Watershed Association.

Forest harvest activities can also lead to erosion and sedimentation if best management practices are not followed properly. The Marengo River Watershed is approximately 70% forested. Therefore, the manner in which forests are managed plays a significant role in the quality of aquatic and terrestrial resources of the watershed. About three-quarters of the forest land in the Marengo River Watershed currently is being managed under a plan that includes some version of third party oversight in harvest and management activities. In general, management activities on these lands follow or are similar to the recommendations in Wisconsin's Forest Management Guidelines.

High Bacteria Counts

A previous DNR report (Epstein 1997) indicated the presence of an "effluent ditch to the Marengo River at Marengo" along with a recommendation "to determine if untreated waste effluent poses a public health hazard or is having any effect on Marengo River water quality." Work by the Bad River Tribe, BRWA, and the Wisconsin Community Action Program (WIS-CAP) have revealed that the lower Marengo River is receiving nonpoint sources of pollution from livestock and/or human waste (Figure 9). BRWA and the Bad River Tribe have collected *Escherichia coli* (*E. coli*) samples from streams and rivers in the Marengo River Watershed over the past several years to evaluate the potential health risk of contact with water through recreational activities. Both use the Coliscan EasyGel Method (Micrology Laboratories, Inc. 2010). Some general conclusions from this monitoring are as follows:

- Sites in the lower watershed often have *E. coli* counts exceeding 235 CFU/100 mL. These sites correspond to areas of agriculture land use and human population.
- Samples from sites draining areas with little or no agriculture and human population have low *E. coli* counts.
- *E. coli* counts in the lower watershed are highly variable and tend to increase when associated with runoff events.
- Site specific evaluations reveal the potential source of high *E. coli* counts to the lower main stem of the Marengo to be poor human and livestock waste management.

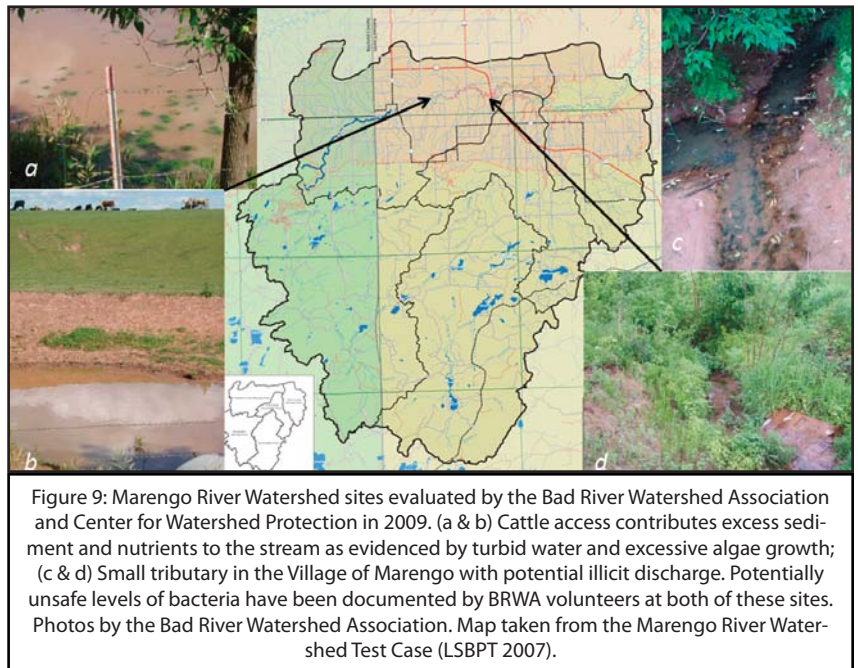
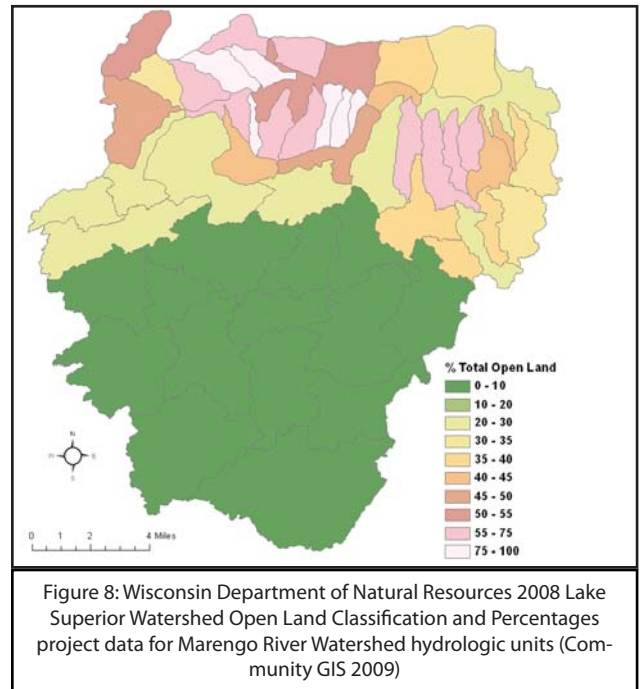
Point Sources

Currently there are no regulated point source discharges to water or air in the Marengo Watershed. There are four air permits issued in Mellen, just east of the watershed.

Waters of Note

Trout Waters

The Marengo River Watershed contains a total of 134.7 miles of trout waters (Class I, Class II and Class III). Class I trout streams are the highest quality streams and indicate that stocking is not needed for trout reproduction. Class II trout streams are those streams that have some natural reproduction, but stocking is needed to maintain a desirable sport fishery. Class III trout streams are waters maintained through stocking. Class I trout streams are situated in the



northern portion of this watershed, with Class II trout streams flowing through the bulk of the landscape. Class III trout streams are scattered tributaries flowing from the Class I and Class II trout streams. The table below lists the waterbodies and stream segments (starting from the mouth at mile 0) where these trout waters can be found.

