West Twin River Watershed

A clean water guide for people living and working in the watersheds of the Neshota River, Devil's River, Black Creek and West Twin River


West Twin River


Sandhill cranes

Blue flag iris

Photos (from left): Debbie Beyer, Jeffrey J. Strobel and Woodland Dunes Nature Center

Explore & Restore

Lakeshore Natural Resource Partnership LNRP · Wisconsin Maritime Museum at Manitowoc · Woodland Dunes Nature Center & Preserve · UW Extension Basin Education Initiative · Wisconsin DNR

What do you value about your river ?

The Neshota River, Devil's River and Black Creek converge in Manitowoc County, forming the West Twin River. Along with their tributaries, they are referred to collectively as the West Twin River system. Although you may see one of these rivers or streams every day, you may not stop to really think about them or the West Twin River system. As you peer out your window or step outside, what do you see? Is the river scenic, or unsightly? What do you hear? What do you smell? Does the river add to or decrease the economic value of your property? Have you thought about how these rivers and streams connect you to the rest of the world?


Jeffrey J. Strobel

Black-crowned night heron

The West Twin River system is in the Great Lakes basin

The West Twin River system feeds water to the Great Lakes. The Great Lakes have played a major role in the history of the United States and Canada and are immensely important today for food, drinking water, transportation, industry, recreation and energy production.

The Great Lakes make up the largest system of fresh surface water on earth and contain about 18% of the total world supply. The Great Lakes basin, the land area that drains into the Great Lakes, is home to more than 10% of the United States population and 25% of Canada's population. The Great Lakes basin harbors some of the world's greatest industrial capacity. Almost 25% of agricultural production in Canada and 7% of agricultural production in the United States.

Read on to learn more about the West Twin River system. Take time to explore and restore this amazing water resource!

About this brochure: *This brochure is part of the 2009 "Explore and Restore" river education project. "Explore and Restore" is a collaborative effort of Woodland Dunes Nature Center, Wisconsin Maritime Museum, the Lakeshore Natural Resource Partnership, and the UW-Extension Basin Education Initiative and supported with funding through a 2008-09 Wisconsin Department of Natural Resources river protection grant. Through this partnership, programs and educational brochures are offered to citizens regarding four watersheds (East Twin River, West Twin River, Manitowoc River and Silver Creek) that are especially in need of restoration action from citizens. The West Twin River project is partially funded through a grant provided by the Great Lakes Commission with funds from the United States Department of Agriculture.*

The West Twin River system supplies water to Lake Michigan

The West Twin River drains directly into Lake Michigan – one of the greatest of the Great Lakes! By volume, Lake Michigan is the second largest Great Lake and the fifth largest freshwater lake in the world! It is 307 miles long and 118 miles wide, with an average depth of 279 feet.

Lake Michigan is the place where 43% of all Great Lakes fishing happens; it cradles the world's largest collection of freshwater sand dunes and recreational beaches; and it supplies drinking water to 11 million people, including our nearby cities of Manitowoc, Two Rivers and Green Bay. But Lake Michigan and the Great Lakes system have limits. They are showing serious signs of stress from more than 100 years of intense human activity.

Lake Michigan water has a retention time of about 99 years. Polluted water entering the lake almost 100 years ago is likely to still be influencing it today. West Twin River water entering Lake Michigan today may affect not only you and your grandchildren, but even your great-great grandchildren.

Water quality in the West Twin River system contributes directly to the health of Lake Michigan. Activities that support healthy rivers also support a healthy Lake Michigan.

Source: The Great Lakes – An Environmental Atlas and Resource Book. U.S. Environmental Protection Agency (EPA) and the Government of Canada, 1995; and the Lake Michigan Lakewide Area Management Plan (LaMP). Michigan Department of Environmental Quality and U.S. EPA, 2007.

West Twin River Watershed

U.S. Army Corp. of Engineers – Detroit District, and NASA Geospacial Interoperability Office, Jet Propulsion Laboratory


Debbie Beyer

Healthy rivers support healthy Great Lakes for our children and grandchildren to use and enjoy.

What threatens the health of the West Twin River system?

The main threats to the river system and thus, also to Lake Michigan and the rest of the Great Lakes, include polluted runoff, industrial waste, habitat loss and fragmentation, and invasion by alien species.

