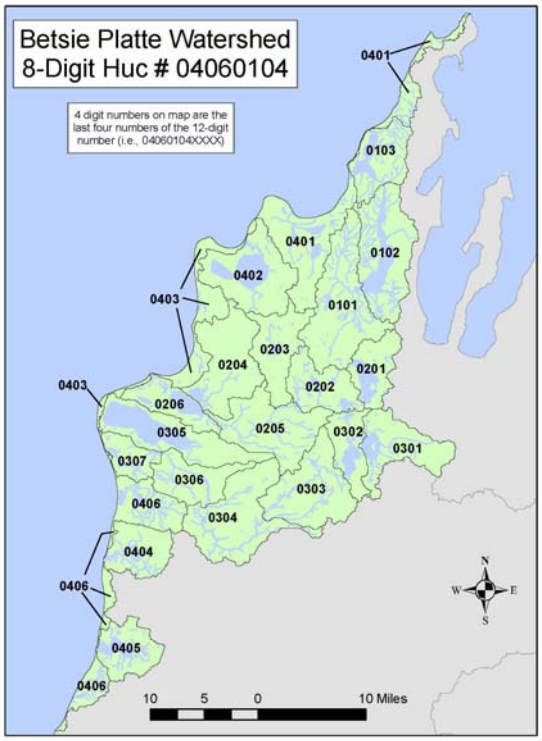
Betsie-Platte Watershed

Hydrologic Unit Code: 04060104

For more information, see the USEPA "Surf Your Watershed" website at cfpub.epa.gov/surf/huc.cfm?huc_code=04060104 contact the Michigan Department of Environmental Quality at 517-335-6969 to request:

- **Report #07/107 "A Biological Survey of the Betsie and Little Betsie Rivers and Dair Creek. Benzie and Manistee County, Michigan. July 15-17, 2003"**
- **Report #07/111 "A Biological Survey of the Platte River System. Benzie County. July 14-15, 2003"**



Watershed Management Plans

- **Betsie River — Conservation Resource Alliance, www.rivercare.org/**
- **Glen Lake/Crystal River — Glen Lake Association, www.mlswa.org/gla-916/WaterQualityRpt.htm#GLCRWMP**
- **Lake Leelanau — Conservation Resource Alliance, www.rivercare.org/**
- **Platte River — Benzie Conservation District, www.benziecd.org/watershed.html**
- **Long Lake**

Watershed Groups

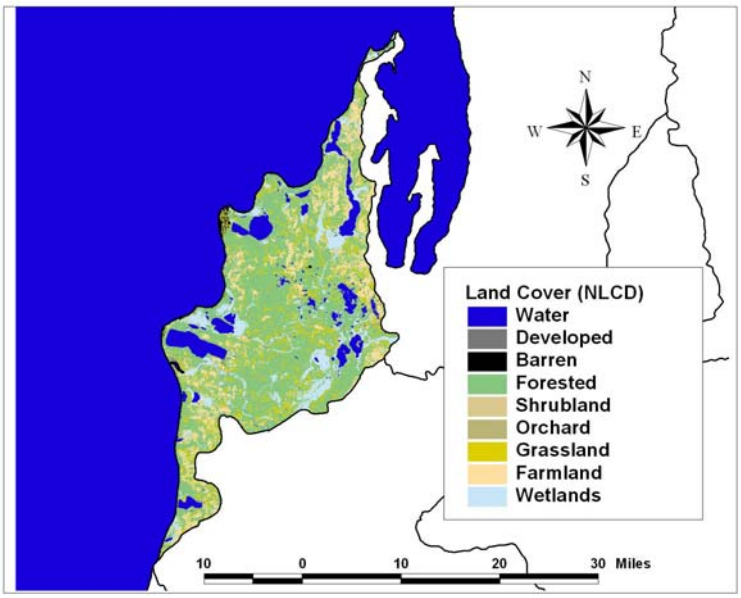
- Conservation Resource Alliance — www.rivercare.org
- The Leelanau Conservancy — www.theconservancy.com
- Glen Lake Association — www.glenlakeassociation.com
- Grand Traverse Regional Land Conservancy — www.gtrlc.org
- Crystal Lake & Watershed Association — www.clwa.us
- Northwest Michigan Council of Governments — www.nwm.org

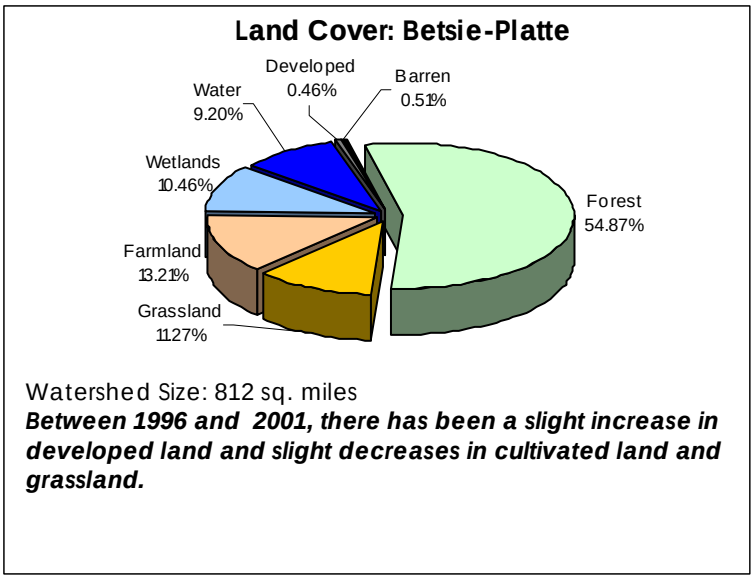
Watershed Overview

- The basin was known for a large logging industry in the late 1800s and early 1900s that led to deep sand deposits in the rivers and creeks and roads cut through forests.
- Attempts at crop farming the cut over land proved largely unsuccessful due to poor soils.
- The area is known for orchards and vineyards.
- The watershed has large stretches of State forest and Federal parklands.
- A majority of the land is forested.
- Native plant species in the area range from the extremely drought tolerant species Bearberry (Arctostaphylos uvaursi) and Stiff Coreopsis (Coreopsis palmata) to the wetland species of Blue Flag Iris (Iris veriscolor) and Buttonbush (Cephalanthus occidentalis). More unusual species include the Red Milkweed or Swamp Milkweed (Asclepias incarnata), desired by the Monarch Butterfly as the favorite food source for the larvae.
- The watershed is home to critical habitat identified by the Nature Conservancy include: Great Lakes Hemlock - Beech - Hardwood Forest, Great Lakes Beachgrass Dune, Great Lakes Shoreline Cattail - Bulrush Marsh, Great Lakes Dune Pine Forest, Great Lakes Beachgrass Dune, Interdunal Wetland.
- Critical species identified by the Nature Conservancy and other partners include Prairie Moonwort, Prairie Dunewort, Piping Plover, Pitcher's Thistle, and Michigan Monkey-flower.

Subwatersheds of the Betsie-Platte Watershed

0101 Cedar Run
0102 Mehert Creek-Lake Leelanau
0103 Lake Leelanau
0201 Long Lake-Platte River
0202 Bronson Lake-Platte River
0203 Pearl Lake
0204 North Branch Platte River
0205 Collison Creek-Platte River
0206 Platte River
0301 Duck Lake
0302 Green Lake
0303 Little Betsie River-Betsie River
0304 Dair Creek-Betsie River
0305 Crystal Lake Outlet
0306 Rice Creek-Betsie River
0307 Betsie River
0401 Shalda Creek-Frontal Lake Michigan
0402 Crystal Run
0403 Otter Creek-Frontal Lake Michigan
0404 Arcadia Lake
0405 Portage Lake
0406 Lower Herring Lake-Frontal Lake Michigan





Watershed Size: 812 sq. miles

Between 1996 and 2001, there has been a slight increase in developed land and slight decreases in cultivated land and grassland.

Watershed Priorities

- Identified Platte River impairments include fertilizers; human and animal waste; oils, toxic chemicals, and salt; sediment; heated runoff; altered stream; pesticides; bacteria; and channel flow.
- The watershed has listed impairments for mercury, PCB and chlordane fish consumption advisories for a limited number of waterbodies (see table on opposite page).
- The watershed has seen significant erosion at stream crossings.
- There is significant sedimentation that has occurred in the watershed.
- Watershed and environmental groups have been undertaking significant projects to protect and restore the watershed. The primary focus of the protection and restoration efforts include:
  - Improving water quality and Soil Erosion and Sediment Control.
  - Removing manmade drainage features on former farmland to reduce excess storm water runoff.
  - Purchase of easements to protect open space and improve environmental functions.
  - Protecting ecologically sensitive areas like wetlands and their associated forests as well as undeveloped shoreline.
  - Protected sensitive "dune and swale" topography at Sleeping Bear Dunes. The area is recognized by the U.S. Fish and Wildlife Service as "globally rare habitat."
  - Remove invasive species and restore dunes in the Greater Point Betsie landscape. The project facilitates activity at the greater Pt. Betsie landscape to remove invasives and restore dunes to benefit the rare natural communities, including Pitcher's thistle, a threatened species.
  - Improve habitat for critical species like the piping plover.

Impaired (303d) Waters

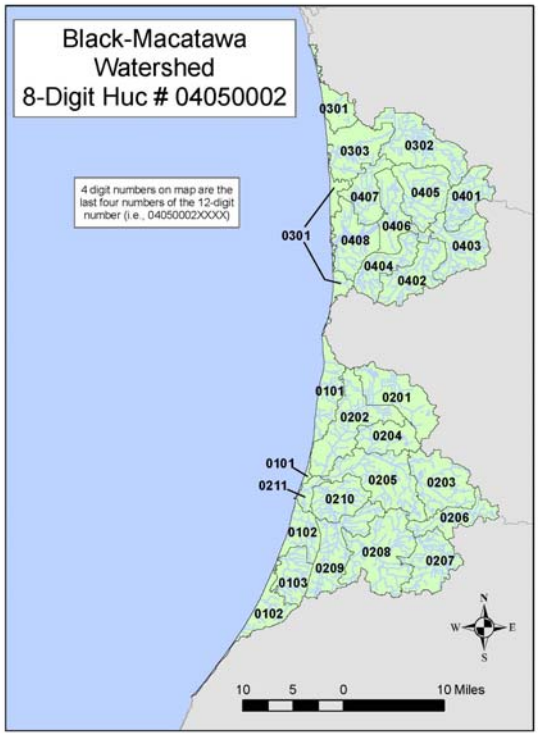
Waterbody	Impairment
Bass Lake	Mercury (Fish Tissue)
Crystal Lake	PCB Fish Consumption Advisory
Crystal Lake Bellows Beach	Pathogens
Glen Lake	Chlordane Fish Consumption Advisory, Mercury (Fish Tissue), PCB Fish Consumption Advisory
Green Lake	PCB Fish Consumption Advisory, Mercury (Fish Tissue)
Lake Ann	Mercury (Fish Tissue)
Lake Michigan - North of Frankfort	Chlordane Fish Consumption Advisory, Dioxin Fish Consumption Advisory, PCB Fish Consumption Advisory, Mercury (Fish Tissue)
Lake Michigan - South of Frankfort	Chlordane Fish Consumption Advisory, Fish consumption advisory (dioxin), PCB Fish Consumption Advisory, mercury (Fish Tissue), Fish consumption advisory (DDT)
North Lake Leelanau	PCB Fish Consumption Advisory, Mercury (fish tissue)
Portage Lake	PCB Fish Consumption Advisory
Unnamed Tributary to Platte Lake	Bacterial Slimes, Macroinvertebrate Community Rated Poor, Organic Enrichment

More information on specific projects are available from the local watershed groups listed at the beginning of this fact sheet.

Data Sources. Land cover map and percentages: National Land Cover database, 1992 (edc.usgs.gov/products/landcover/nlcd.html; Land use change: NOAA Coastal Change Analysis Program, 1996 and 2001 (www.csc.noaa.gov/crs/lca/ccap.html); Total Maximum Daily Load (TMDL) Impaired Waters: Surf Your Watershed (www.epa.gov/surf)

Black-Macatawa Watershed

Hydrologic Unit Code: 04050002



For more information, see the USEPA "Surf Your Watershed" website at cfpub.epa.gov/surf/huc.cfm?huc_code=04050002 or contact the Michigan Department of Environmental Quality at 517-335-6969 to request a copy of the following reports:

- **MI/DEQ/WB-07/086, "Monthly Water Quality Assessment of Lake Macatawa and Its Tributaries, 2006".**
- **MI/DEQ/WB-07/014, "A Biological Survey of Sites in the Lake Macatawa Watershed. Allegan and Ottawa Counties, Michigan, Jun 2005".**
- **MI/DEQ/WB-07/062, A Biological Survey of Sites in the Pigeon River Watershed, Ottawa County, Michigan, Jul 2005".**
- **MI/DEQ/WD-03/077, "A Biological Survey of Sites on Select Lake Michigan Tributaries, Allegan and Van Buren Counties, Michigan".**
- **MI/DEQ/WD-03/067, "A Biological Survey of Sites in the Black River Watershed, Allegan and Van Buren Counties, Michigan, Aug 19 and 20, 2002".**

Watershed Management Plans

- Pigeon River -- Timberland RC&D Council
- Black River Watershed Management Plan -- Van Buren Conservation District -- www.vbco.org/natfeat8363127.asp
- Lake Macatawa Watershed Management Plan -- Macatawa Area Coordinating Council
- Black River

Watershed Groups

- Macatawa Greenway Partnership — www.macatawagreenway.org
- Macatawa Watershed Project — www.michigan.gov/documents/deq/ess-nps-fs-macatawa_208830_7.pdf
- Van Buren Conservation District -- www.vanburencd.org
- Bangor / South Haven Heritage Water Trail Association -- www.vbco.org/watertrail.asp

Watershed Overview

- 151 miles of the rivers and streams flow year round.
- Soil associations in the Black River watershed are generally fine sandy to sandy loam, poor to somewhat poorly drained.
- Channelization from historic dredging has removed channel diversity, reduced bank stability, and generally the quality and quantity of stream biota.
- The Macatawa watershed has two major tributaries: the Macatawa River and Pine Creek. The lake and all its tributaries in the Macatawa watershed are protected as designated warmwater systems.
- Soil erosion and sedimentation is a major problem throughout due to agricultural land use and urbanization and has modified drainage patterns, increased direct surface runoff and erosion.
- Holland and South Haven, Michigan are the two urban areas in the watershed.

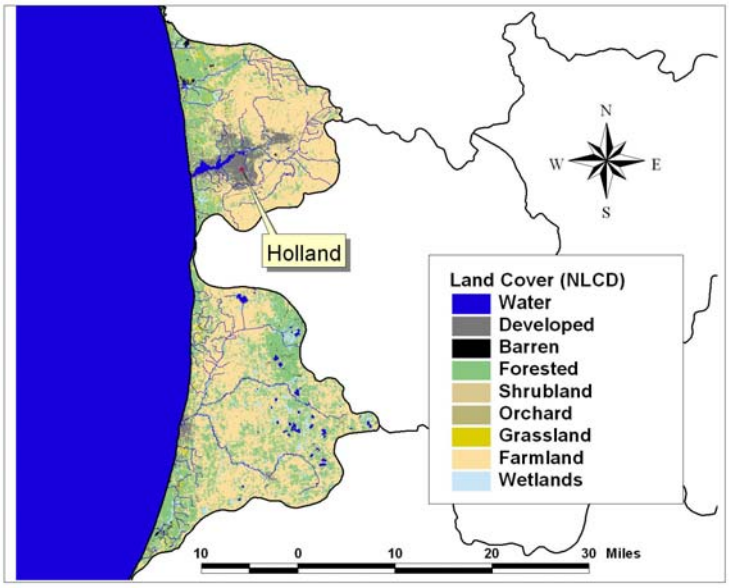
Subwatersheds in the Black-Macatawa Watershed

0101 Plummerville Creek-Frontal Lake Michigan
0102 Deerlick Creek-Frontal Lake Michigan
0103 Brandywine Creek
0201 Headwaters North Branch Black River
0202 North Branch Black River
0203 Headwaters Middle Branch Black River
0204 Scott Creek Drain
0205 Middle Branch Black River
0206 Great Bear Lake Drain
0207 Headwaters South Branch Black River
0208 Maple Creek-South Branch Black River
0209 Cedar Creek-South Branch Black River
0210 South Branch Black River
0211 Black River
0301 Little Pigeon Creek-Frontal Lake Michigan
0302 Headwaters Pigeon River
0303 Pigeon River
0401 Upper Macatawa River
0402 South Branch Macatawa River
0403 Middle Macatawa River
0404 North Branch Macatawa River
0405 Bosch and Hulst Drain
0406 Lower Macatawa River
0407 Pine Creek
0408 Macatawa Bay

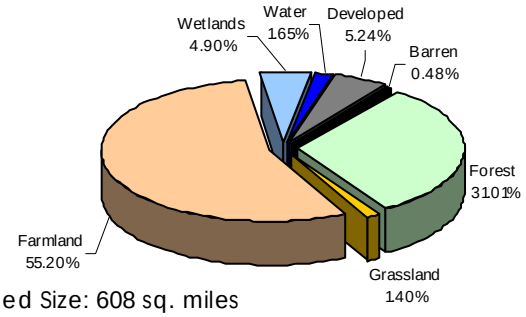
- Two and a half million visitors visit Holland, Michigan each year.
- The counties located in the watershed have a population of over 594,000.
- 96 of the 151 miles of impaired waterways (or 64%) have been assessed.
- Ottawa County is rated as Michigan's most diverse agricultural county. Products grown include apples, asparagus, strawberries, cherries, annuals, perennials, pumpkins, squash, among others.
- Large natural areas in the Black River Watershed include the Van Buren State Park, Kal-Haven Trail, and Allegan State Game Area

Watershed Activities

- A significant number of impairments are related to farming activities, including excessive phosphorus loadings as a result of the use of phosphorus-based fertilizers, sedimentation from erosion and runoff.
- The Lake Macatawa Watershed includes all the land that drains to Lake Macatawa. There is excess sedimentation due to nonpoint sources, mainly agricultural, in the Macatawa watershed and its tributaries. The Noordeloos Creek Sedimentation Project is focused on a creek that is comprised largely of agricultural land.
- Black River watershed activities include streambank stabilization and raingarden projects in two municipal parks, land conservation efforts, land use planning assistance to local municipalities to incorporate water quality objectives, and information/education activities with a strong focus on LID and landscaping for water quality.
- Restoration and protection activities focus on:
  - ◊ Reducing phosphorus loadings and sedimentation.
  - ◊ Implement Best Management Practices.
  - ◊ Provide long term protection of the Black River Watershed through improved local land use policies and land protection.
  - ◊ Improving water quality in lakes and streams.
  - ◊ Improving educational outreach to the community.
  - ◊ Performing watershed inventories.
  - ◊ Identifying pollutant sources and causes, identifying critical areas.
  - ◊ Gathering information about watershed from preexisting sources.



Land Cover: Black-Macatawa Watershed



Watershed Size: 608 sq. miles

Between 1996 and 2001, there has been a slight increase in developed land and slight decreases in cultivated land, forest, and grassland.

Impaired (303d) Waters

Waterbody	State Impairment
Huizenga Park Pond Beach	Pathogens
Lake Macatawa Duton Park Beach	Pathogens
Lake Macatawa (Macatawa River Mouth)	Chlordane Fish Consumption Advisory PCB Fish Consumption Advisory
Lake Michigan - Rosy Mound Recreation Area Beach)	Pathogens
Lake Michigan - South of Frankfort	Chlordane Fish Consumption Advisory DDT Fish Consumption Advisory Dioxin Fish Consumption Advisory PCB Fish Consumption Advisory Mercury (Fish Tissue)
Silver Lake Inlet	Macroinvertebra Community Rated Poor, Simazine

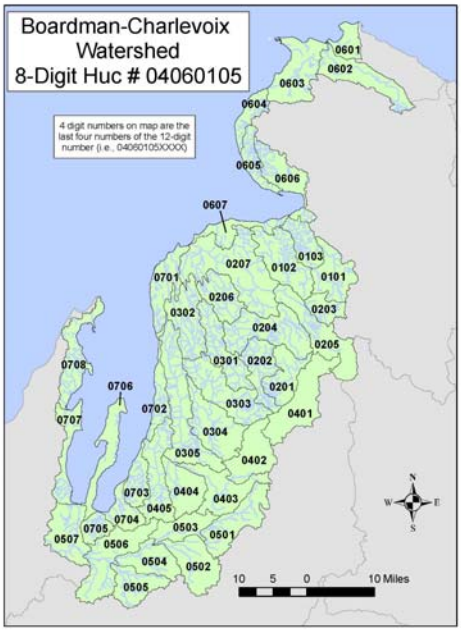
Data Sources. Land cover map and percentages: National Land Cover database, 1992 (edc.usgs.gov/products/landcover/nlcd.html; Land use change: NOAA Coastal Change Analysis Program, 1996 and 2001

Boardman-Charlevoix Watershed

Hydrologic Unit Code: 04060105

For more information, see the USEPA "Surf Your Watershed" website at cfpub.epa.gov/surf/huc.cfm?huc_code=04060105 or contact the Michigan Department of Environmental Quality at 517-335-6969 to request a copy of the following reports:

- **MI/DEQ/SWQ-01/135, "A Biological Survey of the Upper Boardman River and Selected Tributaries to the Boardman River"**
- **MI/DEQ/SWQ-02/016, "A Biological Survey of Charlevoix County Streams, Charlevoix County, Michigan, 1998."**



Watershed Management Plans

- **Boardman River — Grand Traverse Conservation District**
- **Elk River Chain of Lakes — Antrim Conservation District**
- **Long Lake — Grand Traverse County Drain Commission**
- **Mitchell Creek — Grand Traverse County Drain Commission**
- **Grand Traverse Bay—Watershed Center Grand Traverse Bay**
- **Lake Charlevoix, Charlevoix Conservation District**
- **Elk River Chain of Lakes Watershed — Antrim Conservation District, Tip of the Mitt Watershed Council, Conservation Resource Alliance**
- **Little Traverse Bay — Tip of the Mitt Watershed Council**

Watershed Groups

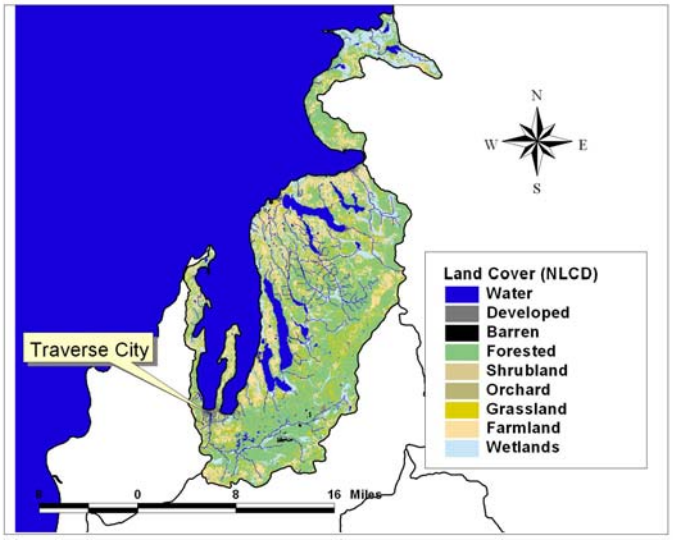
- Boardman River Project — www.boardmanriver.org
- Grand Traverse Conservation District — www.gtcd.org
- Grand Traverse County Drain Commission — www.grandtraverse.org
- Antrim Conservation District — www.antrimcd.org
- Charlevoix Conservation District — www.charlevoixcounty.org/cd.asp
- Tip of the Mitt Watershed Council — www.watershedcouncil.org
- Conservation Resource Alliance — www.rivercare.org
- Watershed Center Grand Traverse Bay — www.gtbay.org
- Northwest Michigan Council of Governments — www.nwm.org
- Grand Traverse Band of Ottawa and Chippewa Indians — www.gtb.nsn.us
- Little Traverse Bay Bands of Odawa Indians — www.ltbbodawa-nsn.gov

Watershed Overview

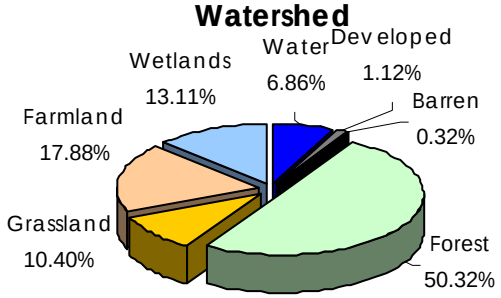
- The watershed has over 217 miles of Lake Michigan shoreline.
- Over 529 miles of streams and rivers flow year-round.
- Major waterways in the basin include the Elk River, the Boardman River, Lake Charlevoix, Little Traverse Bay, and the Carp River.
- The Grand Traverse Bay, which is part of the watershed, is one of the premier tourist and outdoor recreation regions in the State of Michigan. The Boardman River is the largest tributary to Grand Traverse Bay.
- The majority of the Boardman River is in the North Central Hardwood Forest ecoregion. The uppermost reach (about 7-8 miles) of the North Branch Boardman River is in the Northern Lakes and Forest ecoregion.
- The Boardman's well drained soils allow cold groundwater to the streams and provide for the stable stream flow.
- The Boardman River ranks among Michigan's top 10 trout streams. It contains excellent populations of brook and

Subwatersheds for Boardman-Charlevoix Watershed

0101 Spring Brook
0102 Walloon Lake-Bear River
0103 Bear River
0201 Stevens Creek-Jordan River
0202 Severance Creek-Jordan River
0203 North Branch Boyne River
0204 Jordan River
0205 Boyne River
0206 South Arm Lake Charlevoix
0207 Lake Charlevoix
0301 St Clair Lake
0302 Hanley Lake
0303 Cedar River-Intermediate River
0304 Clam Lake
0305 Torch Lake
0401 Wetzel Lake
0402 Headwaters Rapid River
0403 Rapid River
0404 Lake Skegemog
0405 Elk River
0501 Crofton Creek-North Branch Boardman River
0502 South Branch Boardman River
0503 North Branch Boardman River
0504 Brown Bridge Pond-North Branch Boardman River
0505 East Creek
0506 Jaxon Creek-North Branch Boardman River
0507 Boardman River
0601 French Farm Creek-Frontal Trails End Bay
0602 Carp Lake River
0603 Wycamp Creek-Frontal Lake Michigan
0604 Horseshoe Bend-Frontal Lake Michigan
0605 Fivemile Creek-Frontal Lake Michigan
0606 Roaring Brook-Frontal Lake Michigan
0607 Susan Creek-Frontal Lake Michigan
0701 McGeach Creek-Frontal Grand Traverse Bay
0702 Birch Lake-Frontal Grand Traverse Bay
0703 Petobego Pond-Frontal East Arm Grand Traverse Bay
0704 Acme Creek-Frontal East Arm Grand Traverse Bay
0705 East Branch Mitchell Creek
0706 Prescott Lake-Frontal Grand Traverse Bay
0707 Cedar Creek-Frontal West Arm Grand Traverse Bay
0708 Belangers Creek-Frontal Grand Traverse Bay



Land Cover: Boardman-Charlevoix Watershed



Watershed Size: 1664 sq. miles

Between 1996 and 2001, there has been a slight increase in developed land and slight decreases in grassland, farmland and grassland.

brown trout.

- Agriculture, tourism and recreation dominate the economy. Cherries and other fruit crops dominate agricultural production in the region.
- The watershed boasts scenic bluffs, forests, nearly a hundred inland lakes, several hundred miles of stream (including 55 miles of blue ribbon trout streams), intact wetland systems and globally rare ecosystems.
- The Boardman River watershed contains Great Lakes Beachgrass Dune, Dune Pine Forest, Great Lakes Shallow Marsh, Great Lakes Shoreline Cattail - Bulrush Marsh, Interdunal Wetland, and White Cedar - Boreal Conifer Mesic Forest.
- The watershed has baymouth/barrier beaches with bedrock nearshore, sandy beach/dunes with bedrock (resistant) nearshore, sandy beach/dunes with sand and gravel lag over clay nearshore, and sandy beach/dunes with sand/gravel nearshore.
- The watershed is home to species of Black Bear, Deer, Great Blue Heron, Lady Slippers, and Trillium.
- Waugoshance is an important Landbird stopover site, Raptor stopover site, Shorebird stopover site, and Waterfowl stopover site. It is home to Bald Eagle, Black Tern, Blackburnian Warbler, Black-throated Blue Warbler, Black-throated Green Warbler, Blue-winged Warbler, Chestnut-sided Warbler, Eastern Wood-Pewee, Least Flycatcher, Mourning Warbler, Nashville Warbler, Piping Plover, Prairie Warbler, Purple Finch, Rose-breasted Grosbeak, Ruffed Grouse, Veery, Wood Duck, Wood Thrush, Dwarf Lake Iris, Houghton's Goldenrod, and Pitcher's Thistle.

Impaired (303d) Waters

Waterbody Name	Impairment
Arbutus Lake	Mercury (Fish Tissue)
Boardman River Watershed	PCBs
Boyne River	PCB Fish Consumption Advisory
Deer Lake	Mercury (Fish Tissue)
Elk Lake	Mercury (Fish Tissue) PCB Fish Consumption Advisory
Ellsworth Lake	Mercury (Fish Tissue)
Grand Traverse Bay—East Bay State Park Beach	Pathogens
Grand Traverse Bay—Milliken Beach	Pathogens
Kids Creek	Macroinvertebrate Community Rated Poor
Lake Bellaire	Mercury (Fish Tissue)
Lake Charlevoix	PCB Fish Consumption Advisory
Torch Lake	Chlordane Fish Consumption Advisory PCB Fish Consumption Advisory Dioxin Fish Consumption Advisory Mercury (Fish Tissue)

Watershed Activities

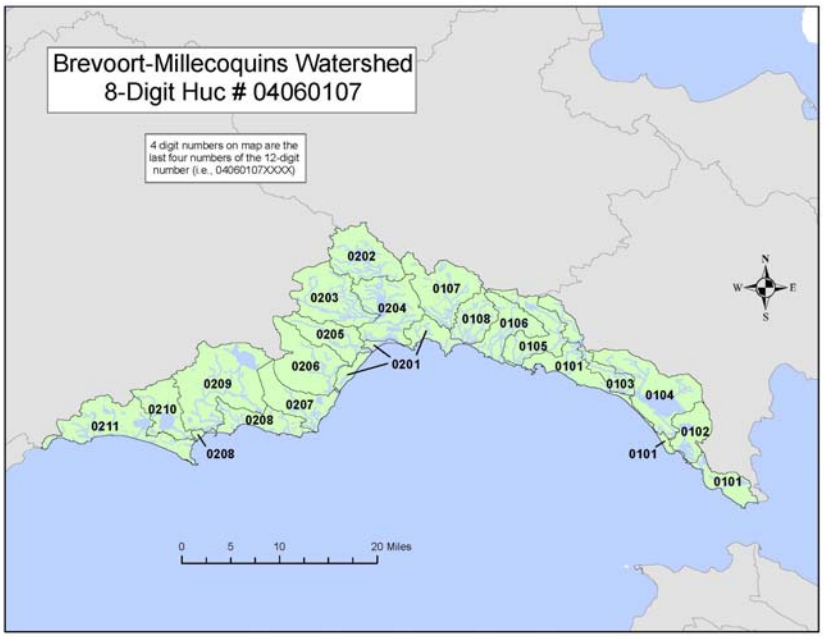
- The Grand Traverse Bay region is currently experiencing tremendous population growth and development pressure, with a predicted 40% increase in population by 2020. Two of the three fastest growing counties in the state, Grand Traverse and Leelanau, are located within the watershed.
- Sediment and excessive nutrient loading are two of the highest priority pollutants. Other pollutants that threaten the watershed's designated uses include thermal pollution, toxins, changes in hydrologic flow, invasive species, pathogens, and loss of habitat.
- There has been a focus on streambank stabilization, bridge projects, woody debris installation for fish habitat, sand traps, and wildlife corridor work.
- Other projects have focused on management of nonpoint pollution, reducing stormwater runoff and pollution form shoreline properties; improving road/stream crossings; providing educational materials to the agricultural community; land

Data Sources. Land cover map and percentages: National Land Cover database, 1992 (edc.usgs.gov/products/landcover/nlcd.html; Land use change: NOAA Coastal Change Analysis Program, 1996 and 2001 (www.csc.noaa.gov/crs/lca/ccap.html); Total Maximum Daily Load (TMDL) Impaired Waters: Surf Your Watershed (www.epa.gov/surf)

Brevoort-Millecoquins Watershed

Hydrologic Unit Code: 04060107

For more information, see the USEPA "Surf Your Watershed" website at cfpub.epa.gov/surf/huc.cfm?huc_code=04060107



Watershed Overview

- The watershed is located at the southeastern portion of Michigan's Upper Peninsula.
- The watershed covers 562 square miles. With 102.53 miles of Lake Michigan shoreline
- 301 of the 369 river miles run year-round.
- It has 19 square miles of inland lakes.
- It has two listed impaired waters.
- The Hiawatha National Forest makes up a significant portion of the watershed.
- The watershed has many minerals and aggregates and limestone quarries.
- The Brevoort River watershed is home to Pitcher's Thistle and Dwarf Lake Iris.

Subwatersheds of the Brevoort-Millecoquins Watershed

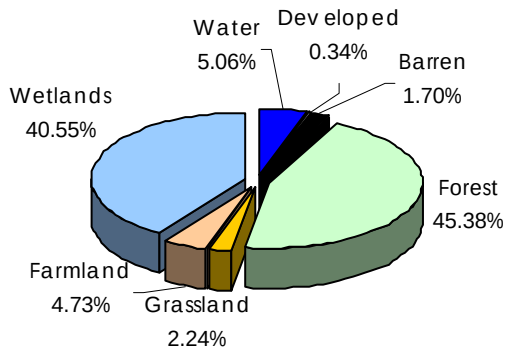
0101 Cut River-Frontal Lake Michigan
0102 Point Aux Chenes River
0103 Little Brevoort River
0104 Brevoort River
0105 Davenport Creek-Frontal Lake Michigan
0106 Hog Island Creek
0107 Peters Creek-Black River
0108 Black River
0201 East Mile Creek-Frontal Lake Michigan
0202 Jocko Creek-Upper Millecoquins River
0203 Furlong Creek
0204 Lower Millecoquins River
0205 Rock River
0206 Crow River
0207 Point Patterson Creek-Frontal Lake Michigan
0208 Hudson Creek-Frontal Lake Michigan
0209 Milakokia River
0210 Bulldog Creek
0211 Marblehead Creek-Frontal Lake Michigan

Data Sources. Land cover map and percentages: National Land Cover database, 1992 (edc.usgs.gov/products/landcover/nlcd.html; Land use change: NOAA Coastal Change Analysis Program, 1996 and 2001 (www.csc.noaa.gov/crs/lca/ccap.html); Total Maximum Daily Load (TMDL) Impaired Waters: Surf Your Watershed (www.epa.gov/surf)

Impaired (303d) Waters

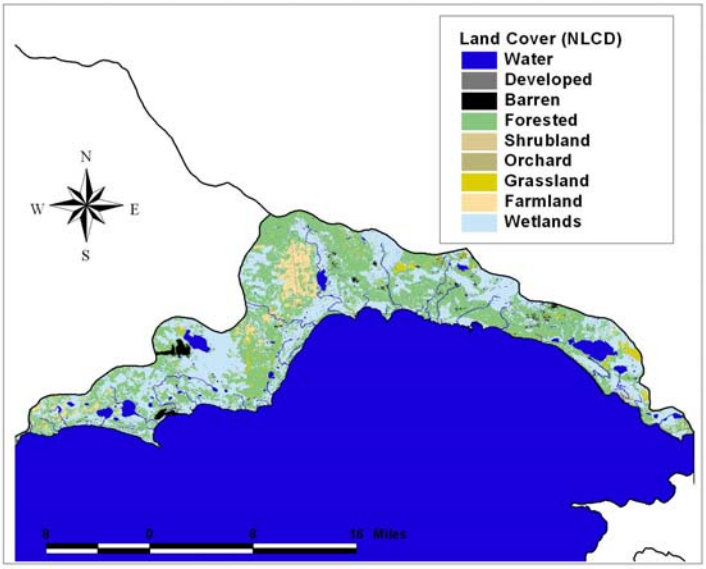
Water Body	Impairment
Gulliver Lake	Mercury (Fish Tissue)
Milakokia Lake	Mercury (Fish Tissue)
Millecoquins Lake	Mercury (Fish Tissue)

Land Cover: Brevoort-Millecoquins Watershed



Watershed Size: 562 sq. miles

Between 1996 and 2001, there have been slight increases in grassland, cultivated land, and developed land and a slight decrease in forest.



Brule River Watershed

Hydrologic Unit Code: 04030106

For more information, see the USEPA "Surf Your Watershed" website at cfpub.epa.gov/surf/huc.cfm?huc_code=04030106 or contact the Michigan Department of Environmental Quality at 517-335-6969 to request a copy of report number MI/DEQ/WD-03/032, "A Biological Survey of the Brule, Paint, and Michigamme River Watersheds, Iron and Marquette Counties, 2002".

Watershed Management Plans

- **Iron River Watershed — Iron Conservation District**

Watershed Groups

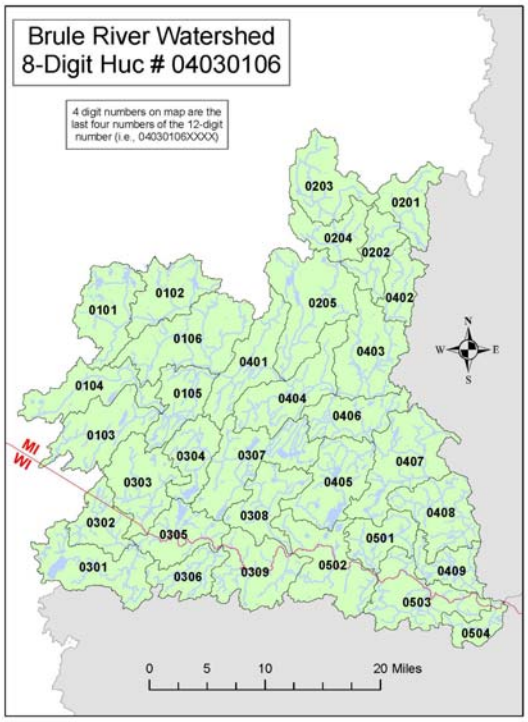
- **Iron River Conservation District — www.iron.org/edc/gov-conservation.php**
- **Iron River Watershed Project & Council — www.ironriverwatershed.org**

Watershed Overview

- Prior to the logging area, the watershed was extensively managed by Native Americans using fire to stimulate wildlife use. The name "Brule" (originally "Brulee") comes from the early French explorers means "burned woodlands."
- Extensive logging occurred in the watershed from the late 1800s to the early 1900s.
- The Ottawa National Forest is 1.7 million acres and makes up Much of the Brule River watershed .
- The Brule River watershed covers 1057 square miles and does not have any Lake Michigan shoreline.
- The Iron River in the watershed supports a naturally reproducing brook trout populations in the upper peninsula.
- 12 1/2 miles of the streams are classified as blue-ribbon trout streams.
- Forestry, wood products, and tourism are the dominant industries.
- All but one of the MDEQ watershed sampling sites had an excellent habitat rating. The one that did not had a good rating.

Watershed Activities / Concerns / Priorities

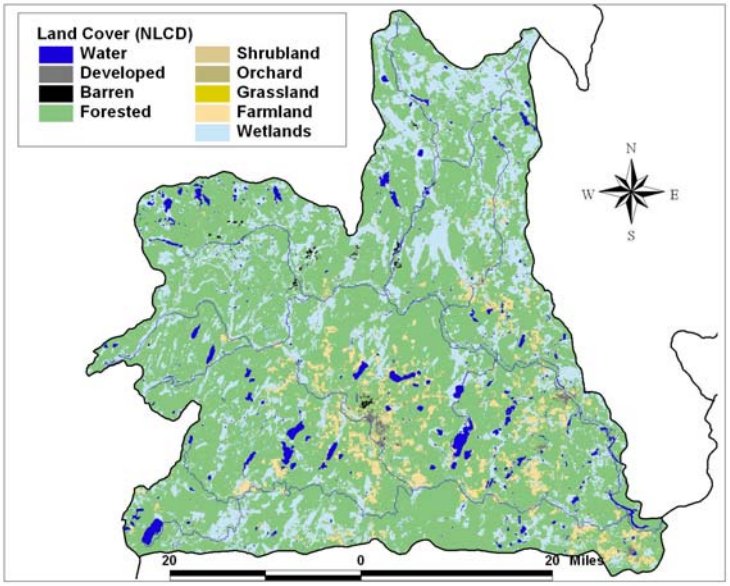
- The overall health status of the watershed is generally good.
- A limited number of point source discharges exist in the area. This includes the West iron County Sewer Authority Wastewater treatment Plant and the National Steel-Dober pit site in Caspian, and Wastewater Sewage Lagoons at Crystal Falls and Alpha.
- The Brule River watershed has an "excellent" macroinvertebrate community.
- Most of the listed impairments are related to fish consumption advisories.
- Contamination from mines has occurred, although the number has been limited. Recent fines have been applied to restoration activities on the Iron River.



Subwatersheds of the Brule River Watershed

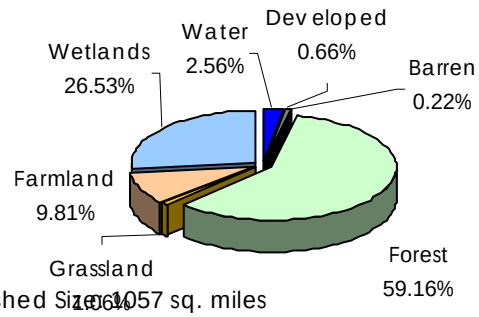
0101 Paint Creek-North Branch Paint River
0102 Winslow Creek-North Branch Paint River
0103 Headwaters South Branch Paint River
0104 Cooks Run
0105 South Branch Paint River
0106 North Branch Paint River
0201 Shank Lake Creek-East Branch Net River
0202 East Branch Net River
0203 Net River Flooding-West Branch Net River
0204 West Branch Net River
0205 Net River
0301 Brule Creek
0302 Elvoy Creek
0303 Pendleton Creek
0304 North Branch Iron River-South Branch Iron River
0305 Wilson Creek-Brule River
0306 Allen Creek
0307 Stanley Creek-Iron River
0308 Iron River
0309 Wisconsin Creek-Brule River
0401 Silver Creek-Paint River
0402 West Branch Hemlock River-East Branch Hemlock River
0403 Hemlock River
0404 Parks Creek-Paint River
0405 Chicagon Slough
0406 Peterson Creek-Paint River
0407 Briar Hill Creek-Paint River
0408 Tim Bowes Creek-Paint River
0409 Paint River
0501 Armstrong Creek
0502 Riley Creek-Brule River
0503 Brule Island Dam-Brule River
0504 Brule River

- Watershed activities have consisted of watershed inventories, public education, and identifying strategies to deal with nonpoint source pollution.
- An information and education campaign designed to reduce nonpoint source pollution and restore or sustain habitat and water quality, including newsletters and articles, radio and television appearances, public presentations, training workshops, road signs, interpretive signs, a website, storm drain markers, and a comprehensive brochure was created fir parts of the watershed.
- Grants have been awarded for road and stream stabilization in the watershed.