Table 4: Marengo River Watershed Trout Waters

WADRS ID	Official Waterbody Name	Local Waterbody Name	WBIC	Start Mile	End Mile	Trout Class	Trout ID	Counties
17713	Billy Creek	Billy Creek	2912200	0	2	CLASS II	2775	Ashland
17740	Blaser Creek	Blazer Creek	2922800	0	3	CLASS II	2787	Bayfield
1514642	Brunswailer River	Brunswailer River	2913800	4.2	9.53	CLASS III	3289	Ashland
1483630	Brunswailer River	Brunswailer River	2913800	9.54	10.38	CLASS II	2777	Ashland
1524421	Brunswailer River	Brunswailer River	2913800	10.38	11.37	CLASS II	2777	Ashland
1497263	Brunswailer River	Brunswailer River	2913800	11.37	14.01	CLASS II	2778	Ashland
17718	Brunswailer River	Brunswailer River	2913800	14.01	15.38	CLASS III	3291	Ashland
17724	Frames Creek	Frames Creek	2915300	0	2.66	CLASS II	2780	Ashland
17734	Hawkins Creek	Hawkins Creek	2920300	0	3.64	CLASS I	1476	Bayfield
1519697	Marengo River	Marengo River	2911900	0	11.74	CLASS III	3287	Ashland
17712	Marengo River	Marengo River	2911900	11.74	38.51	CLASS III	3287	Ashland, Bayfield
17711	Marengo River	Marengo River	2911900	39.25	53.25	CLASS II	2774	Ashland, Bayfield
1438817	Unnamed	Marengo River Trib (S20)	3000125	0	1.35	CLASS I	3436	Bayfield
305436	Unnamed	Marengo River Trib (S9)	2919700	0	3.65	CLASS I	1475	Bayfield
17727	McCarthy Creek	Mccarthy Creek	2917400	0	5	CLASS II	2782	Ashland
17733	Morgan Creek	Morgan Creek	2920200	0	8	CLASS II	2783, 2784	Ashland, Bayfield
17714	Silver Creek	Silver Creek	2912300	0	2.43	CLASS III	3288	Ashland
17715	Silver Creek	Silver Creek (T46n R3w S34)	2912300	2.43	9.44	CLASS II	2776	Ashland
17723	Spring Brook	Spring Brook	2915200	0	8	CLASS I	1473	Ashland
17721	Trout Brook	Trout Brook	2913900	0	3.25	CLASS III	3292	Ashland
17722	Trout Brook	Trout Brook	2913900	3.27	9.43	CLASS II	2779	Ashland
17731	Troutmere Creek	Troutmere Creek	2919300	0	3	CLASS I	1474	Ashland
17736	Unnamed	Unnamed Trib To Marengo River T44n R5w S16 (Nwne)	2921700	0	2	CLASS I	1478	Bayfield
305426	Unnamed	Unnamed Trib To Marengo River T44n R5w S9	2921500	0.01	1.59	CLASS I	1477	Bayfield
17737	Unnamed	Unnamed Trib. To Marengo River T44n R5w S15	2921800	0	1.54	CLASS I	1479	Bayfield
17725	Waboo Creek	Waboo Creek	2915500	0	1.16	CLASS II	2781	Ashland
17738	Whisky Creek	Whiskey Creek	2922100	0	0.84	CLASS III	3293	Bayfield
1514832	Whisky Creek	Whisky Creek	2922100	1.45	2.18	CLASS II	2786	Bayfield
17739	Whisky Creek	Whiskey Creek	2922100	3.04	4.82	CLASS II	2785	Ashland

Outstanding and Exceptional Resource Waters

Wisconsin has designated many of the state's highest quality waters as Outstanding Resource Waters (ORWs) or Exceptional Resource Waters (ERWs). Waters designated as ORW or ERW are surface waters which provide outstanding recre-

ational opportunities, support valuable fisheries and wildlife habitat, have good water quality, and are not significantly impacted by human activities. ORW and ERW status identifies waters that the State of Wisconsin has determined warrant additional protection from the effects of pollution. These designations are intended to meet federal Clean Water Act obligations requiring Wisconsin to adopt an “antidegradation” policy that is designed to prevent any lowering of water quality, especially in those waters having significant ecological or cultural value.

Outstanding Resource Waters (ORWs) typically do not have any point sources discharging pollutants directly to the water (for instance, no industrial sources or municipal sewage treatment plants), though they may receive runoff from nonpoint sources. New discharges may be permitted only if their effluent quality is equal to or better than the background water quality of that waterway at all times. No increases of pollutant levels are allowed. If a waterbody has existing point sources at the time of designation, it is more likely to be designated as an Exceptional Resource Water (ERW). Like ORWs, dischargers to ERW waters are required to maintain background water quality levels; however, exceptions can be made for certain situations when an increase of pollutant loading to an ERW is warranted because human health would otherwise be compromised (<http://dnr.wi.gov/> (search: orw)). The Marengo River Watershed contains 62.31 miles of waters defined as Outstanding Resource Waters and 27.02 miles defined as Exceptional Resource Waters.