Industrial waste

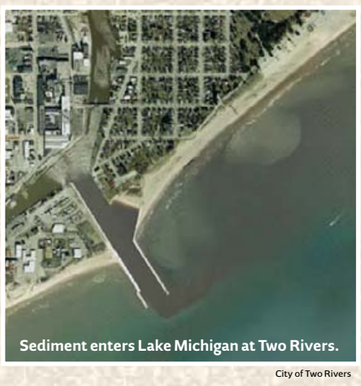
Under federal policy, the lower stretch of the West Twin River, from the Shoto dam to Lake Michigan is classified as "impaired water." This means that due to pollutants the lower West Twin River is not meeting its potential for supporting activities like fishing and swimming. Although the West Twin River and many of its tributaries are impacted by pollution – especially runoff in rural areas, it is contamination from polychlorinated biphenyls (PCBs) in the lower stretch of the West Twin River that puts it on the list of Wisconsin's impaired waters.

PCBs are present in the sediment of the West Twin River and in Lake Michigan. Manufacturing products with PCBs was banned in the U.S. in 1977, but PCBs still persist in air, water and soil. The presence of PCBs restricts the amount of fish that is safe to eat from the lower West Twin River. Remember to check and follow fish consumption guidelines found on the Wisconsin Department of Natural Resources website at: *http://dnr.wi.gov/fish/consumption/*

Runoff from agricultural and urban areas

Agriculture makes up 63% of the land use in the watershed of the West Twin River system. Polluted runoff draining from agricultural lands may contain fertilizers, pesticides, herbicides, manure, land-spread industrial waste, and sediment from soil erosion. Scientists estimate that agricultural lands in the watershed of the West Twin River system contribute 7,100 tons of sediment from soil erosion – equivalent to 340 dump-truck loads, and 24 tons of phosphorus to Lake Michigan each year.

Source: State of the Lakeshore Basin. Wisconsin Department of Natural Resources. 2001.


Sediment enters Lake Michigan at Two Rivers.

City of Two Rivers

(Source: USGS 1996 Water Resources Investigations Report #96-4092)

In urban or residential areas, soil erosion at construction sites and chemicals that run off from pavement and lawns, or are poured into storm sewers can be toxic to fish and other aquatic organisms. Small amounts of pollutants can have big impacts. Just one quart of motor oil poured down a storm drain can create a 2-acre oil slick harming waterfowl, fish and other aquatic organisms. What goes into storm sewers flows untreated directly into lakes, rivers and streams.

Loss of forests and wetlands

Prior to European settlement, the West Twin River watershed was covered with forests and wetlands that provided rich wildlife habitat and protected soil and water resources. Forests held the soil in place during rainstorms and spring thaws, keeping soil from eroding into streams. Forests also shaded rivers and streams, keeping their waters cool.

Wetlands absorbed floodwaters and released them slowly into surrounding rivers, lakes, streams and groundwater. With fewer wetlands and forests, flash floods are becoming the norm today when rainstorms rage or snow thaws.

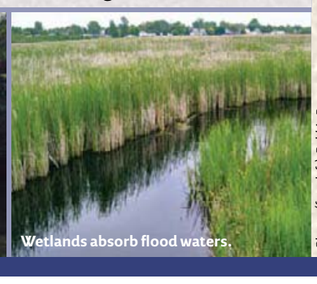
Dams

The Shoto Dam is the major dam on the West Twin River and defines the upper river and lower river. Dams and other barriers, like improperly installed culverts, slow or stop the flow of water, allowing it to warm and promoting algae growth.

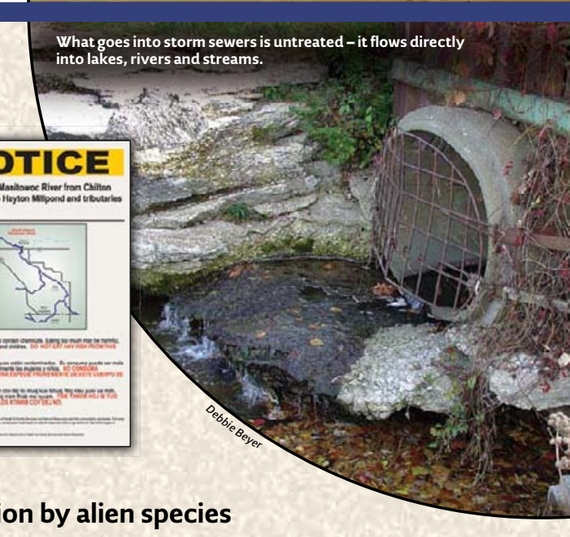
Dams and other barriers confine fish and other aquatic organisms to limited stretches of river or stream and may keep them from spawning areas, winter or summer habitat, or Lake Michigan. Loss of access to critical habitat can reduce or eliminate populations such as northern pike or smallmouth bass that depend on flowing waters.