Data Sources. Land cover map and percentages: National Land Cover database, 1992 (edc.usgs.gov/products/landcover/nlcd.html; Land use change: NOAA Coastal Change Analysis Program, 1996 and 2001 (www.csc.noaa.gov/crs/lca/ccap.html); Total Maximum Daily Load (TMDL) Impaired Waters: Surf Your Watershed (www.epa.gov/surf)

Land Cover: Brule River Watershed



Watershed Size: 1057 sq. miles

Between 1996 and 2001, there has been a slight increase in developed land, grassland, and cultivated land and a slight decreases in forest.

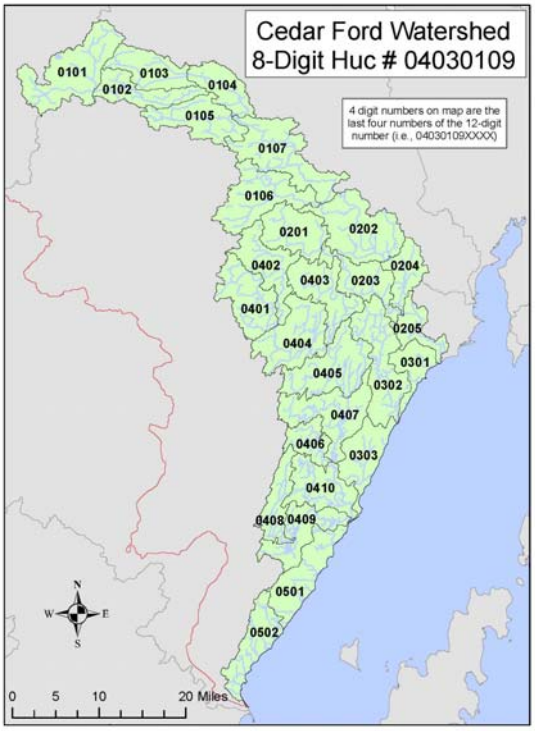
Impaired (303d) Waters

Waterbody Name	Impairment
Brule River Flowage (WI)	Mercury Fish Consumption Advisory
Cable Lake (MI)	Mercury (Fish Tissue)
Chicagon Lake (MI)	Mercury (Fish Tissue)
Fortune Lake (Second Lake) (MI)	Mercury (Fish Tissue)
Kentuck Lake (WI)	Mercury Fish Consumption Advisory
Lake Emily (MI)	Mercury (Fish Tissue)
Net River (MI)	Mercury (Fish Tissue)
Ottawa River (MI)	PCB Fish Consumption Advisory
Paint River (MI)	Pathogens
Sunset Lake (MI)	Mercury (Fish Tissue)

Cedar-Ford Watershed

Hydrologic Unit Code: 04030109

For more information, see the USEPA "Surf Your Watershed" website at cfpub.epa.gov/surf/huc.cfm?huc_code=04030109 or contact the Michigan Department of Environmental Quality at 517-335-6969 to request a copy of report number MI/DEQ/WB-05/038, "A Biological Survey of the Big Cedar, Bark, and Ford River Watersheds Located in Delta and Menominee Counties, 2000."



Watershed Groups

- **Friends of the Cedar River**
- **Central Lake Superior Watershed Partnership — www.michigan.gov/documents/deq/ess-nps-fs-central-lake-superior_208575_7.pdf**

Watershed Overview / Ecology / Biodiversity

- The Cedar-Ford watershed covers 1029 square miles with almost 53 miles of Lake Michigan shoreline.
- There are many large, privately held hunting camps and industrial/state forest land.
- Fishing recreation, deer and grouse hunting, snow mobile touring, and cross country skiing are some of the important basin recreational activities.

Watershed Priorities

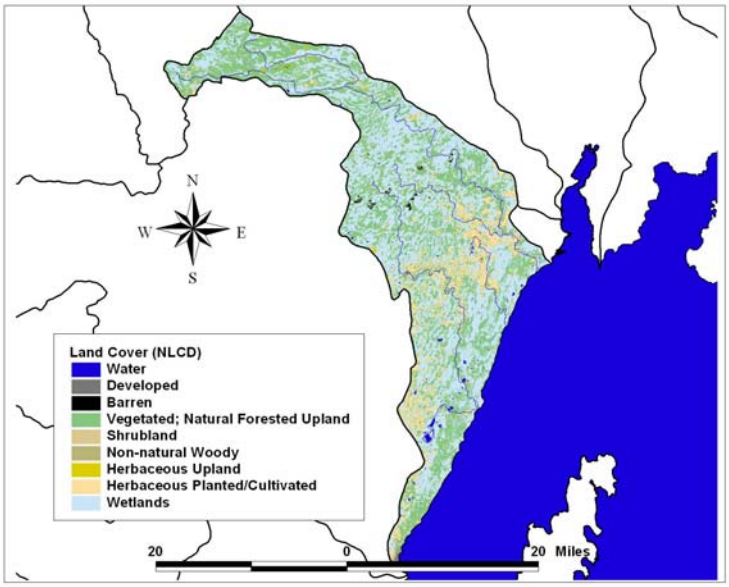
Areas of focus include:

- Watershed Planning
- Great Lakes Protection
- Water Quality Protection
- Stream Restoration and Enhancement
- Aquatic Nuisance Species Monitoring and Assessment
- Water Quality Monitoring and Habitat Assessment
- Land Use Planning Tool Development
- Native Plant Restoration
- Invasive Species Monitoring and Control
- Habitat Restoration
- Land Protection (zoning and conservation easement)
- Erosion Control
- Public Education and Outreach

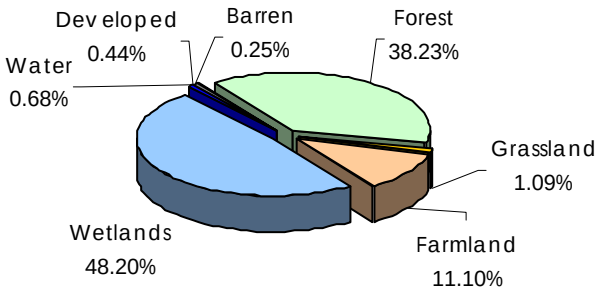
Subwatersheds of the Cedar-Ford Watershed

0101 Twomile Creek-Ford River
0102 Hayes Creek-Ford River
0103 Headwaters North Branch Ford River
0104 North Branch Ford River
0105 Stafford Creek-Ford River
0106 West Branch Ford River
0107 Town of Northland-Ford River
0201 Headwaters Tenmile Creek
0202 Camp Creek-Ford River
0203 Tenmile Creek
0204 Town of Riverland-Ford River
0205 Ford River
0301 Sunny Brook-Frontal Green Bay
0302 Bark River
0303 Deer Creek-Frontal Green Bay
0401 West Branch Cedar River
0402 Pittsburg Creek-Cedar River
0403 Fortyseven Mile Creek
0404 Wilson Creek-Cedar River
0405 Advent Creek-Cedar River
0406 Devils Creek
0407 Depas Creek-Cedar River
0408 Big Brook
0409 Cedar River
0410 Walton River
0501 Fowler Creek-Frontal Green Bay
0502 Beattie Creek-Frontal Green Bay

Data Sources. Land cover map and percentages: National Land Cover database, 1992 (edc.usgs.gov/products/landcover/nlcd.html; Land use change: NOAA Coastal Change Analysis Program, 1996 and 2001 (www.csc.noaa.gov/crs/lca/ccap.html); Total Maximum Daily Load (TMDL) Impaired Waters: Surf Your Watershed (www.epa.gov/surf)



Land Cover: Cedar-Ford Watershed



Watershed Size: 1029 sq. miles

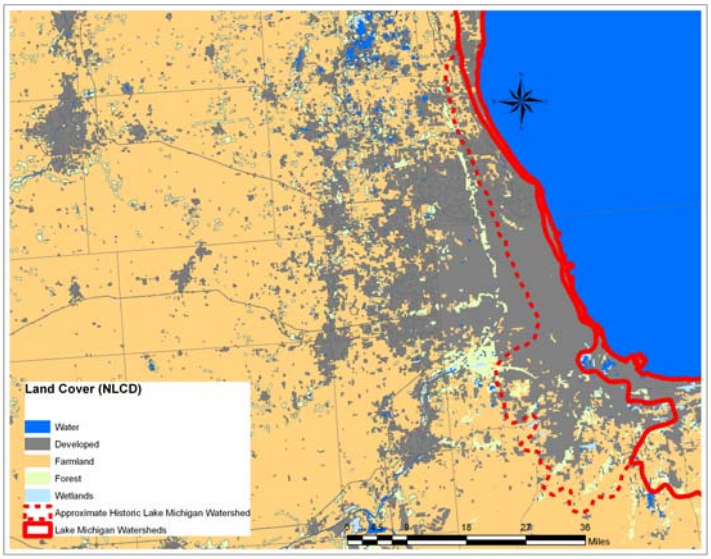
Between 1996 and 2001, there has been a slight increase in grassland a slight decrease in forest.

Impaired 303(d) Waters

Waterbody Name	Impairment
Green Bay (Lake Michigan)	Dioxins Fish Consumption Advisory PCB Fish Consumption Advisory Mercury (Fish Tissue)
Lake Michigan Henes Park Beach	Pathogens

Chicago Area Waterway System

For more information, see the Chicago Waterways website at http://www.chicagoareawaterways.org/.



Water System Overview

- The Chicago River once flowed into Lake Michigan. To facilitate a reversal of the flow of the Chicago River to divert water from Lake Michigan to the Chicago Area Waterway System (CAWS), the Chicago Sanitary and Ship Canal, the Calumet-Sag Channel and the North Shore Channel were constructed over 100 years ago. The diversion and the artificial waterways facilitated navigation and protected the drinking water intakes in Lake Michigan from Chicago wastes. The Little Calumet River North Leg, the Chicago River, the South Branch of the Chicago River and North Branch of the Chicago River downstream from its confluence with the North Shore Channel are natural rivers that have been modified through channelization and widened and deepened.
- The CAWS includes the Calumet River and Chicago River basin water bodies that are generally classified as Secondary Contact Recreation and Indigenous Aquatic Life. The CAWS also includes Lake Calumet and a variety of tributaries designated as General Use.
- Land use within the CAWS basin is generally urban with extensive industrial development. Basin stakeholders include the City of Chicago and 31 suburban municipalities. Flow in the CAWS is dominated by treated wastewater from 5 million residents and an additional industrial load of approximately 4.5 million population equivalents.
- Chicago's wastewater system was developed with a combined sewer system that accepted both stormwater and sanitary waste. After rainstorms, the capacity of the sewer system became overwhelmed on a regular basis and combined sewer overflows (CSO) occurred. These CSOs are discharged into the CAWS and frequently from the river into Lake Michigan. To address this problem, the Metropolitan Water Reclamation District of Greater Chicago (MWRDGC) developed the Tunnel and Reservoir project (TARP), which included the construction of the Deep Tunnel project. The Deep Tunnel is a series of tunnels that lie 250 to 300 feet below the Chicago River and are located parallel to it. The first phase of the TARP project or "Deep Tunnel" project has been completed. During periods of heavy rainfall, the TARP project directs combined sanitary waste and infiltrating rainwater into massive tunnels and collection reservoirs where it can be withdrawn for treatment after the rain subsides.
- A comprehensive multi-year evaluation of current conditions in the Chicago Waterway System, and its potential for expanded uses, has been launched by the Illinois EPA. This evaluation, also called a Use Attainability Analysis (UAA), will be the first in-depth look at the system in nearly three decades. In mid-February, the Illinois Environmental Protection Agency announced plans for the project that involves the Chicago River, its two main branches (North Branch and South Branch), the Cal-Sag Channel, the Chicago Sanitary and Ship Canal, and tributaries in an area extending from the metropolitan Chicago area to the Lockport vicinity. The Chicago Waterway System makes up the surface drainage network serving the majority of the Greater Chicago metropolitan area. The system receives discharge from three of the largest municipal wastewater treatment plants in the nation as well as releases from more than 100 individual combined sewer outfalls.
- Since passage of the Clean Water Act in 1972, there have been major upgrades of treatment facilities along the Chicago Waterway. Under IEPA oversight, extensive pretreatment programs have begun, as well as treatment of industrial wastes before discharge. The first phase of the Tunnel and Reservoir (TARP) project or "Deep Tunnel" project has been completed.
- Recreational boating and other sports are on the rise within the system and improved fish populations and species diversity now support a modest recreational fishing use. These benefits indicate that the current use classification is outdated, making the planned study a timely undertaking. Jointly, these efforts have significantly improved conditions and public interest in the waterway, resulting in increased efforts to restore abandoned areas and provide public open spaces along the banks. As part of the study, a stakeholders advisory group will be created and involved through the review process and the completed review will be posted for Internet viewing.

Watershed Activities

- Chicago's shoreline habitats provide stopover sites for migratory birds and support rare plants. The dune restoration area at Loyola Beach currently supports State of Illinois endangered species. In addition the federally listed piping plover has stopped at this location. The project supports measures called for in the Service's Urban Bird Conservation

Treaty by implementing dune enhancement and expansion of restoration beyond the existing dune area through invasive species control, planting native species, species inventory and education projects. The outcome of the project will be a restored dune area providing a tangible resource for rare coastal bird and plant species.

Impaired (303d) Waters

Waterbody Name	Impairment
12th St. Beach	Pathogens, PCBs
31st St. Beach	Pathogens, PCBs
49th St. Beach	Pathogens, PCBs
57th St. Beach	Pathogens, PCBs
67th St. Beach	Pathogens, PCBs
Albion Beach	Pathogens, PCBs
Armitage Beach	Pathogens, PCBs
Calumet Beach	Pathogens, PCBs
Clark Beach	Pathogens, PCBs
Elder Beach	Pathogens, PCBs
Foster Beach	Pathogens, PCBs
Fullerton Beach	Pathogens, PCBs
Gilson Beach	Pathogens, PCBs
Glencoe Beach	Pathogens, PCBs
Greenwood Beach	Pathogens, PCBs
Hollywood/Ostermann Beach	Pathogens, PCBs
Howard Beach	Pathogens, PCBs
Il Beach State Park North	Pathogens, PCBs
Il Beach State Park South	Pathogens, PCBs
Jackson Park/63rd Beach	Pathogens, PCBs
Jarvis Beach	Pathogens, PCBs
Juneway Terrace	Pathogens, PCBs
Kenilworth Beach	Pathogens, PCBs
Lake Bluff Beach	Pathogens, PCBs
Lake Forest Beach	Pathogens, PCBs
Lake Michigan	PCBs

Waterbody Name	Impairment
Lee Beach	Pathogens, PCBs
Lighthouse Beach	Pathogens, PCBs
Lloyd Beach	Pathogens, PCBs
Loyola (Greenleaf) Beach	Pathogens, PCBs
Maple Beach	Pathogens, PCBs
Montrose Beach	Pathogens, PCBs
North Ave. Beach	Pathogens, PCBs
North Point Beach	Pathogens, PCBs
North Shore/Columbia	Pathogens, PCBs
Northwestern University Beach	Pathogens, PCBs
Oak St. Beach	Pathogens, PCBs
Ohio St. Beach	Pathogens, PCBs
Park Ave. Beach	Pathogens, PCBs
Pratt Beach	Pathogens, PCBs
Rainbow	Pathogens, PCBs
Rogers Beach	Pathogens, PCBs
Rosewood Beach	Pathogens, PCBs
Schiller Beach	Pathogens, PCBs
South Boulevard Beach	Pathogens, PCBs
South Shore Beach	Pathogens, PCBs
Thorndale Beach	Pathogens, PCBs
Touhy (Leone) Beach	Pathogens, PCBs
Tower Beach	Pathogens, PCBs
Waukegan North Beach	Pathogens, PCBs
Waukegan South Beach	Pathogens, PCBs
Webster Beach	Pathogens, PCBs

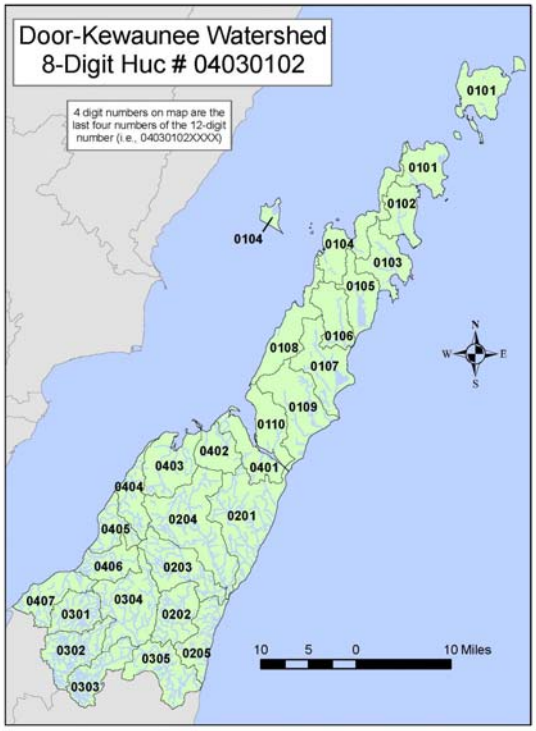
Data Sources. Land cover map and percentages: National Land Cover database, 1992 (http://edc.usgs.gov/products/landcover/nlcd.html; Land use change: NOAA Coastal Change Analysis Program, 1996 and 2001 (http://www.csc.noaa.gov/crs/lca/ccap.html); Total Maximum Daily Load (TMDL) Impaired Waters: Surf Your Watershed (www.epa.gov/surf)

Door-Kewaunee Watershed

Hydrologic Unit Code: 04030102

For more information, see the USEPA "Surf Your Watershed" website at cfpub.epa.gov/surf/huc.cfm?huc_code=04030102

The Door-Kewaunee Watershed as defined by the USGS is part of the WDNR's Lakeshore Basin Management Area. For more information, see the Wisconsin Department of Natural Resources' "Wisconsin's Basins" website at dnr.wi.gov/org/gmu/gmu.html.



Watershed Groups

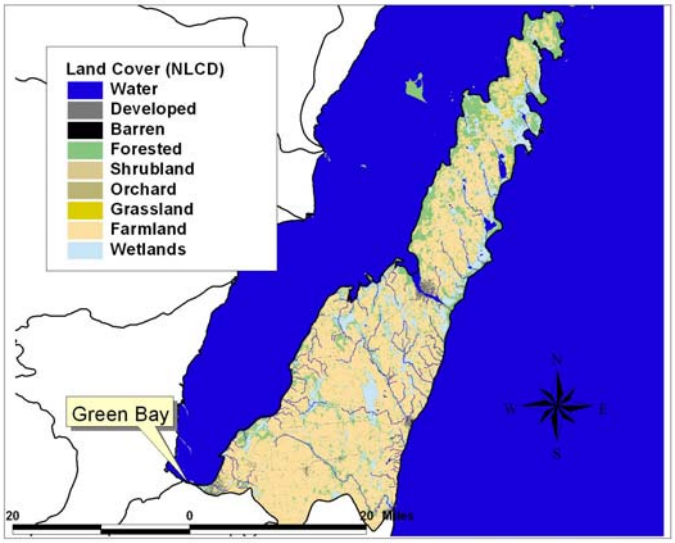
- **1000 Friends of Wisconsin — www.1kfriends.org**
- **Door County Environmental Council — www.dcec-wi.org**
-
- **Door County Land Trust — www.doorcountylandtrust.org**
- **River Alliance of Wisconsin — www.wisconsinrivers.org**
- **Clean Wisconsin — www.cleanwisconsin.org**
- **Lakeshore Natural Resource Partnership — www.lnrp.org**
- **Charles Verhoeven, Regional Water Program Leader – Charles.Verhoeven@dnr.state.wi.us**

Watershed Overview

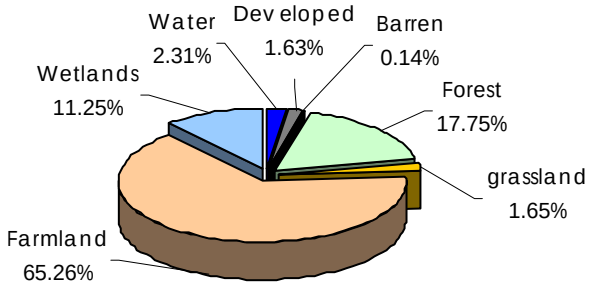
- Most of the watershed's land is engaged in agriculture, with just over 65% of land uses.
- Tourism and summer homes are important parts of the watershed economy. Recreational highlights include: hiking, birding, camping, rafting, canoeing, hunting, fishing, and boating on Lake Michigan and Green Bay.
- The diversity of islands, forests, wetlands, sand dunes, and ridge and swale topography provide habitat to an abundance of rare, threatened and endangered plants and animals.
- Critical ecological systems on the Door Peninsula include bedrock shoreline with semi-protected and open wetlands with sand nearshore; large, spring-fed lakes; shallow dune lakes; and small coastal streams on thin till over bedrock and lacustrine sand
- Great Lakes fisheries provide lake trout, lake whitefish, salmon and yellow perch.
- Grasslands, which support over 105 bird species, are promoted through prescribed burns and mowing.
- Cat Island in Green Bay has a critical migratory shorebird stopover site.
- The Great Lakes Beach, Midwest Calcareous Floating Mat, Juniper Alvar Shrubland, and Midwest Mixed Emergent Deep Marsh are critical habitat.

Subwatersheds of the Door-Kewaunee Watershed

0101 Mink River and Washington Island-Frontal Lake Michigan
0102 Three Springs Creek-Frontal Lake Michigan
0103 Mud Lake-Frontal Lake Michigan
0104 Fish Creek-Frontal Green Bay
0105 Kangaroo Lake-Frontal Lake Michigan
0106 Hibbard Creek-Frontal Lake Michigan
0107 Logan Creek-Frontal Lake Michigan
0108 Egg Harbor-Frontal Green Bay
0109 Lilly Bay Creek
0110 Big Creek-Frontal Sturgeon Bay
0201 Stony Creek-Frontal Lake Michigan
0202 Rio Creek
0203 Silver Creek
0204 Ahnapee River
0205 Mashek Creek-Frontal Lake Michigan
0301 Headwaters Kewaunee River
0302 School Creek
0303 Scarboro Creek
0304 Casco Creek-Kewaunee River
0305 Kewaunee River
0401 Strawberry Creek-Frontal Sturgeon Bay
0402 Larson Creek-Frontal Green Bay
0403 Keyes Creek-Frontal Green Bay
0404 Sugar Creek-Frontal Green Bay
0405 Renard's Creek-Frontal Green Bay
0406 Red River-Frontal Green Bay
0407 Gilson Creek-Frontal Green Bay



Land Cover: Door-Kewaunee Watershed



Watershed size: 767 sq. miles

Between 1996 and 2001, there has been a slight increase in developed land, grassland, and barren land and slight decreases in farmland.

Watershed Activities

In 2000 the Lakeshore Basin Partnership Team, which includes the Door-Kewaunee watershed, developed the following prioritized list of the most pressing issues impacting natural resources.

1. Loss of riparian (stream and lakeside) buffers (streamside habitat)
2. Inadequate identification and protection of wetlands, wetland corridors, and groundwater recharge areas
3. Need for better land use planning & improved local zoning
4. Inadequate management & protection of woodlots
5. Absence of stewardship ethic
6. Loss of small farms and/ or Conversion to large farms
7. Contamination of drinking water
8. Illegal dumping of toxins
9. Loss of biodiversity
10. Loss of shoreline habitat

Activities in the water shed focus on:

- Addressing water quality problems from in- place pollutants, dams, urban and agricultural runoff.
- Preserving biodiversity and protect endangered and threatened species.
- Protecting large contiguous blocks of forestland, grassland and wetland that serve as habitat for mammals, birds, and amphibians, as well as providing a large self- sustaining forest ecosystem for all to enjoy.
- Seeking additional monitoring of wildlife populations, water quality, and ecosystem function .

Impaired (303d) Waters

Waterbody Name	Impairment
Ahnapee River	PCB Fish Consumption Advisory
Clark Lake	PCB Fish Consumption Advisory
Crescent (L. Michigan)	Bacteria
East Alaska Lake	Mercury Fish Consumption Advisory
Green Bay—South of Marinette and its Tribs	Mercury Fish Consumption Advisory
Kewaunee Harbor	Metals Aquatic Toxicity Fish Consumption Advisory
Kewaunee Marsh	Metals Aquatic Toxicity Wildlife
Kewaunee River	PCB Fish Consumption Advisory
Lake Michigan	Mercury Fish Consumption Advisory, PCB Fish Consumption Advisory
MacKaysee Lake	Mercury Fish Consumption Advisory
Stony Creek	Degraded Habitat Sediment
Sunset Beach - Sturgeon Bay (L. Michigan)	Bacteria

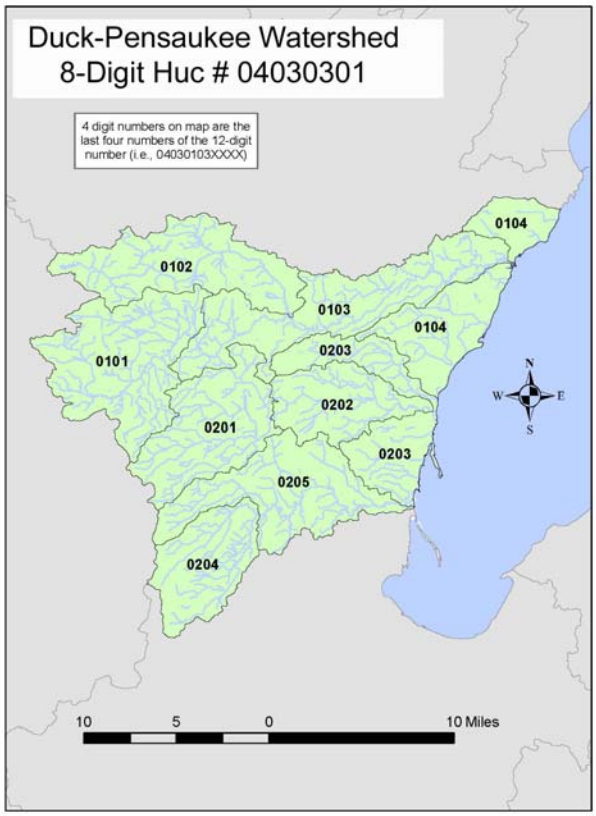
Data Sources. Land cover map and percentages: National Land Cover database, 1992 (edc.usgs.gov/products/landcover/nlcd.html; Land use change: NOAA Coastal Change Analysis Program, 1996 and 2001 (www.csc.noaa.gov/crs/lca/ccap.html); Total Maximum Daily Load (TMDL) Impaired Waters: Surf Your Watershed (www.epa.gov/surf)

Duck-Pensaukee Watershed

Hydrologic Unit Code: 04030103

For more information, see the USEPA "Surf Your Watershed" website at http://cfpub.epa.gov/surf/huc.cfm?huc_code=04030103

The Wisconsin Department of Natural Resources manages the Duck-Pensaukee watershed in two integrated management areas. The northern portion is managed as part of the Upper Green Bay Basin and the southern portion as part of a larger Lower Fox River basin. For more information, see the Wisconsin Department of Natural Resources' "Wisconsin's Basins" website at http://dnr.wi.gov/org/gmu/gmu.html.



Watershed Groups

- **Duck Creek Watershed Priority Project, Outagamie County Land Conservation Department — www.co.outagamie.wi.us/landcons/DAA.html**
- **Wisconsin Land & Water Conservation Association, Inc. — www.wlwca.org**
- **Pensaukee River Priority Watershed Project — www.co.shawano.wi.us/subwebs/pnd/plan_dev/Land%20Conserv/Pensaukee/pensaukee_home.htm**
- **Oconto County Conservation Department — www.co.oconto.wi.us/departments.asp?d_id=2043**

Watershed Overview

- The Duck-Pensaukee watershed covers approximately 490 square miles.
- There are approximately 35 miles of Lake Michigan shoreline.
- Green Bay is the sole urbanized area in the watershed.
- Coastal wetlands are an important feature of the watershed.
- Groundwater is the source of potable water for most residents within the Duck-Pensaukee watershed leading to a drop in groundwater levels. This caused suburban areas to seek direct withdrawals from Lake Michigan.

Subwatersheds of the Duck-Pensaukee Watershed

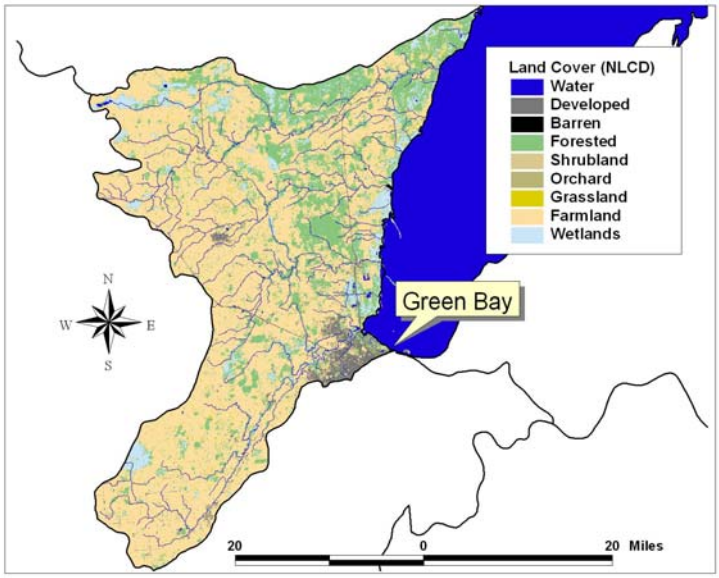
0101 Headwaters Pensaukee River
0102 North Branch Pensaukee River
0103 Pensaukee River
0104 Kirchner Creek-Frontal Green Bay
0201 Headwaters Little Suamico River
0202 Little Suamico River
0203 Tibbet Creek-Frontal Green Bay
0204 South and West Branches of the Suamico River
0205 North Branch Suamico River-Suamico River

Watershed Activities

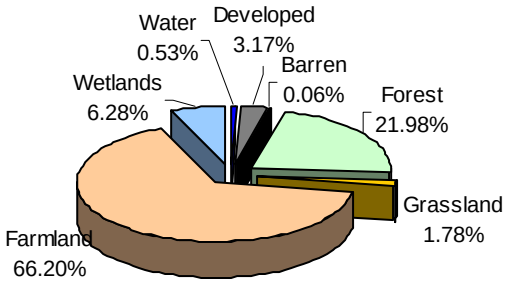
The following are objectives for the Upper Green Bay management Basin, which includes a significant portion of the Duck-Pensaukee watershed:

- Target the West Shore of Green Bay as a high priority for habitat protection.
- Implement the DNR's 50 year Land Legacy Study, an acquisition plan for the state.
- Protect shoreland habitat and water quality through water regulation and zoning.
- Work with local communities in developing "smart growth" plans & promoting wise land use and zoning.
- Complete a comprehensive fisheries plan for the basin.
- Complete the Master Plan for the Governor Tommy G. Thompson Centennial State Park.
- Encourage sound forestry practices on public and private land and identify and manage terrestrial invasive exotic species.
- Enhance educational activities for forestry, water quality, wildlife management, healthy ecosystem.
- The Oneida are leaders in the Duck Creek watershed, which runs through the reservation.

Data Sources. Land cover map and percentages: National Land Cover database, 1992 (http://edc.usgs.gov/products/landcover/nlcd.html; Land use change: NOAA Coastal Change Analysis Program, 1996 and 2001 (http://www.csc.noaa.gov/crs/lca/ccap.html); Total Maximum Daily Load (TMDL) Impaired Waters: Surf Your Watershed (www.epa.gov/surf)



Land Cover: Duck-Pensaukee Watrershed



Watershed Size: 490 sq. miles

Between 1996 and 2001, there has been a slight increase in developed land and slight decreases in grassland, and forest.

Impaired (303d) Waters

Waterbody Name	Impairment
Duck Creek * (1)	Dissolved Oxygen, Phosphorus, Sediment
Green Bay - South Of Marinette And Its Tribs Including The Menominee, Oconto, Fox & Peshtigo Rivers From Their Mouths To The First Dam	Mercury Fish Consumption Advisory
Green Bay AOC (Inner Bay) (1)	Phosphorus, Dissolved Oxygen, PCB Fish Consumption Advisory
Lake Michigan	Mercury Fish Consumption Advisory, PCB Fish consumption Advisory
Neenah Slough	Dissolved Oxygen, PCB Fish Consumption Advisory, Phosphorus
Trout Creek (2)	Dissolved Oxygen, Phosphorus, Sediment

Escanaba River Watershed

Hydrologic Unit Code: 04030110

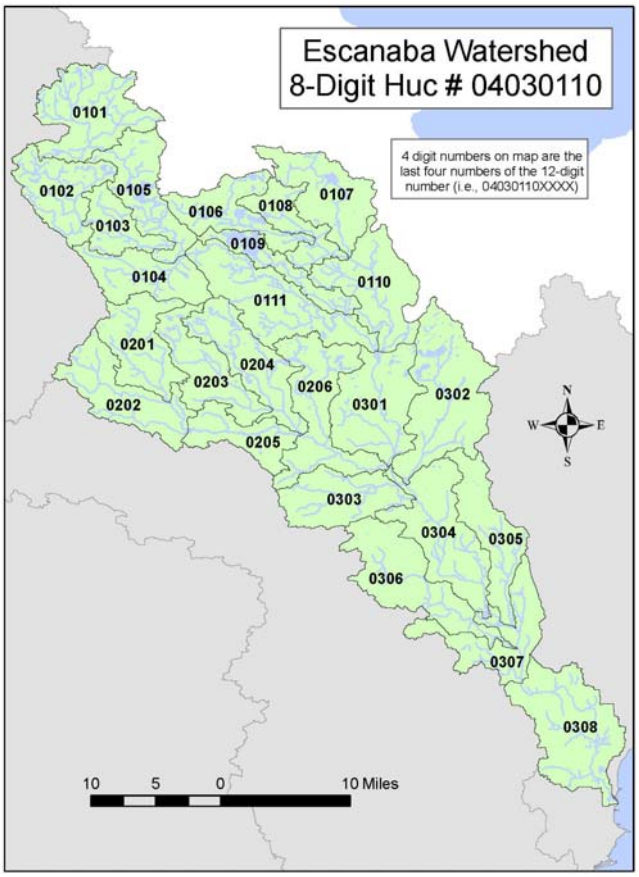
For more information, see the USEPA "Surf Your Watershed" website at cfpub.epa.gov/surf/huc.cfm?huc_code=04030110 or contact the Michigan Department of Environmental Quality at 517-335-6969 to request a copy of report number MI/DEQ/SWQ-01/010, "A Biological Survey of the Escanaba River Watershed, Marquette, Dickinson, and Delta Counties, August 2000."

Watershed Group

- **Central Lake Superior Watershed Partnership — www.superiorwatersheds.org/**

Watershed Overview / Ecology / Biodiversity

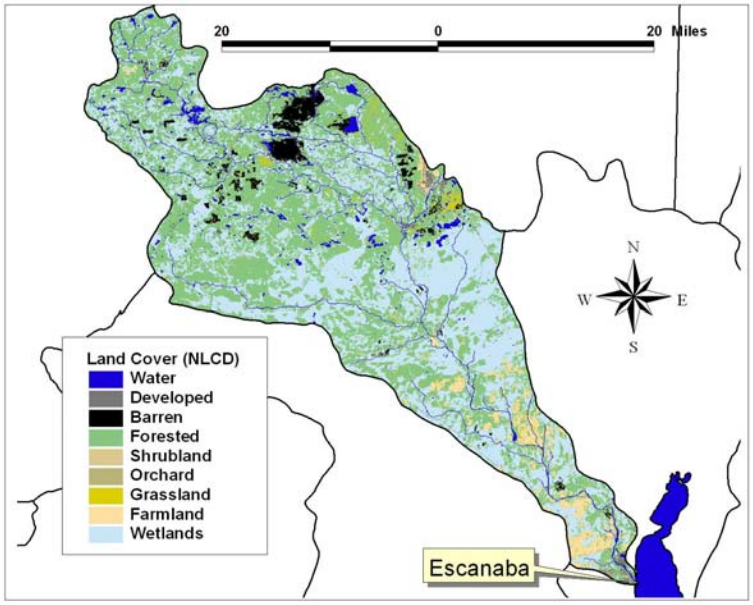
- Over 508 miles of the streams flow year-round.
- The Escanaba River Watershed is one of the Upper Peninsula's largest watersheds.
- The Escanaba River provides ample opportunity for the outdoor enthusiast including canoeing, fishing, swimming, public campsites and hiking to name a few.
- Much of the Escanaba system in Marquette County is open for public use including a large tract on the lower East Branch owned by Marquette County.
- The Escanaba River supports brook, brown and some rainbow trout throughout along with warm water species in the impoundments.
- The Upper Escanaba has three major dams on it, the Greenwood Dam, Schweitzer Dam and the Cataract Dam.
- The East Branch and the Middle Branch of the Escanaba converge in the town of Gwinn to form the Main Branch. The stretch from this convergence south to the Delta County line is mostly wide and smooth, ideal for a canoe trip. From the Delta County line, the river runs south to its discharge point at Lake Michigan, just outside of the City of Escanaba.
- The Escanaba River watershed is one of the watersheds within which the Sault Ste. Marie Tribe of Chippewa Indians live.
- The Escanaba River has critical Tufted Hairgrass Wet Alvar Grassland ecological systems as identified by the Nature Conservancy.
- The Nature Conservancy identified Little Lake's Algae-like pondweed as an critical species in the watershed.



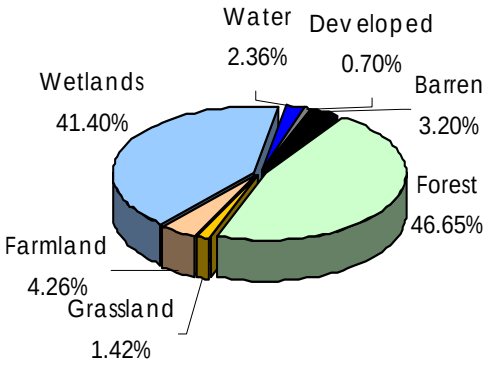
Subwatersheds of the Escanaba River Watershed

0101 Halfway Creek-Middle Branch Escanaba River
0102 Bruce Creek-Black River
0103 Black River
0104 West Branch Middle Branch Escanaba River
0105 Greenwood Reservoir Outlet-Middle Branch Escanaba River
0106 Schweitzer Creek
0107 Goose Lake Outlet
0108 Warner Creek-East Branch Escanaba River
0109 Green Creek
0110 East Branch Escanaba River
0111 Middle Branch Escanaba River
0201 Flat Rock Creek
0202 McGregor Creek-West Branch Escanaba River
0203 Big Brook
0204 Bryan Creek
0205 Cody Creek-West

Data Sources. Land cover map and percentages: National Land Cover database, 1992 (edc.usgs.gov/products/landcover/nlcd.html; Land use change: NOAA Coastal Change Analysis Program, 1996 and 2001 (www.csc.noaa.gov/crs/lca/ccap.html); Total Maximum Daily Load (TMDL) Impaired Waters: Surf Your Watershed (www.epa.gov/surf)



Land Cover: Escanaba River Watershed



Watershed size: 924 sq. miles

Between 1996 and 2001, there has been a slight increase in developed land, and grassland, and a slight decrease in forest, cultivated land, and water.

Impaired Waters

Waterbody Name	Impairment
Escanaba River	Mercury, Mercury (Fish Tissue)
Escanaba River Watershed	PCBs
Goose Lake	Phosphorus, Algal Blooms PCB Fish Consumption Advisory
Greenwood Reservoir	Mercury (Fish Tissue)
Round Lake	Mercury (Fish Tissue)
Schweitzer Reservoir	Mercury (Fish Tissue)
Shag Lake	Mercury (Fish Tissue)

Fishdam-Sturgeon Watershed

Hydrologic Unit Code: 04030112

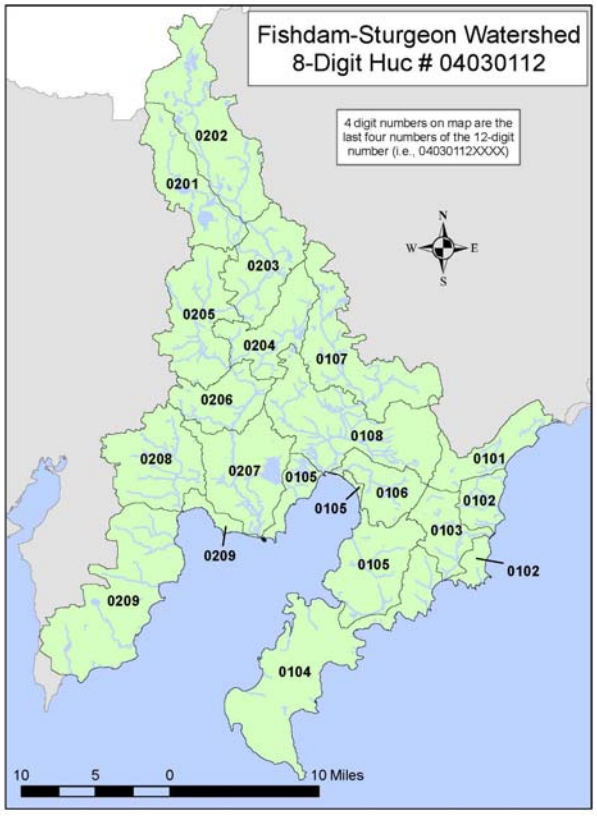
For more information, see the USEPA "Surf Your Watershed" website at http://cfpub.epa.gov/surf/huc.cfm?huc_code=04030112 or contact the Michigan Department of Environmental Quality at 517-335-6969

Watershed Group

- **Sturgeon/Otter River Watershed Council**

Watershed Overview

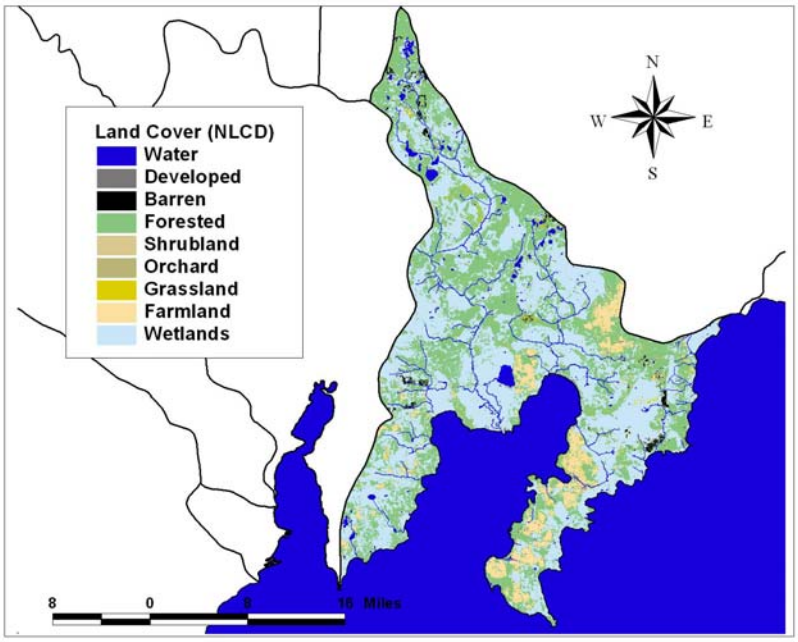
- **The Fishdam-Sturgeon watershed is located in the upper peninsula of Michigan and covers approximately 559 square miles.**
- **The watershed has approximately 123 miles of Lake Michigan shoreline.**
- **Most of the wetlands in the watershed are characterized as coastal wetlands.**
- **The watershed has 260 miles of rivers and streams.**
- **The watershed now includes two identified impaired waters.**
- **The Nature Conservancy identified the Garden Peninsula's Spruce-Cedar Wet Alvar Woodland and Dwarf Lake Iris as critical species in the watershed.**



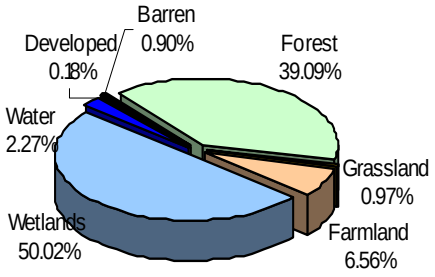
Subwatersheds of the Fishdam-Sturgeon Watershed

0101 Southtown Creek-Frontal Lake Michigan
0102 Snyder Creek-Frontal Lake Michigan
0103 Bursaw Creek
0104 Puffy Creek-Frontal Lake Michigan
0105 Valentine Creek-Frontal Big Bay De Noc
0106 Little Fishdam River
0107 Archambeau Creek-Fishdam River
0108 Fishdam River
0201 West Branch Sturgeon River
0202 Camp R Creek-Sturgeon River
0203 Dana Lake-Sturgeon River
0204 Eighteenmile Creek
0205 Little Black Creek-Sturgeon River
0206 Mormon River-Sturgeon River
0207 Sturgeon River
0208 Ogontz River
0209 Big River-Frontal Big Bay De Noc

Data Sources. Land cover map and percentages: National Land Cover database, 1992 (http://edc.usgs.gov/products/landcover/nlcd.html; Land use change: NOAA Coastal Change Analysis Program, 1996 and 2001 (http://www.csc.noaa.gov/crs/lca/ccap.html); Total Maximum Daily Load (TMDL) Impaired Waters: Surf Your Watershed (www.epa.gov/surf)



Land Cover: Fishdam-Sturgeon Watershed



Watershed Size: 559 sq. miles

Between 1996 and 2001, there has been a slight increase in developed land, grassland, bare land, and farmland, and a slight decrease in forest and wetland.