Table 5: Marengo River Watershed Outstanding and Exceptional Resource Waters

WADRS ID	Official Name	Local Name	WBIC	ORW/ERW	ORW/ERW ID	Start Mile	End Mile	Counties
1520386	Brunswweiler River	Brunswweiler River	2913800	ORW	2053	0	1.02	Ashland
1514607	Brunswweiler River	Brunswweiler River	2913800	ORW	2054	2.82	4.2	Ashland
1514642	Brunswweiler River	Brunswweiler River	2913800	ORW	2054	4.2	9.53	Ashland
1483630	Brunswweiler River	Brunswweiler River	2913800	ORW	2054	9.54	10.38	Ashland
1524421	Brunswweiler River	Brunswweiler River	2913800	ORW	2054	10.38	11.37	Ashland
1497263	Brunswweiler River	Brunswweiler River	2913800	ORW	2054	11.37	14.01	Ashland
17718	Brunswweiler River	Brunswweiler River	2913800	ORW	2054	14.01	15.38	Ashland
1520349	Brunswweiler River	Brunswweiler River	2913800	ORW	2052	19.8	21.56	Ashland
1524441	Brunswweiler River	Brunswweiler River	2913800	ORW	2052	21.56	24.4	Ashland
17717	Brunswweiler River	Brunswweiler River	2913800	ORW	2052	26.17	29.54	Ashland
17712	Marengo River	Marengo River	2911900	ORW	2122	11.74	38.51	Ashland, Bayfield
17711	Marengo River	Marengo River	2911900	ORW	2121	39.25	53.25	Ashland, Bayfield
17734	Hawkins Creek	Hawkins Creek	2920300	ERW	997	0	3.64	Bayfield
17723	Spring Brook	Spring Brook	2915200	ERW	993	0	8	Ashland
17731	Troutmere Creek	Troutmere Creek	2919300	ERW	995	0	3	Ashland
305436	Unnamed	Marengo River Trib (S9)	2919700	ERW	996	0	3.65	Bayfield
17736	Unnamed	Unnamed Trib To Marengo River T44n R5w S16 (Nwne)	2921700	ERW	999	0	2	Bayfield
17737	Unnamed	Unnamed Trib. To Marengo River T44n R5w S15	2921800	ERW	1000	0	1.54	Bayfield
1438817	Unnamed	Marengo River Trib (S20)	3000125	ERW	72	0	1.35	Bayfield
305426	Unnamed	Unnamed Trib To Marengo River T44n R5w S9	2921500	ERW	998	0.01	1.59	Bayfield

Impaired Waters

A waterbody is polluted or “impaired” if it does not support full use by humans, wildlife, fish, and other aquatic life and it is shown that one or more of the pollutant criteria are not met. WDNR recently updated its list of impaired waters as

part of its 2010 Water Quality Report to Congress (WDNR 2010f).

There are currently four waterbodies (English Lake, Lake Three, Mineral Lake, Potter Lake, and Spider Lake) which are all listed for elevated mercury levels due to atmospheric deposition.

Fish Consumption

Wisconsin’s fish consumption advisory is based on the work of public health, water quality, and fisheries experts from eight Great Lakes states. Based on the best available scientific evidence, these scientists determined how much fish is safe to eat over a lifetime based on the amount of contaminants found in the fish and how those contaminants affect human health. Advisories are based on concentrations of the following contaminants along with angler habits, fishing regulations, and other factors. English Lake has had a specific fish consumption advisory for mercury in effect since 2009.

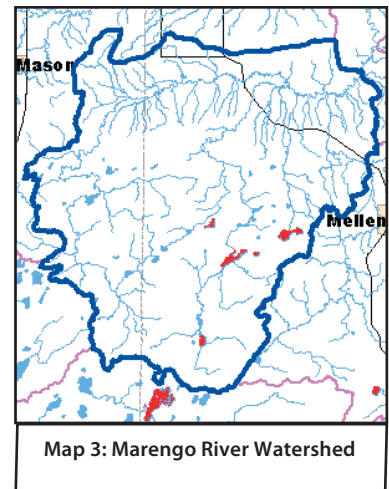
Mercury affects the human nervous system. Mercury can damage developing brains of children and may affect a child’s behavior and ability to learn. While mercury can be eliminated from the body, frequent ingestion of fish with high levels of mercury results in bioaccumulation.

Aquatic Invasive Species

As of July 2010, there are no known infestations of prohibited or restricted (Chapter NR 40) fish, alga, or aquatic invertebrate invasive species within the Marengo River Watershed. Restricted aquatic species that have been documented within five miles of the watershed include the Chinese mystery snail (*Cipangopaludina chinensis*) and Eurasian ruffe (*Gymnocephalus cernuus*). Even though invasive species survey data are limited, the Marengo River Watershed has generally not seen the level of infestation by aquatic invasive species as more populated areas of the Great Lakes region.

Species of Special Concern

WDNR’s Natural Heritage Inventory Database indicates that the following water-dependent endangered, threatened, or special concern species and/or communities have been sighted in this watershed within the last 20 years. In addition, a coastal wetlands evaluation conducted in 1995 and 1996 identified a number of species and habitats described in a comprehensive report, Wisconsin’s Lake Superior Coastal Wetlands Evaluation / Including Other Selected Natural Features of the Lake Superior Basin (Epstein 1997). Note: The lack of rare elements listed here does not signify a lack of rare elements in the watershed. They have merely gone unreported in the Natural Heritage Inventory Database.



Rare macroinvertebrates include:

- Order Ephemeroptera; Family Ephemerellidae - *Drunella cornutella* (habitat: Trout Brook)
- Order Odonata; Family Gomphidae - *Ophiogomphus carolus* (Brunswailer River, Hawkins Creek, and Marengo River)

The following table contains federally-listed Threatened, Endangered, Proposed, and Candidate species found in Ashland and Bayfield counties, in which the Marengo River Watershed is located.