If you own woodland or wetland, learn more and do what you can to care for it and protect it – you have a special feature that is important to the water quality above and below ground.


Forests help keep river water cool.


Wetlands absorb flood waters.

Photos (from left): Debbie Beyer and Woodland Dunes Nature Center


What goes into storm sewers is untreated – it flows directly into lakes, rivers and streams.

Debbie Beyer

Invasion by alien species

Today, carp and rusty crayfish are the only aquatic aliens known to be present in the entire river system. Other aliens like zebra mussels, sea lamprey and round goby coming from Lake Michigan have been limited to the lower river by the Shoto dam. These aliens replace native species like emerald shiners, sculpin and northern clearwater crayfish.

Purple loosestrife, Eurasian water milfoil, phragmites and bush honeysuckle are alien plants found in the watershed. They displace native plants that provide valuable food and cover for fish and wildlife.

FOR MORE INFORMATION

WISCONSIN DEPARTMENT OF NATURAL RESOURCES

General information
7 am-10pm, 7 days per week:
1-888-936-7463

Spill Hotline
24 hours/day, 7 days/week:
1-800-943-0003

www.dnr.state.wi.us/

Keywords: *Wisconsin waters, rivers, Great Lakes, beach health, impaired waters, fish consumption advisories, runoff, forests, wetlands, dams, aquatic invasive species, natural areas, fish*

COUNTY CONSERVATION DEPARTMENTS

Brown County: 920-391-4620 **www.co.brown.wi.us/**
Kewaunee County: 920-845-1360 x3 **www.kewauneeco.org/**
Manitowoc County: 920-683-4183 **www.manitowoc.wi.us/**

Soil erosion control and water protection information, technical assistance and cost sharing opportunities for farmers, landowners, and home owners with private wells.

UNIVERSITY OF WISCONSIN – EXTENSION COUNTY OFFICES
www.uwex.edu/ces/

Brown County: 920-391-4610
Kewaunee County: 920-388-7141
Manitowoc County: 920-683-4169

Information on drinking water and private wells, water resources, forestry, and earth-friendly yard care. Information aand training for farmers, crop advisors and manure haulers.

WOODLAND DUNES NATURE CENTER 920-793-4007

Focus on East Twin and West Twin Rivers
www.woodlanddunes.com/

WISCONSIN MARITIME MUSEUM 920-684-0218 X 115

Focus on Manitowoc River and Silver Creek
www.wisconsinmaritime.org/

Volunteer opportunities and educational programs.

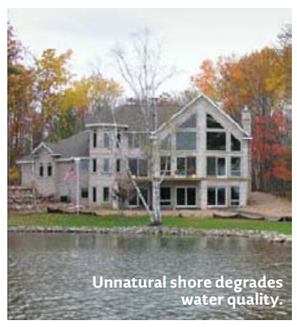
Take action in the watershed to help restore the West Twin River system

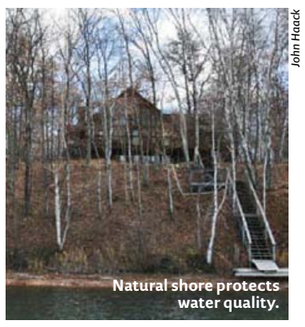
Volunteer...

- Observe and record changes in a portion of the West Twin River system.
- Label "Dump No Waste – Drains to River" on city storm drains
- Restore habitat and beauty to a portion of degraded riverbank by replacing invasive plants with native trees, shrubs, wildflowers and grasses. *(You will need to follow county ordinances and may need a shoreline permit.)*
- Report pollution runoff to the Wisconsin DNR Spill Hotline 1-800-943-0003 *(24 hrs/day)* or your county conservation office.


Kris Stepenuck

Volunteer stream monitoring


Unnatural shore degrades water quality.


John Haack

Natural shore protects water quality.

At home...

- Use lawn care practices that minimize the use of chemicals, especially phosphorus.
- Use lawn care practices that minimize runoff and maximize rainfall and snowmelt infiltration into the soil.
- Maintain or establish a buffer of natural vegetation, rather than mowed lawn, along shorelands.
- Have your septic system inspected and pumped every three years by a certified septic installer to be sure it functions properly.
- Properly dispose of household hazardous waste *(paint, drained oil, old herbicides, cleaning solutions, etc.)*. Watch for annual *"Clean Sweep"* announcements.

On your farm...