Impaired (303d) Waters

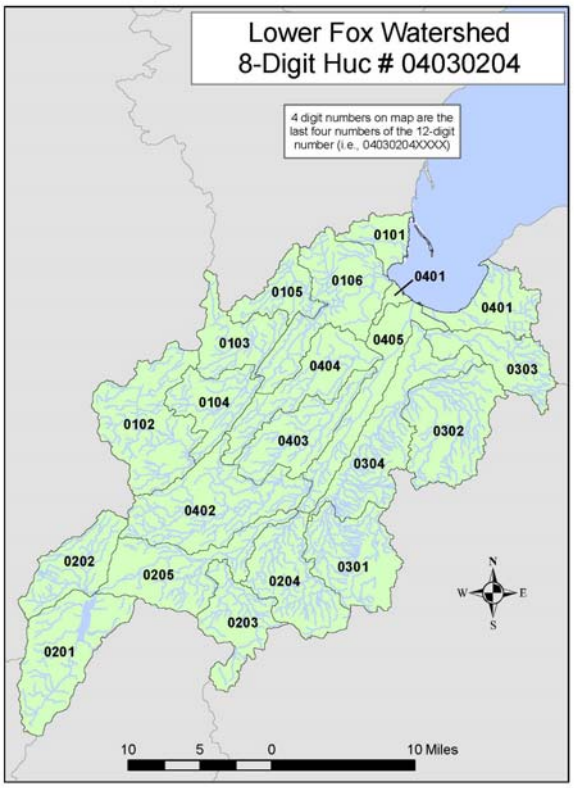
Waterbody Name	Impairment
Round Lake	Mercury (Fish Tissue)
Sturgeon River	Mercury
Sturgeon River Watershed	PCBs

Lower Fox River Watershed

Hydrologic Unit Code: 04030204

More information is available at the USEPA "Surf Your Watershed" website at cfpub.epa.gov/surf/huc.cfm?huc_code=04030204

The Wisconsin Department of Natural Resources manages the watershed as part of the Lower Fox River management area that includes the East River, Baird Creek, Bower Creek, Duck- Apple Ashwaubenon Creek , and Plum Creek subwatersheds. For more information, see the Wisconsin Department of Natural Resources' "Wisconsin's Basins" website at dnr.wi.gov/org/gmu/gmu.html



Watershed Groups

- Lower Fox Basin Partners- Kendra Axness, [kendra.axness@ces.uwex.edu]
- Brown County Land Conservation Department, Bill Hafs [hafs-bc@co.brown.wi.us] www.co.brown.wi.us/land_conservation/
- Outagamie County Land Conservation Department, Greg Baneck [baneckgj@co.outagamie.wi.us]
- Oneida Tribe of Indians, Mike Finney [mfinney@oneidanation.org]
- Fox Wolf Watershed Alliance — www.fwwa.org
- Rivers Alliance of Wisconsin — www.wisconsinrivers.org
- Richard Stoll, Green Bay Water Basin Team Leader, [richard.stoll@wisconsin.gov]
- University of Wisconsin Seagrant, Vicky Harris [harrisv@uwgb.edu]
- Science and Technical Advisory Committee – Green Bay RAP, John Kennedy [jkennedy@gbmsd.org]
- US Fish and Wildlife Service, Louise Clemency [Louise_Clemency@fws.gov]
- Baird Creek Preservation Foundation -- www.Bairdcreek.org
- Northeast Wisconsin Land Trust, Jim Klinkert [jimk@newlt.org]
- PCB remediation effort -- Fox River, Greg Hill [Gregory.Hill@Wisconsin.gov]
- Green Bay Area Great Lakes Sports Fisherman, Tom Patzke 920-822-2342 -- www.great-lakes.org/wi/greenbayareaglsf.html
- Brown County Conservation Alliance , Ron Vanderloop President , 929-494-4886
- Nature Conservancy in the Green Bay Watershed, Mike Grimm [mgrimm@tnc.org] -- nature.org/wisconsin

Watershed Management Plans

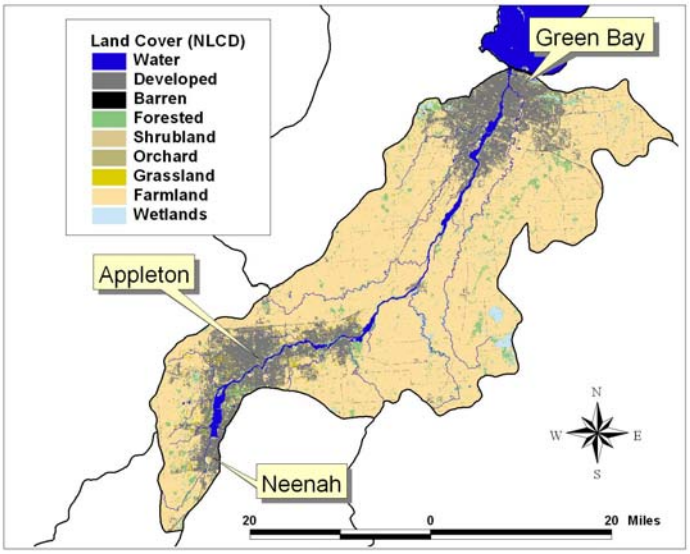
- Brown County Land and Water Resource Management Plan 2004 – 2008 www.co.brown.wi.us/land_conservation/ResourcesReports2.htm
- Nonpoint Source Control Plan for the East River Priority Watershed Project Publication WR-274-93
- Lower Green Bay Remedial Action Plan
- Outagamie County Land and Water Resource Management Plan
- Nonpoint Source Control Plan for the Duck,Apple and Ashwaubenon Creeks Priority Watershed Plan Publication WT- 493-97

Subwatersheds of the Lower Fox River Watershed

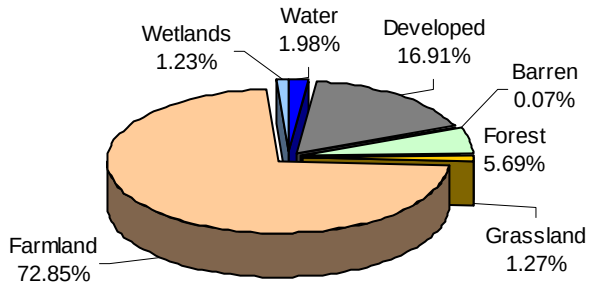
0101 Dead Horse Bay-Frontal Green Bay
0102 Upper Duck Creek
0103 Oneida Creek
0104 Middle Duck Creek
0105 Trout Creek
0106 Lower Duck Creek
0201 Little Lake Butte des Mortes
0202 Mud Creek
0203 Kankapot Creek
0204 Plum Creek
0205 Garners Creek-Fox River
0301 Upper East River
0302 Bower Creek
0303 Baird Creek
0304 Lower East River
0401 Point du Sable-Frontal Green Bay
0402 Apple Creek
0403 Ashwaubenon Creek
0404 Dutchman Creek
0405 City of Green Bay-Fox River

Watershed Overview

- The Lower Fox River originates at the outlet of Lake Winnebago and flows northeast for 39 miles where it empties into the bay of Green Bay. The Lower Green Bay and Fox River Area of Concern (AOC) consists of the lower 11.2 km of the Fox River below DePere Dam and a 55 km² area of southern Green Bay out to Point au Sable and Long Tail Point.
- The Lower Fox River has the most paper mills of any river in the world.
- Agriculture land is the predominant land use in the basin. 44% of the Lower Fox Watershed in Brown County is Agriculture, 32% Urban/ Developed, 10% Woods; only ½ of a percent remain in Wetlands. Land use of the watershed in Outagamie County is predominately Urban/Developed.



Land Cover: Lower Fox



Watershed Size: 438 sq miles.

Between 1996 and 2001, there has been a slight increase in developed land, grassland, and wetland and a slight decrease in forest, and a slightly larger decrease in farmland.

- The Lower Fox Basin contains the highest concentration of Dairy Cows in the State of Wisconsin. There is currently not enough cropland available for land application of animal and other land applied waste. Currently only 1.85 acres of cropland per 1 animal unit are available for nutrient management plans (3 acres per AU are needed).
- Much of the drinking water in the basin is derived from groundwater. However, the City of Green Bay receives its drinking water from Lake Michigan. Several communities constructed a pipeline from Lake Michigan at Manitowoc to suburban Green Bay in 2007.
- The main stem of the Fox River in the Lower Fox River Basin is fragmented by a series of 17 locks and 12 dams that were built in the mid 1800's to aid navigation or produce power.
- The Oneida Reservation, established by an 1838 Treaty, is in the basin. It is participating in the State's priority watershed program and the WTCAC.
- Wildlife diversity and populations are affected by the variability of habitats within the basin. The two main terrestrial habitats within the basin are Agricultural land and woodland. Aquatic habitats within the area are wetland, riverine, and lacustrine (lakes or lake- like).
- Numerous endangered, threatened and otherwise rare species exist in the basin, including the endangered Barn Owl and the threatened Small White Lady's Slipper.
- Recreational highlights include wildlife watching, hiking, fishing, hunting, bicycling, horseback riding, snowmobiling, skiing, camping, picnicking, and water sports.
- Wildlife include songbirds, White- tailed Deer, Rabbits, Red Fox, Coyote, Pheasant, Hungarian Partridge, Squirrel, Skunk, Raccoon, Upland Game Birds, Waterfowl, Bats, small mammals and invertebrates, reptiles, amphibians and many others.
- The Niagara Escarpment runs from the southwest corner of the watershed to the Northeast towards Door County.
- The Multi-rib Vallonia is an important species in the Greenleaf Escarpment area.
- West Shore of Green Bay contains 50% of all remaining wetlands in Lake Michigan Drainage Basin.

Watershed Activities

- West Shore of Green Bay contains 50% of all remaining wetlands in Lake Michigan Drainage Basin. The West Shore Pike Habitat Wetland Restoration project (2007-2009) is funded by Natural Resources Damage Assessment and administered by Brown County Land Conservation Department and US Fish and Wildlife Service. Goals are to restore wetlands for pike spawning and install vegetated buffer strips.
- Hydraulic dredging of PCB-contaminated sediment started in the Lower Fox River at Little Lake Butte des Morts. Over the next decade as much as 4.0 million cubic yards of contaminated sediment will be removed from a 39-mile stretch of the Lower Fox River. On the Sheboygan River, the cleanup of a 14-mile stretch of the river, as well as adjacent soil and groundwater, is expected to take seven years.
- Environmental concerns include habitat loss, deterioration and fragmentation from rapid development and conversion of rural lands; inadequate cropland for land application of animal and other waste; private well and groundwater contamination of karst areas adjacent to the Niagara escarpment; water quality problems from contaminated sediment, runoff in urban and agricultural areas, floodplain development and overuse of groundwater supplies (with groundwater quality implications); heavy recreational use of resources, such as lakes and shorelines; exotic species are a continuing emerging problem. Plant species such as Reed Canary Grass, Purple Loosestrife, Buckthorn, Garlic Mustard and Eurasian Water Milfoil quickly out-compete native species and affect ecosystem balance. Zebra Mussels and Rusty Crayfish are spreading, disrupting stream and lake ecology; monitoring of wildlife populations, water quality, and ecosystem function are needed to understand the status and trends of

Data Sources. Land cover map and percentages: National Land Cover database, 1992 (edc.usgs.gov/products/landcover/nlcd.html; Land use change: NOAA Coastal Change Analysis Program, 1996 and 2001 (www.csc.noaa.gov/crs/lca/ccap.html); Total Maximum Daily Load (TMDL) Impaired Waters: Surf Your Watershed (www.epa.gov/surf)

resources.

- The main priorities identified in the integrated management plan include: Increase and protect critical habitats and habitat integrity; sustain a diverse, balanced and healthy ecosystem; Improve surface water and groundwater quality and identify water conservation opportunities; establish a self-sustaining, balanced, and diversified edible fish community; manage resources for multiple users; strengthen program support and enforcement initiatives; and Improve educational programs.

Impaired (303d) Waters

Waterbody Name	Impairment
Apple Creek *	Phosphorus, Degraded Habitats, Organic Enrichment/Low Dissolved Oxygen, Sediment, Temperature
Baird Creek	Degraded Habitat, Dissolved Oxygen, Phosphorus, Sediment
Duck Creek (1)	Phosphorus, Dissolved Oxygen, Sediment
Dutchman Creek	Ammonia, Aquatic Toxicity, Dissolved Oxygen, Phosphorus
East River * *	Metals, Phosphorus, Aquatic Toxicity, Degraded Habitat, Dissolved Oxygen, Sediment
Fox River (Seg. 1)	Phosphorus, Dissolved Oxygen, PCB Fish Consumption Advisories
Fox River (Seg. 2 lower)	Phosphorus, Dissolved Oxygen, PCB Fish Consumption Advisories
Fox River (Seg. 3 Lower)	Phosphorus, Dissolved Oxygen, PCB Fish Consumption Advisories
Kankapot Creek	Degraded Habitat, Sediment
Mud Creek	Degraded Habitat, Sediment
Neenah Slough	Phosphorus, Dissolved Oxygen, PCB Fish Consumption Advisories
Plum Creek	Degraded Habitat, Sediment, Temperature
Tributary to East River	PCBs, Aquatic Toxicity

Area of Concern Activities

The lower 40 miles of the Fox River and Green Bay

Stressors and Primary Contaminants

- PCBs
- Phosphorus
- Suspended solids
- Mercury
- Urban and rural runoff
- Sediments
- Aquatic exotic species
- Wetland loss
- Habitat alteration

Programs

- Clean Water Act – Integrated TMDL for the Lower Fox
- Superfund
- Natural Resource Trustee's Damage Assessment

Clean-Up Actions

- Watershed NPS abatement
- Remedial investigation completed remedial action nearly ongoing. Dredging and PCB removal (Deposit in 11,000 cubic yards of sediment removed,, Deposit 56/57: 80,000 cubic yards of sediment removed OU1 335,000 cubic yards of sediment removed, and Phase I, 132,000 cubic yards of sediment removed)
- Dissolved oxygen wasteload
- Deposit N, 56, 57
- Cumulative sediments remediated from 1998-2007 – 558,000 cubic yards
- Consent Decree for Phase I Fox River clean-up announced 4/12/06, Unilateral Administrative Order issued November 2007 for remainder of river contamination (from OU2 to OU5)

Delisting Targets

- Will be started in 2008

Key Activity Needed

- Dredging
- Pollution Prevention
- Stream buffers
- Habitat protection and restoration
- Coordination with RAP program for AOC delisting purposes
- Coordination with integrated TMDL

Challenges

- Rapid land development
- Contaminated material disposal
- Seeing through completion of cleanup for OUs 2-5

Next Steps

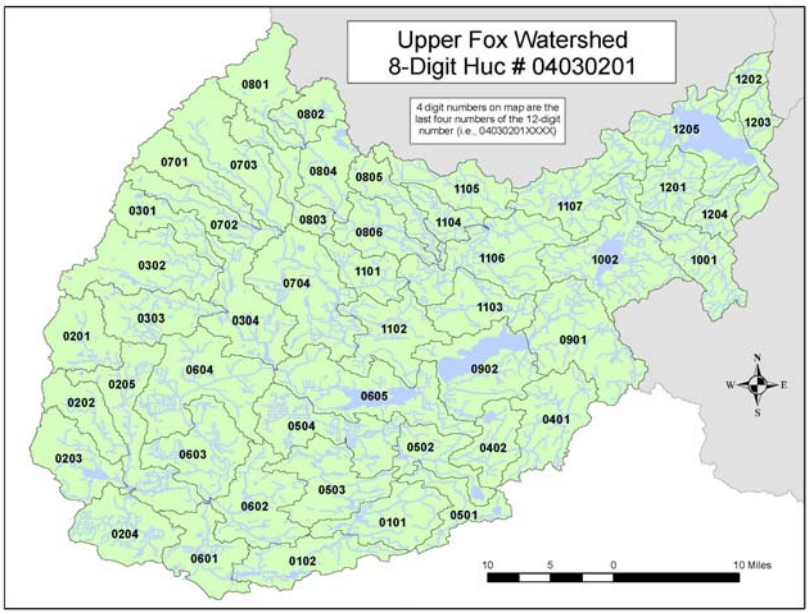
- Implement 4/12//06 Consent Decree for detailed engineering for the final cleanup plan.
- Compliance with the Unilateral Administrative Order issued November 13, 2007
- Remediation (using dredging/disposal, capping and sand covers) I of an additional 7.5 million cubic yards of sediment.
- Final cleanup expected to be complete approximately 2020. River monitoring will continue indefinitely.
- Implement integrated TMDL

Upper Fox River Watershed

Hydrologic Unit Code: 04030201

For more information, see USEPA "Surf Your Watershed" website at cfpub.epa.gov/surf/huc.cfm?huc_code=04030201

The Upper Fox River basin is part of the Wisconsin DNR's Upper Fox River basin management area, which also includes the Lake Winnebago watershed. For more information, see the Wisconsin Department of Natural Resources' "Wisconsin's Basins" website at dnr.wi.gov/org/gmu/gmu.html.



Watershed Groups

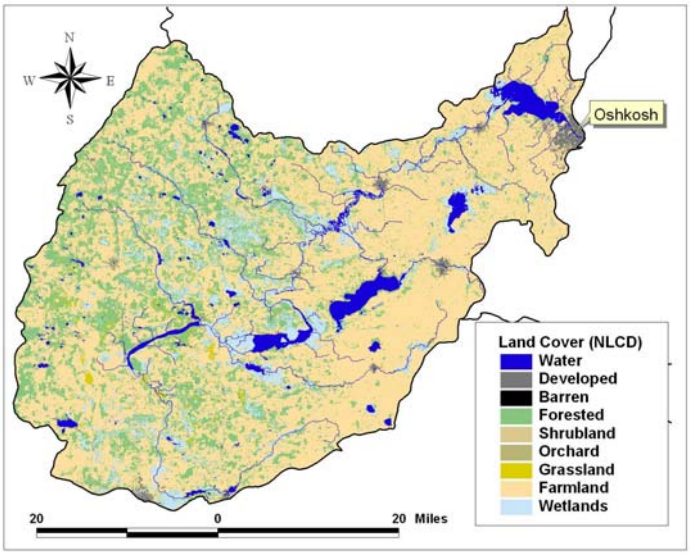
- Fox River Watch — www.foxriverwatch.com
- Fox Wolf Watershed Alliance — www.fwwa.org
- Lake Michigan Forum — www.lkmichiganforum.org
- Rivers Alliance of Wisconsin — www.wisconsinrivers.org
- Rob McLennan, the Upper Fox River Water Basin Team Leader — Robin.McLennan@dnr.state.wi.us
- Fox-Wolf Basins, The University of Wisconsin-Extension — basineducation.uwex.edu/foxwolf

Watershed Overview / Ecology / Biodiversity

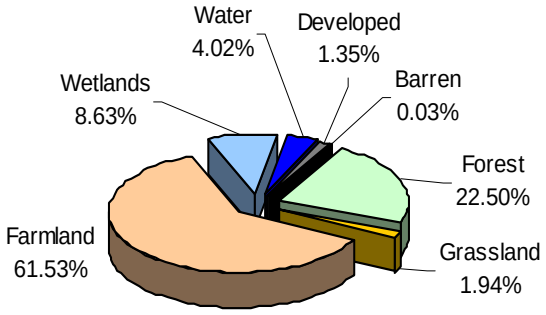
- Numerous endangered, threatened and otherwise rare species exist in the basin, including the threatened White Lady's Slipper, a species that needs fens and calcareous wet prairies, and Forster's Tern, which needs large marshes, estuaries and lake islands.
- Over 8% of the basin area is wetland greater than 40 acres in size, accounting for 145,428 acres. The total wetland area is actually much greater, as mapping identifies wetlands as small as 2 acres in size.
- There are over 55,678 acres of major public lands in the Upper Fox management basin including 51,311 acres of state wildlife, fisheries and park lands (not including the 11 state natural areas in the basin) and 4,367 acres of U.S. Fish and Wildlife Service wildlife refuge and waterfowl production acres.
- The Basin includes the Central Sand Ridges, Southeast Glacial Plains, and a small portion of the Central Sand Plains Ecological Landscapes.
- Most of the basin's cold water trout streams are located in the western portion of the basin near the Sandy Ridges ecosystem.

Subwatersheds of the Upper Fox River Watershed

0101 Sand Spring Creek-Fox River
0102 Swan Lake-Fox River
0201 Neenah Lake-Neenah Creek
0202 Green Creek
0203 South Branch Neenah Creek
0204 Big Slough
0205 Neenah Creek
0301 Tagatz Creek
0302 Westfield Creek
0303 Klawitter Creek
0304 Montello River
0401 Headwaters Grand River
0402 Little Green Lake-Grand River
0501 Lake Emily
0502 Grand Lake-Grand River
0503 Belle Fountain Creek
0504 Grand River
0601 Portage Canal-Fox River
0602 French Creek
0603 Good Earth Creek-Fox River
0604 Buffalo Lake-Fox River
0605 Puckaway Lake-Fox River
0701 Weddle Creek
0702 Chafee Creek
0703 Little Pine Creek-Mecan River
0704 Mecan River
0801 West Branch White River
0802 Soules Creek-White River
0803 Lunch Creek
0804 Little Lunch Creek-White River
0805 Sucker Creek
0806 White River
0901 Silver Creek
0902 Big Green Lake
1001 Eightmile Creek
1002 Rush Creek
1101 Black Creek
1102 Mill Race-Fox River
1103 Puchyan River
1104 Town Ditch
1105 Barnes Creek
1106 City of Berlin-Fox River
1107 Hogars Bayou-Fox River
1201 Spring Brook
1202 Daggetts Creek
1203 Brooks Cemetary
1204 Sawyer Creek
1205 Lake Butte des Mortes-Fox River



Land Cover: Upper Fox River Watershed



Watershed size: 1637 sq. miles

Between 1996 and 2001, there has been an increase in developed land and grassland and a decrease in farmland and forest.

Warm water rivers, streams and lakes support various game and non- game species including large and small mouth bass, walleye, northern pike, catfish and sturgeon.

- Common woodland wildlife include White- tailed Deer, Turkey, Ruffed Grouse; upland/ grassland wildlife includes Ring-necked Pheasant, non- game songbirds (Vesper Sparrow, Bobolink, Meadowlark); grassland nesting waterfowl include Mallards and Blue- winged Teal. Wetland species include various waterfowl, amphibians and reptiles.
- Oak- hickory is the most common forest type and the tree species with the greatest volume in the Upper Fox Basin is White Oak followed by Black and Pin Oak, White and Red Pine, Aspen and Soft Maple.
- The Nature Conservancy identified Eightmile-Waukau Creek as a critical ecological system .
- The Upper Fox watershed is home to the state's largest Wetland Reserve Restoration Program (WRP). Duffy's Marsh is a 1,732 acre wetland restoration project in Marquette County.

Watershed Activities

- Several dams have been removed, with fish species returning and the population of exotic species declining.
- The Upper Fox Basin Partnership identified three major priorities affecting the natural resources of the basin and the uses of those resources by the public: wetland filling/ loss; habitat loss and fragmentation; and nutrient loading/ Nonpoint Source Pollution
- Other environmental concerns include:
  - ◊ Water quality problems from contaminated sediments, runoff in urban and agricultural areas, floodplain development and overuse of groundwater supplies.
  - ◊ Riparian/wetland, woodland, and grassland habitat loss, deterioration, and fragmentation from rapid development and conversion of rural lands.
  - ◊ Grassland restoration is a major initiative, with virtually the entire historic prairie, sedge meadows and oak savannas having been converted to agriculture.
  - ◊ Exotic species such as plant species such as reed canary grass, purple loosestrife, buckthorn, garlic mustard, and Eurasian water milfoil are a continuing problem. Zebra mussels and rusty crayfish are spreading to basin waterways, disrupting stream and lake ecology.
  - ◊ Monitoring of wildlife populations, water quality, and ecosystem function are needed to understand the status and trends of resources.

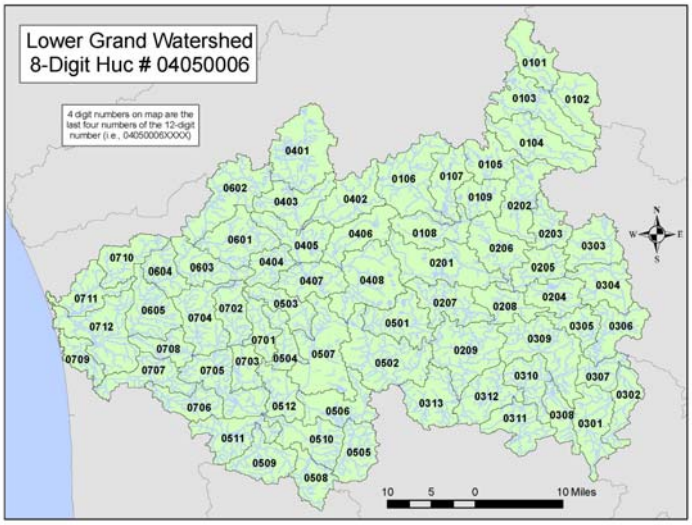
Data Sources. Land cover map and percentages: National Land Cover database, 1992 (edc.usgs.gov/products/landcover/nlcd.html; Land use change: NOAA Coastal Change Analysis Program, 1996 and 2001 (www.csc.noaa.gov/crs/lca/ccap.html); Total Maximum Daily Load (TMDL) Impaired Waters: Surf Your Watershed (www.epa.gov/surf)

Impaired 303(d) Waters

Waterbody Name	Impairment
Big Green Lake	PCB Fish Consumption Advisory
Buffalo Lake	Mercury Fish Consumption Advisory
Fox River (From Portage North To, But Not Including Buffalo Lake)	PCB Fish Consumption Advisory
Fox River (Swan Lake Downstream to Portage)	PCB Fish Consumption Advisory
Fox River At Buffalo Lake	PCB Fish Consumption Advisory
Fox River near immediately Upstream of Lake Winnebago	Aquatic Toxicity, Coal Tar
Fox River, Oshkosh	Aquatic Toxicity
Hill Creek	Degraded Habitat, Sediment
Lake Butte Des Morts	PCB Fish Consumption Advisory, Dissolved Oxygen, Sediment, Phosphorous, Mercury Fish Consumption Advisory, Eutrophication
Little Green Lake	Degraded Habitat, Dissolved Oxygen, Eutrophication, PH, Phosphorous
Mason Lake	Eutrophication, PH, Phosphorous
Park Lake	Eutrophication, Phosphorous, Sediment
Peppermill Creek	Degraded Habitat, Sediment, Temperature
Poygan Lake	Dissolved Oxygen, PCB Fish Consumption Advisory, Phosphorous, Sediment
Roy Creek (All)	Degraded Habitat, Sediment
Silver Creek (2)	Degraded Habitat, Sediment, Temperature
Silver Lake (Big) , Waushara Co.	Aquatic Toxicity
Un. Trib To Mason Lake	Loss Of Instream Habitat, Sediment
Wurchs Creek	Loss Of Instream Habitat, Sediment

Lower Grand River Watershed

Hydrologic Unit Code: 04050006



For more information, see the USEPA "Surf Your Watershed" website at: cfpub.epa.gov/surf/huc.cfm?huc_code=04050006 or contact the Michigan Department of Environmental Quality at 517-335-6969 to request a copy of the following reports:

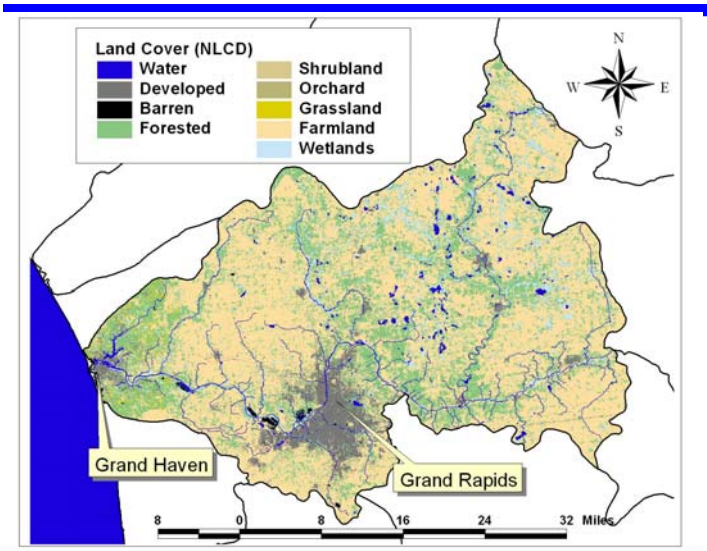
- **Flat River (2003): MI/DEQ/WD-03/130**
- **Rogue River (2003): MI/DEQ/WD-03/129**
- **Plaster Creek (2001): MI/DEQ/SWP-01/107**

Watershed Management Plans

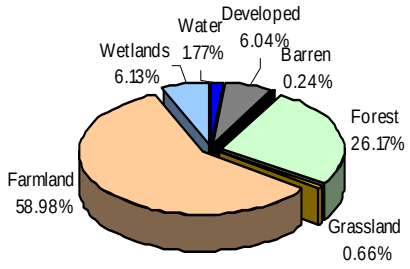
- **Hager Creek — Ottawa County Parks & Recreation Commission**
- **Plaster Creek — Kent County Drain Commission**
- **Spring Lake — Spring Lake Lake Board**
- **Buck Creek — Grand Valley Metro Council**
- **Crockery Creek — Muskegon Conservation District**
- **Rogue River — Grand Valley Metro Council and GVSU/AWRI**
- **Sand Creek — Grand Valley Metro Council and GVSU/AWRI**
- **Upper and Lower Grand River -- Grand Valley State University and Annis Water Resources Institute**

Subwatersheds of the Lower Grand River Watershed

0101 Clear Lake-Black Creek
0102 Fifth Lake
0103 Townline Creek-Flat River
0104 Mud Lake-Flat River
0105 Hunter Lake-Flat River
0106 Alder Creek Drain-Black Creek
0107 Clear Creek
0108 Coopers Creek
0109 Perch Lake-Flat River
0201 Wabasis Creek
0202 County Farm Pond-Dickerson Creek
0203 Twin Lakes-Dickerson Creek
0204 Long Lake
0205 Dickerson Creek
0206 Sanderson Lake-Flat River
0207 Seely Creek
0208 Honey Lake-Flat River
0209 Flat River
0301 Taylor Drain-Libhart Creek
0302 Libhart Creek
0303 Bacon Creek-Prairie Creek
0304 Ross and Branch Drain-Prairie Creek
0305 Bow Pond
0306 Prairie Creek
0307 Dry Creek-Grand River
0308 Sessions Creek
0309 Bellamy Creek-Grand River
0310 Crooked Creek-Grand River
0311 Lake Creek
0312 Toles Creek-Grand River
0313 Lee Creek-Grand River
0401 Hickory Creek-Rogue River
0402 Duke Creek
0403 Spring Creek-Rogue River
0404 Nash Creek
0405 Ball Creek-Rogue River
0406 Cedar Creek
0407 Freska Lake-Rogue River
0408 Stegman Creek-Rogue River
0501 Bear Creek
0502 Egypt Creek-Grand River
0503 Mill Creek
0504 Indian Mill Creek
0505 Headwaters Plaster Creek
0506 Plaster Creek
0507 Lamberton Creek-Grand River
0508 Sharps Creek-Buck Creek
0509 East Branch Rush Creek
0510 Buck Creek
0511 Rush Creek
0512 Walker-Grand River
0601 North Branch Crockery Creek
0602 Eastland Drain-Crockery Creek
0603 Rio Grande Creek-Crockery Creek
0604 Lawrence Drain-Crockery Creek
0605 Crockery Creek
0701 East Fork
0702 Headwaters Sand Creek
0703 Sand Creek
0704 Dear Creek
0705 Ottawa Creek-Grand River
0706 Bass Creek
0707 Bass River
0708 Jubb Bayou-Grand River
0709 Pottawatomie Bayou
0710 Norris Creek
0711 Spring Lake
0712 Grand River



Land Cover: Lower Grand River Watershed



Watershed size: 2014 sq. miles

Between 1996 and 2001, there has been a slight increase in developed land and cultivated land and a slight decrease in forest and grassland.

Watershed Groups

- Ottawa County Parks & Recreation Commission — www.co.ottawa.mi.us/parks
- Kent County Drain Commission — www.accesskent.com/YourGovernment/DrainCommisioner/drain_index.htm
- West Michigan Environmental Action Council — www.wmeac.org
- The Lower Grand River 319 Project, Grand Valley State University Annis Water Resources Institute — www.gvsu.edu/wri/isc/lowgrand

Watershed Overview

- Almost 60 percent of the land use is agricultural.
- Grand Rapids and Grand Haven are the major urban areas in the watershed.
- The Grand River Watershed is the largest watershed in the State of Michigan. The watershed has been divided into two parts, the Lower Grand River Watershed and the Upper Grand River Watershed. The Lower Grand River Watershed covers ten counties.
- The Nature Conservancy identified the critical ecological resources in the watershed: The Rogue River has White Oak - Red Oak / Early Meadow-Rue Forest; The Saul Lake Bog is a Leatherleaf Bog; Zeigenfuss Lake/Greenville has White Pine - White Oak Forest; and The Rogue River has small to medium-sized tributary streams in end moraine and outwash

Watershed Activities

A Watershed Management Plan was developed for the Lower Grand River by the Annis Institute. Goals of the plan include:

- Maintain and improve water quality by promoting sound land management decisions.
- Assess relationships between water quality and storm water runoff by developing guidelines for stormwater management to reduce impacts of urbanization.
- Preserve and restore, coldwater fisheries, and reintroduce indigenous game fish species where possible.
- Provide for flood protection, minimize risk of flooding, and assess necessity of flood control improvements.
- Ensure public safety in recreational opportunities in surface waters.
- **Summary of Upper and Lower Grand WMP?**

Impaired (303d) Waters

Waterbody Name	Impairment
Bills Lake	Mercury (Fish Tissue)
Buck Creek	Pathogens
Deer Creek (Watershed)	Dissolved Oxygen, Fish Kills, Nuisance Plant Growths, Phosphorous, Untreated Sewage Discharges, Pathogens
Flat River	PCB Fish Consumption Advisory
Grand River	Pathogens, Mercury
Grand River Grand Haven Boaters Park Beach	Pathogens
Grand River Watershed	Pathogens
Grand River and Red Cedar River	PCB Fish Consumption Advisory, Mercury (Fish Tissue)
Indian Mill Creek	Macroinvertebrate Community Rated Poor
Lincoln Lake	Mercury (Fish Tissue)
Lincoln Lake Pine Resort Beach	Pathogens
Long Lake	Mercury (Fish Tissue)
Morrison Lake	Algal Blooms, Phosphorous, PCB Fish Consumption Advisory)
Rainbow Lake	Mercury (Fish Tissue)
Reeds Lake	PCB Fish Consumption Advisory Fish Tissue (Mercury)
Unnamed Tributary To Grand River	Fish Community Rated Poor
Wabasis Lake	Mercury (Fish Tissue)
Lake Michigan Rosy Mound Beach	Pathogens

Data Sources. Land cover map and percentages: National Land Cover database, 1992 (edc.usgs.gov/products/landcover/nlcd.html; Land use change: NOAA Coastal Change Analysis Program, 1996 and 2001 (www.csc.noaa.gov/crs/lca/ccap.html); Total Maximum Daily Load (TMDL) Impaired Waters: Surf Your Watershed (www.epa.gov/surf)

Upper Grand River Watershed

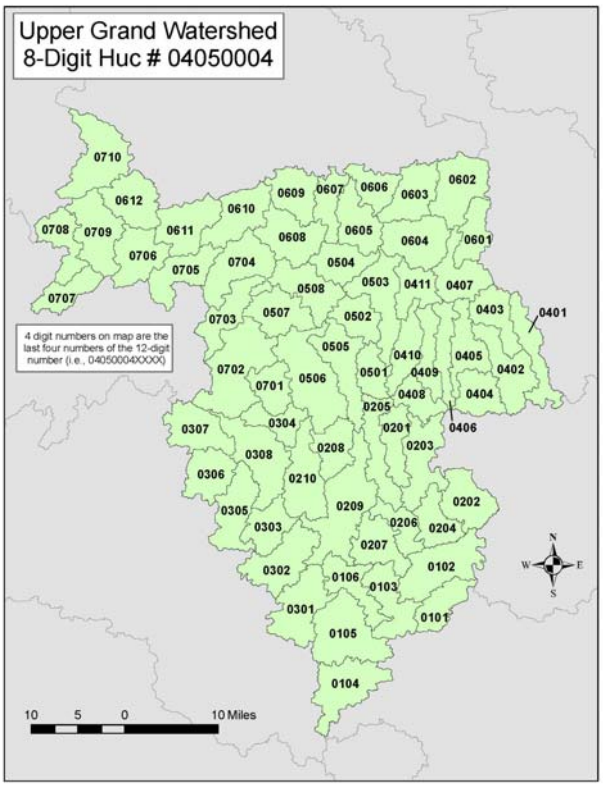
Hydrologic Unit Code: 04050004

For more information, see the USEPA website at cfpub.epa.gov/surf/huc.cfm?huc_code=04050004 or contact the Michigan Department of Environmental Quality at 517-335-6969 to request a copy of the following reports:

- **Upper Grand: Report #07/072 "A biological survey of the Upper Grand River Watershed"**
- **Red Cedar (2001): MI/DEQ/WD-03/025**
- **Looking Glass (2002): MI/DEQ/WD-03/120**

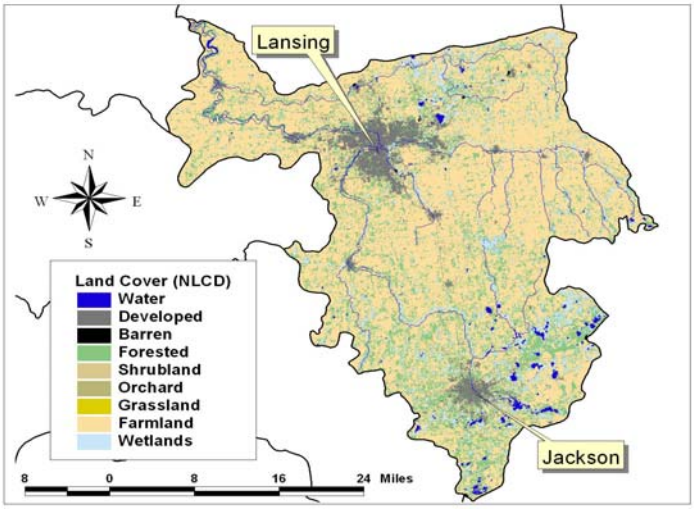
Watershed Organizations

- **Carrier Creek Stormwater Management and Restoration Project — www.carriercreek.com**
- **Eaton County Drain Commission — www.eatoncounty.org/Drain/Drain.htm**
- **The Upper Grand River Watershed Council — www.uppergrandriver.org**
- **Friends of the Looking Glass -- www.lookingglassriverfriends.org**

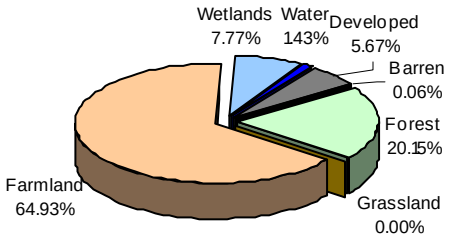


Subwatersheds of the Upper Grand River Watershed

0101 Wolf Lake
0102 Grass Lake Drain
0103 Center Lake
0104 Headwaters Grand River
0105 Booth Drain-Grand River
0106 Hurd Narvin Drain-Grand River
0201 Cahoogan Creek
0202 Headwaters Portage River
0203 Orchard Creek
0204 Portage Lake-Portage River
0205 Batteese Creek
0206 White Lake-Portage River
0207 Portage River
0208 Huntoon Creek
0209 Western Creek-Grand River
0210 Perry Creek-Grand River
0301 Indian Brook-Sandstone Creek
0302 Mackey Brook-Sandstone Creek
0303 Sandstone Creek
0304 Willow Creek
0305 Otter Creek-Spring Brook
0306 Peacock Extension-Spring Brook
0307 Spring Brook
0308 Kettler and Norris Drain-Grand River
0401 Handy Howell Drain-Red Cedar River
0402 Middle Branch Red Cedar River
0403 Handy Drain No 5-Red Cedar River
0404 Headwaters West Branch Red Cedar River
0405 West Branch Red Cedar River
0406 Kalamink Creek
0407 Wolf Creek-Red Cedar River
0408 Hayhoe Drain-Doan Creek
0409 Dietz Creek
0410 Doan Creek
0411 Squaw Creek-Red Cedar River
0501 Deer Creek
0502 Sloan Creek
0503 Coon Creek-Red Cedar River
0504 Pine Lake Outlet
0505 Mud Creek
0506 Headwaters Sycamore Creek
0507 Sycamore Creek
0508 Red Cedar River
0601 Headwaters Looking Glass River
0602 Howard Drain-Looking Glass River
0603 Kellog Drain-Looking Glass River
0604 Buck Branch-Vermillion Creek
0605 Vermillion Creek
0606 Leisure Lakes-Looking Glass River
0607 Mud Creek-Looking Glass River
0608 Remey Chandler Drain
0609 Turkey Creek Drain-Looking Glass River
0610 Summers Drain-Looking Glass River
0611 Husted and Landenburg Drain-Looking Glass River
0612 Looking Glass River
0701 Columbia Creek
0702 Skinner Extension Drain-Grand River
0703 Silver Creek-Grand River
0704 Carrier Creek-Grand River
0705 Sandstone Creek-Grand River
0706 Frayer Creek-Grand River
0707 Winchell and Union Drain-Sebewa Creek
0708 Sebewa Creek
0709 Cryderman Lake Drain-Grand River
0710 Goose Creek-Grand River



Land Cover: Upper Grand River Watershed



Watershed size: 1750 sq. miles

Between 1996 and 2001, there has been a slight increase in developed land, wetlands, and farmland and a slightly larger decrease in grassland.