Species	Status	Habitat	Taxa
Canada lynx (<i>Lynx canadensis</i>)	Threatened	While no resident populations are known from Wisconsin, the species occasionally occurs in northern forested areas, and counties listed are those with the highest likelihood of occurrence.	Mammal
Gray wolf (<i>Canis lupus</i>)	Endangered	Northern forested areas	Mammal
Piping plover (<i>Charadrius melodus</i>)	Endangered	Sandy beaches; bare alluvial and dredge spoil islands	Bird

Kirtland's warbler (<i>Dendroica kirtlandii</i>)	Endangered	Young jack pine stands (5 to 25 years old). Confirmed breeding in Adams county, potential breeding in the other counties.	Bird
Fassett's locoweed (<i>Oxytropis campestris</i> var. <i>chartaceae</i>)	Threatened	Open sandy lakeshores	Plant

State Natural Areas

Brunswelier River and Mineral Lake

Brunswelier River and Mineral Lake features a scenic, rocky river gorge incised in an upland of Keweenawan granite bedrock, and several high quality old growth hemlock-hardwood stands embedded in a large tract of maturing northern mesic hardwoods that includes some of the largest yellow birch on the forest. The closed canopy northern mesic forest is dominated by sugar maple, hemlock, and yellow birch. Snags and down woody debris is common. American fly honeysuckle is the dominant shrub with leatherwood, Canada yew, and alternate-leaved dogwood also present. The ground flora is diverse. Grass and grass-like species include sedges, rattlesnake manna grass, and bottlebrush grass. Other herbaceous plants are club-moss, sessile-leaved bellwort, large-flowered trillium, rosy twisted stalk, dutchman's breeches, mountain wood sorrel, and three-leaved goldthread. The flora of the gorge varies considerably from streamside to the adjacent ridge tops. The lowland areas and low, shaded cliffs are dominated by a canopy of white cedar, yellow birch, hemlock, and black ash. Canada yew and mountain maple are present in the midstory and on shaded cliff ledges. Ferns (especially Dryopteris) are abundant in the understory. Speckled alder dominates lower, wetter portions of the bank. In this region, the Brunswelier River flows north through a series of natural, glacially-created lakes, with high gradients and deeply-cut chasms between the lakes. The erosive power of the river has created numerous streamside cliffs, both open and shaded, some of which harbor a large population of the rare fragrant fern. The cliffs also afford habitat to Braun's holly fern. This stretch of river contains slack water in the form of shallow pools and is interspersed with rapids flowing over large, granitic boulders. Two small, intermittent feeder streams, which drain the adjacent uplands, flow into the river from the east. A bridge crossing FR 187 spans the river and a footbridge for the North Country Trail crosses the river at the northern edge. The river itself is in natural condition, is of high quality, and supports a diverse fishery. Brunswelier River and Mineral Lake is owned by the U.S. Forest Service and was designated a State Natural Area in 2007.

Chequamegon Hardwoods

Chequamegon Hardwoods is an old second-growth northern mesic hardwood forest with an undisturbed understory. Scattered throughout the site are several very large exposures of gabbro bedrock, some up to 50 feet in height. Although the stand was logged in the 1930's, it still retains patches of old-growth hemlock, various hardwoods, and some very large big-tooth aspen. Sugar maple, basswood, and yellow birch dominate most of the stand with canopy associates of red oak and white ash. Other areas feature hemlock and large big-tooth aspen. The midstory includes such characteristic species as leather-leaf, mountain maple, beaked hazelnut, and alternate-leaved dogwood. The herbaceous layer has never been grazed and is diverse with over 80 plant species, including spikenard, blue cohosh, green adders-mouth, nodding trillium, maidenhair fern, and bloodroot. Three orchids, purple fringed, spotted coral, and early coral root, are also present. Low areas of wet-mesic forest are dominated by black ash with white cedar, red maple, yellow birch, and hemlocks with an understory of speckled alder, swamp aster, and spotted Joe-Pye-weed. The stream running through the site contains a good population of Fontinalis, a genus of aquatic mosses, and an abundant larval caddisfly fauna. Numerous forest interior birds are present, such as Nashville, black and white, and black-throated green warblers, along with ovenbird and wood pewee. Amphibians include wood frog and red-backed salamander. Chequamegon Hardwoods is owned by the U.S.D.A. Forest Service and was designated a State Natural Area in 1996.

English Lake Hemlocks

English Lake Hemlocks contains an excellent example of upland and swamp hemlock and white cedar forest with an intact gradient from upland to lowland. Most dramatic is the reproduction of both species with all age classes present. Average diameter for dominant hemlock is 14 to 18 inches, with trees greater than 24 inches common. The core of the site is northern mesic and wet-mesic forest dominated by an overstory of large diameter hemlock, white cedar, yellow birch, a few scattered white pine, red maple, and sugar maple. The understory is relatively open with young hemlock and cedar, Canada yew, and mountain maple. Ground flora species include wood ferns, American starflower, bunchberry, wood sorrel, and other *Tsuga/Maianthemum-Coptis* (TMC) inhabiting species. Along the shore of English Lake is a stand with old-growth features, which is bordered by a conifer swamp to the south. Other notable features include shaded rock outcrops, Canada yew, large diameter red maple and sugar maple, and yellow birch. English Lake itself has excellent aquatic plant life includ-

ing several large bulrush (*Scirpus*) beds adjacent to the site. English Lake is a soft-water drainage lake. Common fish species include muskellunge, largemouth bass, bluegill, black crappie, perch, and pumpkinseed. Breeding birds include yellow-bellied flycatcher, winter wren, hermit thrush, veery, Nashville warbler, ovenbird, and northern waterthrush. English Lake Hemlocks is owned by the U.S. Forest Service and was designated a State Natural Area in 2007.

North Country Trail Hardwoods

North Country Trail includes good examples of most of the major community types known from the Penokee/Gogebic Iron Range land type. In particular, there are several significant pockets of older sugar maple-basswood forest with a rich, mesic understory. One of these stands had a large component of American elm, which died in the late 1970's and was not salvaged, making it a unique site with large amounts of coarse woody debris and standing snags. This site also contains two high quality hemlock hardwood stands, which is a relatively uncommon on this land type. Another important ecological feature is a steep sided ravine containing Hawkin's Creek, a small cold water trout stream. This ravine includes vertical shaded cliffs, upland hemlock and white cedar, Canada yew, and Braun's holly fern (*Polystichum braunii*). Other unnamed streams run through small bedrock ravines and contain uncommon and/or rare plants. The Marengo River, with its associated steep cliffs, dry talus, and open bedrock glades, runs through the westernmost portion of the site. Of note are the ruins from The Swedish Settlement, a well known historical site. North Country Trail Hardwoods is owned by the U.S. Forest Service and was designated a State Natural Area in 2007.