- Reduce erosion with crop rotations, conservation tillage, no-till planting, cover crops and grassed waterways.
- Establish wooded or grass buffers along all shorelands.
- Develop and follow a nutrient management plan to optimize yields and lower the phosphorus content in your soil to 25-40ppm.
- Incorporate manure into the soil immediately upon application.
- Avoid applying manure during frozen or snow-covered conditions.
- Do not apply manure or agricultural chemicals near ditches, lakes, rivers, streams, sinkholes, bedrock fractures and wells.
- Build berms to divert water away from sinkholes, bedrock fractures and wells.
- Restore wetlands and woodlands.


Lynn Betts, USDA-NRCS

Rural stream buffer


Wisconsin Maritime Museum

Storm drain stenciling

In town...

- Avoid dropping or pouring anything into storm drains.
- Encourage city officials to create stormwater management ordinances, programs and incentives.
- Encourage city, county and state officials to press for clean-up of contaminated sediments in the West Twin River.

Join your neighbors in the West Twin River watershed to explore and restore clean water to YOUR river and to YOUR Great Lake!

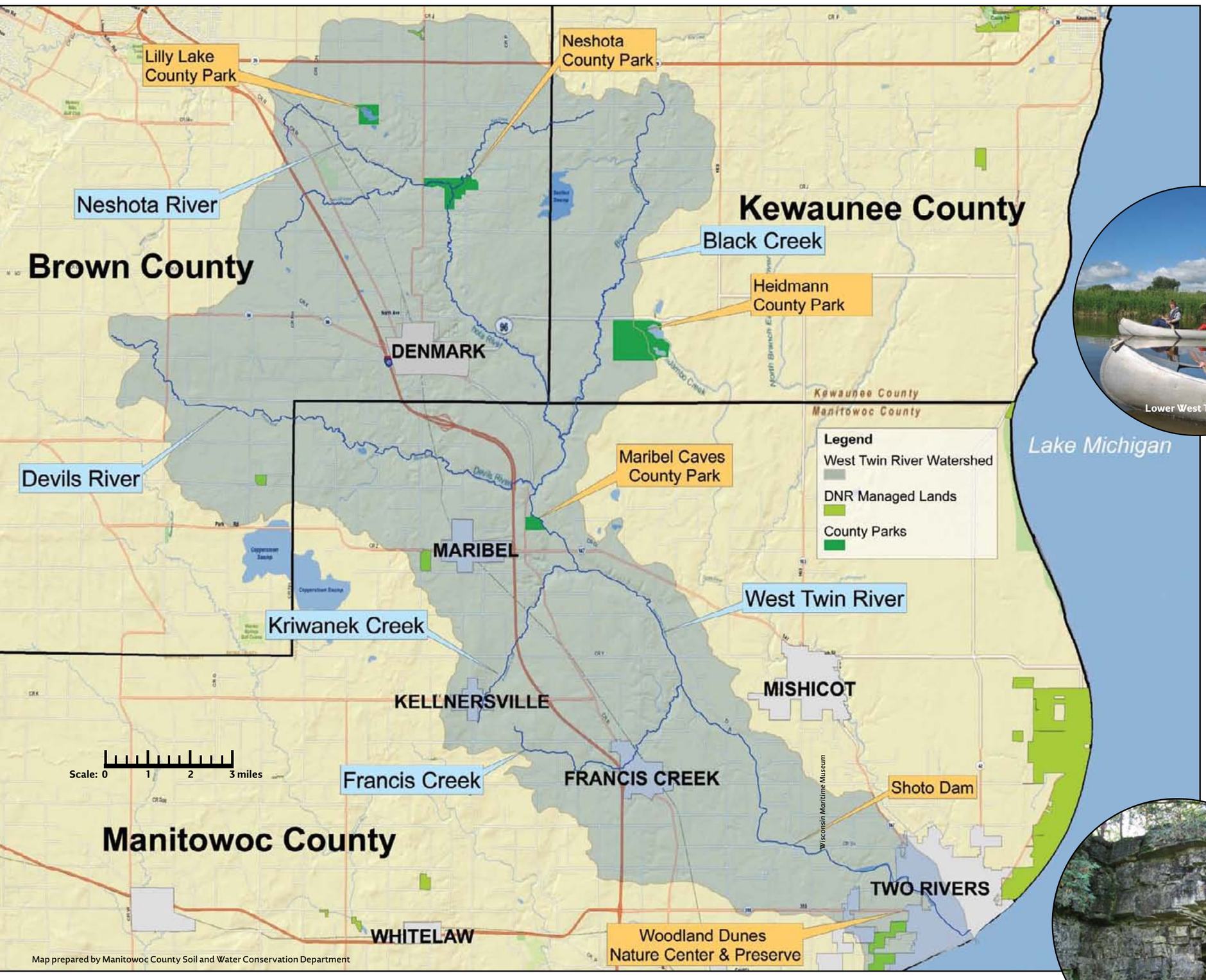
Explore the West Twin River System

Four rivers, one river system

The Devil's River, Neshota River, and Black Creek drain lands in Brown and Kewaunee counties, converge in Manitowoc County as the West Twin River, and flow into Lake Michigan. We refer to these rivers and their tributaries together as the West Twin River system.