Impaired (303d) Waters

Waterbody Name	Impairment
Grand River	Pathogens, Mercury
Grand River and Red Cedar River	PCB Fish Consumption Advisory, Mercury (Fish Tissue), Dissolved Oxygen, Fish Kills, Pathogens
Moores Park Im-poundment (Grand River)	Mercury (Fish Tissue)
Portage Lake	Mercury (Fish Tissue)
Red Cedar River	Pathogens Fish Community Rated Poor Macroinvertebrate Community Rate Poor
Sycamore Creek	Dissolved Oxygen
Vermilion Creek	Untreated Sewage Discharges, Pathogens

Watershed Management Plans

- Carrier Creek — Eaton County Drain Commission
- Upper and Lower Grand River — Grand Valley State University Annis Water Resources Institute
- Upper Looking Glass River

Watershed Overview

- The Upper Grand River watershed is almost 1750 square miles.
- Almost 65% of the land is in agricultural use.
- There are three urban areas in the watershed: Lansing, East Lansing, and Jackson, Michigan.
- The watershed has 8 listed impaired waters.
- There are 958 miles of river and streams in the watershed.
- The Upper Grand watershed flows into the Lower Grand River watershed, where it then flows into Lake Michigan

Watershed Priorities

- A 319 grant was awarded to the Jackson Country Drain Commission Office to develop an Upper and Lower Grand River watershed management plan. Goals of the plan include:
  - ◊ Maintain and improve water quality by promoting sound land management decisions.
  - ◊ Assess relationships between water quality and storm water runoff by developing guidelines for stormwater management to reduce impacts of urbanization.
  - ◊ Preserve and restore, coldwater fisheries, and reintroduce indigenous game fish species where possible.
  - ◊ Provide for flood protection, minimize risk of flooding, and assess necessity of flood control improvements.
  - ◊ Ensure public safety in recreational opportunities in surface waters.
  - ◊ Protect healthy habitats for native aquatic life and wildlife.
- Development has significantly changed the areas in the watershed
- An increase in the amount of impervious surface area (i.e., rooftops and parking lots) has caused an increase in the amount of rainwater draining into such waterways as Carrier Creek.
- The increase in development and the use of drain tiles in agricultural areas has led to flashier streams.

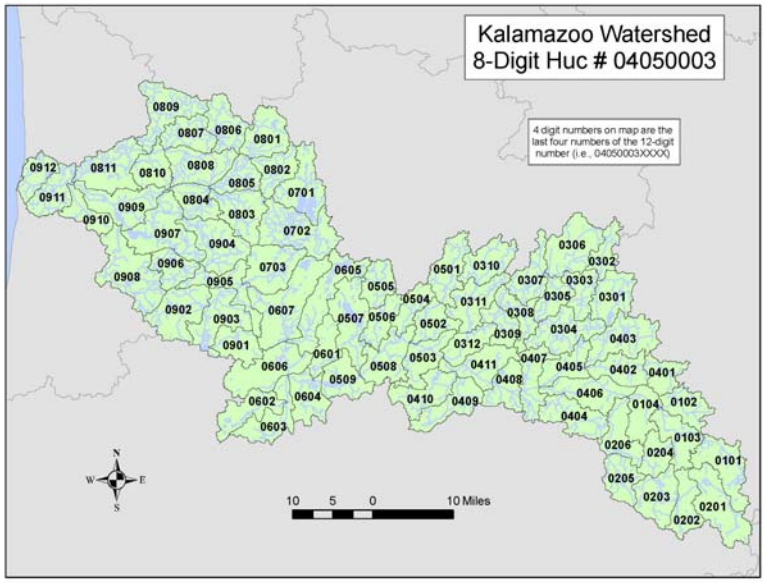
Data Sources. Land cover map and percentages: National Land Cover database, 1992 (edc.usgs.gov/products/landcover/nlcd.html; Land use change: NOAA Coastal Change Analysis Program, 1996 and 2001 (www.csc.noaa.gov/crs/lca/ccap.html); Total Maximum Daily Load (TMDL) Im-paired Waters: Surf Your Watershed (www.epa.gov/surf)

Kalamazoo River Watershed

Hydrologic Unit Code: 04050003

For more information, see the USEPA "Surf Your Watershed" website at cfpub.epa.gov/surf/huc.cfm?huc_code=04050003 or contact the Michigan Department of Environmental Quality at 517-335-6969 to request a copy of report number:

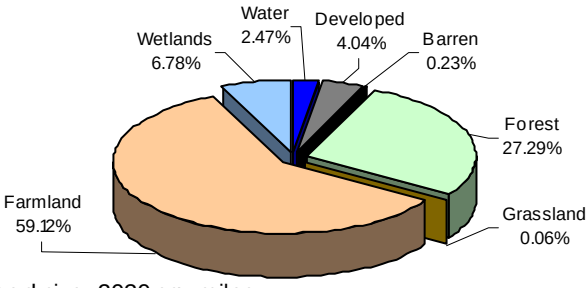
- MI/DEQ/WB-05/066, "A Biological Survey of Sites in the Upper Kalamazoo River Watershed, Calhoun and Jackson Counties, Michigan, Aug 2004".
- MI/DEQ/WB-05/067, "A Biological Survey of Sites in the North and South Branches of the Kalamazoo River Watershed, Calhoun, Hillsdale, and Jackson Counties, Michigan, Aug 2004".
- MI/DEQ/WB-05/064, "A Biological Survey of the Kalamazoo River and Selected Tributaries from the City of Battle Creek to Lake Michigan, Jul-Sept 2004".
- MI/DEQ/WB-05/065, "A Biological Survey of Sites in the Battle Creek River Watershed, Barry, Calhoun, and Eaton Counties, Michigan, June and Aug 2004".



Subwatersheds of the Kalamazoo River Watershed

0101 Upper North Branch Kalamazoo River
0102 Spring Arbor and Concord Drain
0103 Middle North Branch Kalamazoo River
0104 Lower North Branch Kalamazoo River
0201 Horseshoe Lake-South Branch Kalamazoo River
0202 Cobb Lake-South Branch Kalamazoo River
0203 Beaver Creek-South Branch Kalamazoo River
0204 Swains Lake Drain-South Branch Kalamazoo River
0205 Lampson Run Drain
0206 South Branch Kalamazoo River
0301 Narrow Lake-Battle Creek
0302 Relaid Mills Drain-Battle Creek
0303 Big Creek
0304 Headwaters Indian Creek
0305 Indian Creek
0306 Dillon Relaid Drain-Battle Creek
0307 Townline Brook Drain-Battle Creek
0308 Ackley Creek-Battle Creek
0309 Clear Lake-Battle Creek
0310 Headwaters Wanadoga Creek
0311 Wanadoga Creek
0312 Battle Creek
0401 Headwaters South Branch Rice Creek
0402 South Branch Rice Creek
0403 North Branch Rice Creek
0404 Wilder Creek
0405 Rice Creek
0406 Montcalm Lake-Kalamazoo River
0407 Buckhorn Lake-Kalamazoo River
0408 Pigeon Creek-Kalamazoo River
0409 Harper Creek
0410 Minges Brook
0411 Willow Creek-Kalamazoo River
0501 Headwaters Wabascon Creek
0502 Wabascon Creek
0503 Harts Lake-Kalamazoo River
0504 Sevenmile Creek
0505 Headwaters Augusta Creek
0506 Augusta Creek
0507 Gull Creek
0508 Eagle Lake-Kalamazoo River
0509 Morrow Lake-Kalamazoo River
0601 Comstock Creek
0602 West Fork Portage Creek
0603 Portage Creek
0604 Davis Creek-Kalamazoo River
0605 Spring Brook
0606 Averill Lake-Kalamazoo River
0607 Silver Creek-Kalamazoo River
0701 Gun Lake-Gun River
0702 Fenner Creek-Gun River
0703 Gun River
0801 Green Lake Creek
0802 Fales Drain-Rabbit River
0803 Miller Creek
0804 Bear Creek
0805 Buskirk Creek-Rabbit River
0806 Headwaters Little Rabbit River
0807 Little Rabbit River
0808 Pigeon Creek-Rabbit River
0809 Black Creek
0810 Silver Creek-Rabbit River
0811 Rabbit River
0901 Sand Creek
0902 Base Line Creek
0903 Pine Creek
0904 Schnable Brook
0905 Trowbridge Dam-Kalamazoo River
0906 Tannery Creek-Kalamazoo River
0907 Lake Allegan-Kalamazoo River
0908 Swan Creek
0909 Bear Creek-Kalamazoo River
0910 Mann Creek
0911 Peach Orchard Creek-Kalamazoo River
0912 Kalamazoo River

- MI/DEQ/WD-04/041, "A Biological Survey of Sites in the Rabbit River Watershed Allegan County, Michigan Aug 2003".
- MI/DEQ/WD-03/103, "Water Quality Monitoring of Lake Allegan and Select Stations on the Kalamazoo River, 2002".

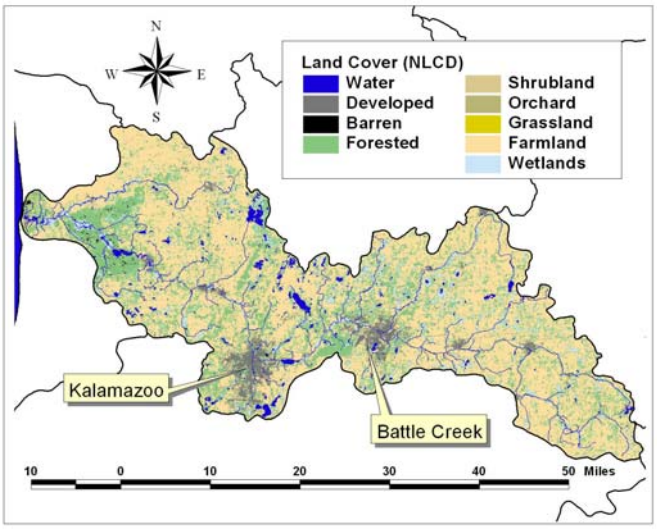


Watershed size: 2030 sq. miles

Between 1996 and 2001, there has been a slight increase in developed land, cultivated, and wetland and a slight decrease in forest and grassland.

Watershed Management Plans

- Battle Creek River and Rice Creek Watershed -- Calhoun Conservation District
- Davis Creek Watershed -- Forum for Greater Kalamazoo
- Davis, Gourdneck and Portage Creeks — City of Portage
- Four Townships Area — Four Townships Water Resources Council
- Greater Battle Creek Area — Battle Creek Area Clean Water Partners
- Gun and Rabbit River Watershed -- Allegan Conservation District
- Portage and Arcadia Creek — Forum of Greater Kalamazoo
- Mainstem 3 Corridor Watershed -- Kalamazoo Stormwater Workgroup
- Kalamazoo River watershed, Kalamazoo River Watershed Council—www.kalamazooriver.org



Watershed Groups

- Kalamazoo River Watershed Council — www.kalamazooriver.org/Mambo/
- The Forum of Greater Kalamazoo — www.theforum.org
- Four Townships Water Resources Council — www.kbs.msu.edu/ftwrc
- Calhoun Conservation District — www.calhouncd.org
- Allegan Conservation District — www.allegancd.org
- Match-e-be-nash-she-wish Band of Pottawatomi (Gun Lake Band)
- Lake Allegan/Kalamazoo River TMDL Implementation Committee—www.kalmazooriver.com

Watershed Overview

- The Kalamazoo basin watershed covers 2030 square miles.
- The Kalamazoo River Watershed drains eight counties in Southwest Lower Michigan and empties into Lake Michigan at Saugatuck, Michigan.
- The Kalamazoo River is an Area of Concern due to PCB contamination.
- The Nature Conservancy identified the following important ecological areas, species, and resources in the watershed:
  - ◊ Allegan Barrens have Lakeplain Wet-Mesic Prairie, Inland Coastal Plain Marsh, Lakeplain Wet Prairie, Central Water Lily Aquatic Wetland, and Interdunal Wetland.
  - ◊ Allegan Barrens is home to Eastern Massasauga, Ottoe's Skipper, Karner Blue Butterfly, Sprague's Pygarctic, Hall's Bulrush, and, Reticulated or Netted Nutrush.
  - ◊ Fort Custer has Blanchard's Cricket Frog, Blanding's Turtle, and Eastern Massasauga.
  - ◊ Headwaters have Leatherleaf Bog, interlobate headwater streams (Lake Michigan drainage), kettle moraine lakes, large rivers in southwest Michigan till plains (not coastal reach), and tributary streams in medium textured moraines (southern Ionia moraines).
  - ◊ Fort Custer has Central Mesic Tallgrass Prairie, Cinquefoil - Sedge Prairie Fen, Red Maple - Ash - (Elm) Swamp Forest, White Oak - Red Oak / Early Meadow-Rue Forest, Silver Maple - Elm - (Cottonwood) Forest, and White Oak - Red Oak Dry-Mesic Forest.
  - ◊ Fort Custer has important large, deep, stream-connected lakes.
  - ◊ The Spring Brook-Kalamazoo Nature Center has the endangered Mitchell's Satyr (which is found in small numbers in locations in Michigan, Indiana, Ohio, and Maryland).
  - ◊ Upper Kalamazoo tributaries have kettle moraine lakes, interlobate headwater streams (Lake Michigan drainage), and large rivers in southwest Michigan till plains (not coastal reach).

Data Sources. Land cover map and percentages: National Land Cover database, 1992 (edc.usgs.gov/products/landcover/nlcd.html; Land use change: NOAA Coastal Change Analysis Program, 1996 and 2001 (www.csc.noaa.gov/crs/lca/ccap.html); Total Maximum Daily Load (TMDL) Impaired Waters: Surf Your Watershed (www.epa.gov/surf)

Watershed Activities

- Runoff from agriculture and developed landhas created impairments for excessive nutrients and sedimentation for a number of streams in the watershed. Erosion and stream stability have been problematic for parts of the watershed.
- Improving water quality and preserving aquatic habitat are among the highest priorities for the watershed.

Impaired (303d) Waters

Waterbody Name	Impairment
Allegan Lake	PCB Fish Consumption Advisory
Battle Creek River	PCB Fish Consumption Advisory
Ceresco Impound-ment	PCB Fish Consumption Advisory
Crooked Creek	Macroinvertebrate Community Rated Poor
Davis Creek	Oil
Fenner Creek	Macroinvertebrate Community Rated Poor
Fenner Lake	Phosphorus PCB Fish Consumption Advisory Mercury (Fish Tissue) Nuisance Plant Growths
Fish Lake	Mercury (Fish Tissue)
Gull Lake	Mercury PCB Fish Consumption Advisory
Hamilton Impound-ment (Rabbit River)	PCB Fish Consumption Advisory
Kalamazoo Lake	PCB Fish Consumption Advisory
Kalamazoo River	Mercury
Kalamazoo River (Includes Lakes and Impoundments)	PCB Fish Consumption Advisory
Kalamazoo River Wa-tershed	PCBs
Morrow Pond	PCB Fish Consumption Advisory
Pine Lake	Mercury (Fish Tissue)
Rabbit River	PCB Fish Consumption Advisory
Selkirk Lake	Mercury (Fish Tissue)
Swimmers Lake - Markin Glen County Beach	Pathogens

Kalamazoo River Area of Concern Activities

Location
The lower 40 miles of the Fox River and Green Bay

Stressors and Primary Contaminants
- PCBs
- Phosphorus
- Suspended solids
- Mercury
- Urban and rural runoff
- Sediments
- Aquatic exotic species
- Wetland loss
- Habitat alteration

Programs
- Clean Water Act – Integrated TMDL for the Lower Fox
- Superfund
- Natural Resource Trustee's Damage Assessment

Clean-Up Actions
- Watershed NPS abatement
- Remedial investigation completed remedial action nearly ongoing. Dredging and PCB removal (Deposit in 11,000 cubic yards of sediment removed,, Deposit 56/57: 80,000 cubic yards of sediment removed OU1 335,000 cubic yards of sediment removed, and Phase I, 132,000 cubic yards of sediment removed)
- Dissolved oxygen wasteload
- Deposit N, 56, 57
- Cumulative sediments remediated from 1998-2007 – 558,000 cubic yards
- Consent Decree for Phase I Fox River clean-up announced 4/12/06, Unilateral Administrative Order issued November 2007 for remainder of river contamination (from OU2 to OU5)

Delisting Targets
- Will be started in 2008

Key Activity Needed
- Dredging
- Pollution Prevention
- Stream buffers
- Habitat protection and restoration
- Coordination with RAP program for AOC delisting purposes
- Coordination with integrated TMDL

Challenges
- Rapid land development
- Contaminated material disposal
- Seeing through completion of cleanup for OUs 2-5

Next Steps
- Implement 4/12//06 Consent Decree for detailed engineering for the final cleanup plan.
- Compliance with the Unilateral Administrative Order issued November 13, 2007
- Remediation (using dredging/disposal, capping and sand covers) l of an additional 7.5 million cubic yards of sediment.
- Final cleanup expected to be complete approximately 2020. River monitoring will continue indefinitely.
- Implement integrated TMDL

Little Calumet – Galien Watershed

Hydrologic Unit Code: 04040001

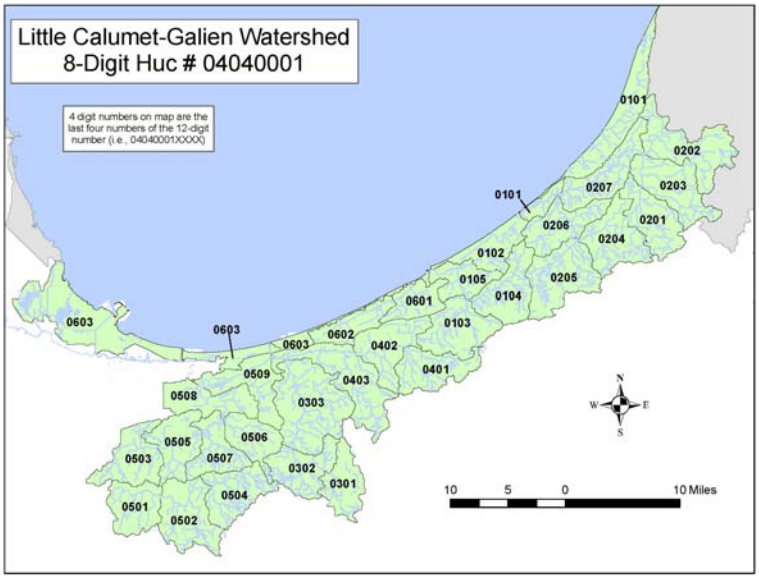
For more information, see the USEPA "Surf Your Watershed" website at cfpub.epa.gov/surf/huc.cfm?huc_code=04040001 or contact the Michigan Department of Environmental Quality at 517-335-6969 to request a copy of report number MI/DEQ/WD-03/054, "A Biological Survey Sites in the Galien River Watershed, Berrien County, Michigan, July 2002."

Watershed Management Plans

- Galien River — The Conservation Fund, Chikaming Open Lands — www.chikamingopenlands.org
- Berrien County Drain Commissioner — www.berriencounty.org/?dept=9
- Trail Creek
- Dunes Creek

Watershed Groups

- Save the Dunes Council — www.savedunes.org
- Chicago Wilderness — www.chicagowilderness.org
- Chikaming Open Lands — www.chikamingopenlands.org
- Great Lakes Center for Environmental and Molecular Sciences (GLEAMS) — quickplace.mtri.org/QuickPlace/gleams/Main.nsf/h_E8AA5D1C0E773CF485256D880040A13B/f58b8d600246470b85256f1700630e81/?OpenDocument
- Northwestern Indiana Regional Planning Commission — www.nirpc.org
- Northeastern Illinois Planning Commission — www.nipc.org/environment
- Trail Creek Watershed Group



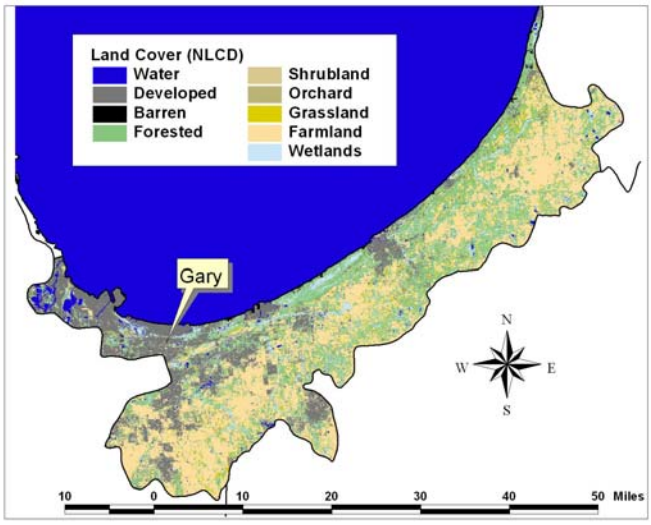
Subwatersheds of the Little Calumet – Galien Watershed

0101 Painterville Drain-Frontal Lake Michigan
0102 White Ditch-Frontal Lake Michigan
0103 West Branch Trail Creek
0104 East Branch Trail Creek
0105 Trail Creek
0201 Dowling Creek
0202 East Branch Galien River
0203 Blue Jay Creek-Galien River
0204 Spring Creek
0205 Headwaters South Branch Galien River
0206 South Branch Galien River
0207 Kirktown Creek-Galien River
0208 Galien River
0301 Sagers Lake-Salt Creek
0302 Clark Ditch-Salt Creek
0303 Squirrel Creek-Salt Creek
0401 Reynolds Creek-East Arm Little Calumet River
0402 Kemper Ditch-East Arm Little Calumet River
0403 Coffee Creek-East Arm Little Calumet River
0501 Headwaters Main Beaver Dam Ditch
0502 Main Beaver Dam Ditch-Deep River
0503 Headwaters Turkey Creek
0504 Deer Creek-Deep River
0505 City of Merrillville-Turkey Creek
0506 Duck Creek
0507 Lake George-Deep River
0508 Little Calumet River-Deep River
0509 Willow Creek-Burns Ditch
0601 Kintzele Ditch
0602 Dunes Creek
0603 Calumet River-Frontal Lake Michigan

Watershed Overview

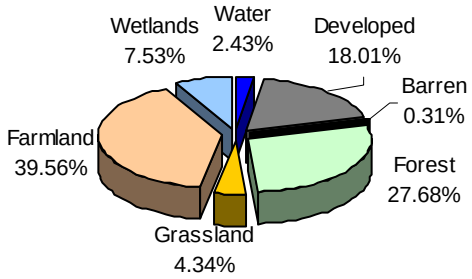
- Urban areas include Chicago, Gary, Michigan City, Hammond, Portage, and Valparaiso.
- Most coastal wetlands and nearshore aquatic habitats have been eliminated or degraded. Presettlement northwest Indiana was continuous wetland. As of 1979, less than 5 percent of the original wetland cover remained. This exists primarily as narrow strips of intact habitat. Industry filled or drained the wetlands and leveled the dunes and used steel slag to fill low areas and the lakefront. The region is one of the most industrialized in the Lake Michigan basin.
- The watershed includes the Grand Calumet Area of Concern The AOC, which is part of three watersheds, including the Chicago River and Chicago-Lake Michigan watersheds.
- Today, 90% of the river's flow originates as municipal and industrial effluent, cooling and process water and storm water overflows. Although discharges have been reduced, a number of contaminants continue to impair the AOC.
- The Indiana Dunes National Lakeshore has more plant species (including exotics) than all but two other national

parks, and at 16,000 acres is much smaller than most other national parks.



- Warren Dunes State Park provides 1,950 acres of recreational opportunities along the beautiful shore of Lake Michigan in southwestern Michigan. The rugged dune formation rises 240 feet above the lake. The park has more than two miles of shoreline, six miles of hiking trails and is open year-round.
- The Indiana Dunes contains Mesic Sand Tallgrass Prairie and Black Oak / Lupine Barrens, sandy beach/dunes with sand and gravel lag over clay nearshore, sandy beach/dunes with sand/gravel nearshore, and sandy coastal dune streams.
- The Indiana Dunes is an important migratory bird stopover site and raptor stopover site.
- The Tolleston Strand Plain in Lake County is home to Pale False Foxglove, Karner Blue Butterfly, Blanding's Turtle, Byssus Skipper, Great Plains Ladies' Tresses, Hill's Thistle, and Ottoe's Skipper.
- Important plant communities at Indiana Tolleston include Black Oak / Lupine Barrens, Bulrush - Cattail - Burreed Shallow Marsh, Central Cordgrass Wet Sand Prairie, Hardhack Shrub Prairie, Interdunal Wetland, Lakeplain Wet Prairie, Lakeplain Wet-Mesic Prairie, Mesic Sand Tallgrass Prairie, and Midwest Cattail Deep Marsh, among others.
- The Hoosier Prairie in Lake County, Indiana is home to the Pale False Foxglove, identified by the Nature Conservancy as a critical species in the Great Lakes basin.
- The Nature Conservancy identified the following critical environmental resources in the watershed.
  - ◊ The Galien River has Great Lakes Shoreline Cattail Marsh
  - ◊ The Warren Dunes-Grand Mere has a land bird stopover site
  - ◊ The Warren Dunes-Grand Mere has Acadian Flycatcher, American Woodcock, Baltimore Oriole, Black-billed Cuckoo, Blue-winged Warbler, Canada Warbler, Cerulean Warbler, Chimney Swift, Eastern Wood-Pewee, Field Sparrow, Hooded Warbler, Least Flycatcher, Louisiana Waterthrush, Marsh Wren, Prairie Warbler, Prothonotary Warbler, Red-headed Woodpecker, Rose-breasted Grosbeak, Veery Warbling Vireo, Willow Flycatcher, Wood Duck, Wood Thrush, Worm-eating Warbler, Yellow-billed Cuckoo, Yellow-throated Warbler, and Pitcher's Thistle.

Land Cover: Little Calumet – Galien



Watershed Size: 723 sq miles.

Between 1996 and 2001, there has been a slight increase in developed land, and wetland and a slight decrease in cultivated land, and grassland.

Watershed Activities

- The US Army Corp of Engineers (USACE) is in the planning and implementation phase of dredging the sediments from the IHSC in order to continue its use as a navigable waterway.
- The Galien River Watershed Project is focused on decreasing drainage and flooding problems along the river and the streams flowing into it. The focus of a 319 grant is flood prevention and improved water quality in the system. Beneficiaries will be local farmers and those interested in fishing and other recreational activities.
- Save the Dunes Conservation Fund developed a watershed plan for the Dunes Creek watershed. Also included in the project is a study to assess the efficacy of a pilot wetland restoration site along a section of Dunes Creek. study results will be included in the final written summary project report. Public outreach activities will include outreach brochures, news releases about the project, and quarterly newsletters, e-mail, or website articles.
- IDEM is requiring the development of long term CSO control plans.

Data Sources. Land cover map and percentages: National Land Cover database, 1992 (edc.usgs.gov/products/landcover/nlcd.html; Land use change: NOAA Coastal Change Analysis Program, 1996 and 2001 (www.csc.noaa.gov/crs/lca/ccap.html); Total Maximum Daily Load (TMDL) Impaired Waters: Surf Your Watershed (www.epa.gov/surf)

Impaired (303d) Waters

Waterbody Name	Impairment
Burns Ditch, IN	Mercury Fish Consumption Advisory, PCB Fish Consumption Advisory, Pathogens
Calumet, IL	PCBs
Calumet River, IL	Fecal Coliform, PCBS, PH, Silver, Total Phosphorous
Clark Ditch and Other Tribs, IN	E. Coli
Coffee Creek Basin, IN	E. Coli
Damon Run –Swanson Lamporte Ditch, IN	E. Coli
Damon Run and Trib, IN	E. Coli
Deep River, IN	E. Coli
Deep River-Burns Ditch	Impaired Biotic Communities
Deep River Tributary Merrillville	Impaired Biotic Communities, Siltation
Deep River US30, IN	E. Coli
Dunes Creek	E. Coli, Impaired Biotic Communities
Galena River	E. Coli
Galien River, MI	Chlordane Fish Consumption Advisory, PCB Fish Consumption Advisory
Grand Calumet River - Gary to Indiana Harbor Canal	Cyanide, E. Coli, Mercury Fish Consumption Advisory, PCB Fish Consumption Advisory, Impaired Biotic Communities, Oil and Grease
Grand Calumet River - Headwaters	AMMONIA, Cyanide, Mercury Fish Consumption Advisory, PCB Fish Consumption Advisory, Impaired Biotic Communities, Oil and Grease
Gustafson Ditch - Other Tributaries	E. Coli
Indiana Harbor Canal - Lake George Br	E. Coli, Mercury Fish Consumption Advisory, PCB Fish Consumption Advisory, Impaired Biotic Communities , Oil and Grease
Indiana Harbor Canal - Main Channel	E. Coli, Mercury Fish Consumption Advisory, PCB Fish Consumption Advisory
Kinzele Ditch and Tribs	E. Coli
Lake George	PCB Fish Consumption Advisory
Lake Michigan Shoreline East of IHC	Mercury Fish Consumption Advisory, PCB Fish Consumption Advisory, Pathogens
Lake Michigan Shoreline West of IHC	Mercury Fish Consumption Advisory, PCB Fish Consumption Advisory, Pathogens
Little Calumet River	Mercury Fish Consumption Advisory, PCB Fish Consumption Advisory, Pathogens, Cyanide
Little Calumet River - East Arm	Mercury Fish Consumption Advisory, PCB Fish Consumption Advisory, Pathogens
Little Calumet River - Headwaters	Mercury Fish Consumption Advisory, PCB Fish Consumption Advisory, Pathogens
Little Calumet River N.	Aldrin, Dissolved Oxygen, Iron, Mercury, PCBs, Silver, Total Phosphorous
Main Beaver Dam Ditch Above Niles Ditch, IN	Impaired Biotic Communities
Main Beaver Dam Ditch Above Crown Point WWTP, IN	Impaired Biotic Communities
Marquette Park Lagoons (East and West), IN	PCB Fish Consumption Advisory
Munson Ditch, IN	E. Coli, Impaired Biotic Communities
Niles Ditch, IN	Impaired Biotic Communities
Potage Burns Waterway, IN	Mercury Fish Consumption Advisory, PCB Fish Consumption Advisory, Pathogens
Rice Lake Tribs and Outlet, IN	E. Coli
Sawyer Creek, MI	Oil
Trail Creek	Mercury Fish Consumption Advisory, PCB Fish Consumption Advisory
Turkey Creek - Merrillville	E. Coli
Turkey Creek Mainstem, IN	E. Coli, Impaired Biotic Communities
Wolf, IL	PCBs
Wolf Lake,IN	PCB Fish Consumption Advisory

Grand Calumet River Area of Concern Activities

Stressors and Primary Contaminants

- PCB and mercury Contaminated Sediments
- Pathogens from Combined Sewer Overflows
- Contaminated groundwater
- Contaminated land sites
- Habitat fragmentation
- Aquatic Nuisance Species
- PAHs
- Cadmium
- Chromium
- Lead
- Biochemical oxygen demand
- Suspended solids
- Oil and grease
- PCB
- Mercury
- Arsenic
- Urban runoff

Programs

- Superfund
- RCRA
- Clean Water Act
- WRDA
- Navigational Dredging
- Natural Resource Trustee's Damage Assessment
- Great Lakes Legacy Act

Clean-Up Actions

- West Branch Remediation – a sediment dredging and habitat restoration demonstration project at the East Chicago Sanitary District Canal has been designed by the USACE and ECSD
- U. S. Steel Gary Works dredging of 5 river miles on the East Branch complete including 824,00 cubic yards of sediment removed from the river and placed in the CAMU.
- GSD Sediment Remediation-selected remedial option is currently being considered by EPA
- Navigational dredging
- U.S. Lead - 19,000 cubic yards of sediment have been remediated
- A total of 700,000 cubic yards of sediment have been remediated
- IDEM and EPA are currently working on the amendment to currently existing federal consent decrees to address CSO long term control plan issues.

Delisting Targets

- Delisting targets for all 14 listed BUIs will be in place by December 31, 2008.

Key Activity Needed

- Dredging
- CSO Long Term Control Plans
- Issue NPDES Permits
- BUI Indicator Monitoring
- West Branch assessment completed in 2002 – Remedial Alternatives Development Report completed in 2006
- Coordination with RAP program for AOC delisting purposes

Challenges

- Public concern regarding location of contaminated material disposal
- Local funding and match for federal projects
- Legal concerns
- Permitting
- Monitoring resources
- The draft Water Quality Component of Stage Two includes some provisions being implemented through indirect methods; direct resources for implementation have been limited

Next Steps

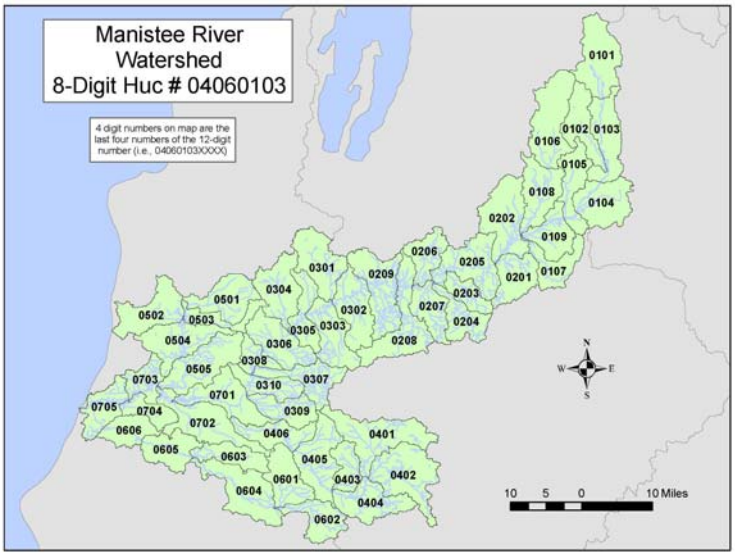
- EPA GLNPO - IDEM is working in partnership with the Great Lakes Legacy Act to remediate the West Branch of the Grand Calumet River.
- Dredging at U. S. Steel complete
- NRDA-Consent decree has been entered and restoration planning is underway
- ACOE- WRDA Diagnostic Feasibility Study
- GSD-Site Characterization
- Monitor BUI Indicators
- CDF construction is currently underway
- The RAP process has developed and obtained funds for a Toxic Pollution Prevention (TPP) Program

Manistee River Watershed

Hydrologic Unit Code: 04060103

For more information, see the USEPA "Surf Your Watershed" website at cfpub.epa.gov/surf/huc.cfm?huc_code=04060103

Contact the Michigan Department of Enviornmental Quality at 517-335-6969 to request a copy of report number MI/DEQ/WD-04/031 "A Biological Survey of the Lower Manistee River and Selected Tributaries in the Counties of Manistee, Wexford, Missaukee, and Kalkaska, June 6 - August 17, 1999" and report number MI/DEQ/WD-04/017, "A Biological Survey of the Upper Manistee River and Selected Tributaries, Crawford County and Kalkaska County, August 17 - September 2, 1999".



Watershed Management Plans

- Little Manistee River — Conservation Resource Alliance
- Manistee River — Conservation Resource Alliance

Watershed Organizations

- Upper Manistee River Association
- Conservation Resource Alliance — www.rivercare.org
- Little River Band of Ottawa Indians — www.itcmi.org/thehistorytribal7.html
- Huron Pines Resource Conservation & Development Council — www.huronpines.org
- Northwest Michigan Council of Governments — www.nwm.org
- Little Manistee Watershed Conservation Council - www.lmwcc.org

Subwatersheds of the Manistee River Watershed

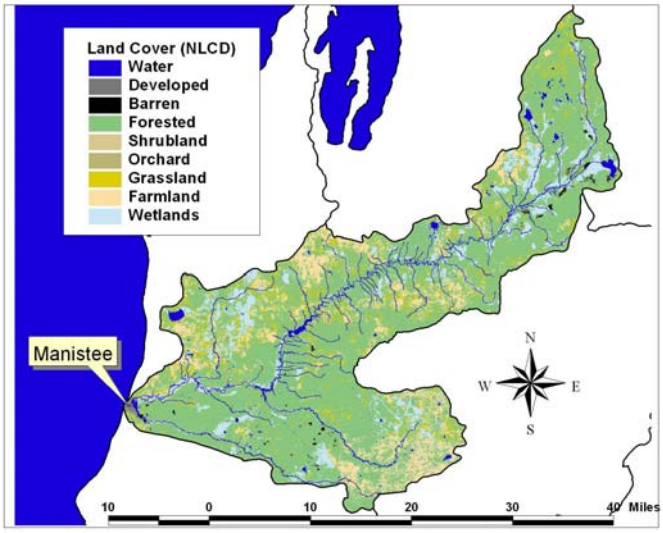
0101 Frenchman Creek-Manistee River
0102 Goose Creek
0103 Lost Lake-Manistee River
0104 Portage Creek-Manistee River
0105 Black Creek-Manistee River
0106 Manistee Lake-North Branch Manistee River
0107 Big Cannon Creek
0108 North Branch Manistee River
0109 Big Devil Creek-Manistee River
0201 Little Cannon Creek
0202 Maple Creek-Manistee River
0203 Ham Creek
0204 Hopkins Creek
0205 Hopkins Creek-Manistee River
0206 Fife Lake Outlet
0207 Chase Creek-Manistee River
0208 Manton Creek-Manistee River
0209 Silver Creek-Manistee River
0301 Anderson Creek
0302 Soper Creek-Manistee River
0303 Cole Creek-Manistee River
0304 Fletcher Creek
0305 Burkett Creek-Manistee River
0306 Hodenpyl Dam Pond-Manistee River
0307 Slagle Creek
0308 Eddington Creek-Manistee River
0309 Peterson Creek
0310 Hinton Creek-Manistee River
0401 North Branch Pine River
0402 East Branch Pine River
0403 Coe Creek
0404 Beaver Creek-Pine River
0405 Poplar Creek-Pine River
0406 Pine River
0501 Dutchman Creek-Bear Creek
0502 Little Bear Creek
0503 Lemon Creek-Bear Creek
0504 Little Beaver Creek-Bear Creek
0505 Bear Creek
0601 Twin Creek
0602 Lincoln Creek-Little Manistee River
0603 Stronach Creek
0604 Elbow Lake-Little Manistee River
0605 Tank Creek-Little Manistee River
0606 Little Manistee River
0701 Tippy Dam Pond-Manistee River
0702 Pine Creek-Manistee River
0703 Larson Creek-Manistee River
0704 Claybank Creek-Manistee River
0705 Manistee River

Watershed Overview

- The Manistee River watershed covers 1906 square miles, with less than half of mile of Lake Michigan shoreline.
- Its predominant land use is forest.
- The watershed has just over 15 square miles of inland lakes.
- It has 833 miles of waterways, 93 percent of which have been assessed.
- Three waterways are TMDL listed waterways. Two are listed for one contaminant and one is listed for three contaminants.
- The Manistee is one of the most stable, high-quality, coldwater streams in the country. It is a groundwater-driven stream.
- Excessive sediment is a primary problem in the watershed, affecting fish reproduction, alters channel morphology, and impairs aquatic invertebrates. The primary sources are erosion from degraded streambanks and poorly designed stream crossings.
- The Nature Conservancy identified the following critical ecological resources in the watershed:
  - ◊ The Little Manistee River has Great Lakes Leatherleaf Intermittent Wetland.
  - ◊ Critical communities of the Lower Manistee River include Great Lakes Hemlock - Beech - Hardwood Forest.
- Eastern Massasauga is found on the Manistee River.
- The river is designated as a natural river.

Impaired (303d) Waters

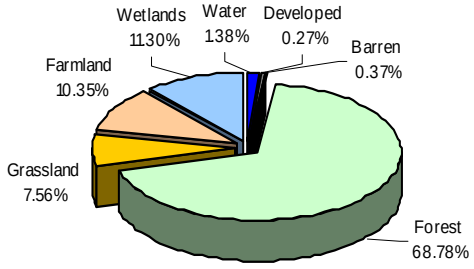
Waterbody	Impairment
Anderson Creek	Mercury
Lake Margrethe	Mercury (Fish Tissue)
Manistee Lake	Pathogens, PCB Fish Consumption Advisory
Manistee River Watershed	PCBs



Watershed Activities

- Watershed Restoration work on the Manistee River is carried out by a diverse group of partners organized as members of the Upper Manistee River Restoration Committee. This committee is administered by Huron Pines RC&D and has actively worked on stabilizing streambanks, restoring access sites, and creating aquatic habitat.
- The Little River Band of Ottawa Indians received one of the first 20 national watershed grants to support their efforts to restore and monitor the water quality of the Manistee River.
- The Little River Band of Ottawa Indians received a 319 grant to address four road-stream crossings that are failing, improve access to the river's edge, and reclaim a lake sturgeon spawning ground.
- Targeted streambanks and road/stream crossings within the Bear Creek Watershed will be repaired.

Land Cover: Manistee River Watershed



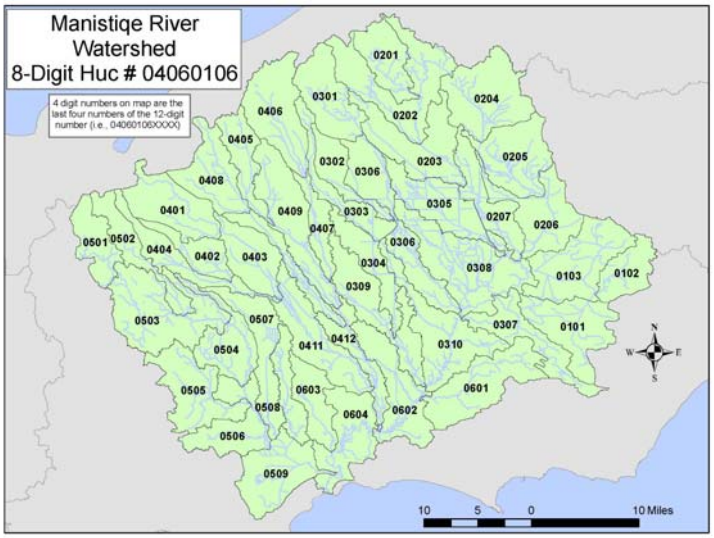
Total Acreage: 1906 sq. miles

Between 1996 and 2001, there has been a slight increase in developed land, and wetland and a slight decrease in cultivated land, grassland, and forest.