Spider Lake

Spider Lake features a high quality stand of swamp hardwoods dominated by black ash of various age and size classes with canopy associates of red maple, paper birch, white cedar, and white spruce. The shrub layer is well developed and dense consisting of speckled alder, mountain maple, red-osier dogwood, and winterberry. Characteristic herbs include cinnamon fern, marsh marigold, swamp saxifrage, creeping snowberry, and fringed, swollen, and three-fruited sedges. Cuckoo-flower (*Cardamine pratensis*), a species of special concern in Wisconsin, is also present. Mosses are also an important component of the herbaceous flora. Small pools of standing or slowly moving water are frequent within the ash forest including tip-up pools with four to eight inches of water. Drainage patterns in this area of pitted moraine are rather poorly developed and lakes, kettle depressions, and swamps are abundant. The headwaters of the Chippewa and Marengo rivers are in this area. Spider Lake supports a diverse array of bird species including the great-crested flycatcher, veery, northern parula, black-and-white warblers, black-throated green warblers, northern waterthrush, and the yellow-bellied flycatcher (*Empidonax flaviventris*), a species of special concern in Wisconsin. Spider Lake is owned by the U.S.D.A Forest Service and was designated a State Natural Area in 1988.

St. Peter's Dome

The highest point on the Chequamegon, St. Peter's Dome features a stream situated on a scenic chasm surrounded by a large block of unfragmented second-growth northern hardwood forest. The stream descends the Lake Superior escarpment in a gorge, which follows a fracture in Keweenaw granite. The gorge contains several low cliffs and occasional vertical cliffs, both moist and dry. Most of the lower gorge slopes are composed of moss-covered boulders one to three feet in size. The exposed bedrock features are used extensively by university groups studying Precambrian geology. The upland northern mesic forest contains extensive stands of maturing hemlock-hardwood and rich sugar maple-basswood forest along with significant inclusions of "old-growth-like" forest. Other forest types include black ash-white cedar swamp, mixed swamp conifer, and dry-mesic forest. The northern mesic forest is dominated by rich sugar maple and basswood with scattered hemlock, yellow birch, white cedar, and pockets of mature white pine. Regeneration of white pine, hemlock, and white cedar is good and there are stable populations of Canada yew. The understory is rich with one of the most complete species assemblages on the Chequamegon-Nicolet National Forest. Shrubs include mountain maple, alternate-leaved dogwood, red elder, leatherwood, and American fly-honeysuckle. Herbaceous species include Carolina spring-beauty, trillium, bellwort, rosy twisted-stalk, trout-lily, wild leek, wild ginger, red baneberry, and blue cohosh. White mandarin (*Streptopus amplexifolius*), a species



Brunsweller River and Mineral Lake,
Photo by U.S. Forest Service

of special concern in Wisconsin is also present. Open cliff faces, talus, and cliff tops support an overstory of white pine, red pine, white cedar, mountain maple, gooseberries, blueberry, and bearberry. Herbs include pale corydalis, columbine, long-leaved bluets, and numerous ferns. Of interest is the presence of three rare fern species: fragrant fern (*Dryopteris fragrans*), spreading wood fern (*Dryopteris expansa*) and state-threatened Braun's holly fern (*Polystichum braunii*). Other notable features include the headwaters of several important cold water streams including Morgan, Frames, and Waboo creeks, a full range of forest development in a natural matrix, the unroaded and remote nature of the site, the widest elevation gradient on the forest (500 feet), and the 80-foot waterfall, Morgan Falls. St. Peter's Dome is owned by the U.S. Forest Service and was designated a State Natural Area in 2007.

Watershed Actions

Grants and Projects

Great Lakes Project - Lincoln Township Streambank Stabilization

2008 - Complete

Restoration of streambank and habitat in the Marengo River along the Altamont roadside after high velocity and volumes of water washed it out.

Lake Protection - Bayfield County Lake Protection Implementation Project 2004 - Complete

Bayfield County conducted a project to improve the implementation of the lake classification and protection system that was adopted by the county in 1999, through the use of increased public education, enhanced technology, and review and update of shoreland ordinances. This project involved the following elements and deliverables: 1) Conducting a series of educational meetings with all county municipalities and the tribe describing new procedures, materials, etc.; 2) Conducting a minimum of five meetings throughout the county introducing the new electronic procedures involving; Land Use permits, Septic Maintenance, and a Voluntary Compliance program; 3) Reviewing existing ordinances for problem areas, etc. and development recommendations for improvements for the county land use and zoning committees; 4) Development and distribution of brochures for: Shoreland mitigation and restoration procedures, online permit processing, and self-reporting requirements. 4) Implementation of an electronic permit monitoring system; 5) Implementation of a voluntary compliance program; 6) Hiring of a contractor and part-time employee to implement grant project; and 7) Preparation of a final report covering all aspects of grant project and accomplishments. The Department of Natural Resources was provided with both a paper copy and an electronic copy of all project products and periodic reports on the progress of the project. The project results were disseminated to the public by newsletter(s), or public meeting(s), and/or local newspaper article(s).

River Planning - Capacity Building 2003 - Complete

The Friends of McCarthy Park strengthened the effectiveness of their organization to promote, educate, and involve citizens in the quality of the creek's ecosystem, as well as to protect, enhance, and restore the quality of the creek's ecosystem, and provide outdoor recreational opportunities that protect the creek. A full description of project scope and deliverables is available in the grant application, which is a part of this agreement. The Friends of McCarthy Park disseminated information to the public as described in the grant application. The DNR was provided with both a paper copy and an electronic copy of the final report. Information was disseminated to the public as described in the grant application.