Data Sources. Land cover map and percentages: National Land Cover database, 1992 (edc.usgs.gov/products/landcover/nlcd.html; Land use change: NOAA Coastal Change Analysis Program, 1996 and 2001 (www.csc.noaa.gov/crs/lca/ccap.html); Total Maximum Daily Load (TMDL) Impaired Waters: Surf Your Watershed (www.epa.gov/surf)

Manistique River Watershed

Hydrologic Unit Code: 04060106



For more information, see the USEPA "Surf Your Watershed" website at http://cfpub.epa.gov/surf/huc.cfm?huc_code=04060106 or contact the Michigan Department of Environmental Quality at 517-335-6969 to request a copy of report number MI/DEQ/WB-05/106, "A Biological Survey of Manistique River Watershed, Luce, Mackinac, Alger, Schoolcraft, and Delta Counties, Michigan."

Watershed Groups

Manistique River Chapter of the Michigan Statewide Public Advisory Council; Corey Barr, Chair, www.glc.org/spac/spacmemb.html

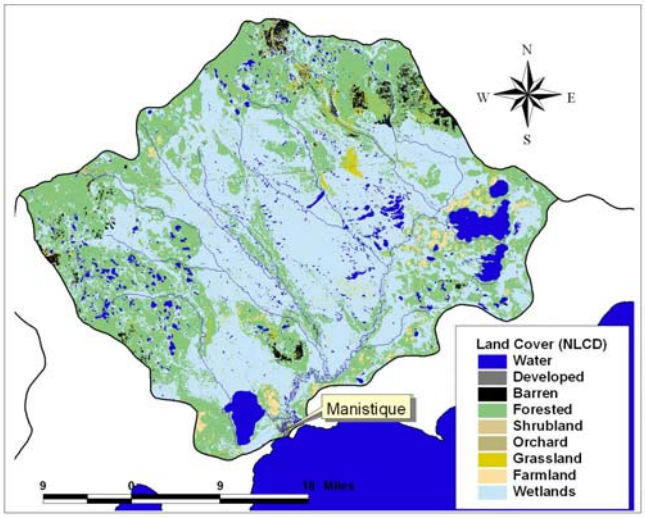
- Manistique River Area of Concern — www.epa.gov/glnpo/aoc/manistique.html

Watershed Overview

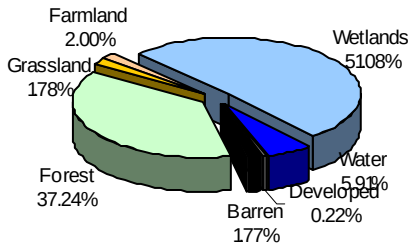
- Historical uses of Manistique River waters in the AOC include receiving wastes from sawmills, a paper mill, small industries, the municipal waste water treatment plant, plus navigation for shipping, ferrying, recreational boating and commercial fishing. Current uses include receiving the wastewater discharges from Manistique Papers, Inc. and the City of Manistique Wastewater Treatment Plant.
- Recreational uses are mainly boating, sightseeing, and fishing.
- The Seney National Wildlife Refuge is upriver of Manistique. The refuge is 95,455 acres of field and secondary growth forest. Almost two-thirds of the refuge is comprised of varying types of wetlands that provide habitat for threatened and endangered species and a variety of wildlife. The refuge is home to 26 fish species, 50 mammalian species, and 200 bird species, including eagles, loons, and trumpeter swans.
- Historically, a majority of forestland in the Manistique headwaters was logged and subsequent fires burned over the land leaving behind many white pine stump fields that are now being overcome by forest again.
- The dredging of contaminated sediments was completed at the end of 2000. Final dredging was done by divers with hydraulic hoses to minimize resuspension of PCBs and to ensure a clean substrate when completed.
- The Nature Conservancy identified the following critical ecological resources in the watershed: Seney Fens and East Branch Fox River have White Pine / Blueberry Dry-Mesic Forest; Critical ecological systems include the lower reaches of

Subwatersheds of the Manistique River Watershed

0101 South Manistique Lake
0102 Black Creek
0103 Manistique Lake
0201 West Branch Fox River
0202 Little Fox River-Fox River
0203 Twomile Ditch-Fox River
0204 Camp Seven Creek-East Branch Fox River
0205 Deer Creek-East Branch Fox River
0206 East Branch Fox River
0207 Fox River
0301 Negro Creek-Driggs River
0302 Walsh Creek
0303 C-3 Pool-Walsh Creek
0304 Walsh Ditch
0305 Holland Ditch
0306 Driggs River
0307 Mead Creek
0308 Pine Creek-Manistique River
0309 Duck Creek
0310 Marsh Creek-Manistique River
0401 Beaver Creek-North Branch Stutts Creek
0402 Middle Branch Stutts Creek
0403 North Branch Stutts Creek
0404 South Branch Stutts Creek
0405 Star Creek
0406 Stoner Creek-Creighton River
0407 Creighton River
0408 Prairie Creek-Hickey Creek
0409 Section Nineteen Creek-West Branch Manistique River
0410 Hickey Creek
0411 Stutts Creek
0412 West Branch Manistique River
0501 Squaw Creek-Indian River
0502 Little Indian River
0503 Delias Run-Indian River
0504 Little Murphy Creek-Indian River
0505 Big Murphy Creek
0506 Iron Creek-Indian River
0507 Dead Creek
0508 Smith Creek
0509 Indian Lake-Indian River
0601 Bear Creek
0602 Merwin Creek-Manistique River
0603 Sturgeon Hole Creek
0604 Manistique River



Land Cover: Manistique River Watershed



Watershed size: 1466 sq. miles

Between 1996 and 2001, there has been a slight increase in developed land, farmland, and grassland, and a slight decrease in forest.

Tahquamenon and Manistique Rivers and Seney sand lake plain streams; Critical specie at the Seney Fens and East Branch Fox River - Auricled Twayblade

Watershed Activities

- The Manistique River RAP found that the main problem contributing to fishery use impairment was PCBs. Aquatic nuisance species also threaten the fishery productivity. The dam at the head of the old flume restricts fish passage
- There are plans to phase out combined sewer systems by 2020.
- A study conducted in 1994 showed 115 erosion sites covering 10,821 feet of stream bank that contributes an estimated 3,000 tons of sediment each year to the Driggs River, which is a tributary to the Manistique River.

Area of Concern Activities

Location

The last 1.7 miles of the river to the mouth of the harbor at Lake Michigan

Primary Contaminants and Stressors

- PCBs
- Combined sewer overflow
- PCB-contaminated sediments

Programs

- Superfund
- USACE

Clean-Up Actions

- Dredging of contaminated sediments completed in 2000 (190,000 cubic yards)
- Manistique Wastewater Treatment Plant made improvements to its system toward elimination of CSOs

Delisting Targets

- All delisting targets were set in 2006

Key Activity Needed

- Sampling and monitoring follow-up to confirm downward trends of contamination
- Coordination with RAP program for AOC delisting purposes

Challenges

- Navigational dredging
- Fish consumption advisories
- CSO to be closed by 2020

Next Steps

- Sampling and monitoring continuing as part of delisting process

Data Sources. Land cover map and percentages: National Land Cover database, 1992 (http://edc.usgs.gov/products/landcover/nlcd.html; Land use change: NOAA Coastal Change Analysis Program, 1996 and 2001 (http://www.csc.noaa.gov/crs/lca/ccap.html); Total Maximum Daily Load (TMDL) Impaired Waters: Surf Your Watershed (www.epa.gov/surf)

Impaired (303d) Waters

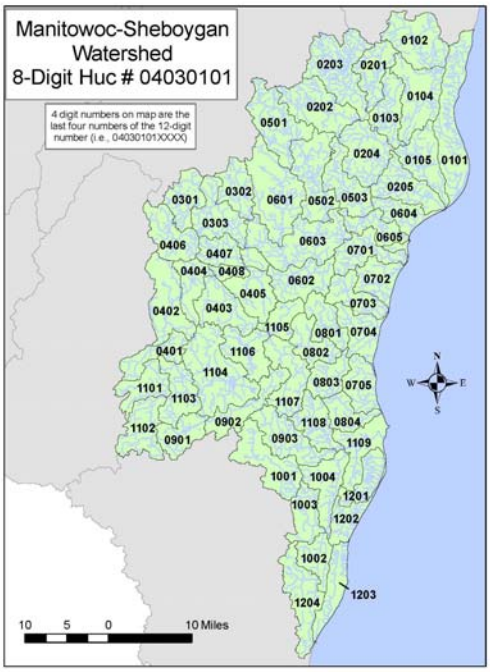
Waterbody Name	Impairment
Manistique Lake	Mercury (Fish Tissue)
Manistique River	Pathogens, Mercury
Manistique River Watershed	PCBs
West Branch Lakes	Mercury (Fish Tissue)

Manitowoc-Sheboygan Watershed

Hydrologic Unit Code: 04030101

For more information, see the USEPA website at cfpub.epa.gov/surf/huc.cfm?huc_code=04030101

The Wisconsin DNR divides the Sheboygan-Manitowoc watershed (as defined by the USGS) between the Sheboygan basin management area and the Lakeshore basin management area. For more information, see the Wisconsin Department of Natural Resources' "Wisconsin's Basins" website at dnr.wi.gov/org/gmu/gmu.html.

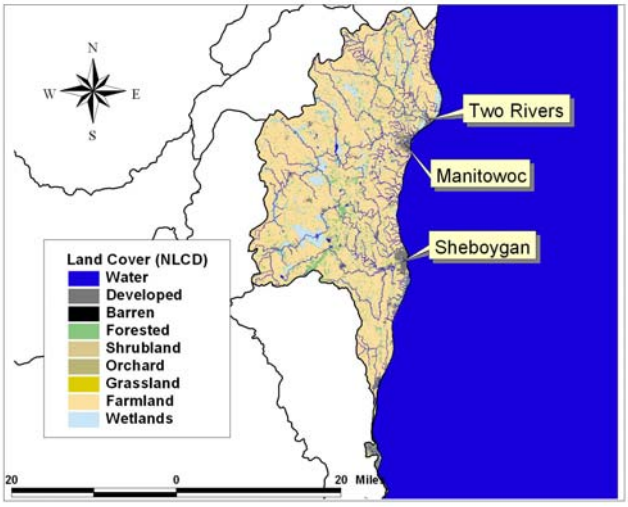


Watershed Groups

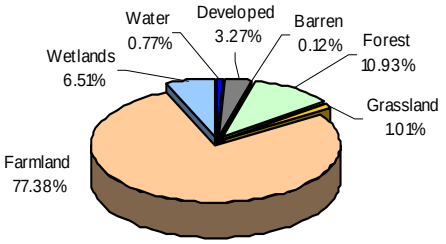
- **Sheboygan River Basin Partnership — www.sheboyganrivers.org**
- **Lakeshore Basin Website — basineducation.uwex.edu/lakeshore**
- **Lakeshore Natural Resource Partnership — www.lnrp.org**
- **Sheboygan River Basin DNR Team — www.dnr.state.wi.us/org/gmu/sheboygan**
- **Vic Pappas , Sheboygan River Basin Water Team Leader — Victor.Pappas@dnr.state.wi.us**
- **Deb Beyer, UW Extension Basin Educator, Lakeshore & Sheboygan Basins — deb.beyer@ces.uwex.edu**

Subwatersheds of the Manitowoc-Sheboygan Watershed

- 0101 Molash Creek-Frontal Lake Michigan
- 0102 Krok Creek-East Twin River
- 0103 Jambo Creek
- 0104 Tisch Mills Creek-East Twin River
- 0105 East Twin River
- 0201 Black Creek
- 0202 Devils River
- 0203 Neshota River
- 0204 Francis Creek-West Twin River
- 0205 West Twin River
- 0301 Headwaters North Branch Manitowoc River
- 0302 Spring Creek
- 0303 North Branch Manitowoc River
- 0401 Headwaters South Branch Manitowoc River
- 0402 Stony Brook-South Branch Manitowoc River
- 0403 Pine Creek
- 0404 City of Chilton-South Branch Manitowoc River
- 0405 Cedar Creek
- 0406 Headwaters Killsnake River
- 0407 Killsnake River
- 0408 South Branch Manitowoc River
- 0501 Upper Branch River
- 0502 Middle Branch River
- 0503 Lower Branch River
- 0601 Village of Reedsville-Mud Creek
- 0602 Village of St. Nazianz-Mud Creek
- 0603 Cato Falls-Manitowoc River
- 0604 Little Manitowoc River-Frontal Lake Michigan
- 0605 Manitowoc River
- 0701 Silver Creek
- 0702 Pine Creek-Frontal Lake Michigan
- 0703 Point Creek
- 0704 Centerville Creek-Frontal Lake Michigan
- 0705 Sevenmile Creek-Frontal Lake Michigan
- 0801 Meeme River
- 0802 Upper Pigeon Creek
- 0803 Middle Pigeon Creek
- 0804 Lower Pigeon Creek
- 0901 Upper Mullet River
- 0902 Middle Mullet River
- 0903 Lower Mullet River
- 1001 Upper Onion River
- 1002 City of Belgium
- 1003 Middle Onion River
- 1004 Lower Onion River
- 1101 Community of Mt. Calvary
- 1102 Headwaters Sheboygan River
- 1103 Feldner's Creek-Sheboygan River
- 1104 Sheboygan Lake-Sheboygan River
- 1105 Cedar Lake
- 1106 Kiel Marsh State Wildlife Area-Sheboygan River
- 1107 Otter Creek-Sheboygan River
- 1108 City of Sheboygan Falls-Sheboygan River
- 1109 Sheboygan River-Frontal Lake Michigan
- 1201 Black River
- 1202 Barr Creek-Frontal Lake Michigan
- 1203 Sucker Creek-Frontal Lake Michigan
- 1204 Sauk Creek



Land Cover: Manitowoc-Sheboygan Watershed



Total Acreage = 1652 sq. miles

Between 1996 and 2001, there has been a slight increase in developed land, wetland, and grassland and a slight decrease in farmland and forest.

Watershed Overview

- The major tributaries of the watershed include the Branch River, the North and South branches of the Manitowoc River, the Lower Manitowoc River, Sevenmile and Silver Creeks, (all in the Manitowoc sub-watershed) Sauk and Sucker Creeks, the Black River,the Sheboygan River, the Onion River, the Mullet River, and the Pigeon River (in the Sheboygan River subwatershed).
- Predominant land uses are agricultural or rural and include pasture land, cropland and vacant fields. Natural Areas, including open water, woodlands, wetlands, parklands and undisturbed non- agricultural lands are the second most abundant land use.
- The Natural Heritage Inventory has documented 10 endangered, 20 threatened and 37 special concern plant and animal species, and 24 rare aquatic and terrestrial communities within the Sheboygan River basin.
- Willow Creek, a small tributary to the Sheboygan River that has its confluence in the AOC. The creek receives annual runs of trout and salmon from Lake Michigan, and recent fish surveys discovered the presence of young brook trout and salmon, which seemed to indicate at least some amount of natural reproduction. It appears that stream improvements are possible in some of the degraded sections and SRBP has been meeting with landowners and local municipal officials to discuss projects in the watershed. In addition, the SRBP is seeking grant funds to conduct additional stream studies.
- Runoff from specific and diffuse sources, contaminated sediment, habitat modifications (such as channelization and dams) have degraded water quality throughout the Basin.
- Recreational highlights include wildlife watching, hiking, fishing, birding, bicycling, golf, horseback riding, snowmobiling, skiing, camping, picnicking and water sports.
- State facilities such as the Kettle Moraine State Forest, Kohler- Andrae State Parks, Harrington Beach State Park, various state wildlife areas, and the Ice Age National Scenic Trail provide both satisfying and unique recreational experiences.
- The Basin includes the Southeast Glacial Plains and Northern Lake Michigan Ecological Landscapes.
- Some streams have the ability to support trout populations. Others have spring and fall runs of Stocked Steelhead and Salmon. Fishing opportunities exist in rivers and harbors for Northern Pike, Small Mouth Bass, and Yellow Perch.
- Wildlife include White- Tailed Deer, Ring- Necked Pheasant, Waterfowl, Geese, Gray and Flying Squirrels, Raccoons, Woodcock, a variety of hawks, songbirds, and shorebirds.
- Grasslands and barrens are promoted through prescribed burns and mowing.
- The Nature Conservancy identified critical habitats of Black Ash - Mixed Hardwood Swamp, Great Lakes Dune Pine Forest, Great Lakes Hemlock - Beech - Hardwood Forest, Great Lakes Beachgrass Dune and Great Lakes Beach as well as baymouth/barrier beaches with sand nearshore at Point Beach State Park.
- The Nature Conservancy identified Pitcher's Thistle and the Piping Plover as critical species at Point Beach State Park.

Watershed Priorities

- Identified Environmental concerns for the Sheboygan River management area include:
  - ◊ Water quality problems are from in- place pollutants, runoff in urban areas, floodplain development, and agricultural practices.
  - ◊ Preserve biodiversity and protect endangered and threatened species by preserving their habitat.
  - ◊ A need for a comprehensive approach to wetlands protection and restoration.
  - ◊ Educate people to help prevent the spread of exotic nuisance species, which can wreak havoc on ecosystem balance.
  - ◊ Monitoring of wildlife populations, water quality, and ecosystem function are needed to understand the status and trends of resources in the basin.

- Partnership priorities for the Sheboygan River Basin include:
  - ◊ Educate members and the public about the ecology of the Sheboygan River Basin and threats to its health.
  - ◊ Promote sustainable use and recreation in the Sheboygan River Basin and its watersheds.
  - ◊ Increase public awareness and membership.
  - ◊ Promote sound decision-making when issues affect the health of the basin's rivers and watersheds.
  - ◊ Support the protection and improvement of the Sheboygan River Basin and its watersheds for the benefit of the general public.
  - ◊ Develop a working relationship with local officials and collaborate with conservation organizations.
  - ◊ Promote improved health of the rivers and watersheds through conservation projects and education.
  - ◊ Purchase or promote the purchase of land or easements for conservation purposes.
- There have been several projects undertaken to install buffers to control runoff.
- On streams impaired by bacterial contamination, there have been projects undertaken to control animal waste runoff.
- Numerous actions have been completed or are underway to acquire public land, remove of ponds and small dams, installation of lunker structures and farm runoff management practices.
- Recent trout surveys on the Onion River indicate that a newly instituted fishing regulation change on the river has protected many fish from harvest. The hope is that more adult trout will be available to boost natural reproduction of trout in the system.

Data Sources. Land cover map and percentages: National Land Cover database, 1992 (edc.usgs.gov/products/landcover/nlcd.html); Land use change: NOAA Coastal Change Analysis Program, 1996 and 2001 (www.csc.noaa.gov/crs/lca/ccap.html); Total Maximum Daily Load (TMDL) Impaired Waters: Surf Your Watershed (www.epa.gov/surf)

Impaired (303d) Waters

Waterbody Name	Impairment
Big Elkhart Lake	Mercury Fish Consumption Advisory
Bradford Beach -- Lake Michigan	Bacteria
Branch River in Maitowoc Co.	PCB Fish Consumption Advisory
Bullhead Lake	Mercury Fish Consumption Advisory
City of Kewaunee (Lake Michigan)	Bacteria
Crystal Lake	Mercury Fish Consumption Advisory
East Twin River Upstream To First Dam	PCB Fish Consumption Advisory
Fischer Park Beaches -- Lake Michigan	Bacteria
General King Beach (Lake Michigan)	Bacteria
Grandma Creek	Degraded Habitat, Dissolved Oxygen, Phosphorous, Sediment
Hika Park Bay -- Lake Michigan	Bacteria
Jordan Creek	PCB Fish Consumption Advisory
Lake Michigan	Mercury Fish Consumption Advisory PCB Fish Consumption Advisory
Manitowoc River	Aquatic Toxicity, PAHS
Manitowoc River (Mouth to N. Branch)	PCB Fish Consumption Advisory
Manitowoc River (N. Branch to Chilton)	PCB Fish Consumption Advisory
McKinley Beach -- Lake Michigan	Bacteria
Memorial Drive Wayside Beach-- Lake Michigan	Bacteria
Neshota Beach -- Lake Michigan	Bacteria
Otter Creek	Bacteria
Pigeon Lake	Mercury Fish Consumption Advisory
Pine Creek	PCB Fish Consumption Advisory
Point Beach State Park Beach -- Lake Michigan	Bacteria
Red Arrow Park Beach -- Lake Michigan	Bacteria
Sheboygan River	PCB Fish Consumption Advisory
Sheboygan R. Below Franklin Downstream To Sheboygan Falls	PCB Fish Consumption Advisory
Two Rivers Harbor	Aquatic Toxicity
Unnamed Trib (Osman Trib) to Meeme River	Phosphorus, Degraded Habitat, Dissolved Oxygen, Sediment
Unnamed Trib to Onion River in Waldo Impoundment	Degraded Habitat, Sediment
Unnamed Trib, to S. Br. Manitowoc (T18N, R19E, Sec 24	Degraded Habitat, Sediment
Upper Lake Park (Lake Michigan)	Bacteria
Warm Water Beach	Bacteria
West Twin River	Phosphorus, Organic Enrichment/Low DO
YMCA Beach -- Lake Michigan	Bacteria

Sheboygan River Area of Concern Activities

Location
The lower Sheboygan River downstream from the Sheboygan Falls Dam, including the entire harbor and nearshore waters

Stressors and Primary Contaminants
- Suspended Solids
- PCBs
- PAHs
- Heavy Metals
- Pathogens
- Phosphorus
- Nonpoint source pollution
- Habitat restoration on streambanks and wetland areas

Programs
- Superfund
- RCRA Corrective Action
- Clean Water Act #319

Clean-up Activities
- The former Tecumseh plant site PCB hot spot removal and cut-off trench installed along the Sheboygan River removing any preferential pathways for contaminants to move to the river from the site.
- Removal of 20,700 cubic yards of PCB-contaminated sediments from Sheboygan Falls downstream to the Waelderhaus Dam – 4.5 miles of river.
- Brownfield remediation on the C. Reiss Coal site.

Delisting Targets
◊ In progress.

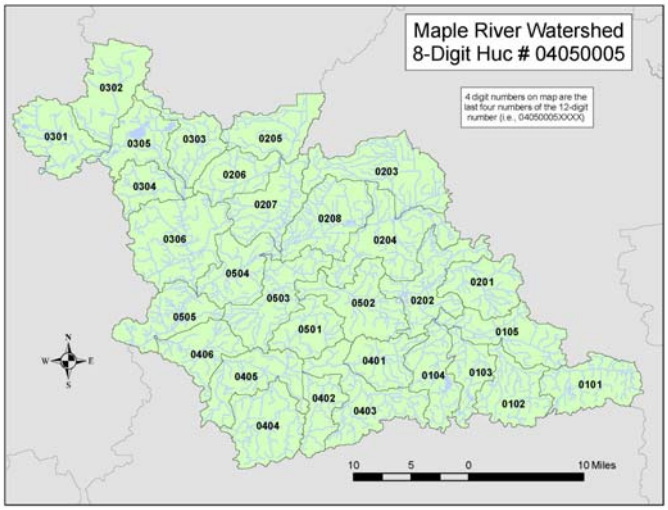
Key Activities Needed
- Completion of PCB remediation
- Completion of PAH remediation at Camp Marina coal gasification site
- Control buffers
- Habitat protection
- NPS controls for urban and rural pollution
- Development of Delisting Targets for AOC.
- Funding needed for monitoring for BUI evaluation and delisting targets.

Next Steps
- Conduct sediment recharacterization for the Middle River, Lower River and Inner Harbor reaches.
- Complete dredging.
- Dredge PAH contaminated sediment at the manufactured Gas Plant.
- Conduct post-remedial monitoring at the site and in the Upper River section.

Maple River Watershed

Hydrologic Unit Code: 04050005

For more information see the USEPA website at cfpub.epa.gov/surf/huc.cfm?huc_code=04050005 or contact the Michigan Department of Environmental Quality at 517-335-6969 to request a copy of report number MI/DEQ/WD-03/017, "A Biological Survey of the Maple River Watershed and Selected Tributaries, Shiawasse, Clinton, Montcalm, Gratiot, and Ionia Counties, Michigan, August 2002."



Watershed Groups

- **Friends of the Maple River— www.friendsofthemapleriver.org**

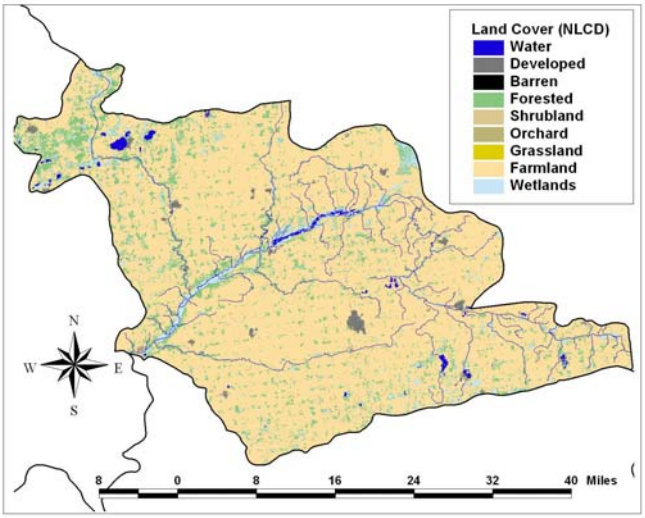
Watershed Overview

- The Maple River watershed covers over 937 square miles.
- The watershed has 404 miles of waterways that flow year round.
- The Maple River watershed feeds into the Lower Grand River.
- The watershed is over 81 percent agricultural.
- In the cropland areas of the Watershed there are about 1,789 farms covering about 405,706 acres. The average size farm is 250 acres. Primary crops include soybeans, corn, dry edible beans, forage and sugar beets.
- The Maple suffers from high turbidity due to the soil types in its drainage basin.
- The watershed boundaries include 604,226 acres in central Michigan. The watershed is located in Clinton, Gratiot, Ionia, Montcalm and Shiawassee counties.
- The Maple River State Game Area contains the largest contiguous wetland complex in mid-Michigan. It primarily consists of floodplain, lowlands, and marshes associated with the Maple River corridor. The eastern end of the area has been divided into wildlife management units. These units are easily accessed by US-27 and offer prime wildlife viewing.
- Wetland-related wildlife may be viewed here year-round. Spring waterfowl viewing is excellent, as thousands of ducks, geese, and swans stop over in these wetlands on their annual migration to northern breeding grounds. Viewing is best from March through May.
- The geography of the Maple River watershed is diverse. It ranges from large flat swamp land at the eastern headwaters, to areas of significant relief further down stream, to the west In addition, the width of the river ranges dramatically from its narrow headwaters to a wide area, called "The Lake" that runs from Maple Rapids north for about a mile.
- There are five dams and impoundments in the Maple River Watershed.

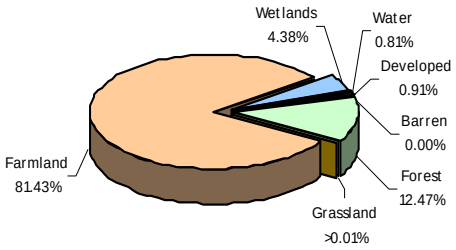
Subwatersheds of the Maple River Watershed

0101 Spring Brook-Maple River
0102 Coon Creek-Bear Creek
0103 Alder Creek
0104 Little Maple River
0105 Ovid-Maple River
0201 Baker Creek
0202 Stevens Drain-Maple River
0203 Nile Drain-Bear Creek
0204 Ferdon Creek-Maple River
0205 River Styx-Pine Creek
0206 North Shade Drain
0207 Pine Creek
0208 Collier Creek-Maple River
0301 West Branch Fish Creek
0302 Upper Fish Creek
0303 County Ditch No 131
0304 Butternut Creek
0305 Middle Fish Creek
0306 Lower Fish Creek
0401 Spaulding Drain
0402 Bad Creek
0403 Holden Drain-Stony Creek
0404 Muskrat Creek
0405 Kloeckner and Fuller Creek-Stony Creek
0406 Stony Creek
0501 South Fork Hayworth Creek
0502 Doty Brook-Hayworth Creek
0503 Hayworth Creek
0504 Reynolds and Sessions Drain-Maple River
0505 Maple River

Data Sources. Land cover map and percentages: National Land Cover database, 1992 (edc.usgs.gov/products/landcover/nlcd.html; Land use change: NOAA Coastal Change Analysis Program, 1996 and 2001 (www.csc.noaa.gov/crs/lca/ccap.html); Total Maximum Daily Load (TMDL) Impaired Waters: Surf Your Watershed (www.epa.gov/surf)



Land Cover: Maple River Watershed



Total Acreage: 937 sq. miles

Between 1996 and 2001, there has been a slight increase in developed land, farmland, forest and wetland, and a slight decrease in grassland.

Impaired (303d) Waters

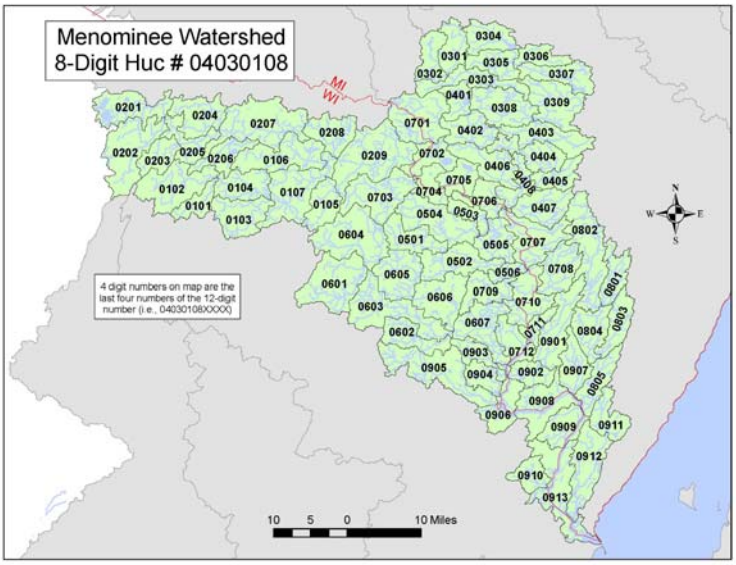
Waterbody Name	Impairment
Alder Creek	Algal Growth, Phosphorous
Lost Creek	Phosphorus, Algal Growths, Bacterial Slimes, Fish Community Rated Poor, Macroinvertebrate Community Rated Poor
Maple River	Phosphorus, Nuisance Plant Growths
Ovid Lake	Mercury (Fish Tissue)
Peet Creek	Phosphorus, Nuisance Plant Growths
Pine Creek	Nuisance Plant Growths, Phosphorus

Menominee River Watershed

Hydrologic Unit Code: 04030108

For more information, see the USEPA "Surf Your Watershed" website at cfpub.epa.gov/surf/huc.cfm?huc_code=04030108 or contact the Michigan Department of Environmental Quality at 517-335-6969 to request a copy of the following reports:

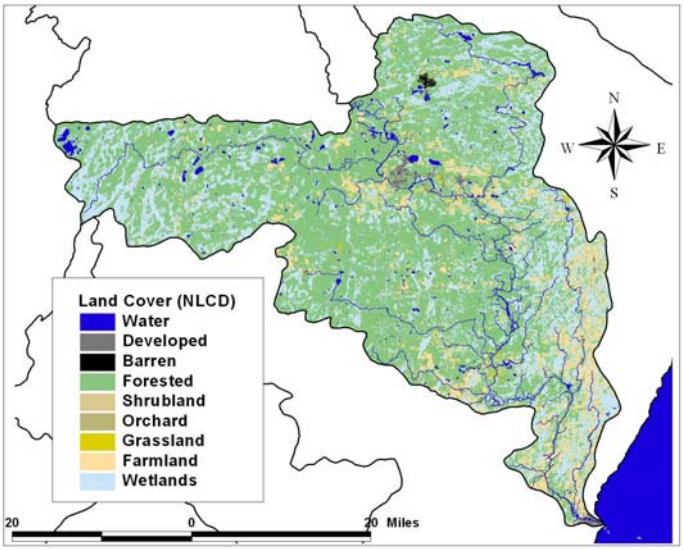
- **MI/DEQ/WD-03/039, "A Biological Survey of selected Streams in the Menominee River Watershed, Dickinson County, 2002"**
- **MI/DEQ/WB-08/020, "A Biological Survey of the Menominee River Watershed including the Iron, Brule, Paint, Michigamme, Sturgeon, and Little Cedar Rivres Subwatersheds, Barage, Dickinson, Iron, Marquette, and Menomine Counties, Michigan, June 2007."**



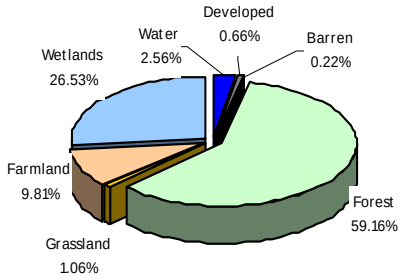
Subwatersheds of the Menominee River Watershed

0101 Little Popple River
0102 Upper Popple River
0103 South Branch Popple River
0104 Middle Popple River
0105 Lamon Tangue Creek
0106 Woods Creek
0107 Lower Popple River
0201 North Branch Pine River
0202 McDonald Creek-Pine River
0203 Jones Creek
0204 Stevens Creek
0205 Kingstone Creek-Pine River
0206 Fay Lake Outlet
0207 Wakefield Creek/Johnson Creek-Pine River
0208 Keys Lake-Pine River
0209 Halls Creek-Pine River
0301 North Branch Sturgeon River
0302 Gestner Branch-West Branch Sturgeon River
0303 Mill Pond-West Branch Sturgeon River
0304 Genes Pond Dam-East Branch Sturgeon River
0305 Sixmile Creek-East Branch Sturgeon River
0306 Skunk Creek-East Branch Sturgeon River
0307 Peronto Lake-East Branch Sturgeon River
0308 West Branch Sturgeon River
0309 East Branch Sturgeon River
0401 Tailings Pond Outlet-Pine Creek
0402 Seiberts Creek-Pine Creek
0403 Breen Creek-Sturgeon River
0404 Cassidy Creek-Sturgeon River
0405 Beaver Creek-Sturgeon River
0406 Pine Creek
0407 Hamilton Creek
0408 Sturgeon River
0501 Headwaters South Branch Pemebonwon River
0502 South Branch Pemebonwon River
0503 Spikehorn Creek-North Branch Pemebonwon River
0504 North Branch Pemebonwon River
0505 Sullivan Creek-North Branch Pemebonwon River
0506 Pemebonwon River
More -

0601 Headwaters South Branch Pike River
0602 Little South Branch Pike River
0603 South Branch Pike River
0604 Upper North Branch Pike River
0605 Middle North Branch Pike River
0606 Lower North Branch Pike River
0607 Pike River
0701 Twin Falls Dam-Menominee River
0702 Henry Ford Dam-Menominee River
0703 Little Popple River
0704 Big Quninnesec Dam-Menominee River
0705 Little Quinnesec Falls-Menominee River
0706 Sturgeon Dam-Menominee River
0707 Silver Creek-Menominee River
0708 Pemenee Creek
0709 Miscauno Creek
0710 Chalk Hill Dam-Menominee River
0711 White Rapids Dam-Menominee River
0712 Squaw Creek-Menominee River
0801 Holmes Creek-Little Cedar River
0802 Schetter Creek-Little Cedar River
0803 Hays Creek
0804 Ross Creek-Little Cedar River
0805 Little Cedar River
0901 Little Shakey Creek-Shakey River
0902 Shakey River
0903 Holmes Creek-Menominee River
0904 Wolf Creek
0905 Wausaukee River
0906 The Oxbow-Menominee River
0907 Phillips Creek
0908 Grand Rapid Dam-Menominee River
0909 Maggies Island-Menomonee River
0910 Twin Creek
0911 Hanson Creek-Little River
0912 Little River
0913 Menominee River



Land Cover: Menominee River Watershed



Watershed size = 4070 sq. miles

Between 1996 and 2001, there has been a slight increase in developed land and farmland and a slight decrease in grassland, and wetland.

Watershed Management Plans

- Fumee Creek — Dickinson Conservation District — www.dickinsoncd.org/fumeecreek
- Hamilton Creek — Dickinson Conservation District -- www.dickinsoncd.org/hamiltoncreek
- Pine Creek (Dickinson Co) — Dickinson Conservation District -- www.dickinsoncd.org/pinecreek

Watershed Groups

- Dickinson Conservation District — www.dickinsoncd.org
- Hamilton, Fumee, and Pine Creek Watershed Projects — www.dickinsoncd.org/hamiltoncreek;
- www.dickinsoncd.org/fumeecreek; and www.dickinsoncd.org/pinecreek
- Menominee River Area of Concern — www.epa.gov/glnpo/aoc/menominee.html
- Menominee River RAP, Great Lakes Commission — www.glc.org/spac/rapdocs.html

Impaired (303d) Waters

Waterbody Name	State Impairment
Chalk Hills Impoundment (Menominee River), MI	Mercury (Fish Tissue)
Fumee Lake, MI	Mercury (Fish Tissue)
Hamilton Lake, MI	Mercury (Fish Tissue)
Lower Menominee AOC, MI	Arsenic, Mercury Fish Consumption Advisory, PAHs
Menominee River (Pier's Gorge to Lower Scott Flowage, MI	Mercury Fish Consumption Advisory, PCB Fish Consumption Advisory
Menominee River in Marinette County, WI	Mercury Fish Consumption Advisory, PCB Fish Consumption Advisory
Menominee River, MI	Mercury, PCB Fish Consumption Advisory, Mercury (Fish Tissue)
Menominee River Watershed	PCBs
Sand Lake T38 R18E S21, WI	Mercury Fish Consumption Advisory
Sea Lion Lake, WI	Mercury Fish Consumption Advisory
South Groveland Pond	Mercury (Fish Tissue)
Unnamed Tributary to Porterfield Creek, MI	Phosphorus Algal Growth
Van Zile Lake, WI	Mercury Fish Consumption Advisory

Watershed Overview

- The Menominee River forms the boundary between Wisconsin and the Upper Peninsula of Michigan in Marinette, Florence, Forest, Vilias, Menominee, Dickinson, and Iron counties before draining its contents into Lake Michigan.
- Historic iron mining in Menominee was a catalyst for growth in the watershed.
- Piers Gorge whitewater area is located in the watershed. It is often done as a big-water, carry-up park-and-play whitewater rafting area.
- The Menominee system is comprised of a number of large and small tributaries, the major tributaries being the Michigamme, Brule, Pine, Paint, Iron and Sturgeon Rivers. The Menominee originates at the confluence of the Michigamme and Brule Rivers and flows approximately 115 miles to the east towards the waters of Green Bay.
- The total basin covers approximately 4,070 square miles with 2,618 square miles located in Michigan and 1,452 square miles located in Wisconsin.

Data Sources. Land cover map and percentages: National Land Cover database, 1992 (edc.usgs.gov/products/landcover/nlcd.html; Land use change: NOAA Coastal Change Analysis Program, 1996 and 2001 (www.csc.noaa.gov/crs/lca/ccap.html); Total Maximum Daily Load (TMDL) Impaired Waters: Surf Your Watershed (www.epa.gov/surf)

- The topography in the Menominee River basin was formed and heavily altered by periodic glaciation, the most recent of which was the Wisconsin period- 10,000-20,000 years ago.
- The region is characterized by lakes, glacial plains, end moraines, and poorly integrated east to west drainage. Bedrock outcrops and moraine deposits in the northern river basin create a more rugged terrain with a maximum elevation of 1300 feet, giving the basin a gradient of approximately five feet per mile. The Menominee basin consists mostly of sand and gravel called outwash which is underlain by dolomite.
- Active natural resource exploitation and land use changes occurred throughout the watershed in the mid-1800's. Iron ore deposits were discovered in the 1850's on the western edge of the Menominee Iron Range and numerous mines opened shortly thereafter particularly in the Iron Mountain, Michigan area.
- The logging era impacted water quality and physical habitat conditions in the watershed. The rivers and streams were used extensively for log drives during the 1880's and 1890's.
- Some of the developed areas are constructed on man-made soils that were deposited during the lumbering boom around the turn of the century. These man-made soils are composed of sawdust and waste wood that was discarded and then overlain with sand or topsoil as the building surface. These unstable soils have subjected many structures with excessive settling and alignment shifting.
- Two large impoundments are located on the Sturgeon River including Genes Pond and the Hardwood Reservoir. These impoundments modify river temperatures and influence downstream fish and macroinvertebrate communities. Warmwater fish species such as Walleye, Black Crappie, and Yellow Perch are now common in the Sturgeon River downstream of these impoundments.
- Consistent with the Wilderness Shores Settlement (WSS), the Wisconsin Electric Power Company is required to remove a 65-foot dam located on the Sturgeon River near Loretto, Michigan. This dam removal project is scheduled to be complete by 2007.
- The major economic activities are logging, paper making, tourism, and potato farming.
- The Menominee is a sturgeon spawning area.
- The Nature Conservancy identified the Pine-Popple River as having a critical large to moderate groundwater flow and small to medium-sized streams on outwash and coarse ground/end moraine.
- The Nature Conservancy identified the Lower Menominee River as a critical ecological system with riverine coastal marsh, Lake sturgeon, and Skillet clubtail.

Watershed Activities

- The Wisconsin portion of the watershed is part of the Wisconsin DNR's Upper Green Bay basin management area.
- There are ongoing effort to address non-point source pollution throughout the watershed.
- Grants have targeted sediment and nutrient pollution caused by road crossings, forest harvest practices, agriculture, cropland erosion, ORV trail crossing, and eroding streambanks.
- The watershed has received funding to promote education about Best Management Practices and non-point source pollution control.
- There are efforts to protect and restore creeks, lakes and streams within the watershed from further degradation due to non-point sources of pollution.

Menominee River Area of Concern Activities

Location
Lower 4.8 km of river to the mouth and 5 km north and south of the mouth along the bay shore

Stressors and Primary Contaminants
- Lloyd/Flanders Paint Sludge Site-high level of lead and other heavy metals coated sediments where deposited
- Arsenic
- Mercury
- PCBs
- PAHs
- Oil and grease
- Pathogens
- Sediments
- Coastal wetlands habitat loss
- Nonpoint pollution
- Historic shoreline developments to support harbor activities

Programs
- MDNR-Administrative Order
- RCRA Corrective Action
- Superfund
- Menominee Watershed Initiative

Clean-up Activities
- Paint sludge cleanup completed in 1995 (10 million pounds of hazardous waste from Bay and 20 million pounds of contaminated sediments.
- Development of cleanup plans for the Ansul site and river.

Delisting Targets
- In progress.

Key Activities Needed
- Arsenic source control
- Dredging of arsenic and coal tar contaminated sediments
- Protect riparian and coastal habitat
- Manufactured Gas Plant PAH site remediation and dredging.

Challenges
- Funding for dredging the Menekaunee Harbor.
- Funding needed for monitoring for BUI evaluation and delisting targets.