Lake Protection - Lakes Classification & Protection Guide Booklet 2002 - Complete

Ashland County prepared a property owners guide for developing, managing, and protecting shorelands within the county. This guide provides information about governmental regulations and standards, building and site construction, water supply and waste disposal, and shoreland buffers and protection. Other resource issues covered in this guide include: 1) A layman's overview of watershed management; 2) An overview of Ashland County's surface waters, to include outstanding and exceptional resource waters; 3)



St. Peters Dome, Photo by Linda Parker (WDNR photo)

What to look for when purchasing shoreland property; 4) Guidelines for landscaping and managing your shoreland property; 5) Impervious surfaces; 6) Shoreland lighting; and 7) Aquatic habitat protection. This guide will be distributed to all lake associations, county real estate offices, local government regulatory agencies, and to persons inquiring or applying for shoreland land use permits. A specific product or deliverable for this grant project will be a copy of the prepared "Guide Booklet." The DNR was provided with both a paper copy and an electronic copy of the final report.

River Protection - Ashland Co. Rivers Ordinance Development 2002 - Complete
Ashland County conducted a Rivers Ordinance Development Project on all rivers and streams within Ashland County. Project activities included an inventory of existing river resources, including the documentation of stream ratings, existing development, ownership, land uses and cover types, adjacent wetlands, and floodway delineation. Recommended new river shoreland ordinances were developed and an information and education program was conducted to share project results. This Information and Education (I & E) program included workshops, the development of a "River and Stream Protection Guide," and the dissemination of project materials to the public.

Lake Planning - Bayfield County UW-Ext. Lake Education 2001 - Complete
The Bayfield County UW-Extension proposed to conduct a Lake Leaders Workshop project. This project followed the procedure of three previous "Lake Fairs" conducted by the Bayfield County Lakes Forum and other local partners. This workshop provided important and useful information to lake residents, lake association representatives, lake leaders, and the general public from a five county area of northwestern Wisconsin. Partners with the UW-Extension for this project included the Bayfield County Lakes Forum. Specific deliverables for this project included copies of a summary report article and informational handouts prepared for distribution.

Lake Protection - Bayfield County Lakes Classification Implementation 2000 - Complete
Bayfield County conducted a project to implement the lake classification system that was adopted by the county in 1999. This project involved the following elements and deliverables: Development of ordinances implementing the lakes classification system. Development of a shoreland buffer restoration technical assistance program. Development of an information and education program focusing on lakes classification and the need for implementing voluntary compliance. Development of a lakes classification database and related GIS mapping products to assist in tracking, implementing, and streamlining administration of the compliance activities associated with the lakes classification program. This project provided for a six month limited term employee (LTE) position designed to provide the needed on-site technical assistance to implement restoration and mitigation requirements. In addition to these project described duties, the Department of Natural Resources requested that the role of this technical position be expanded to provide training to the Bayfield County Zoning Department staff on buffer restoration and mitigation, so they can independently provide the required technical assistance to property owners during the course of their ordinance administration duties.

Lake Protection - Ashland Co. Lake Class, Environmental Prot., & Ordinance Development 1999 - Complete
Ashland County proposed to implement a three-element, county-wide lake and shoreland project to assist the county in protecting its valuable land and water resources; (I.) Automation of countywide land use and shoreland resource elements, (II.) Implementing its lakes classification program, and (III.) Assessing and amending or revising existing land use and shoreland ordinances. Activities associated with this project included: development of ordinances for new shoreland development standards, public education of lakes classification program, inventory of applicable existing ordinances, rewrite of shoreland and subdivision control ordinances, review of proposed ordinance changes, and the development of a countywide GIS data/map product to provide base for management and administration of water resources.

Lake Protection - Bayfield Co. Shoreland Zoning Ordinance Revision 1999 - Complete
Bayfield County proposed to implement a county-wide lake and shoreland project that would culminate in the development, adoption, and implementation of a revised set of shoreland provisions of the Bayfield County Zoning Ordinance. This project included four (4) basic components: 1) Further refinement of the existing "Lakes Classification" information; 2) Education and training; 3) Development of information to support the learning process; and 4) Drafting and implementation of the management policies. Activities associated with this project included the development of a specific management zone (or district overlay for all areas within 1,000 feet of each Bayfield County lake, pond, or flowage), establishment of distinct management strategies (and revised ordinance language) for each of these "districts"

that is dependent upon lake classification, development of a GIS database and digitized parcel mapping, development of I & E materials for shoreland protection and information on new regulations, etc., involvement of an “Ad Hoc” citizen advisory committee to hold public meetings, etc., drafting ordinance amendment recommendations, and the final compilation of ordinance revisions by the zoning committee and a contracted professional service.

Lake Planning - Bayfield County Zoning Ordinance Revision

1999 - Complete

Bayfield County proposed to form an “Ad Hoc” committee, which would, with the assistance of a liaison and outside technical resources (e.g., UW-Extension and the Northwest Regional Planning Commission), generate proposed shore-line ordinance revisions for all shoreland areas in Bayfield County. Project activities included the formation of the ad hoc committee from varying interest groups with a stake in the shoreland zones, hiring an ad hoc committee liaison to facilitate committee function and assure progress, and conducting public meetings, distributing I & E materials, holding technical demonstrations, and holding I & E seminars.

Monitoring

Lakes Baseline and Trends Monitoring

- River Monitoring is ongoing to comply with Clean Water Act implementation - water quality standards: use designations, criterion, permit issuance and compliance, assessments, and impaired waters management.
- Fisheries projects include a wide variety of “baseline” monitoring and targeted fieldwork to gain specific knowledge related to Wisconsin’s fish communities.
- In cooperation with UW Extension and Wisconsin Sea Grant, education efforts focus on working with resource professionals and citizens statewide to teach boaters, anglers, and other water users how to prevent transporting aquatic invasive species when moving their boats. Additional initiatives include monitoring and control programs.