Next Steps
- Ansul site barrier wall installation.
- Complete Arsenic dredging
- Manufactured Gas Plant site remediation and dredging for coal tar (PAHs).
- Identify sources for fish consumption advisories (mercury, PCBs, dioxin) to ensure that sources are controlled

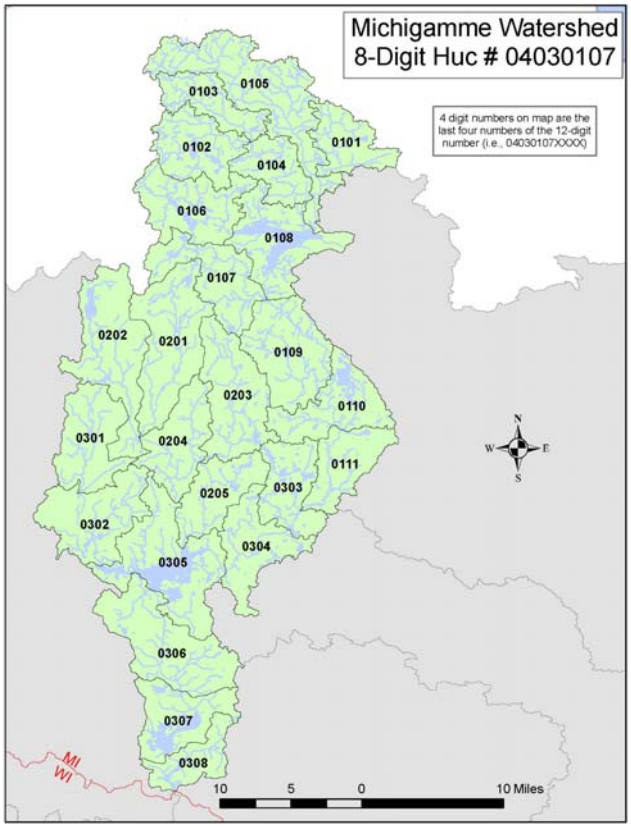
Michigamme River Watershed

Hydrologic Unit Code: 04030107

For more information, see the USEPA "Surf Your Watershed" website at cfpub.epa.gov/surf/huc.cfm?huc_code=04030107 or contact the Michigan Department of Environmental Quality at 517-335-6969 to request a copy of report number MI/DEQ/WD-03/032, "A Biological Survey of the Brule, Paint, and Michigamme River Watersheds, Iron and Marquette Counties, 2002."

Watershed Groups

- **Michigamme Highlands Project, The Upper Peninsula Conservation Program of The Nature Conservancy — www.nature.org**
- **Central Lake Superior Land Conservancy — www.clslc.org/projects.htm**

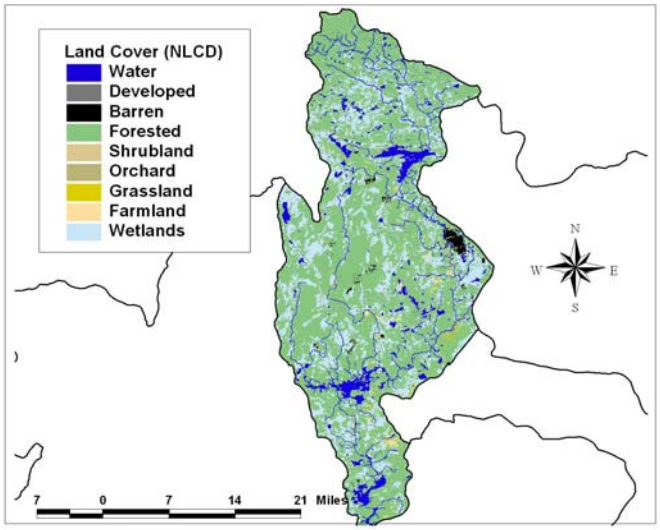


Watershed Overview

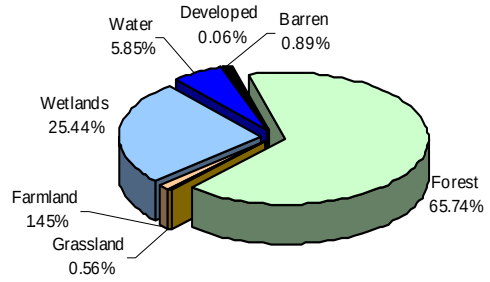
- The Michigamme River watershed covers approximately 727 square miles.
- There are 465 miles of rivers and streams in the watershed.
- The Michigamme River system flows into the Menominee River watershed.
- Approximately 66 percent of the watershed is forested. The predominant vegetation in the hilly uplands are Sugar Maple, basswood, and Yellow Birch while the lowland vegetation is dominated by American Elm, Black Ash, Trembling Aspen, and Red Maple. The vegetation of drier outwash sand plains include Balsam Fir, White Pine, Red Pine, and Paper Birch.
- Forty percent of Michigan's "blue ribbon" trout streams are found in the Brule, Michigamme, and Paint River systems.
- Most of the forested lands in the Michigamme watershed are owned by private forest product companies.
- Forestry, wood products, and tourism are the dominanat industries. Other major activities include winter sports, fishing, hunting, camping, boating, fall color tours, and sightseeing.
- The watershed topography is characterized by sandy hills and elliptical ridges. These sandy deposits have high infiltration rates, can be up to 200 feet thick, and are a major source of cold groundwater to the rivers.
- The lower Michigamme River watershed has a large area of pitted and flat glacial outwash plains. Most of the streams originate in sedge and forested wetlands or sallow kettle lakes, which causes the water to appear strained from the presence of decaying plant material.
- Bedrock outcrops are common.
- Many abandoned mines can be found in the watershed.
- Most waters are heavily stained with tannins from wetland drainages.
- There are five listed impaired waters.
- Macroinvertebrate community status was assessed at 10 different sites within the Michigamme River watershed. Half received macroinvertebrate community ratings of "excellent," while the other half rated acceptable.

Subwatersheds of the Michigamme River Watershed

0101 Dishno Creek
0102 Craig Lake
0103 Lake Elinor-West Branch Peshekee River
0104 West Branch Peshekee River
0105 Baraga Lake-Peshekee River
0106 Spurr River
0107 Spruce River
0108 Lake Michigamme Dam-Michigamme River
0109 Michigamme Basin Dam-Michigamme River
0110 Gambles Creek-Michigamme River
0111 Camp Floodwood-Michigamme River
0201 East Branch Fence River
0202 West Branch Fence River
0203 Mitchigan River
0204 Smith Creek-Fence River
0205 Fence River
0301 Johnson Creek-Deer River
0302 Deer River
0303 Squaw Creek-Michigamme River
0304 Crescent Pond Outlet-Michigamme River
0305 Michigamme Reservoir-Michigamme River
0306 Camp Six Creek-Michigamme River
0307 Peavy Pond-Michigamme River
0308 Michigamme River



Land Cover: Michigamme River Watershed



Watershed Size: 727 sq. miles

Between 1996 and 2001, there has been a slight increase in developed land and a slight decrease in farmland and forest.

Impaired (303d) Waters

Waterbody Name	Impairment
Beaufort Lake	Mercury (Fish Tissue)
Craig Lake	Mercury (Fish Tissue)
Lake Michigamme	Mercury (Fish Tissue)
Michigamm Reservoir (Michigamme River Imp.)	Mercury (Fish Tissue)
Michigamme River	Mercury (Fish Tissue)
Peavy Pond	Mercury (Fish Tissue)
Perch Lake	Mercury (Fish Tissue)
Runkle Lake	Mercury (Fish Tissue)
Silver Lake	Mercury (Fish Tissue)
Unnamed Lake	Mercury (Fish Tissue)

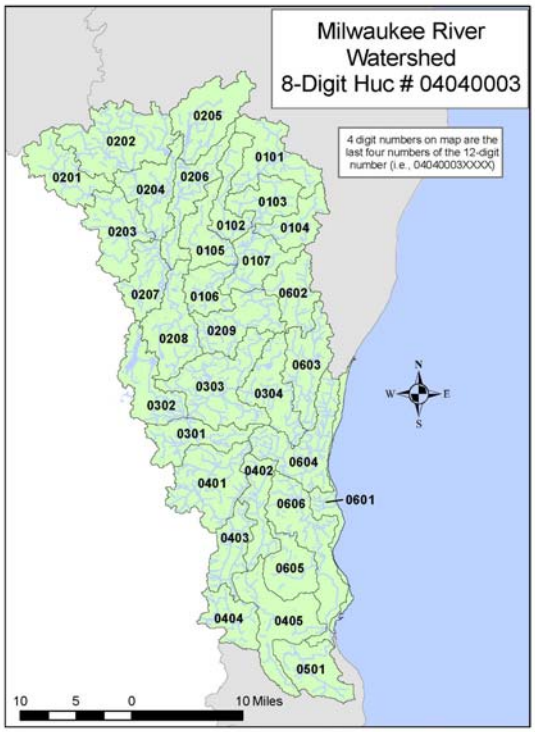
Data Sources. Land cover map and percentages: National Land Cover database, 1992 (edc.usgs.gov/products/landcover/nlcd.html; Land use change: NOAA Coastal Change Analysis Program, 1996 and 2001 (www.csc.noaa.gov/crs/lca/ccap.html); Total Maximum Daily Load (TMDL) Impaired Waters: Surf Your Watershed (www.epa.gov/surf)

Milwaukee River Watershed

Hydrologic Unit Code: 04040003

The USEPA "Surf Your Watershed" website at cfpub.epa.gov/surf/huc.cfm?huc_code=04040003

The Milwaukee River basin is part of the Wisconsin DNR's Milwaukee River basin management area. For more information, see the Wisconsin Department of Natural Resources' "Wisconsin's Basins" website at dnr.wi.gov/org/gmu/gmu.html.



Watershed Groups

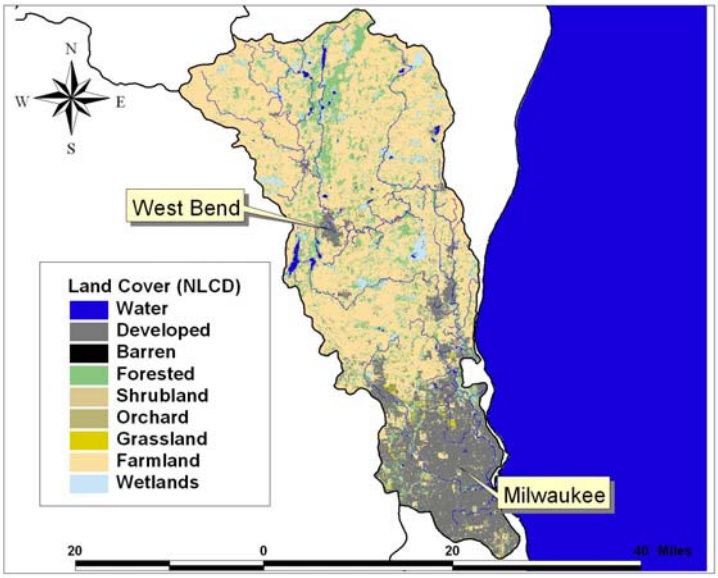
- **Friends of Milwaukee's Rivers — www.mkeriverkeeper.org**
- **Milwaukee Metropolitan Sewerage District — www.mmsd.com**
- **Milwaukee River Basin Partnership — basineducation.uwex.edu/milwaukee**
- **River Revitalization Foundation — www.riverrevitalizationfoundation.org**

Watershed Overview

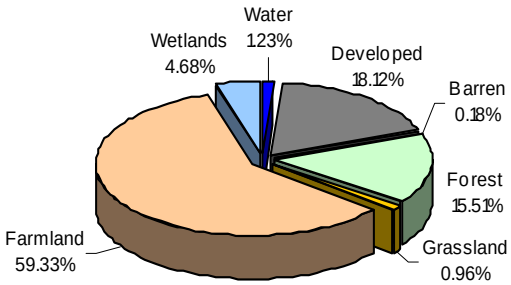
- The Milwaukee River Basin encompasses almost 870 square miles of land in portions of Dodge, Fond du Lac, Milwaukee, Ozaukee, Sheboygan, Washington, and Waukesha counties.
- The southern quarter of the basin is the most densely populated area in the state, holding 90% of the basin's population, which is approximately 1.3 million people.
- The Basin includes 6 watersheds, 3 of the watersheds (Milwaukee River North, Milwaukee River East- West, Milwaukee River South) contain the Milwaukee River from start to finish. The other three watersheds (Cedar Creek, Menomonee River and Kinnickinnic River) are named after the major rivers they contain.
- Collectively the six watersheds contain about 500 miles of perennial streams, over 400 miles of intermittent streams, 35 miles of Lake Michigan shoreline, 57 named lakes and many small lakes and ponds.
- The Natural Heritage Inventory has documented 16 endangered, 26 threatened and 65 special concern plant and animal species, and 30 rare aquatic and terrestrial communities within the Basin.
- The AOC encompasses 57.5 km² or 2.6 % of the entire basin, including lands that drain directly to the AOC via storm sewers and combined sewer systems. This relatively small drainage area contributes disproportionately large amounts of pollutants associated with urban runoff.
- Runoff from specific and diffuse sources, contaminated sediment, habitat modifications (such as channelization and dams) have degraded water quality throughout the Basin.
- Recreational highlights include wildlife watching, hiking, fishing, hunting, bicycling, horseback riding, snowmobiling, skiing, camping, picnicking, and water sports.
- The Basin includes the Southeast Glacial Plains, Southeast Lake Michigan Coastal and Northern Lake Michigan Ecological

Subwatersheds of the Milwaukee River Watershed

0101 Nichols Creek
0102 Mink Creek
0103 Batavia Creek-North Branch Milwaukee River
0104 Silver Creek
0105 Stony Creek
0106 Lizard Mound State Park
0107 North Branch Milwaukee River
0201 Headwaters West Branch Milwaukee River
0202 Kettle Moraine Lake-Milwaukee River
0203 West Branch Milwaukee River
0204 Auburn Lake Creek-Milwaukee River
0205 Long Lake-East Branch Milwaukee River
0206 East Branch Milwaukee River
0207 Village of Kewaskum-Milwaukee River
0208 Silver Creek-Milwaukee River
0209 Village of Newburg-Milwaukee River
0301 Town of Richfield
0302 Cedar Lake-Cedar Creek
0303 Jackson Marsh State Wildlife Area-Cedar Creek
0304 Cedar Creek
0401 Village of Menomonee Falls-Menomonee River
0402 Little Menomonee River
0403 City of Butler-Menomonee River
0404 Underwood Creek
0405 Menomonee River
0501 Kinnickinnic River
0601 Fox Point-Frontal Lake Michigan
0602 Town of Freedonia-Milwaukee River
0603 Village of Grafton-Milwaukee River
0604 Pigeon Creek-Milwaukee River
0605 Lincoln Creek
0606 Milwaukee River



Land Cover: Milwaukee River Watershed



Watershed size: 865 sq. miles

Between 1996 and 2001, there has been a slight increase in developed land, farmland, forest, and bare land and a slight decrease in grassland and wetland.

Landscapes.

- Some streams have the ability to support some trout populations. Others have spring and fall runs of stocked trout and salmon. Fishing opportunities also exist in the rivers and harbors for Northern Pike, Small Mouth Bass, and Walleye.
- Wildlife include White- tailed Deer, Ring- necked Pheasant, Waterfowl, Geese, Gray and Flying Squirrels, Raccoons, Woodchucks, Great Horned Owls, a variety of hawks, songbirds, and shorebirds.
- Grasslands are promoted through prescribed burns & mowing.
- Maple- basswood is the most common forest type and the tree species with the greatest volume in the Basin is Ash followed by Hard Maple, Basswood, Soft Maple and Red Oak.
- The Nature Conservancy identified the East Branch of the Milwaukee River and the Kettle Moraine Lakes as having have important groundwater/wetland fed headwater streams in ice contact and end moraine and critical kettle moraine lakes.
- The Milwaukee River Mainstem has critical moderate groundwater mainstems on till/lake plain; headwaters in ice contact/end moraine as identified by the Nature Conservancy.
- Cladaphora algae is becoming a problem a the shoreline.

Watershed Activities

- Water quality problems are from in- place pollutants, runoff in urban areas, floodplain development, and agricultural practices. As people move to the more rural areas of the basin, groundwater quantity and quality issues will become very important.
- Preserve biodiversity and protect endangered and threatened species by preserving their habitat.
- The Milwaukee Metropolitan Sewerage District is purchasing headwaters to protect it from development that would increase runoff into the system.
- MMSD is a leader in developing watershed approaches to the problems associated with managing an urbanized watershed.
- Education is a major component of watershed activities.
- There are plans to restore selected streams from concrete lined to more natural streams.
- Monitoring of wildlife populations, water quality, and ecosystem function are needed to understand the status and trends of resources.
- Milwaukee County Parks plans to stabilize and reconstruct approximately 0.25 miles of trail and vernal streambank; remove invasive exotic plant species; install erosion control geotextile; plant trees and shrubs and herbaceous plugs; and hold two single-day volunteer events per year to educate residents on the issues of erosion, invasive species and native plantings.
- The Milwaukee Metropolitan Sewerage District is leading a number of watershed-based projects to reduce the number and frequency of combined sewer overflows

Data Sources. Land cover map and percentages: National Land Cover database, 1992 (edc.usgs.gov/products/landcover/nlcd.html; Land use change: NOAA Coastal Change Analysis Program, 1996 and 2001 (www.csc.noaa.gov/crs/lca/ccap.html); Total Maximum Daily Load (TMDL) Impaired Waters: Surf Your Watershed (www.epa.gov/surf)

Milwaukee Estuary Area of Concern Activities

AOC Location
The lower 5 km of the Milwaukee River ; the lower 4.8 km of the Menominee River; the lower 4 km of the Kinnickinnic River; the inner and outer Harbor and the nearshore waters

Stressors and Primary Contaminants
- Phosphorus
- Pathogens
- PCBs
- Metals
- PAHs
- Urban and rural runoff
- Wastewater discharges
- Sediments
- Habitat loss
- Dams

Programs
- Clean Water Act
- Clean Air Act
- Superfund
- Brownfields
- Navigational dredging
- Milwaukee Estuary Fish spawning habitat improvement project
- Kinnickinnic River Remediation planned for 2008-09

Delisting Targets
- In progress

Key Activities Needed
- Key Activiti
- Dredging
- Nonpoint source pollution control
- Stream buffers
- Pathogen source research
- Coordination with RAP program for AOC delisting purposes

Impaired (303d) Waters

Waterbody Name	Impairment
Adell Tributary	Degraded Habitat, Sediment
Beaver Creek	Aquatic Toxicity
Cedar Creek	PCB Fish Consumption Advisory
Evergreen Creek(T11n R19e Sec 36 Sw Se)	Degraded Habitat, Sediment
Forest Lake	Mercury Fish Consumption Advisory
Indian Creek	Metals, Phosphorus, Aquatic Toxicity, Degraded Habitat, Dissolved Oxygen, Sediment, Temperature
Jackson Park Pond	PCB Fish Consumption Advisory
Lehner Creek	Degraded Habitat, Sediment, Temperature
Lincoln Creek	Metals, Phosphorus, Aquatic Toxicity, Degraded Habitat, Dissolved Oxygen, PAHS, Sediment, Temperature
Little Menomonee R.	Aquatic Toxicity, Creosote
Mauthe Lake	Mercury Fish Consumption Advisory
Milwaukee R. Estuary AOC (Outer Harbor to LM)	Metals, Aquatic Toxicity, Bacteria, PCB Fish Consumption Advisory
Milwaukee R. Estuary AOC (Menomonee River)	Metals, Phosphorus, Aquatic Toxicity, Dissolved Oxygen, PCB Fish Consumption Advisory
Milwaukee R. Estuary AOC (Kinnickinnic River)	Metals, Phosphorus, Aquatic Toxicity, Bacteria, Dissolved Oxygen, PCB Fish Consumption Advisory
Milwaukee R. Estuary AOC (Milwaukee River)	Metals, Phosphorus, Aquatic Toxicity, Bacteria, Dissolved Oxygen, PCB Fish Consumption Advisory
Milwaukee River	Bacteria PCB Fish Consumption Advisory
Natural Channel Reaches	Degraded Habitat Sediment
Unnamed Trib to Cedar Cr.	Degraded Habitat Sediment
Zeunert Pond	Mercury Fish Consumption Advisory

Challenges
- High urban density and rapid development
- Historic developed sites which could be restored to improve floodplain functions and wetland function

Next Steps
- Estabrook Impoundment remediation needed (assessment in progress)
- Watershed analysis to assess water quality impacts and options for restoration (funding needed)

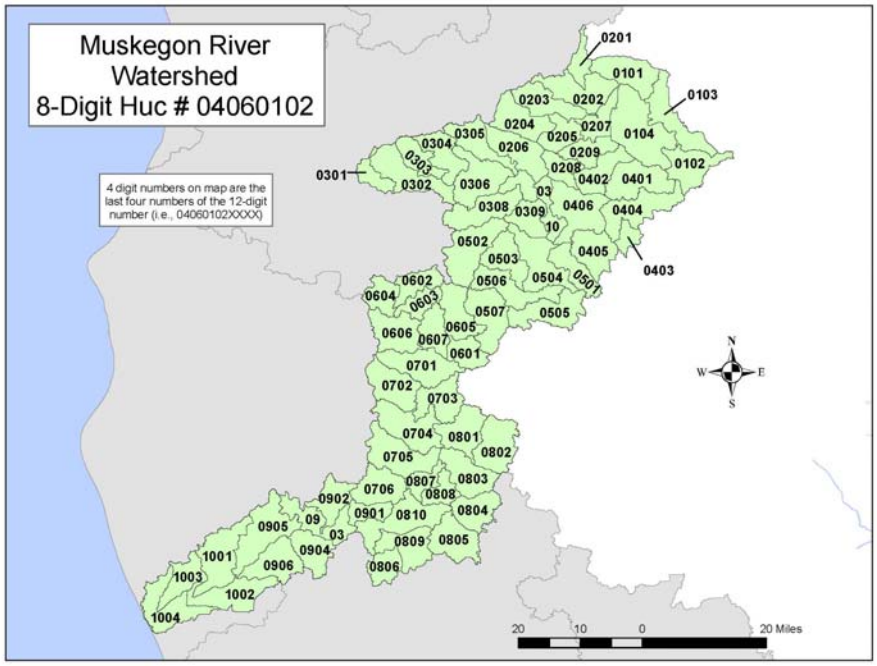
)

Muskegon River Watershed

Hydrologic Unit Code: 04060102

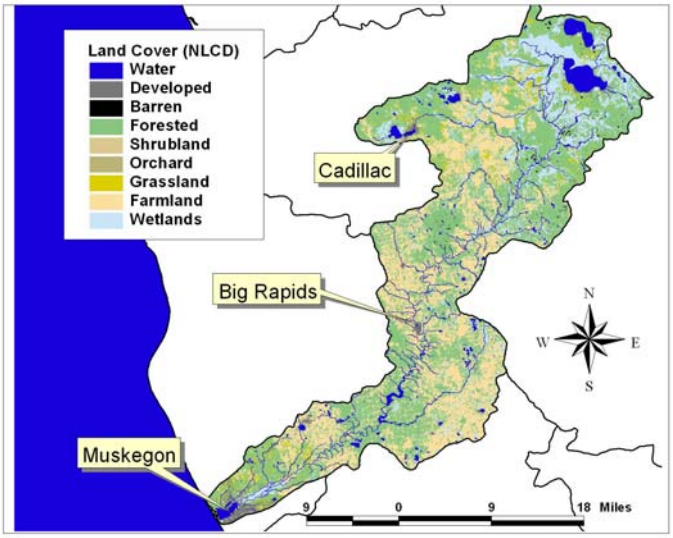
For more information see the USEPA "Surf Your Watershed" website at cfpub.epa.gov/surf/huc.cfm?huc_code=04060102 or contact the Michigan Department of Environmental Quality at 517-335-6969 to request a copy of report number MI/DEQ/WB-05/070, "A Biological Survey of the Middle Muskegon River Watershed , Clare, Mecosta, Newaygo, and Osceola Counties, Michigan, 2001" and report number MI/DEQ/WB-05/071, "A Biological Survey of the Upper Muskegon River Watershed, Clare, Missaukee, Osceola, and Roscommon Counties, Michigan, 2001."

Report #05/054 "Biological Survey of the Lower Muskegon River Watershed, Muskegon and Newaygo Counties, Michigan, July 7-11, 2001"

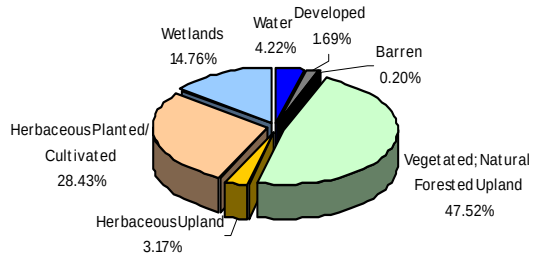


Subwatersheds of the Muskegon River Watershed

0101 Higgins Lake
0102 Denton Creek
0103 Backus Creek
0104 Houghton Lake
0201 Willow Run
0202 Dead Stream
0203 Haymarsh Creek
0204 Headwaters West Branch Muskegon
0205 West Branch Muskegon
0206 Headwaters Butterfield Creek
0207 Dead Stream Flooding-Muskegon River
0208 Butterfield Creek
0209 Nellsville Ditch-Muskegon River
0301 Mitchell Creek
0302 Lake Cadillac-Clam River
0303 Pleasant Lake-Clam River
0304 Cunnerson Creek-Clam River
0305 Mosquito Creek
0306 Taylor Creek-Clam River
0307 Town of Falmouth-Clam River
0308 North Branch Creek-West Branch Clam River
0309 West Branch Clam River
0310 Clam River
0401 Wolf Creek
0402 Bear Creek-Muskegon River
0403 South Branch Town Line Creek
0404 Town Line Creek
0405 Floodwood Creek
0406 Cranberry Creek-Muskegon River
0501 Green Creek
0502 Crocker Creek-Middle Branch River
0503 Middle Branch River
0504 Dishwash Creek-Muskegon River
0505 Doc and Tom Creek
0506 Whetstone Creek-Muskegon River
0507 Chippewa Creek-Muskegon River
0601 Big Stone Creek
0602 East Branch Hersey River
0603 Lincoln Creek
0604 Burt Creek-Hersey River
0605 Twin Creek-Muskegon River
0606 Hersey River
0607 Cat Creek-Muskegon River
0701 Buckhorn Creek-Muskegon River
0702 Dalziel Creek-Muskegon River
0703 Ryan Creek
0704 Cold Spring Creek-Muskegon River
0705 Bennett Creek-Muskegon River
0706 Hardy Dam Pond-Muskegon River
0801 West Branch Little Muskegon River
0802 East Branch Little Muskegon River
0803 Brackway Creek-Little Muskegon River
0804 Brandy Creek-Tamarack Creek
0805 Weatherby Drain-Tamarack Creek
0806 Little Whitefish Lake
0807 Big Creek
0808 Quigley Creek-Little Muskegon River
0809 Tamarack Creek
0810 Little Muskegon River
0901 Croton Dam Pond-Muskegon River
0902 Bigelow Creek
0903 Penoyer Creek-Muskegon River
0904 Fourmile Creek-Muskegon River
0905 Brooks Creek
0906 Minnie Creek-Muskegon River
1001 Cedar Creek
1002 Mosquito Creek-Muskegon River
1003 Bear Creek
1004 Muskegon River



Land Cover: Muskegon River Watershed



Watershed size: 2738 sq. miles

Between 1996 and 2001, there has been a slight increase in developed land, grassland, and wetland and a slight decrease in farmland, and forest.

Watershed Management Plans

- Higgins Lake — Huron Pines RC&D Council
- Muskegon River — Grand Valley State University Annis Water Resources Institute
- Upper Clam River — City of Cadillac
- Bear Creek
- Bear Lake

Watershed Groups

- Muskegon River Watershed Assembly — www.mrwa.org
- Huron Pines RC&D Council — www.huronpines.org
- Muskegon River Watershed Project, Annis Water Resources Institute — www.gvsu.edu/wri/isc/muskegon
- Muskegon River Watershed River Initiative Assessment — www.muskegonriver.org
- Muskegon Watershed Research Partnership — www.mwrp.net
- City of Cadillac — www.cadillac-mi.net
- Muskegon Lake Watershed partnership— www.muskegonlake.org

Watershed Overview

- The Muskegon River Watershed drains approximately 2,738 square miles of land and is located in north-central Michigan.
- The River is approximately 219 miles long from its start at Houghton and Higgins Lakes down to its mouth at Muskegon Lake and, eventually, Lake Michigan.
- The Muskegon River Watershed is one of the of the largest watersheds in the State of Michigan and spans across the better part of nine counties: Wexford, Missaukee, Roscommon,

Impaired (303d) Waters

Waterbody Name	Impairment
Bear Lake	Nuisance Plant Growths, Phosphorous, PCB Fish Consumption Advisory
Bills Lake	Mercury (Fish Tissue)
Croton Pond	Mercury (Fish Tissue)
Hess Lake	PCB Fish Consumption Advisory
Higgins Lake	Chlordane Fish Consumption Advisories PCB Fish Consumption Advisory Mercury (Fish Tissue)
Houghton Lake	PCB Fish Consumption Advisory
Houghton Lake Denton Township Public Beach	Pathogens
Houghton Lake DNR Boat Launch and Park Beach	Pathogens
Houghton Lake Heights Beach	Pathogens
Houghton Lake State Forest Campground Beach	Pathogens
Lake Mitchell	Mercury (Fish Tissue)
Lily Lake	Mercury (Fish Tissue)
Muskegon Lake And Muskegon River#	PCB Fish Consumption Advisory
Muskegon River Watershed	PCBS
Ruddiman Creek	Pathogens, Fish Community Rated Poor, Macroinvertebrate Community Rated Poor
Ruddiman Creek (Wetlands)	PCB Fish Consumption Advisory
Ryerson Creek	Fish Community Rated Poor Macroinvertebrate Community Rated Poor
Todd Lake	Mercury (Fish Tissue)

Data Sources. Land cover map and percentages: National Land Cover database, 1992 (edc.usgs.gov/products/landcover/nlcd.html; Land use change: NOAA Coastal Change Analysis Program, 1996 and 2001 (www.csc.noaa.gov/crs/lca/ccap.html); Total Maximum Daily Load (TMDL) Impaired Waters: Surf Your Watershed (www.epa.gov/surf)

Osceola, Clare, Mecosta, Montcalm, Newaygo, and Muskegon.

- Muskegon Lake is an Area of Concern (AOC). The AOC includes the entire lake with the lake being separated from Lake Michigan by sand dunes. The Muskegon River flows through the lake before emptying into Lake Michigan.
- The Muskegon River and many of its streams and creeks are considered cool water fisheries. They can support both cold-water fish, such as Trout and Salmon, and warm water fish, such as Northern Pike and Smallmouth Bass.
- The sportfishery is worth an estimated $5 million per year.
- Impairments are excessive nutrient loading, sedimentation, hydrologic flow, invasive species and toxic substances.
- The river faces significant thermal pollution, which raises water temperature, from dams hydroelectric facilities, stormwater runoff, and a lack of streamside canopy. When temperature rises, available oxygen decreases, making it difficult for aquatic life to survive.

Watershed Activities

- The Great Lakes Fishery Trust (GLFT) selected the Muskegon River watershed as the focus of their "River Initiative."
- The Hersey River Restoration Project is working to clean up contaminated sediments and the removal of dilapidated dam structures on the Hersey River.
- The Muskegon Lake & Estuary Emergent Vegetation Restoration Demonstration Project is working to re-establish native wild rice stands, soft stem bulrush and other aquatic vegetation for fish and wildlife habitat in the Muskegon Lake AOC .
- The Sustainable Futures for the Muskegon River Watershed project developed a geographical information system (GIS) outreach tool.
- There are efforts to correct the effects of urban runoff, soil erosion and sedimentation at three highly visible sites within the AOC.
- The Nature conservancy identified the following critical ecological resources in the watershed:
  - ◊ The Muskegon Dunes holds Hemlock - Yellow Birch Wet-Mesic Forest, Great Lakes Beachgrass Dune, and Interdunal Wetlands.
  - ◊ The Muskegon and White Rivers include Great Lakes Hemlock - Beech - Hardwood Forest, Inland Coastal Plain Marsh, Mesic Sand Tallgrass Prairie, and White Pine - White Oak Barrens
  - ◊ Houghton Lake, Higgins Lake, and the Upper Muskegon River include very large, deep, inland lakes, very large, wetland-connected inland lakes, and wetland-connected headwater streams on outwash plain, ice contact and end moraine
  - ◊ The White and Muskegon Rivers have cold, groundwater-fed stream on sandy lake plain
  - ◊ The White and Muskegon Rivers are Waterfowl and Shorebird stopover sites
  - ◊ Houghton Lake, Higgins Lake, and the Upper Muskegon River are home to the Eastern Massasauga, Secretive Locust, and Hill's Thistle
  - ◊ The White and Muskegon Rivers are home to the Black Tern, Kirtland's Snake, Hill-prairie Spittlebug, Karner Blue Butterfly, Sprague's Pygarctic, and the Hill's thistle.

Muskegon River Area of Concern Activities

Location
- The entire 4149 acre lake and several tributaries within the immediate watershed.

Stressors and Primary Contaminants
- PCBs
- Mercury
- Unstable hydrologic flow
- Contaminated Sediments
- Nonpoint pollution
- Coastal wetlands and habitat loss, isolation and fragmentation

Programs
- Shoreline Brownfield Redevelopment Authority
- Navigational dredging
- Great Lakes Legacy Act and Clean Michigan Initiative
- Superfund
- Non-point Source
- USACE
- US Fish and Wildlife Service - Coastal Program

Clean-up Actions
- Wastewater treatment upgraded
- Some tributary remedial actions underway
- Removal of about 90,000 cubic yards of contaminated sediment in Ruddiman Creek

Delisting Targets
- Yes targets are set and approved by the Muskegon Lake Watershed Partnership and MDEQ for six (6) of the nine(9) BUIs: 1) Fish consumption advisories; 2) Beach Closings; 3) Degraded Benthos; 4) Restrictions on Dredging; 5) Degradation of Aesthetics; 6) Eutrophication/Undesireable Algae; ; Working on finalizing targets for Loss of Fish and Wildlife Habitat, Degradation of Populations, and Restrictions on Drinking Water

Key Activities Needed
- Contaminated Sediment Remediation
- Stream buffers for improved habitat and water quality
- More assessment for progress on attaining BUI targets
- TMDL Assessments for Muskegon Lake; Ruddiman Creek; Ryerson Creek; Bear Lake
- Habitat restoration along Muskegon Lake's south shoreline and adjacent mouths of tributaries and lower river mouth
- Coordination with RAP program for AOC delisting purposes

Challenges
- PCB disposal
- Local funding match for federal projects
- Base support for local coordination of AOC/PAC process

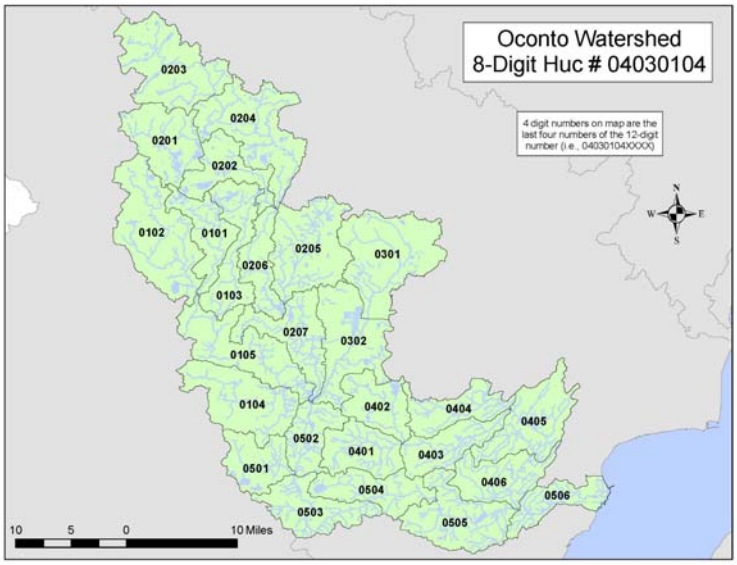
Next Steps
- Remediation of brownfields and sediments
- Sediment remediation in Muskegon Lake at the Division Street Outfall.
- Fish and Wildlife Habitat Restoration

Oconto River Watershed

Hydrologic Unit Code: 04030104

For more information, see the USEPA "Surf Your Watershed website at cfpub.epa.gov/surf/huc.cfm?huc_code=04030104

The Oconto River Watershed is part of WDNR's Upper Green Bay management Basin. For more information, see the Wisconsin Department of Natural Resources' "Wisconsin's Basins" website at dnr.wi.gov/org/gmu/gmu.html



Watershed Groups

- **River Alliance of Wisconsin — www.wisconsinrivers.org**
- **Upper Green Bay Basin DNR Management Area — www.dnr.state.wi.us/org/gmu/upgb**
- **Upper Green Bay Basin Partnership — basineducation.uwex.edu/uppergb**
- **Great Lakes Basin Program for Soil Erosion and Sediment Control — www.glc.org/basin**

Watershed Overview

- The Oconto watershed covers over 1035 square miles and has over 560 miles of streams.
- The major waterways include the Oconto River, the Lower Oconto River, the Little River, the Lower North Branch Oconto River, and the South Branch of the Oconto River.
- Most of the watershed is part of the Upper Green Bay basin management area as identified by Wisconsin DNR.
- Wildlife include Black Bear, White- tailed Deer, Turkey, Ring- necked Pheasant, Ruffed Grouse, Waterfowl, Geese, Beaver, Mink, Otter, Timber Wolves, Elk, Colonial Waterbirds, Trumpeter Swans, Eagle, Osprey, Northern Goshawk, and Shorebirds.
- Maple- basswood is the most common forest type and the tree species with the greatest volume in the basin is Hard Maple followed by aspen, White and Red Pine, Soft Maple and Balsam Fir.
- Coastal wetlands are an important feature of the watershed.
- Groundwater is clean and a primary drinking water supply.
- Oconto is the primary urbanized area in the watershed.

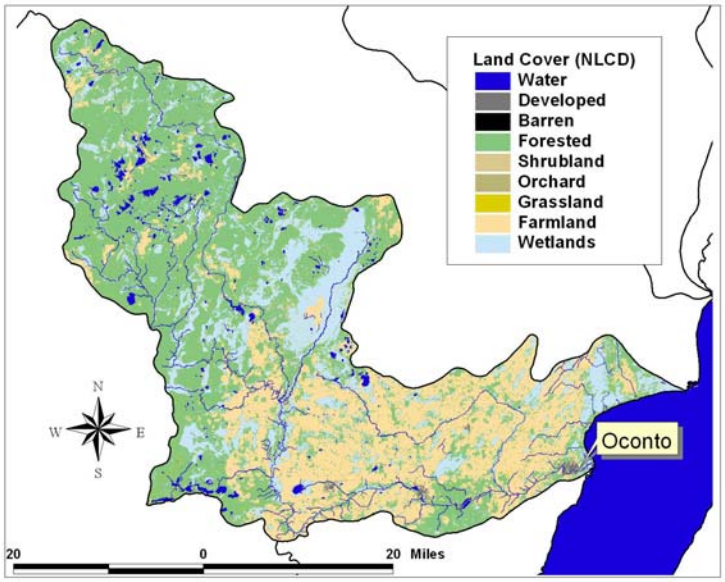
Watershed Activities

The following are objectives for the Upper Green Bay management Basin, which includes the Oconto River watershed:

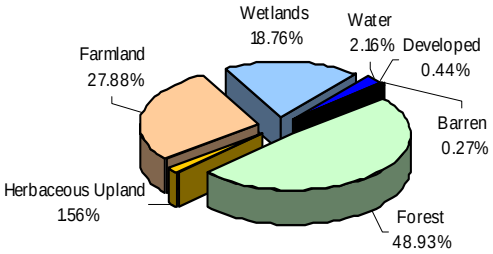
- Target the West Shore of Green Bay as a high priority for habitat protection
- Implement the DNR's 50 year Land Legacy Study, an acquisition plan for the state
- Protect shoreland habitat and water quality through water regulation and zoning
- Work with local communities in developing "smart growth" plans & promoting wise land use and zoning
- Complete a comprehensive fisheries plan for the basin, focusing on the Oconto, Menominee, and Peshtigo Rivers and Lake Michigan, including addressing invasive species
- Encourage sound forestry practices on public and private land and identify and manage terrestrial invasive species
- Enhance educational activities for forestry, water quality, wildlife management, and healthy ecosystems

Subwatersheds of the Oconto River Waterseed

0101 Second South Branch Oconto River
0102 Headwaters South Branch Oconto River
0103 First South Branch Oconto River
0104 Precore Creek
0105 South Branch Oconto River
0201 Townsend Flowage-McCaslin Brook
0202 McCaslin Brook
0203 Torpee Creek-North Branch Oconto River
0204 Knowles Creek-North Branch Oconto River
0205 Waupee Creek
0206 Chute Pond-North Branch Oconto River
0207 Wesco Creek-North Branch Oconto River
0301 Headwaters Peshtigo Brook
0302 Peshtigo Brook
0401 Daly Creek
0402 Headwaters Kelly Brook
0403 Kelly Brook
0404 North Branch Little River
0405 Hogsback Road-Little River
0406 Stiles Junction-Little River
0501 Linzy Creek
0502 Village of Suring-Oconto River
0503 Underhill-Oconto River
0504 Oconto Falls Dam-Oconto River
0505 Machicknee Flowage-Oconto River
0506 Oconto River



Land Cover: Oconto River Watershed



Watershed size: 1035 sq. miles

Between 1996 and 2001, there has been a slight increase in developed land, farmland, and forest and a slight decrease in grassland and wetlands.

Impaired (303d) Waters

Waterbody Name	Impairment
Green Bay – S. of Marinette & Tribs to the first dam	Mercury Fish Consumption Advisory
Maiden Lake	Mercury Fish Consumption Advisory
Oconto River Machinckanee	Mercury Fish Consumption Advisory
Reservoir Pond	Mercury Fish Consumption Advisory

Data Sources. Land cover map and percentages: National Land Cover database, 1992 (edc.usgs.gov/products/landcover/nlcd.html; Land use change: NOAA Coastal Change Analysis Program, 1996 and 2001 (www.csc.noaa.gov/crs/lca/ccap.html); Total Maximum Daily Load (TMDL) Impaired Waters: Surf Your Watershed (www.epa.gov/surf)

Pere Marquette-White Watershed

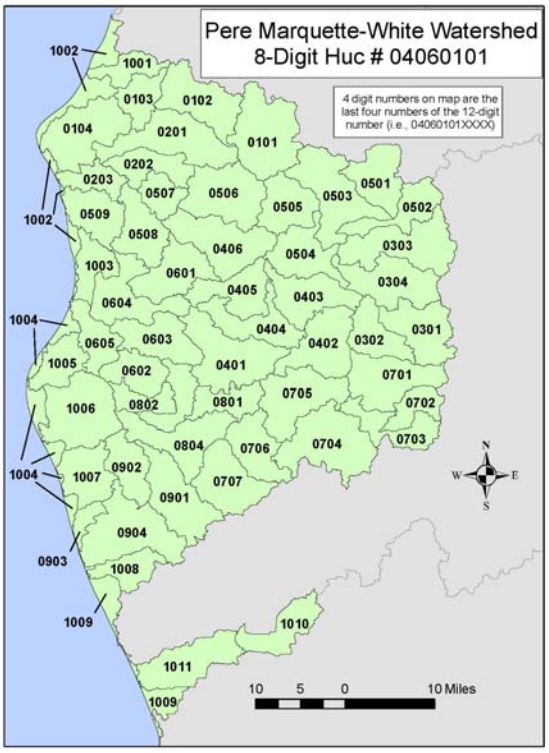
Hydrologic Unit Code: 04060101

For more information, see the USEPA "Surf Your Watershed" website at cfpub.epa.gov/surf/huc.cfm?huc_code=04060101 or contact the Michigan Department of Environmental Quality at 517-335-6969 to request a copy of report number 02/050 "A Biological Survey of the Big Sable River, Mason and Lake Counties, June 5-6 and Sept14, 2000".