Volunteer Monitoring

The Bad River Watershed Association operates a Volunteer Water Quality Monitoring Program, initiated in 2002. The program involves local citizens in collecting water chemistry, macroinvertebrate, and bacteria (E. coli) data from streams throughout the Bad River Watershed, which includes the Marengo. The goal of the program is to establish at least a four-year baseline of water quality data from sites in the watershed. The data are used for determining the overall health of the watershed, to track changes over time, and to make informed decisions about protecting the health of the watershed. BRWA also has developed a volunteer program to assess the severity of stream bank and valley erosion in the Bad River Watershed, called “Get to Know Your Watershed,” and also operates a Culvert Program in partnership with U.S. Fish & Wildlife Service, U.S. Geological Survey, WDNR, Bad River Tribe, Northland College, and others to replace culverts that block fish passage and cause sedimentation in watershed streams.

The Citizen Lake Monitoring Network, the core of the Wisconsin Lakes Partnership, involves over 1,000 citizen volunteers statewide. The goals are to collect high quality data, to educate and empower volunteers, and to share this data and knowledge. Volunteers measure water clarity, using the Secchi Disk method, as an indicator of water quality. This information is then used to determine the lakes trophic state. Volunteers may also collect chemistry, temperature, and dissolved oxygen data, as well as identify and map plants, watch for the first appearance of Eurasian water-milfoil near boat landings, or alert officials about zebra mussel invasions on Wisconsin lakes. Monitoring work in this watershed consists of lake monitoring and surveys for water quality, aquatic plants, aquatic invasive species, and ice observations.

Basin/Watershed Partners

Marengo River Watershed Partnership Project

The Bad River Watershed Association formed the Marengo River Watershed Partnership (MRWP) in 2009 as a way to invest citizens, governments, and agencies to create a Watershed Action Plan. The MRWP Project builds upon previous work by the Wisconsin’s Lake Superior Basin Partner Team (Partner Team), the United States Geological Survey (USGS), and the Bad River Band of the Lake Superior Tribe of Chippewa Indians (Bad River Tribe). The MRWP has been a forum for sharing concerns, identifying the community vision for the watershed, and identifying the key technical issues affecting the health of the watershed and how to fix them. The final product will be a Watershed Action Plan that will meet the Environmental Protection Agency’s nine required elements for watershed plans and implementation of the plan will ultimately be eligible for Clean Water Act Section 319 funds. The MRWP project and updates to the Watershed Action Plan can all be found on the Bad River Watershed Association’s website.

The Marengo River Watershed contains many different jurisdictions within its boundaries, including the Bad River Tribe, State of Wisconsin, and parts of 10 townships and two counties. The MRWP was formed as a way to involve and invest these various jurisdictions to create the Watershed Action Plan. Community-based partnerships are essential to effective watershed planning and management. Through a partnership, different people and organizations work together to address common interests and concerns. The MRWP has consisted of the following teams during development of the Watershed Action Plan:

- **Technical Team** - The Technical Team was charged with providing technical expertise and guidance to support the development of the Watershed Action Plan. The goals of the Technical Team were to: 1) Draft watershed challenges and goals based on citizen and technical input; 2) Review available information and data on the Marengo River Watershed, prioritize challenges, and make specific recommendations on priority projects/actions that are likely to improve the health of the watershed in the short and long term; and 3) Develop a monitoring component to support Watershed Action Plan implementation. A total of 38 people from over 20 agencies and organizations have participated on the Technical Team either by providing input, assisting with data and information gathering, and/or attending meetings.
- **Citizen Involvement Team (CIT)** - The Citizen Involvement Team (CI Team) was charged with identifying the concerns and interests of local citizens related to the land and water resources in our area. The goals of the CI Team were to: 1) Gather what is known about public interests and concerns, and summarize it for incorporation into the Watershed Action Plan; 2) Offer ideas on citizen involvement opportunities and assist in efforts to plan, recruit participants, and spread the word; 3) Develop an outreach and citizen involvement strategy for plan implementation; and 4) Develop plan recommendations and project ideas. Six people from three different agencies, organizations, or general watershed citizens participated on this team.
- **Steering Team** - The Steering Team was initially charged with taking recommendations from the CI and Technical Teams to draft and recommend a Watershed Action Plan. The goals of the Steering Team were revised during the course of the project to provide more specific tasks as follows: 1) Work closely with BRWA to provide review and comment during drafting of Watershed Action Plan; 2) Help build support and buy-in for plan among local government officials and heads of natural resource agencies; and 3) Develop implementation strategy for plan. Seven people from five different agencies and organizations participated in this team.

The Marengo River Watershed is unique to many Wisconsin watersheds in that both the State of Wisconsin and the Bad River Tribe have authority to set water quality standards under the Clean Water Act. The Bad River Tribe was granted Treatment as a State status for implementing a water quality standards program by the United States Environmental Protection Agency in June 2009. Draft standards have been proposed and are under review as of the publication of this report. Through the MRWP, the Bad River Watershed Association has worked to ensure discussions about issues and concerns in the watershed and actions to solve them have been coordinated among the various jurisdictions in this watershed. The MRWP will continue to be the forum for implementing the Marengo River Watershed Action Plan.