Pere Marquette (2000): MI/DEQ/SWQ-02/055 and MI/DEQ/SWQ-02/056

Pentwater (2005): MI/DEQ/WB-06/097

White Lake Tributaries: MI/DEQ/WD-03/063



Watershed Groups

- **White River Watershed Partnership — www.wrwp.org**
- **Conservation Resource Alliance — www.rivercare.org**
- **Pere Marquette Watershed Council — www.peremarquette.org**
- **The Mona Lake Watershed Council — www.monashores.net/monalakewatershed/Design1/home.htm**

White Lake Public Advisory Council—www.muskegoncd.org/White%20Lake%20PAC.htm

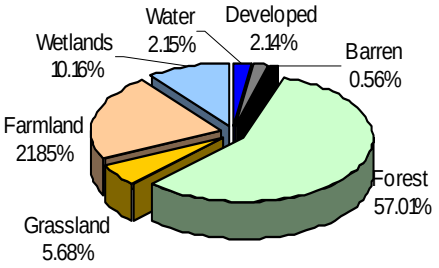
Subwatersheds of the Pere-Marquette-White Watershed

0101 Muckwa Creek-Big Sable River
0102 Ritters Creek-Big Sable River
0103 Freeman Creek-Big Sable River
0104 Big Sable River
0201 North Branch Lincoln River
0202 South Branch Lincoln River
0203 Lincoln River
0301 McDuffee Creek
0302 Headwaters Little South Branch Pere Marquette River
0303 Middle Branch Pere Marquette River
0304 Little South Branch Pere Marquette River
0401 Beaver Creek
0402 Winnepesaug Creek-Big South Branch Pere Marquette River
0403 Cedar Creek
0404 Freeman Creek-Big South Branch Pere Marquette River
0405 Ruby Creek-Big South Branch Pere Marquette River
0406 Big South Branch Pere Marquette River
0501 Cole Creek-Baldwin River
0502 Sanborn Creek
0503 Baldwin River
0504 Danaher Creek-Pere Marquette River
0505 Tank Creek-Pere Marquette River
0506 Weldon Creek-Pere Marquette River
0507 Black Creek-Pere Marquette River
0508 Swan Creek-Pere Marquette River
0509 Pere Marquette River
0601 Allen Drain-North Branch Pentwater River
0602 Huftile Creek
0603 South Branch Pentwater River
0604 North Branch Pentwater River
0605 Pentwater River
0701 Mullen Creek-South Branch White River
0702 Fivemile Creek
0703 Flinton Creek-South Branch White River
0704 Black Creek-South Branch White River
0705 Martin Creek-South Branch White River
0706 Brayton Drain-South Branch White River
0707 South Branch White River
0801 McLaren Lake-North Branch White River
0802 Robinson Creek
0803 Osborn Creek-North Branch White River
0804 North Branch White River
0901 Sand Creek-White River
0902 Carlton Creek
0903 Pierson Drain
0904 White River
1001 Gurney Creek
1002 Cooper Creek-Frontal Lake Michigan
1003 Bass Lake
1004 Bigsbie Lake-Frontal Lake Michigan
1005 Silver Creek
1006 Stony Creek
1007 Flower Creek
1008 Duck Creek
1009 Little Black Creek-Frontal Lake Michigan
1010 Muskegon Newaygo Drain-Black Creek
1011 Mona Lake-Black Creek

Watershed Management Plans

- Pere Marquette — Conservation Resource Alliance
- South Branch, Pentwater River — Oceana Conservation District
- Hamlin Lake/Big Sable — Conservation Resource Alliance

Land Cover: Pere Marquette-White Watershed

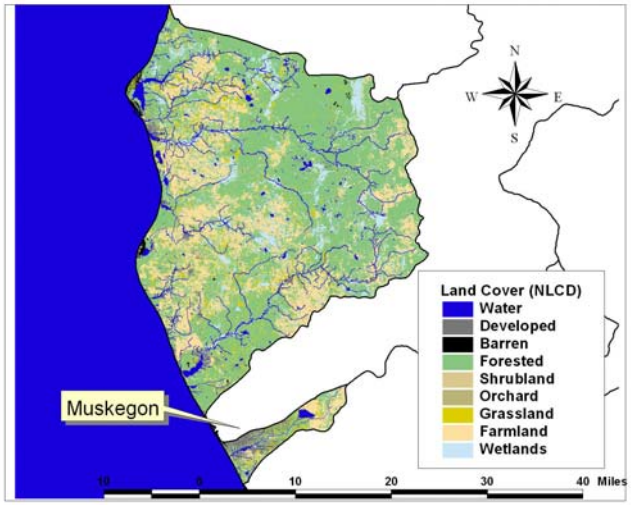


Watershed size: 2105 sq. miles

Between 1996 and 2001, there has been a slight increase in developed land, farmland, and forest and a slight decrease in grassland and wetlands.

Watershed Overview

- The Pere Marquette watershed covers over 2100 square miles.
- The watershed has over 90 miles of Lake Michigan shoreline.
- The watershed is primarily forested.
- Recreational uses include fishing, wildlife viewing, boating, canoeing, kayaking, camping, and hiking.
- The White River is a State designated natural river.
- Pere Marquette River is a designated National Scenic River
- The Big Sable River's headwaters and upstream are recognized for both Brook and Brown Trout, while downstream to Hamlin Lake is noted mostly for Brown Trout. Hamlin Lake is recognized as one of west Michigan's best fishing spots.
- Excessive sedimentation and erosion are major problems in the watershed.
- The Nature Conservancy identified the following critical ecological resources in the watershed:
  - ◊ Big Sable Point and Hamlin Lake include Great Lakes Dune Pine Forest, Great Lakes Beachgrass Dune, and Interdunal Wetland
  - ◊ The Pentwater Marsh includes Great Lakes Shoreline Cattail - Bulrush Marsh
  - ◊ The Pere Marquette watershed includes Central Cordgrass Wet Prairie and Central Cordgrass Wet Sand Prairie
  - ◊ Flower Creek and Dunes include Great Lakes Shoreline Cattail - Bulrush Marsh
  - ◊ Newaygo Prairies include Inland Coastal Plain Marsh, Midwest Dry Sand Prairie, and White Pine - White Oak Forest
  - ◊ Hoffmaster-Kitchel Dunes contains Great Lakes Beachgrass Dune
  - ◊ Stony Creek-Camp Miniwanca contains Great Lakes Shoreline Cattail - Bulrush Marsh
  - ◊ Pere Marquette River Watershed contains drowned river mouth lakes
  - ◊ Big Sable Point-Hamlin Lake is home to Pitcher's Thistle
  - ◊ Pere Marquette River Watershed is home to Karner Blue Butterfly, and Hill's Thistle
  - ◊ Flower Creek and Dunes is home to Pitcher's thistle
  - ◊ Newaygo Prairies is home to Hill-prairie spittlebug, Karner blue butterfly, and Hill's thistle
  - ◊ Hoffmaster-Kitchel Dunes is home to pitcher's thistle
  - ◊ Stony Creek-Camp Miniwanca is home to Pitcher's thistle



Watershed Activities

- The White River Watershed partnership, formed in 2003, has a mission to protect the unique characteristics and the natural resources of the White River watershed by promoting education, conservation, restoration, and preservation activities.
- The primary goals of the Pentwater River Watershed Program are to protect and enhance the high quality waters of the South Branch of the Pentwater River by implementing Best Management Practices (BMPs) within the watershed. BMPs are defined as any structural, vegetative, or managerial practice to treat, prevent, or reduce water pollution.
- The Pere Marquette River Restoration Committee is working to repair road/stream crossing, stabilize streambanks and develop livestock and agricultural projects .
- The Conservation Resource Alliance works with Kanouse Outdoor Restoration to repair erosion at steep, sandy eroding

Data Sources. Land cover map and percentages: National Land Cover database, 1992 (edc.usgs.gov/products/landcover/nlcd.html; Land use change: NOAA Coastal Change Analysis Program, 1996 and 2001 (www.csc.noaa.gov/crs/lca/ccap.html); Total Maximum Daily Load (TMDL) Impaired Waters: Surf Your Watershed (www.epa.gov/surf)

streambanks along the Baldwin River. In addition, a combination of woody debris and fish habitat platform structures are placed at all of the sites to provide hiding and resting cover for fish, aquatic insects and a variety of wildlife.

- In 2003, the Lake Michigan Forum conducted an assessment of environmental stewardship in Michigan's Mona Lake watershed. The assessment process was aimed at identifying opportunities for creating a permanent ethic of environmental stewardship among leaders and the general public in the local watershed.
- The Mona Lake Watershed Council is working on projects to support the health of the watershed.

Impaired (303d) Waters

Waterbody	Impairment
Big Blue Lake	Mercury (Fish Tissue)
Black Creek	PCB Fish Consumption Advisory
Hamlin Lake	Mercury (Fish Tissue)
Lake Michigan—South of Frankfort	Chlordane Fish Consumption Advisory DDT Fish Consumption Advisory Dioxin Fish Consumption Advisory PCB Fish Consumption Advisory Mercury (Fish Tissue)
Mona Lake	PCB Fish Consumption Advisory
Pere Marquette Lake	PCB Fish Consumption Advisory
Pere Marquette River Watershed	PCBs
White Lake	Chlordane Fish Consumption Advisory PCB Fish Consumption Advisory

White Lake Area of Concern Activities

Location

The White Lake AOC is located in the west central portion of Muskegon County in Michigan, and is connected to Lake Michigan by a federally maintained navigation channel. The white Lake AOC includes White Lake proper and a one-quarter mile wide zone around the lake.

Stressors and Primary Contaminants

- Heavy metals
- Stormwater nonpoint pollution
- Arsenic
- Chromium
- Sediments
- Industrial contamination
- Groundwater contamination

Programs
Programs

- Superfund
- RCRA

Clean-Up Actions

- Dredging in Tannery Bay@ (2002) – 73,000 cubic yards of waste (hides, chromium, and arsenic)
- Cleanup of Occidental Chemical site in 2002
- Potential sources of groundwater contamination to White Lake and its tributaries have been identified and remediation efforts are underway
- Some eutrophication has been alleviated by improvements to the sewage collection and treatment systems
- Contaminated groundwater venting to the lake is being intercepted by purge wells and treated prior to discharge

Delisting Targets

- Yes; Targets are pending MDEQ approval

Key Activity Needed

- Assessment and further study of contaminated sites
- Coordination with RAP program for AOC delisting purposes

Challenges

- Monitoring achievement of delisting targets

Next Steps

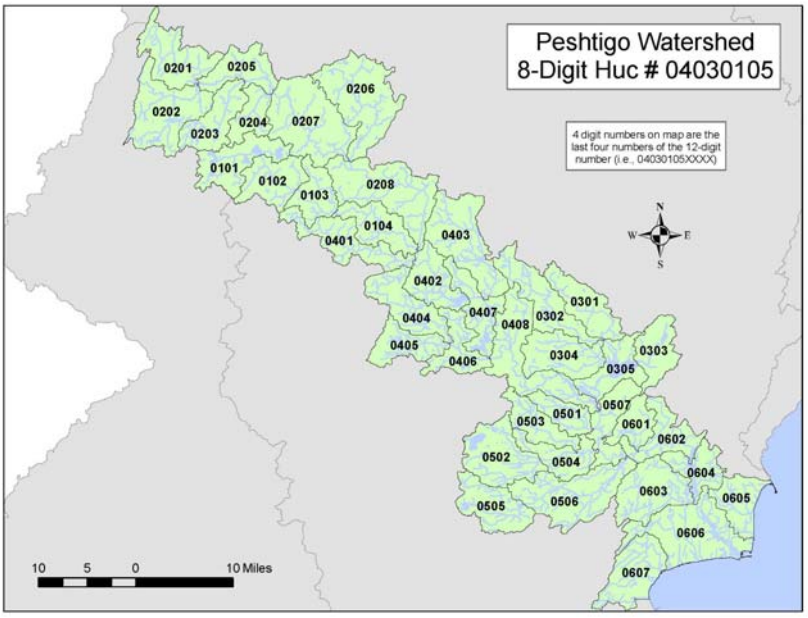
- Further study of the extent of contamination from the Whitehall Leather Company is needed, in addition to possible remediation funds.
- Assessment is needed of sediments at discharge points for other contaminated sites
- Fish and Wildlife Habitat Preservation

Peshtigo River Watershed

Hydrologic Unit Code: 04030105

For more information, see the USEPA "Surf Your Watershed" website at:
cfpub.epa.gov/surf/huc.cfm?huc_code=04030105

The Peshtigo River Watershed is part of the WDNR Upper Green Bay Management Area. For more information, see the Wisconsin Department of Natural Resources' "Wisconsin's Basins" website at
dnr.wi.gov/org/gmu/gmu.html



Watershed Groups

- **Marinette County Land & Water Conservation — www.marinettecounty.com/departments/?department=a67be5f0c03a&subdepartment=3f4f12eefdd5**

Watershed Overview

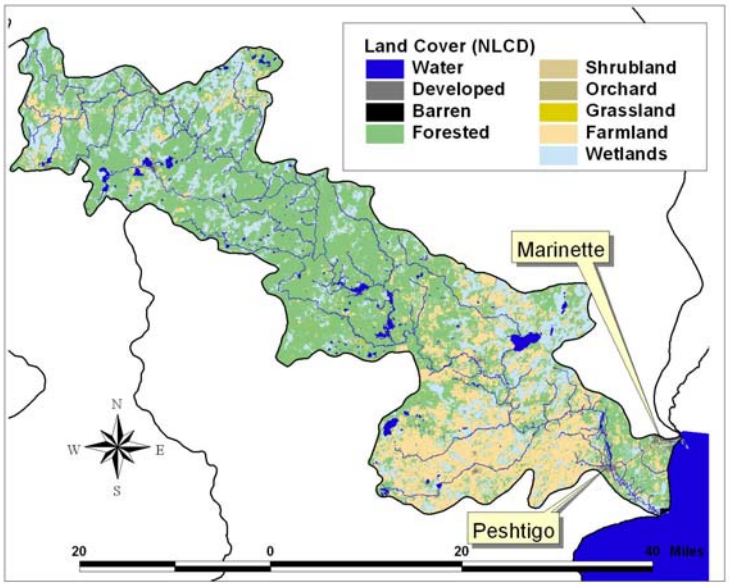
- The watershed flows into Green Bay in Wisconsin.
- The major waterways in the watershed include the Lower Peshtigo River, the Little Peshtigo River, The Middle Peshtigo and Thunder River, and the Upper Peshtigo River.
- The watershed has three listed impaired waters.
- Marinette is the only urbanized area in the watershed.
- Wildlife include Black Bear, White- tailed Deer, Turkey, Ring- necked Pheasant, Ruffed Grouse, Waterfowl, Geese, Beaver, Mink, Otter, Timber Wolves, Elk, Trumpeter Swans, Eagle, Osprey, Northern Goshawk, and Shorebirds.
- Maple-basswood is the most common forest type and the tree species with the greatest volume in the basin is Hard Maple followed by aspen, White and Red Pine, Soft Maple and Balsam Fir.
- The Nature Conservancy identified the following critical habitats and ecosystems in the Peshtigo River: Great Lakes Shoreline Cattail - Bulrush Marsh; Silver Maple - Elm - (Cottonwood) Forest; White Pine - Red Oak Forest; Central Wet-Mesic Tallgrass Prairie; lake plain wetland lakes; large rivers on till plain and lake plain; cool/cold headwaters; large, cool/coldwater rivers in outwash, end moraine, and ice contact; large, headwater lakes in ground moraine, outwash, and ice contact; low gradient tributary streams on west Green Bay till plain; riverine coastal marsh; and spring-fed headwater lakes.
- The Nature Conservancy has identified the following critical species in the Peshtigo River watershed: Wood Duck; Le Conte's Sparrow; Ruffed Grouse; American Bittern; Whip-poor-will; Veery; Black Tern; Northern Harrier; Marsh Wren; Sedge Wren; Black-billed Cuckoo; Northern Bobwhite; Eastern Wood-Pewee; Yellow Rail; Cerulean Warbler; Blackburnian Warbler; Chestnut-sided Warbler; Black-throated Green Warbler; Least Flycatcher; Willow Flycatcher; Bald Eagle; Wood Thrush; Baltimore Oriole; Hooded Merganser; Wild Turkey; Black-and-white Warbler; Mourning Warbler; Rose-breasted Grosbeak; American Woodcock; Clay-colored Sparrow; Field Sparrow; Forster's Tern; Golden-winged Warbler; Blue-winged Warbler; Nashville Warbler; Warbling Vireo; and Canada Warbler.

Subwatersheds of the Peshtigo River Watershed

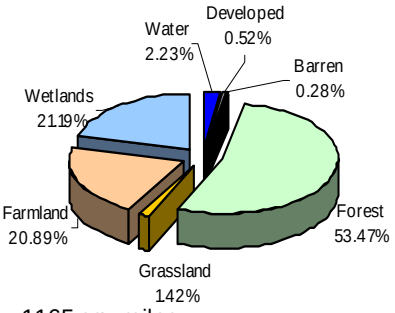
0101 Headwaters Rat River
0102 Upper Rat River
0103 Middle Rat River
0104 Lower Rat River
0201 North Branch Peshtigo River
0202 South Branch Peshtigo River
0203 Otter Creek
0204 Camp Eight Creek
0205 Kersten Creek-Peshtigo River
0206 Armstrong Creek
0207 Catwillow Creek-Peshtigo River
0208 Swede John Creek-Peshtigo River
0301 Upper Middle Inlet
0302 Middle Inlet
0303 Upper Inlet
0304 Lower Middle Inlet
0305 Lake Noquebay-The Outlet
0401 Otter Creek
0402 Caldron Falls Reservoir-Peshtigo River
0403 Eagle Creek
0404 North Fork Thunder River
0405 South Fork Thunder River
0406 Thunder River
0407 High Falls Reservoir-Peshtigo River
0408 Medicine Brook-Peshtigo River
0501 Left Foot Creek
0502 Headwaters South Branch Beaver Creek
0503 North Branch Beaver Creek
0504 South Branch Beaver Creek
0505 Headwaters Little Peshtigo River
0506 Little Peshtigo River
0507 Peterman Brook-Peshtigo River
0601 Gravelly Brook
0602 Potato Rapids Dam-Peshtigo River
0603 Trout Creek
0604 Peshtigo Dam-Peshtigo River
0605 Little River-Frontal Lake Michigan
0606 Peshtigo River-Frontal Lake Michigan
0607 Thomas Slough-Frontal Lake Michigan

Watershed Activities

- The following are objectives for the Upper Green Bay management Basin, which includes the Peshtigo River watershed:
  - ◊ Target the West Shore of Green Bay as a high priority for habitat protection
  - ◊ Protect shoreland habitat and water quality through water regulation & zoning
  - ◊ Work with local communities in developing "smart growth" plans & promoting wise land use and zoning
  - ◊ Complete a comprehensive fisheries plan for the basin, focusing on the Oconto, Menominee, and Peshtigo Rivers and Lake Michigan, including addressing invasive exotic species
  - ◊ Encourage sound forestry practices on public and private land and identify and manage terrestrial invasive exotic species
  - ◊ Enhance educational activities for forestry, water quality, wildlife management, and healthy ecosystem



Land Cover: Peshtigo River Watershed



Total Acreage = 1165 sq. miles

Between 1996 and 2001, there has been a slight increase in developed land, farmland, and forest and a slight decrease in grassland and wetlands.

Data Sources. Land cover map and percentages: National Land Cover database, 1992 (edc.usgs.gov/products/landcover/nlcd.html; Land use change: NOAA Coastal Change Analysis Program, 1996 and 2001 (www.csc.noaa.gov/crs/lca/ccap.html); Total Maximum Daily Load (TMDL) Impaired Waters: Surf Your Watershed (www.epa.gov/surf)

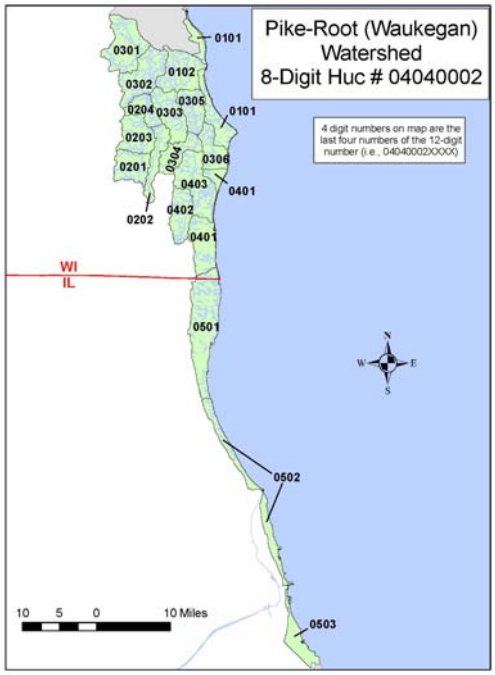
Impaired (303d) Waters

Waterbody Name	Impairment
Bass Lake	Dissolved Oxygen, Phosphorous, Winter Kills
Gilas Lake	Mercury Fish Consumption Advisory
Noquebay Lake	Mercury Fish Consumption Advisory
Peshtigo River at Caldron Falls Flowage	Mercury Fish Consumption Advisory
Peshtigo River at High Falls Flowage	Mercury Fish Consumption Advisory
Peshtigo River at Peshtigo Flowage	Mercury Fish Consumption Advisory
Green Bay—South of Marinette and its tribs	Mercury Fish Consumption Advisory
Lower Menominee AOC	Arsenic, Mercury Fish Consumption Advisory, PAHs

Pike-Root (Waukegan) Watershed

Hydrologic Unit Code: 04040002

For more information, see the Wisconsin Department of Natural Resources' "Wisconsin's Basins" website at http://dnr.wi.gov/org/gmu/gmu.html and the USEPA "Surf Your Watershed" website at http://cfpub.epa.gov/surf/huc.cfm?huc_code=04040002



Watershed Groups

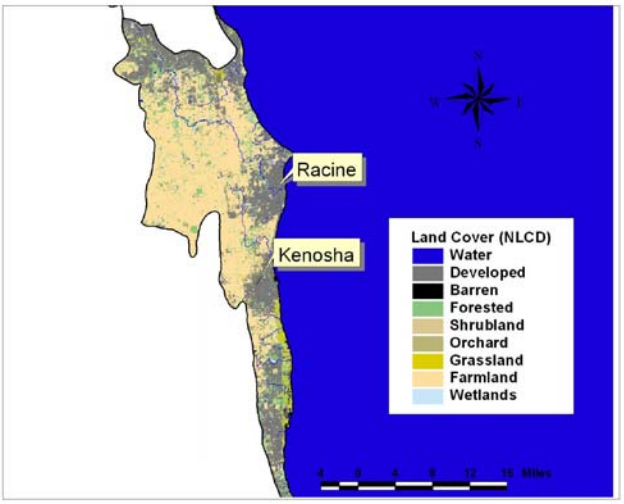
- **Root-Pike Watershed Initiative Network — www.rootpikewin.org**
- **1000 Friends of Wisconsin — www.1kfriends.org**
- **Midwest Center for Environmental Science and Public Policy — www.mcespp.org**
- **Sustainable Racine — www.sustainable-racine.com**
- **The Waukegan Harbor Citizens Advisory Group — www.wkkhome.northstarnet.org/iepa/page2.html**
- **Mike Luba, Root-Pike River Basin Water Leader — Michael.Luba@dnr.state.wi.us**

Watershed Overview

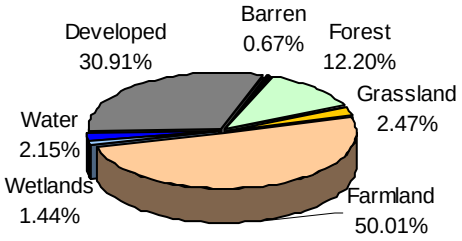
- The Pike-Root watershed covers over 410 square miles and includes major subwatersheds as the Pike River, the Root River, Oak Creek, Racine Harbor, the Waukegan River, and Waxdale Creek. The watershed has over 113 miles of shoreline on the west side of Lake Michigan.
- The watershed stretches from south of Milwaukee to north of Chicago. It includes the cities of Racine and Kenosha, Wisconsin, and Waukegan, Illinois.
- The Waukegan Harbor is an Area of Concern.
- While over 50 percent of the watershed is used for agricultural purposes, 30 percent is urbanized.
- The Waukegan River, which is part of the basin, is the only river in Illinois that flows into Lake Michigan.
- The National Heritage Inventory has documented 16 endangered, 20 threatened, and 52 special concern plant and animal species and 17 rare aquatic and terrestrial species in the watershed.
- The combined effects of the draining of the majority of wetlands and stream modifications like channel manipulation have led to degraded water and habitat quality throughout the Pike- Root Basin.
- The Nature Conservancy identified critical Lakeplain Wet-Mesic Prairie, Mesic Sand Tallgrass Prairie, Interdunal Wetland, Black Oak / Lupine Barrens and Midwest Dry-Mesic Sand Prairie at the Chiwaukee Prairie-Illinois Beach.
- Chiwaukee Prairie-Illinois Beach is an important landbird stopover site and a raptor stopover site.
- Critical species identified by the nature Conservancy at the Chiwaukee Prairie-Illinois Beach include the Pale False Foxglove and the Prairie White-fringed Orchid. Other important species identified by the Nature Conservancy include Central Cordgrass Wet Prairie, Central Cordgrass Wet Sand Prairie, Central Mesic Tallgrass Prairie, Central Water Lily Aquatic Wetland, Cinquefoil - Sedge Prairie Fen, Great Lakes Beach, Great Lakes Beachgrass Dune, Lakeplain Wet Prairie, Midwest Dry Sand Prairie, Midwest Mixed Emergent Deep Marsh, Skunk Cabbage Seepage Meadow, Tussock Sedge Wet Meadow, Blazing Star Stem Borer Moth, Forked Aster, Henslow's Sparrow, Karner Blue Butterfly, Kirtland's Snake, and Silphium Borer Moth.

Subwatersheds of the Pike-Root-Waukegan Watershed

0101 Wind Point-Frontal Lake Michigan
0102 Oak Creek
0201 Village of Union Grove-West Branch Root River Canal
0202 East Branch Root River Canal
0203 West Branch Root River Canal
0204 Root River Canal
0301 Village of Hales Corner-Root River
0302 Ryan Creek-Root River
0303 Husher Creek-Root River
0304 Hoods Creek
0305 Community of Husher-Root River
0306 City of Racine-Root River
0401 City of Kenosha-Frontal Lake Michigan
0402 Pike Creek
0403 Pike River
0501 Waukegan River-Frontal Lake Michigan
0502 Diversey Harbor-Frontal Lake Michigan
0503 Oakwoods Cemetery-Frontal Lake Michigan



Land Cover: Pike-Root Watershed



Watershed size: 410 sq. miles

Between 1996 and 2001, there has been a slight increase in developed land, farmland, and wetlands, a slight decrease in forest, and a slightly larger decrease in grassland.

Watershed Activities

- Recommendations for improving the Pike and Root River watersheds are:
  - ◊ Implement of urban nonpoint source best management practices.
  - ◊ Implement of agricultural nonpoint source best management practices, including buffer strip development.
  - ◊ Conduct baseline surveys on streams within the watershed.
  - ◊ Assess sediment delivery, sediment transport, and streambank erosion.
  - ◊ Conduct aquatic habitat and sediment assessments above and below dams on the Pike and Root Rivers.
  - ◊ Implement aquatic habitat restoration and water quality improvement practices.
  - ◊ Implement wetland restoration projects where practicable.
  - ◊ Evaluate dams for removal.
- About 1 million pounds of PCBs have been dredged from Waukegan River.

Impaired (303d) Waters

Waterbody Name	Impairment
Lake Michigan, WI	Mercury and PCB Fish Consumption Advisories, PCBs
Bender (Lake Michigan	Bacteria
Calumet Harbor	PCBs
Chicago River	Fecal Coliform, Mercury, PCBS, Silver, Total Phosphorous
Diversey Harbor	PCBs
Dugdale	Unknown Cause
Eichelman (Lake Michigan)	Bacteria
Grant Park (Lake Michigan	Bacteria
Lincoln Pk North Pnd, IL	Total Phosphorus, Total Suspended Solids
N. Branch Pike R., WI	Aquatic Toxicity, Fish Fills
Oak Creek, WI	Aquatic Toxicity
Pennoyer Park (Lake Michigan)	Bacteria
Pettibone Creek, IL	Alpha BHC, Arsenic, Copper, Dieldrin, Endrin, Lead, Manganese, Mercury, Nickel, PCBs, Silver, Zinc
Pettibone Creek (S. Br.), IL	Alpha BHC, Endrin, Heptachlor, PCBs
Racine Harbor, WI	Aquatic Toxicity, Metals
Root River, WI	Phosphorus, Dissolved Oxygen, Sediment
Root River Canal, WI	Dissolved Oxygen, Phosphorus, Sediment
Root River Canal W. Branch, WI	Phosphorus, Dissolved Oxygen, Sediment
Root R. From Its Mouth Upstream To The Horlick Dam In Racine, WI	PCB Fish Consumption Advisory
Sand Pond	Unknown Cause
South Shore Beach -- Lake Michigan	Bacteria
Waxdale Creek, WI	Fish Kills, Aquatic Toxicity
Washington Park Lagoon, IL	Unknown Cause
Waukegan Harbor	Arsenic, Cadmium, Chromium, Copper, Lead, PCBs, Total Nitrogen, Total Phosphorus, Zinc
Waukegan River, IL	DDT, PCBs, Total Dissolved Solids, Aldrin, Hexachlorobenzene
Waukegan River (South Branch), IL	Aldrin, Chromium, DDT, Hexachlorobenzene, Nickel, Silver, Total Nitrogen

Waukegan Harbor Area of Concern

Location
1.2 square kilometers of industrial, commercial, municipal and open lands.

Stressors and Primary Contaminants
- PCB contaminated sediments

Programs
- Superfund
- Clean Water Act #319

Clean-Up Actions
- Approximately 1 million pounds of PCBs dredged from the harbor
- Soil removal activities completed at Waukegan Manufactured Gas and Coke site in 2005; extraction and treatment of contaminated groundwater to continue at the site for several years
- Removal and disposal of large amounts of acids, bases, paints, solvents, hydraulic oil, machining oil, compressed gases, metals, sludge and PCB-containing transformer fluid from the Waukegan lake-front site

Delisting Targets
- In progress

Key Activity Needed
- Dredging
- Brownfield development
- Habitat restoration
- Coordination with RAP program for AOC delisting purposes

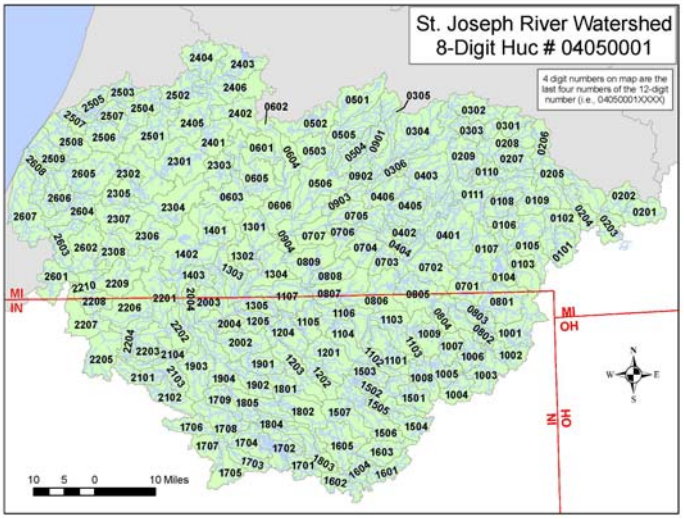
Challenges
- Dredging for navigation and contaminated sediment removal
- Contaminated sediment disposal
- Funding to fulfill local match for dredging and remediation projects

Next Steps
- Pursuit of a dredging plan for the removal of PCB contaminated sediments from Waukegan Harbor
- Final dredging and disposal of Waukegan Harbor sediments
- Outboard Marine Corporation building, soil and groundwater remediation
- Implementation of best management practices to reduce nonpoint source pollution and improve water quality in the Waukegan River watershed, as per the watershed plan

St. Joseph River Watershed

Hydrologic Unit Code: 04050001

For more information, see the USEPA "Surf Your Watershed" website at:
cfpub.epa.gov/surf/huc.cfm?huc_code=04050001
or contact the Michigan Department of Environmental Quality at 517-335-6969 to request a copy of report number MI/DEQ/WB-07/048, "A Biological Survey of Sites in the Upper St. Joseph River Watershed Branch, Calhoun, Cass, Hillsdale, Kalamazoo, and St. Joseph Counties Michigan, Aug and Sep, 2005" , MI/DEQ/WB-07/085, "A Biological Survey of Sites in the Lower St. Joseph River Watershed Berrien and Cass Counties Michigan, August 2006", or MI/DEQ/WB-07/08, "Biological and Water Chemistry Surveys of Selected Stations in the Paw Paw River Watershed, Van Buren and Berrien Counties, Michigan, July, Aug, and Sept 2006".

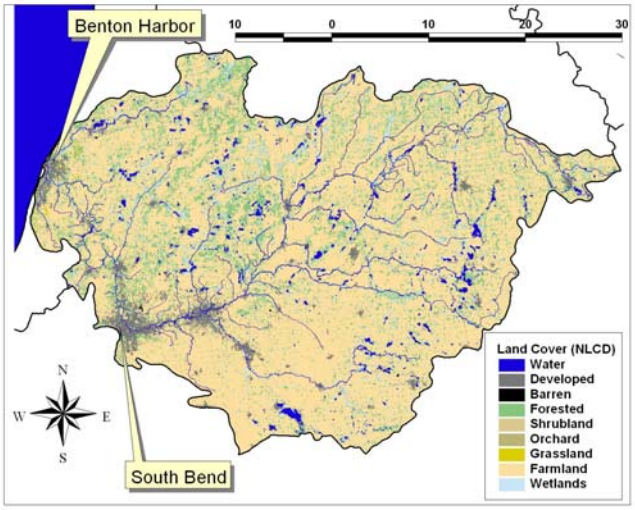


Subwatersheds of the St. Joseph River Watershed

0101 Carpenter Lake-South Branch Hog Creek
0102 Duck Lake-South Branch Hog Creek
0103 Tallahassee Drain
0104 Coldwater Lake
0105 Marble Lake
0106 East Branch Sauk River
0107 Blackhawk Millpond-Coldwater River
0108 Mud Creek
0109 South Branch Hog Creek
0110 Hog Creek
0111 Coldwater River
0201 Beebe Lake-Beebe Creek
0202 Beebe Creek
0203 Soap Creek-St Joseph River
0204 Sand Creek
0205 Soap Creek-St Joseph River
0206 Old Homer Lake-St Joseph River
0207 Tekonsha Creek
0208 Wilder Lake-St. Joseph River
0209 Burnett Creek-St Joseph River
0301 Nottawa Lake-Nottawa Creek
0302 Mud Creek-Nottawa Creek
0303 Alder Creek
0304 Pine Creek
0305 Bear Creek
0306 Nottawa Creek
0401 Corey Lake-Swan Creek
0402 Little Swan Creek
0403 Spencer Creek-St Joseph River
0404 Swan Creek
0405 Mud Lake-St Joseph River
0406 Sturgeon Lake-St Joseph River
0501 Headwaters Portage River
0502 Gourdneck Creek
0503 Portage Creek
0504 Butternut Creek-Bear Creek
0505 Indian Lake-Portage River
0506 Portage River
0601 Upper Flowerfield Creek
0602 Middle Flowerfield Creek
0603 Pickerel Lake-Rocky River
0604 Flowerfield Creek
0605 Four County Drain-Rocky River
0606 Rocky River
0701 Headwaters Prairie River
0702 Gilead Lake-Prairie River
0703 Stewart Lake Drain-Prairie River
0704 Prairie River Lake-Prairie River
0705 Spring Creek
0706 Templare Lake-Prairie River
0707 Prairie River
0801 Snow Lake
0802 Tamarack Lake
0803 Lake James-Crooked Creek
0804 Town of Orland-Fawn River
0805 Himebaugh Drain-Fawn River
0806 Clear Lake-Fawn River
0807 Wegner Ditch-Fawn River
0808 Sherman Mill Creek
0809 Fawn River
0901 Headwaters Little Portage Creek
0902 Little Portage Creek
0903 Sturgis Dam-St Joseph River
0904 City of Florence-St Joseph River
1001 Pigeon Lake-Pigeon Creek
1002 Mud Creek-Pigeon Creek
1003 Long Lake-Pigeon Creek
1004 Headwaters Turkey Creek
1005 Big Turkey Lake-Turkey Creek
1006 Silver Lake-Pigeon Creek
1007 Otter Lake-Pigeon Creek
1008 Little Turkey Lake-Turkey Creek
1009 Green Lake-Pigeon Creek
1010 Mongo Millpond-Pigeon Creek
1101 East Fly Creek
1102 Fly Creek
1103 Cline Lake-Pigeon River
1104 Buck Lake-Buck Creek
1105 Page Ditch
1106 VanNatta Ditch-Pigeon River
1107 Pigeon River
1201 Emma Lake-Emma Ditch
1202 Little Elkhart River Ditch
1203 Rowe Eden Ditch
1204 Mather Ditch-Little Elkhart River
1205 Duck Lake-Little Elkhart River
1301 Headwaters Mill Creek
1302 Wood Lake-Mill Creek
1303 Trout Creek
1304 Black Creek-St Joseph River
1305 York Township Ditch-St Joseph River
1401 Headwaters Christiana Creek
1402 Diamond Lake-Christiana Creek
1403 Christiana Creek
1501 Tamarack Lake-Little Elkhart Creek
1502 Dallas Lake-Little Elkhart Creek
1503 Oliver Lake-Little Elkhart Creek
1504 Waterhouse Ditch-Henderson Lake Ditch
1505 Oviate Ditch-Middle Branch Elkhart River
1506 Jones Lake-North Branch Elkhart River
1507 Huston Ditch-North Branch Elkhart River
1601 Rivir Lake-Forker Creek
1602 Winebrenner Branch-Carrol Creek
1603 Skinner Lake-Croft Ditch
1604 Muncie Lake-South Branch Elkhart River
1605 Diamond Lake-South Branch Elkhart River
1701 Village Lake-Turkey Creek
1702 Lake Wawasee-Turkey Creek
1703 Wabee Lake-Hammond Ditch
1704 Hoopingarner Ditch-Turkey Creek
1705 Coppes Ditch-Turkey Creek
1706 Berlin Court Ditch
1707 Omar Neff Ditch-Turkey Creek
1708 Dausman Ditch-Turkey Creek
1709 Swoveland Ditch-Turkey Creek
1801 Phillips Ditch-Stony Creek
1802 Indian Lake-Elkhart River
1803 Headwaters Solomon Creek
1804 Hire Ditch-Solomon Creek
1805 Whetten Ditch-Elkhart River
1901 Hoover Ditch-Rock Run Creek
1902 Horn Ditch-Rock Run Creek
1903 Headwaters Yellow Creek
1904 Goshen Dam Pond-Elkhart River
2001 Washington Tap Ditch-St Joseph River
2002 Pine Creek
2003 Puterbaugh Creek
2004 Sheep Creek-St Joseph River
2101 Grimes Ditch
2102 Wisler Ditch-Baugo Creek
2103 Township Ditch-Baugo Creek
2104 Rogers Ditch-Baugo Creek
2201 Cebas Creek
2202 City of Elkhart-St Joseph River
2203 Eller Ditch-St Joseph River
2204 Willow Creek-St Joseph River
2205 Auten Ditch-St Joseph River
2206 Juday Creek
2207 Pinhook Lake-St Joseph River
2208 Dutch Corners-St Joseph River
2209 Brandywine Creek
2210 City of Niles-St Joseph River
2301 Spring Creek-Dowagiac River
2302 Silver Creek
2303 Bunker Lake-Dowagiac Creek
2304 La Grange Lake-Dowagiac Creek
2305 Indian Lake-Dowagiac River
2306 Pokagon Creek
2307 Peavine Creek-Dowagiac River
2308 Dowagiac River
2401 Lawton Drain-South Branch Paw Paw River
2402 East Branch Paw Paw River
2403 Cambell Creek-North Branch Paw Paw River
2404 Chase Lake-Brandywine Creek
2405 South Branch Paw Paw River
2406 North Branch Paw Paw River
2501 Brush Creek
2502 Headwaters Paw Paw River
2503 Mud Lake Drain
2504 Paw Paw River above Mud Lake Drain
2505 Paw Paw Lake
2506 Mill Creek
2507 Ryno Drain-Paw Paw River
2508 Blue Creek-Paw Paw River
2509 Paw Paw River
2601 McCoy Creek
2602 Webster Lake-St Joseph River
2603 Lake Chapin-St Joseph River
2604 Love Creek-St Joseph River
2605 Lemon Creek-St Joseph River
2606 Pipestone Creek
2607 Hickory Creek
2608 Outlet St Joseph River

Watershed Management Plans

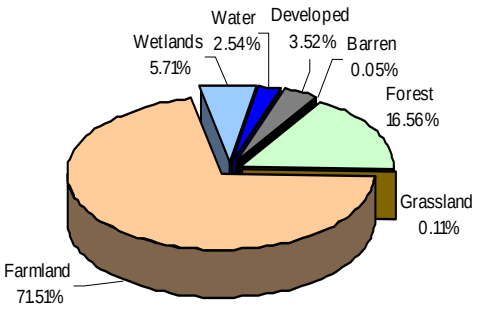
- Baugo Creek, St. Joseph and Elkhart Co.— St. Joseph River Commission/MACOG
- Dowagiac River — Cass Conservation District — casscd.org
- Elkhart River — Elkhart River Restoration Association/Elkhart County Soil and Water Conservation District
- Heaton Lake, Elkhart Co.— Elkhart County Commissioners
- Hodunk-Messenger Chain of Lakes — Branch County Conservation District
- Hog Creek — Hillsdale Conservation District
- Juday Creek , St. Joseph Co.— St. Joseph County Drainage Board
- Little Elkhart River — LaGrange Soil and Water Conservation District
- Nottawa Creek — Calhoun Conservation District — www.calhouncd.org
- Paw Paw River — Southwest Michigan Planning Commission
- Pigeon Creek River — Steuben County Soil and Water Conservation District
- Portage, Davis & Gourdneck Creeks— City of Portage
- Portage River — Kalamazoo County Road Commission
- Rocky River — St. Joseph Conservation District
- St. Joseph River — Friends of the St. Joseph River Association
- Swan Creek — Branch County Conservation District



Basin

Watershed Groups

- Eco-Pax--Goshen College
- Elkhart River Alliance
- Elkhart River Restoration -- www.elkhartriver.org
- Friends of Juday Creek
- Friends of McCoy's Creek
- Friends of the St. Joseph River — www.fotsjr.org
- Hodunk-Messenger Chain of Lakes, Sauk-Coldwater River
- Michiana Watershed Inc.
- MEANDRS — casscd.org/meandrs.htm
- PawPaw River Project -- www.swmpc.org/water.asp
- Pokagon Band of Potawatomi tribe
- St. Joseph River Basin Commission — www.sjrbc.com
- Upper St. Joseph River Association



Watershed size: 4694 sq. miles

Between 1996 and 2001, there has been a slight increase in developed land and a slight decrease in farmland, grassland, forest, and wetlands.