Recommendations

Overall Watershed Recommendations

As mentioned earlier, the most severe and widespread challenges facing the Marengo River Watershed are its altered hydrologic system and excess sediment. Tackling these challenges will require a combination of upland management to “slow the flow” of surface runoff to watershed streams and in-stream management to reduce sediment sources. Excess nutrients and high bacteria counts are challenges localized in the northern portion of the watershed. Addressing these require better implementation of agricultural best management practices specific to livestock management and better management and upgrades to private on-site sewage treatment systems. Addressing the loss of aquatic habitat and terrestrial habitat fragmentation and alteration is linked to improving hydrologic function and reducing sedimentation, but also requires a better understanding of available and potential habitat, efforts to protect known high quality areas, and efforts to prevent invasive species infestations. Citizen awareness is important to the overall management of this watershed. By increasing citizen involvement and awareness about the Marengo River Watershed and its current condition, managers can establish outreach efforts to reduce the pollution that impacts the watershed.

In order to guide management activities, the Marengo River Watershed has two distinct areas that provide a logical break for prioritizing management actions to improve watershed health; the soil transition and clay plain and the upper

watershed. These two areas are roughly defined by the boundary between sand and sand/gravel surficial deposits and clay surficial deposits and an elevation of approximately 1,050 feet above sea level. Overall recommendations for the Marengo River Watershed are divided into these management areas.

Soil Transition and Clay Plain Management Area Recommendations

- Reduce the amount of open land by 7,600 acres, focusing in HUCs with 40% or more open lands (2008 baseline).
- Slow the flow of runoff from upland areas to watershed streams.
- Reduce hydrologic connectivity of road and recreational trail system to less than 15% of the watershed.
- Increase watershed storage capacity (i.e. wetland restorations, stormwater management).
- Break agricultural drainage systems no longer in use.
- Improve coordination of forest harvest activity to maintain less than 40% open land in watershed hydrologic units.
- Reduce adverse effects on watershed from forest harvest and management activities.
- Reduce sediment contributions from roads, recreational trail systems, and all waterway crossings.
- Reduce bluff/stream bank erosion.
- Restore floodplain connectivity in incised reaches and reaches with excessive overbank sedimentation.
- Increase channel roughness.
- Implement agriculture conservation practices that improve manure storage and management.
- Inventory and replace failing, poorly designed, and poorly functioning private on-site sewage treatment systems.

Upper Watershed Management Area Recommendations

- Protection of riparian, headwater, and wetland areas.
- Reduce sediment contributions from roads, recreational trail systems, and all waterway crossings.
- Reduce localized bluff/stream bank erosion.
- In-stream habitat improvement projects (such as dam and quarry rock removal).
- Ensure POWTS are maintained on a regular basis.
- Develop and encourage market-driven solutions to conservation on agricultural and forest land.

Groundwater Management/Monitoring/Wellhead Protection Recommendations

In order to protect groundwater resources, the following recommendations have been made:

- Remediate existing brownfield sites and leaking underground storage tanks (LUSTs).
- Identify and close abandoned wells.
- Develop private well monitoring program.

To understand groundwater contribution to the baseflow and water supply in this watershed, the following recommendations have been made:

- Conduct a baseflow stream survey.
- Map groundwater recharge areas.

Wastewater and Drinking Water System Related Recommendations

For safe water and health and for productive soils to be available and maintained for all human and wildlife uses, surface and groundwater must meet appropriate state and tribal criteria for pathogens, nutrients, and other contaminants. The following are recommendations on meeting this goal:

- Implement agriculture conservation practices that improve manure storage and management.
- Inventory and replace failing, poorly designed, and poorly functioning private on-site sewage treatment systems (POWTS).
- Ensure POWTS are maintained on a regular basis.
- Develop and encourage market-driven solutions to conservation on agricultural and forest land.
- Coordinate and increase opportunities for proper household hazardous waste, pharmaceuticals, pesticides, white goods (i.e. stoves, refrigerators, etc.), and tire disposal.

Identifying sources of the E. coli within the Village of Marengo and in agricultural areas of the lower watershed and finding solutions to remediate them is a priority to reducing this potential health hazard and reducing E. coli counts in the Marengo River.

Fish and Habitat Monitoring or Management Recommendations

Priority habitats for native communities of plants and animals should be identified, restored, and that ecological processes within the watershed be maintained. Recommendations to achieve this goal include:

- Secure protection of existing priority riparian, aquatic, and terrestrial conservation areas and habitats.
- Inventory and control invasive species.
- Identify presence and extent of terrestrial habitat types present in the watershed.
- Identify presence and extent of aquatic habitat types present in the watershed.
- Restore and improve priority aquatic and terrestrial habitats.
- Strengthen local zoning ordinances and encourage practices that protect watershed health while meeting development needs.
- Maintain and/or identify and designate waters meeting special designation criteria.
- Identify and designate stream segments with priority cold or warm water communities, potential ORW/ERW, State Wild Rivers, or other state or tribal special designations.
- Develop monitoring strategy to evaluate and ensure special designations are being met in these streams.

The following recommendations are relevant to evaluating fish and aquatic habitat designated uses:

- Regional basin management team staff should conduct a review of the effluent ditch to the Marengo River at Marengo to determine if untreated waste effluent poses a public health hazard or is having any effect on Marengo River water quality.
- Regional fish management staff should evaluate whether opportunities exist for improving streambed and spawning habitat for trout by controlling bed loads and erosion to the Marengo and Brunsweiler rivers.
- Regional basin management team staff should assess water quality in the Marengo and Brunsweiler rivers.
- Regional basin management team staff should collect data on the Marengo and Brunsweiler rivers to support ranking the watersheds for potential polluted runoff abatement projects.
- Several unnamed tributaries are not currently classed. Recommend combining these into one “batch” assessment. Collecting temperature data first, regional staff should use temperature data to indicate priorities for fisheries/condition assessments, then re-class if necessary.
- Recommend 303(d) evaluations as a group.

Contributors

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DNR PUB WT-934 2011

Wisconsin DNR's mission involves preserving, protecting, and restoring natural resources. Watershed Planning provides a strategic review of water condition to enhance awareness, partnership outreach, and the quality of natural resource management.

Marengo River Watershed