Watershed Overview

- The St. Joseph River Watershed is located in the southwest portion of the Lower Peninsula of Michigan and northwestern portion of Indiana. It spans the Michigan-Indiana border and empties into Lake Michigan at St. Joseph, Michigan.
- The watershed drains 4,694 square miles from 15 counties (Berrien, Branch, Calhoun, Cass, Hillsdale, Kalamazoo, St. Joseph and Van Buren in Michigan and De Kalb, Elkhart, Kosciusko, Lagrange, Noble, St. Joseph and Steuben in Indiana).
- The watershed includes 3,742 river miles and flows through and near the Kalamazoo-Portage, the Elkhart-Goshen, the South Bend and the St. Joseph/Benton Harbor metropolitan areas.

Watershed Activities

- The Friends of the St. Joe River developed a bi-state plan that unites stakeholders in both Michigan and Indiana in a concerted effort to address water quality issues and natural resource protection across jurisdictional boundaries. All data compiled and reports generated as part of the planning project are available on the project website, www.stjoeriver.net. Watershed Concerns include erosion, sediments, nutrients, habitat Loss, wetlands, animal waste, pesticides, urbanization & land use, biota, CSO's, pathogens, hydrologic modification, and litter.

- The St. Joseph watershed project has generated maps of subwatersheds, cities, USGS water resources stations, digital elevations, wetlands, river valley segments, land use, average annual precipitation, 1950-1999, designated trout streams, geological features, and soils.
- The St. Joseph River Basin Commission holds an annual St. Joseph River Symposium
- **Surface Water Designated Use Targets include:**
  - ◊ Warm and cold water fisheries
  - ◊ Other indigenous aquatic life/wildlife
  - ◊ Partial body contact, recreation
  - ◊ Full body contact, recreation (May - October)
  - ◊ Navigation
  - ◊ Public Water Supply: Surface Intake Point
  - ◊ Industrial Water Supply
  - ◊ Agriculture
  - ◊ Certain water bodies are also protected as a coldwater fishery
- **Additional Basin Designated Use Targets**
  - ◊ Groundwater
  - ◊ Habitat preservation
  - ◊ Increased public access (to the river/streams)
  - ◊ Archeological preservation
  - ◊ Preserve agricultural uses and access
  - ◊ Preserve open space
  - ◊ Greenways
  - ◊ Public water trails
  - ◊ Watershed linkages
  - ◊ Manage invasive species
- The most significant water quality problem in Lake George is excess sediment, much of it from severely eroding shorelines.
- In an effort to fulfill ***Goal #1 of the St. Joseph River Watershed Management Plan:*** *Establish and sustain the financial and institutional capacity of a stakeholder group (e.g., steering committee, joint basin commission, watershed council, Friends of the St. Joe River Association) that assumes responsibility for coordinating implementation of the management plan and acts as the primary advocacy group, information clearinghouse, and planning partner for the watershed.* FOTSJR has been re-writing existing by-laws, defining an expanded mission, modifying the existing FOTSJR board, establishing new committee structures, and working on member recruitment.

Impaired (303d) Waters

Waterbody Name	Impairment
Barrel and a Half Lake	Mercury Fish Consumption Advisory
Barton Lake, MI	Mercury (Fish Tissue) PCB Fish Consumption Advisory
Baugo Creek	E. Coli
Baugo Creek and Tribs	E. Coli
Big Otter Lake	Impaired Biotic Communities
Bixler Lake	Mercury Fish Consumption Advisory
Coldwater Lake, MI	Mercury (Fish Tissue)
Dowagiac River, MI	PCB Fish Consumption Advisory
Croft Ditch	E. Coli
Crooked Creek-Jimmerson Lake	PCB Fish Consumption Advisory,
Crooked Lake	Mercury Fish Consumption Advisory
Dallas Lake	Impaired Biotic Communities
Dewart Lake	Mercury Fish Consumption Advisory
Elkhart, River, IN	E. Coli, Mercury Fish Consumption Advisory, PCB Fish Consumption Advisory
Emma Creek Trib	Ammonia, Impaired Biotic Communities
Farmers Creek, MI	Pathogens, Nuisance Plant Growth, Untreated Sewage Discharges, Pathogens
Fawn River, MI	Pathogens
Fawn River - Orland	E. Coli, PCB Fish Consumption Advisory
Fish Lake	Impaired Biotic Communities
Fly Creek-Headwaters (Lagrange)	E. Coli
Gordy Lake	Impaired Biotic Communities
Hackenburg Lake	Impaired Biotic Communities
Hardy Lake	Mercury Fish Consumption Advisory
Henderson Lake	PCB Fish Consumption Advisory
Hindman Lake	Impaired Biotic Communities
Jimmerson Lake, IN	Mercury Fish Consumption Advisory, Impaired Biotic Communities
Juday Creek, IN	PCB Fish Consumption Advisory, E. Coli
Knapp Lake	Impaired Biotic Communities
Lake Chapin (St. Joseph River), MI	PCB Fish Consumption Advisory
Lake James, IN	Mercury Fish Consumption Advisory, Impaired biotic communities
Lake Wawasee, IN	Mercury Fish Consumption Advisory, PCB Fish Consumption Advisory
Lime Lake	Impaired Biotic Communities

Waterbody Name	Impairment
Little Elkhart River	E. Coli
Long Lake, IN	Mercury Fish Consumption Advisory, Fish Consumption Advisory
Marsh Lake, IN	Mercury Fish Consumption Advisory, Impaired Biotic Communities
Mckinzie Creek, MI	Fish Community Rated Poor
Mud Creek, IN	Ammonia Dissolved Oxygen
Messenger Lake Memorial Park Beach	Pathogens
Meserve Lake	Impaired Biotic Communities
Messick Lake	Impaired Biotic Communities
Mill Creek	Pathogens
Mud Creek	Chlorides, Total Dissolved Solids
North Branch Elkhart River and	E. Coli
North Twin Lake	Impaired Biotic Communities
Olin Lake	Mercury Fish Consumption Advisory
Oliver Lake	Mercury Fish Consumption Advisory
Ox Creek, MI	PCB Fish Consumption Advisory, Macroinvertebrate Community Rated Poor
Palmer Lake, MI	Mercury (Fish Tissue)
Pine Creek	Pathogens
Pine Creek-North/South Forks	E. Coli
Pleasant Lake	Mercury Fish Consumption Advisory, PCB Fish Consumption Advisory
Olin Lake, IN	Mercury Fish Consumption Advisory
Oliver Lake, IN	Mercury Fish Consumption Advisory
Pigeon Creek, IN	PCB Fish Consumption Advisory, Mercury Fish Consumption Advisory, Impaired Biotic Communities, E. Coli
Pigeon River	E. Coli
Randall Lake (North Lake and Cemetery Lake Chain), MI	PCBs Fish Consumption Advisory Mercury (Fish Tissue)
Rock Run Creek and Tribs	E. Coli
Royer Lake	Impaired Biotic Communities
Sand Lake Nottawa Park	Pathogens
Seven Sisters Lakes	Impaired Biotic Communities
Shipshewana Lake	PCB Fish Consumption Advisory
Shock Lake	Mercury Fish Consumption Advisory

Impaired (303d) Waters (cont.)

Waterbody Name	Impairment
Snow Lake, IN	Mercury Fish Consumption Advisory, Impaired Biotic Communities
Solomon Creek and Tribs	E. Coli
South Branch Elkhart River	E. Coli
Spear Lake	Mercury Fish Consumption Advisory
St. Joseph River, IN	E. Coli , Mercury Fish Consumption Advisory, PCB Fish Consumption Advisory
St. Joseph River, MI	Mercury Fish Consumption Advisory, PCB Fish Consumption Advisory, Mercury
St. Joseph River Tributary, MI	Impaired Biotic Communities
St. Joseph River Watershed	PCBs
Stoney Creek and Trib	E. Coli
Sylvan Lake	Mercury Fish Consumption Advisory
Thompson Lake	Mercury (Fish Tissue)
Turkey Creek	E. Coli
Turkey Creek - Stump DT	E. Coli
Turkey Creek-Skinner/Hoopingarne Ditches	E. Coli
Union Lake, MI	PCB Fish Consumption Advisory
Village Lake	Impaired Biotic Communities
Waubee Lake	Mercury Fish Consumption Advisory
Willow Creek and Trib	E. Coli
Wisler Ditch and Tribs	Impaired Biotic Communities, Nutrients
Witmer Lake	Impaired Biotic Communities

Data Sources. Land cover map and percentages: National Land Cover database, 1992 (edc.usgs.gov/products/landcover/nlcd.html; Land use change: NOAA Coastal Change Analysis Program, 1996 and 2001 (www.csc.noaa.gov/crs/lca/ccap.html); Total Maximum Daily Load (TMDL) Impaired Waters: Surf Your Watershed (www.epa.gov/surf)

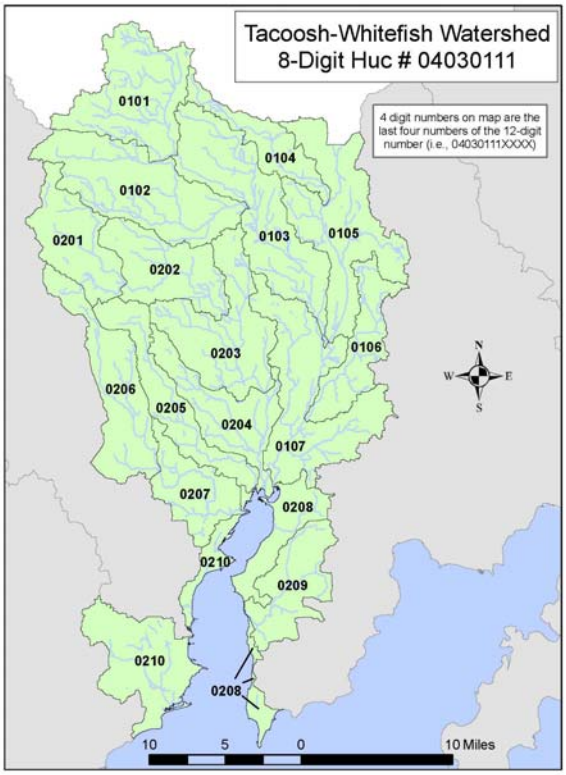
Tacoosh-Whitefish Watershed

Hydrologic Unit Code: 04030111

For more information, see the USEPA "Surf Your Watershed" website at:
cfpub.epa.gov/surf/huc.cfm?huc_code=04030111

Watershed Overview

- **The Tacoosh-Whitefish watershed is located in the upper peninsula of Michigan and covers approximately 633 square miles.**
- **The watershed has almost 53 miles of Lake Michigan shoreline.**
- **Escanaba, Michigan is the lone large urbanized area in the watershed.**
- **The watershed is mostly forest and wetland.**
- **The watershed includes parts of the Hiawatha National Forest.**
- **The watershed supports a world-class Walleye fishery and is an important spawning stream.**



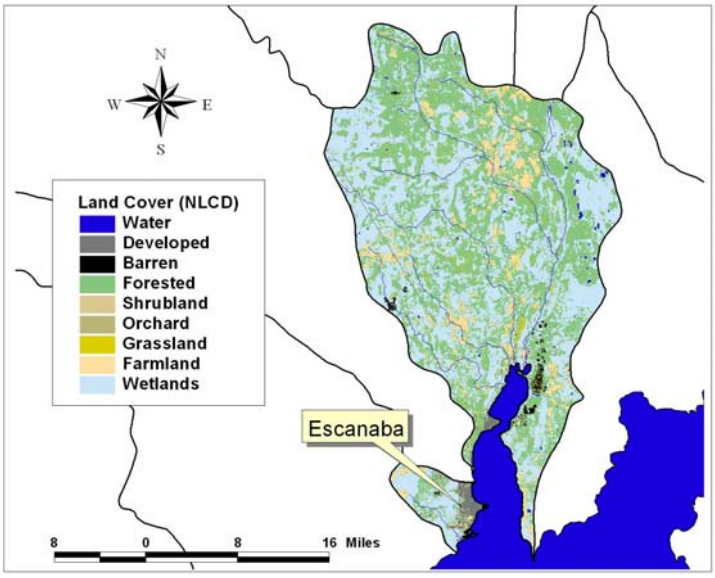
Impaired (303d) Waters

Waterbody Name	Impairment
Little Bay De Noc (Lake Michigan)	PCB Fish Consumption Advisory, Mercury (Fish Tissue)

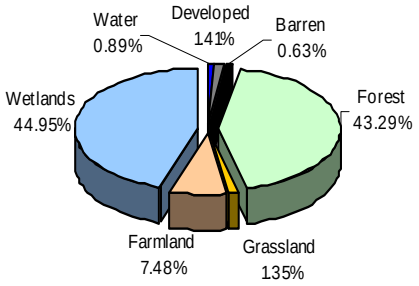
Subwatersheds of the Tacoosh-Whitefish Watershed

0101 Sucker Creek-West Branch Whitefish River
0102 Werners Creek
0103 West Branch Whitefish River
0104 Dexter Creek
0105 East Branch Whitefish River
0106 Haymeadow Creek
0107 Whitefish River
0201 Mud Creek-Rapid River
0202 Boudreau Creek-Rapid River
0203 Baker Creek-Rapid River
0204 Rapid River
0205 Tacoosh River
0206 West Branch Days River-Days River
0207 Days River
0208 Black George Creek-Frontal Little Bay De Noc
0209 Squaw Creek
0210 Portage Creek-Frontal Little Bay De Noc

Data Sources. Land cover map and percentages: National Land Cover database, 1992 (edc.usgs.gov/products/landcover/nlcd.html; Land use change: NOAA Coastal Change Analysis Program, 1996 and 2001 (www.csc.noaa.gov/crs/lca/ccap.html); Total Maximum Daily Load (TMDL) Impaired Waters: Surf Your Watershed (www.epa.gov/surf)



Land Cover: Tacoosh-Whitefish Watershed



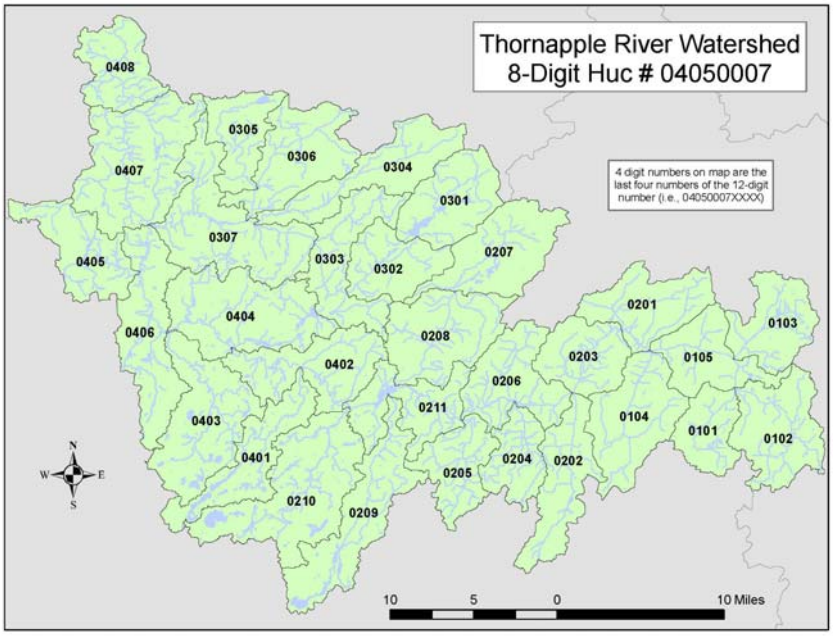
Watershed Size: 633 sq. miles

Between 1996 and 2001, there has been a slight increase in grassland, developed land, and farmland and a slight decrease in forest and wetlands.

Thornapple River Watershed

Hydrologic Unit Code: 04050007

For more information, see the USEPA website at: cfpub.epa.gov/surf/huc.cfm?huc_code=04050007 or contact the Michigan Department of Environmental Quality at 517-335-6969 to request a copy of report number MI/DEQ/WD-04/061, "A Biological Survey of the Thornapple River and Selected Tributaries, 2003."



Watershed Management Plans

- **Coldwater River — Coldwater River Watershed Council**
- **Schoolhouse Creek - Kent County Drain Commission**

Watershed Organizations

- Coldwater River Watershed Council — www.coldwaterriver.org
- Thornapple River Watershed Council — www.thornappleriver.org
- Western Michigan Environmental Action Council — www.wmeac.org

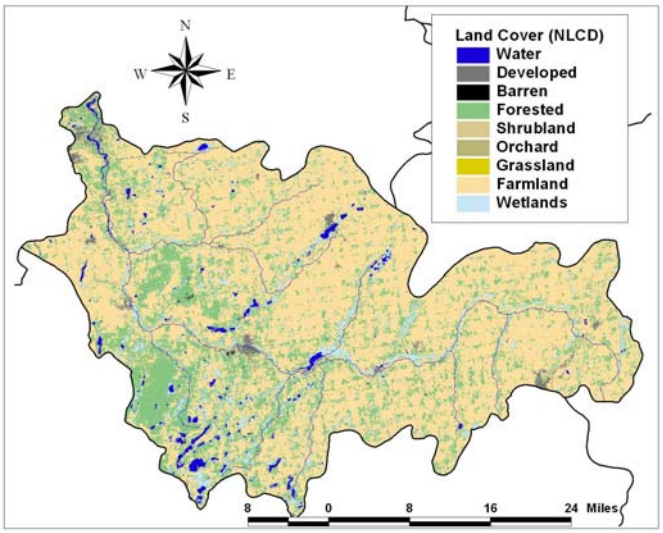
Watershed Overview

- The Thornapple River watershed flows into the Lower Grand River watershed.
- The watershed covers over 857 square miles.
- Over 67 percent of the watershed is in agricultural use.
- 324 miles of the watershed's streams and rivers flow year-round.

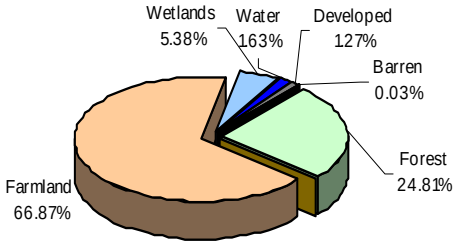
Data Sources. Land cover map and percentages: National Land Cover database, 1992 (edc.usgs.gov/products/landcover/nlcd.html; Land use change: NOAA Coastal Change Analysis Program, 1996 and 2001 (www.csc.noaa.gov/crs/lca/ccap.html); Total Maximum Daily Load (TMDL) Impaired Waters: Surf Your Watershed (www.epa.gov/surf)

Subwatersheds of the Thornapple River Watershed

0101 Butternut Creek
0102 Milbourn Allen and Crane Drain-Thornapple River
0103 Thornapple Drain
0104 Fish Creek-Little Thornapple River
0105 Hayes Drain-Thornapple River
0201 Darken and Boyer Drain-Thornapple River
0202 Lacey Creek
0203 Thompson Creek-Thornapple River
0204 Shanty Creek
0205 Quaker Brook
0206 Scipio Creek-Thornapple River
0207 Headwaters Mud Creek
0208 Mud Creek
0209 High Bank Creek
0210 Cedar Creek
0211 Thornapple Lake-Thornapple River
0301 Jordan Lake-Little Thornapple River
0302 Woodland Creek-Little Thornapple River
0303 Messer Brook-Coldwater River
0304 Duck Creek
0305 Pratt Lake Creek
0306 Bear Creek
0307 Coldwater River
0401 Fall Creek
0402 Butler Creek-Thornapple River
0403 Glass Creek
0404 Algonquin Lake-Thornapple River
0405 Duncan Creek
0406 Turner Creek-Thornapple River
0407 McCords Creek-Thornapple River
0408 Thornapple River



Land Cover Thornapple River Watershed



Watershed size: 857 sq. miles

Between 1996 and 2001, there has been a slight increase in developed land, farmland, forest, and wetland and a slight decrease in grassland.

Impaired (303d) Waters

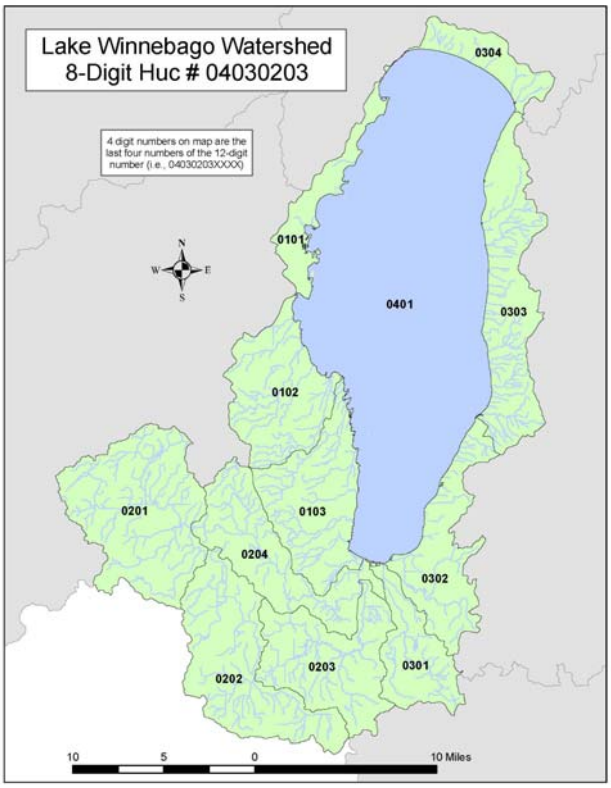
Waterbody Name	Impairment
Jordan Lake	Mercury (Fish Tissue)

Lake Winnebago Watershed

Hydrologic Unit Code: 04030203

For more information, see the USEPA "Surf Your Watershed" website at cfpub.epa.gov/surf/huc.cfm?huc_code=04030203

The Wisconsin DNR manages the Lake Winnebago watershed as part of the Upper Fox River basin management area. For more information, see the Wisconsin Department of Natural Resources' "Wisconsin's Basins" website at dnr.wi.gov/org/gmu/gmu.html



Watershed Contacts

- **The University of Wisconsin-Extension — basineducation.uwex.edu/foxwolf**
- **Fox Wolf Watershed Alliance — www.fwwa.org**
- **Lake Michigan Forum — www.lkmichiganforum.org**
- **Fond du Lac County Land & Water Conservation Department — www.co.fond-du-lac.wi.us/dept/landcon/landcon.html**
- **Fond du Lac River Priority Watershed Project — www.wclwcd.org/fdl.htm**
- **Winnebago County Land & Water Conservation Department — www.wclwcd.org**
- **Rob McLennan, the Upper Fox River Water Basin Team Leader — Robin.McLennan@dnr.state.wi.us**

Subwatersheds of the Lake Winnebago Watershed

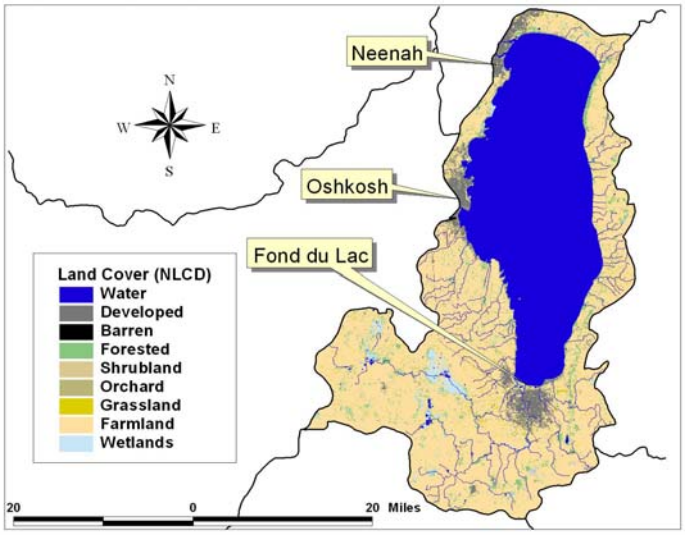
0101 City of Oshkosh-Lake Winnebago
0102 Willow Harbor-Lake Winnebago
0103 Van Dyne Creek-Lake Winnebago
0201 Village of Rosendale-Fond Du Lac River
0202 Sevenmile Creek-East Branch of the Fond Du Lac River
0203 Parsons Creek-East Branch of the Fond Du Lac River
0204 Eldorado Marsh-Fond Du Lac River
0301 De Neveu Creek
0302 Taycheedah Creek
0303 Pipe Creek-Lake Winnebago
0304 City of Utowana Beach-Lake Winnebago
0401 Lake Winnebago

Watershed Overview

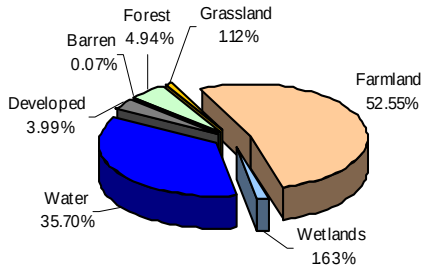
- The Lake Winnebago watershed covers over 581 square miles.
- Over 200 square miles of the watershed are lakes, the largest being Lake Winnebago.
- The watershed is located between the Upper and Lower Fox Rivers in Wisconsin.
- The watershed is primarily glacial plain.
- The watershed is above a sandstone aquifer.
- The Niagra Escarpment, a bedrock ridge, forms the eastern boundary of the Lake Winnebago watershed.
- Menasha, Oshkosh, and Fond du Lac, Wisconsin are the primary urbanized areas located in the watershed.
- High Cliff State Park is a 1,145 acre state park located in Calumet County.
- A Glacial Habitat Restoration Area (GHRA) is located in the watershed in Winnebago and Fond du Lac counties. The GHRA is an area where the state is restoring a patchwork of grasslands and wetlands over a large rural landscape so that wildlife can thrive side-by-side with agriculture.
- The basin hosts resident and migratory neo-tropical songbirds in its open grassland/ agricultural habitat.

Watershed Activities

- Numerous urban stormwater outfalls discharge to Lake Winnebago from portions of the Cities of Oshkosh, Neenah, and Menasha. Storm event runoff from commercial, industrial, and residential construction sites and from plat developments in rapidly developing sections of Oshkosh, Neenah, and Menasha are also nonpoint source pollution problems.
- Water quality modeling done by Northeast Wisconsin Waters of Tomorrow (NEWWT) have indicated this watershed to be a major contributor of phosphorus and suspended solids to Lake Winnebago.
- Critical animal waste and soil erosion problems are intensified by the steep slopes along the Niagara escarpment.
- Average soil loss in all of Calumet County is estimated to be 2.7 tons per acre. These factors accelerate nutrient and sediment delivery to Lake Winnebago. Both the Winnebago Comprehensive Management Plan and the Lower Green Bay Remedial Action Plan identified this watershed as a high priority for the control of nonpoint sources of pollution.
- The eastern portion of the watershed was selected as a nonpoint source priority watershed project in 1989. The primary goals of this watershed project are to reduce Phosphorus and sediment loading to Lake Winnebago and decrease the loading of heavy metals from urban nonpoint sources.
- Lake Winnebago specific fisheries priorities include:



Land Cover: Lake Winnebago Watershed



Watershed size: 581 sq. miles

Between 1996 and 2001, there has been a slight increase in developed land, grassland, and wetlands and a slight decrease in farmland and forest.

- ◊ Continue the Lake Winnebago Fisheries Community Assessment through trawling, seining, shocking, and netting to characterize the Lake Winnebago fish community and assess year-class strength.
- ◊ Continue lake sturgeon management in the Winnebago-Fox-Wolf System. Conduct population and harvest assessments; continue public involvement and education; work closely with the Winnebago Citizens Sturgeon Advisory Committee; pursue Upper Fox River long term sturgeon spawning stock rehabilitation, spawning, and nursery habitat protection and enhancement; cooperate with other regional, statewide, national, and international sturgeon management and research programs; and prepare the annual Winnebago System Sturgeon Management report, direct sturgeon registration, and determine harvest cap for the annual sturgeon spearing season.

Impaired 303(d) Waters

Waterbody Name	Impairment
Campground Creek	Degraded Habitat, Dissolved Oxygen, Sediment, Temperature
Deneveu Creek	Degraded Habitat Sediment
Fond Du Lac River	Aquatic Toxicity, PCB Fish Consumption Advisory, Metals (Other Than Mercury)
Fox River, Oshkosh	Aquatic Toxicity
Fox River, Lower Seg 1 (1)	Phosphorus Dissolved Oxygen PCB Fish Consumption Advisory
Lake Winnebago	Phosphorus Dissolved Oxygen Eutrophication Mercury Fish Consumption Advisory PCB Fish Consumption Advisory Sediment
Mosher Creek	Degraded Habitat Sediment
Parsons Creek	Aquatic Toxicity, Degraded Habitat, Nutrients, Sediment

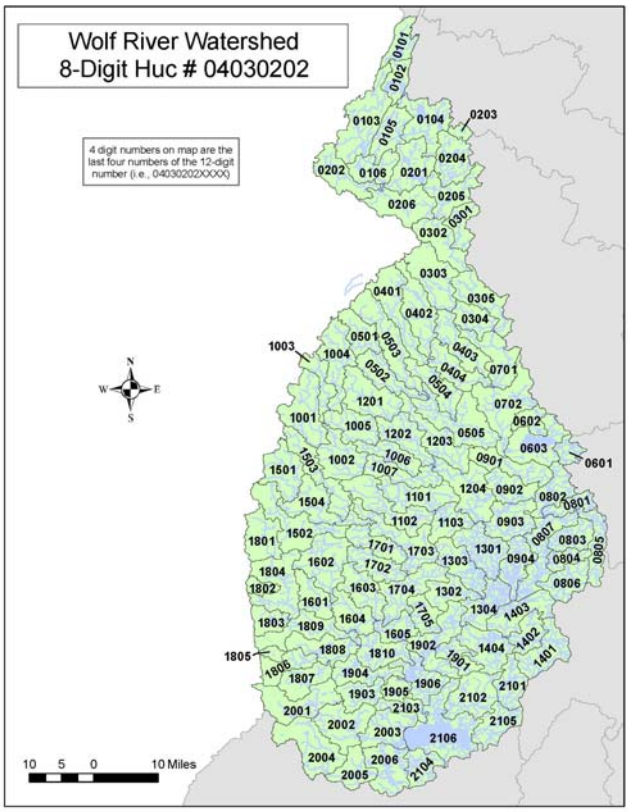
Data Sources. Land cover map and percentages: National Land Cover database, 1992 (edc.usgs.gov/products/landcover/nlcd.html; Land use change: NOAA Coastal Change Analysis Program, 1996 and 2001 (www.csc.noaa.gov/crs/lca/ccap.html); Total Maximum Daily Load (TMDL) Impaired Waters: Surf Your Watershed (www.epa.gov/surf)

Wolf River Watershed

Hydrologic Unit Code: 04030202

For more information, see the USEPA "Surf Your Watershed website at cfpub.epa.gov/surf/huc.cfm?huc_code=04030202

For more information, see the Wisconsin Department of Natural Resources' "Wisconsin's Basins" website at dnr.wi.gov/org/gmu/gmu.html**.**



Watershed Groups

- **The University of Wisconsin-Extension - basineducation.uwex.edu/foxwolf**
- **Fox Wolf Watershed Alliance — www.fwwa.org**
- **Lake Michigan Forum — www.lkmichiganforum.org**
- **Wolf River Basin — dnr.wi.gov/org/gmu/wolf/basinreport.htm**
- **Dan Helf, Wolf River Basin Water Team Leader — Daniel.Helf@dnr.state.wi.us**

Watershed Overview

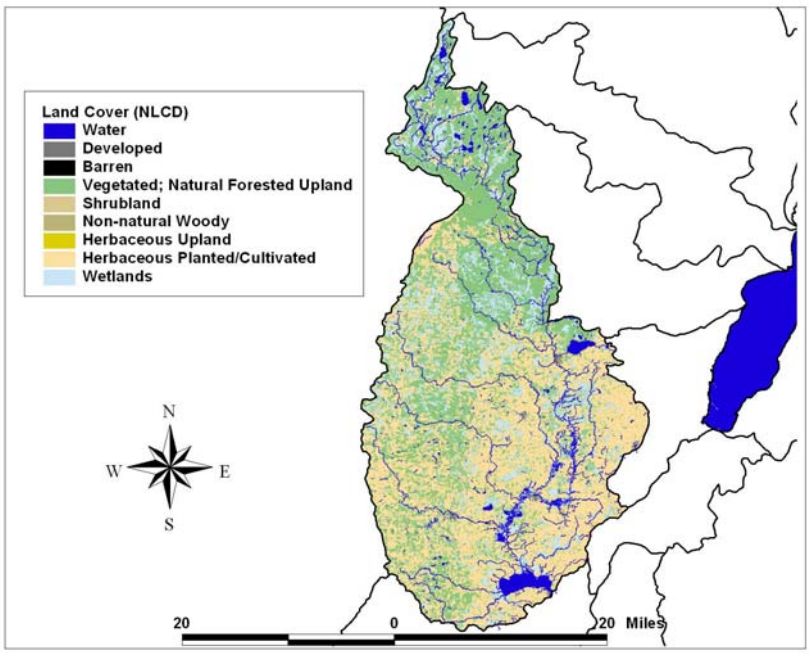
- The Wolf Basin's general topography can be characterized by rolling hills, plain meadows, lush and forested wetlands, numerous lakes and small tributaries. Vegetation consists primarily of hardwood forests mixed with large amounts of hemlock, northern white-cedar swamp, and hardwood-conifer swamp.
- The Wolf River originates with a discharge from Pine Lake located in Forest County. The river flows south for about 203 miles until it reaches Lake Poygan. At that point it becomes part of the Winnebago Lake

Subwatersheds of the Wolf Lake Watershed

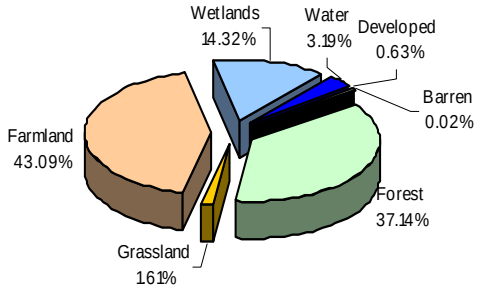
0101 Headwaters Wolf River
0102 Little Rice Lake-Wolf River
0103 Upper Post Lake-Wolf River
0104 Metonga Lake-Swamp Creek
0105 Squaw Creek-Swamp Creek
0106 Spider Creek-Wolf River
0201 Pickerel Creek
0202 Hunting River
0203 Non-Contributing-Lily River
0204 Bog Brook-Lily River
0205 East Branch of the Lily River
0206 Squaw Creek-Wolf River
0301 Ninemile Creek
0302 Slough Gundy Rapids-Wolf River
0303 Elton Creek-Evergreen River
0304 McCall Creek-Evergreen River
0305 White Lake Creek-Wolf River
0401 Little West Branch of the Wolf River
0402 Elma Creek-West Branch of the Wolf River
0403 Little West Branch Creek
0404 Neopit Millpond 108-West Branch of the Wolf River
0501 Mattoon Creek-West Branch of the Red River
0502 Silver Creek-West Branch of the Red River
0503 Moose Lake-Red River
0504 Miller Creek
0505 Red Lakes-Red River
0601 Pickerel Creek
0602 Loon Creek
0603 Shawano Lake
0701 Dalles Creek-Wolf River
0702 Legend Lake-Wolf River
0801 East Branch of the Shioc River
0802 White Lake-Shioc River
0803 Herman Creek
0804 Toad Creek
0805 City of Seymour-Black Creek
0806 Village of Black Creek-Black Creek
0807 Mink Creek-Shioc River
0901 School Section Creek-Wolf River
0902 Schoenick Creek
0903 Navarino Marsh-Wolf River
0904 Outagamie State Wildlife Area-Wolf River
1001 Spranger Creek-South Branch Embarrass River
1002 Tiger Creek-South Branch Embarrass River
1003 Packard Creek-Middle Branch Embarrass River
1004 Elmhurst Creek-Middle Branch of the Embarrass River
1005 Dent Creek-Middle Branch of the Embarrass River
1006 Logemanns Creek-Middle Branch Embarrass River
1007 Municipality of Caroline-South Branch Embarrass River
1101 North Branch of the Pigeon River
1102 South Branch of the Pigeon River
1103 Pigeon Lake-Pigeon River
1201 Strassburg Creek-North Branch of the Embarrass River
1202 Pony Creek-North Branch of the Embarrass River
1203 Mill Creek
1204 Pine Lake-Embarrass River
1301 Township of Deer Creek-Embarrass River
1302 Maple Creek
1303 Bear Creek
1304 Township of Liberty-Embarrass River
1401 Town of Greenville-Bear Creek
1402 Municipality of Stephensville-Bear Creek
1403 Village of Shiocton-Wolf River
1404 Black Otter Lake-Wolf River
1501 Holt Creek-Little Wolf River
1502 Flume Creek
1503 Comet Creek
1504 Bradley Creek-Little Wolf River
1601 Peterson Creek
1602 Nace Creek-South Branch of the Little Wolf River
1603 North Branch of the Little Wolf River
1604 Nichol Creek-South Branch of the Little Wolf River
1605 White Lake-South Branch of the Little Wolf River
1701 Whitcomb Creek
1702 Blake Creek
1703 Shaw Creek-Little Wolf River
1704 Bear Lake-Little Wolf River
1705 Mouse Creek-Little Wolf River
1801 Poncho Creek-Tommorrow River
1802 Emily Lake Non-Contributing Area
1803 Spring Creek
1804 Bear Creek-Waupaca River
1805 Wolf Lake Non-Contributing Area
1806 Emmons Creek
1807 Radley Creek
1808 Crystal River
1809 Mud Lake-Waupaca River
1810 Weyauwega Lake-Waupaca River
1901 Potters Creek
1902 Partridge Crop Lake-Wolf River
1903 Hatton Creek
1904 Walla Walla Creek
1905 Mosquito Creek
1906 Partridge Lake-Wolf River

system. Waters from the Winnebago system then flow into the Lower Fox River where they eventually reach the Bay of Green Bay.

- Development within the basin is predominately along the Wolf River or its major tributaries. Communities like Shawano, Clintonville, New London, Waupaca, Weyauwega and more were developed primarily because of being located on waterways that were used by the logging industry
- The Basin includes the Northern Hills and Northeast Plains Ecological Landscapes with small portions in the Central Sand Hills, Southeast Glacial Plains and North Central Forest.
- Surface waters are a mix of cold and warm water streams with Smallmouth Bass, Walleye, Northern Pike, Panfish, Trout and Salmon. Groundwater is generally abundant, clean and used for drinking water in many of the basin's communities.
- Over 143 rare animal species live in the Wolf River Basin, including Northern Goshawk, Red- headed Woodpecker, Great Gray Owl, Barn Owl, Red- shouldered Hawk, Bald Eagle, Osprey and various butterflies, beetles, dragonflies, fish, grasshoppers, mayflies, mussels, mammals, snails, snakes and turtles.
- The basin supports 57 rare plants (known accounts), including 8 state endangered, 11 state threatened, 38 special concern and two federally listed plants species. The majority of these plants are associated with wetlands.
- Menominee, Stockbridege-Munsee Band of Mohicans, Forest County Potawatomi Community, Sokaogon Chippewa, and Mole Lake-- participate in the Wisconsin NRCS Tribal Conservation Advisory Council.



Land Cover: Wolf River Watershed



Watershed size: 3727 sq. miles

Between 1996 and 2001, there has been a slight increase in developed land, farmland, and forest and a slight decrease in grassland and wetlands.

- The Nature Conservancy identified the Wolf Lake Chain, the Lower Wolf River, Oxbow lakes, and rapids reach of the mainstem Wolf River as critical ecological systems.
- Important plant communities in the Wolf River watershed include Midwest Mixed Emergent Deep Marsh, Silver Maple - Elm - (Cottonwood) Forest, and Tussock Sedge Wet Meadow.
- The Nature Conservancy identified the Wolf River as a critical migratory waterfowl stopover site.
- The Nature Conservancy identified the following critical species in the Wolf River watershed: Lake Sturgeon; American Bittern; Black Tern; Sedge Wren; Cerulean Warbler; Snuffbox; Wood Thrush; Red-headed Woodpecker; Black-and-white Warbler; Round Pigtoe; Prothonotary Warbler; Golden-winged Warbler; and Blue-winged Warbler.
- The Lower Embarrass River's large tributaries to the lower Wolf River and cool headwaters are critical ecological systems identified by the Nature Conservancy.
- Critical species in the Lower Embarrass River include the Lake Sturgeon, Snuffbox, Round Pigtoe, Pygmy Snaketail, Salamander mussel, and Western Sand Darter.

Watershed Activities

Environmental Concerns

- Loss of aquatic habitat and open land to development; pollution threats to surface and groundwater. Simplification of diverse habitat and loss of special places that support rare species.
- Water quality problems from in- place pollutants, dams, urban and agricultural runoff.
- Preserve of biodiversity and protect endangered and threatened species.
- Protection of large contiguous blocks of forests, grassland and wetland that serve as habitat for mammals, birds, and amphibians and provide a large self-sustaining ecosystem for all to enjoy.
- Invasive exotic nuisance species: Purple Loosestrife, Gypsy Moths, Zebra Mussels, Eurasian Water Milfoil, Garlic Mustard

(uplands), and others.
- Monitoring wildlife populations, water quality, and ecosystem function is needed to determine the status and trends of resources in the basin.

Basin Priorities

Wolf Basin Partners identified the following areas as highest basin priorities:
- Water Pollution
- Loss of Shoreline Habitat
- Hunting/ Fishing/ Trapping and Recreational Uses
- Inventory of Resources

Wisconsin DNR's Wolf Team has also identified priorities to guide work:
- Preservation and protection of wetlands
- The presence and spread of exotic species
- Pressures on Natural Resources from development
- Promoting sound land use and "smart growth" or comprehensive planning

Impaired (303d) Waters

Waterbody Name	Impairment
Arbutus Lake	Mercury Fish Consumption Advisory
Bear Creek	Degraded Habitat, Sediment
Big Hills Lake	Mercury Fish Consumption Advisory
Cloverleaf Chain of Lakes	Mercury Fish Consumption Advisory
Collins Lake	Mercury Fish Consumption Advisory
Columbia Lake	Mercury Fish Consumption Advisory
Deep Hole Lake	Mercury Fish Consumption Advisory
Kusel Lake	Mercury Fish Consumption Advisory
Little Sand Lake	Mercury Fish Consumption Advisory
Mayflower Lake	Mercury Fish Consumption Advisory
Pages Slough (L. Poygan)	Degraded Habitat, Eutrophication, Phosphorous, Sediment, Turbity
Poygan Lake	Dissolved Oxygen, PCB Fish Consumption Advisory, Phosphorous, Sediment
Rat River *	Dissolved Oxygen, Phosphorous
Roberts Lake	Mercury Fish Consumption Advisory
Shawano Lake	Mercury Fish Consumption Advisory
Winneconne Lake	Dissolved Oxygen, Eutrophication, Mercury Fish Consumption Advisory, Phosphorous, Sediment
Wolf River Below Shawano Dam Down To State Hwy 156	Mercury Fish Consumption Advisory, PCB Fish Consumption Advisory
Wolf River from Shawano Dam to Lake Poygan	PCB Fish Consumption Advisory

Data Sources. Land cover map and percentages: National Land Cover database, 1992 (edc.usgs.gov/products/landcover/nlcd.html; Land use change: NOAA Coastal Change Analysis Program, 1996 and 2001 (www.csc.noaa.gov/crs/lca/ccap.html); Total Maximum Daily Load (TMDL) Impaired Waters: Surf Your Watershed (www.epa.gov/surf)