Neshota River

Steve Hogler



Map prepared by Manitowoc County Soil and Water Conservation Department

Two sources of river water

Water in the West Twin River system is a mix of groundwater and surface runoff. During dry periods when river levels are low, water you see remaining in rivers and streams is groundwater. Groundwater is rain or snowmelt that soaks into the ground and is stored between soil particles. It slowly seeps into lakes, rivers, and streams.

Rain and snowmelt that does not soak into the ground, but runs off the surface of the land also contributes to the river system. Surface runoff results in increased water depths and river flows seen after rainstorms and winter or spring thaws. Both sources can deliver pollutants to lakes, rivers and streams.

What is your watershed address?

The watershed, the landscape that drains into the West Twin River system, covers 176 square miles or 116,528 acres. Check the map to see where you live or work. If our addresses were based on watersheds rather than city and state, what would be your address?

Answer: Your river or stream, West Twin River, Lake Michigan, Great Lakes, Atlantic Ocean.

Lower West Twin River

Jim Kettler

Boating and canoeing

Below the Shoto dam and immediately above it (Lake Shoto), boats, canoes and kayaks can be used consistently. Upstream from Lake Shoto the rivers get shallow, but most stretches can be canoed or kayaked during wet seasons.

Nature in the watershed


Thomas Meyer

Remnant forests
The West Twin River system meanders its way to Lake Michigan through a landscape that is now mostly agricultural, but was once forested with eastern white cedar, hemlock, beech, sugar maple and white pine. Small relics of this early forest are scattered throughout the watershed, mostly on private land. A few properties open to the public are Maribel Caves County Park-Drumm Memorial Forest and Woodland Dunes Nature Center and Preserve. If you recognize that the woodland on your property looks similar to these, learn more and do what you can to protect it – you have a rare gem!

Cliffs and caves
The Niagara Escarpment is a limestone ridge that curves its way north and west from Niagara, New York, down through eastern Wisconsin. It adds beauty and variety to the land, while challenging us to live and work here with as little impact as possible. The escarpment is limestone that can be dissolved by water. Extensive networks of vertical and horizontal cracks in the limestone are continuously forming, sometimes resulting in caves and cliffs. Explore unique limestone caves and cliffs at Maribel Caves County Park.


Maribel Caves County Park

Manitowoc County

Ancient dunes
At Woodland Dunes Nature Center and Preserve, hike along forested dune ridges and swales – traces of the last Ice Age, when glacial melt waters rose Lake Michigan to levels much higher than today. Notice the rich diversity and changes in plant life as you cross a dune ridge and descend slightly into a swale.

"Karst" regions, including the West Twin River watershed, have bedrock with connecting cracks and layers between rocks that easily transport water and pollutants to the groundwater.


Manitowoc County

People and the river

Imagine the rich hunting and fishing opportunities that drew native people to this area prior to the 1800s. The area now known as Two Rivers, where the East and West Twin Rivers flow into Lake Michigan, was originally the site of native villages and camps. The leader of the local band of Ojibway, was Waumegasako. His summer home was on the banks of the West Twin near Woodland Dunes today.

In the mid 1800s the West Twin River in Two Rivers was lined with shanties where shingles were made. Two Rivers was also the site of many early sawmills and manufacturers, including a wooden chair company and a pail factory. At one time the manufacturers boasted that the Two Rivers Manufacturing Company was the largest producer of pails and tubs in the world. All lumber, shingles, and other goods were floated to the mouth of the rivers by small boats and then transferred to larger vessels for shipping on Lake Michigan.


Logs floating to sawmills in Two Rivers.

Wisconsin Maritime Museum

Plants and animals

Snow Trillium


Thomas Meyer

Along with special habitats found in the watershed are special plants and animals. Limestone cliffs nourish uncommon plants like Christmas fern and walking fern. Caves are home to little brown bats that feast on thousands of mosquitoes and other small flying insects along the river. Winter wrens and mourning warblers use this same food source and nest in wooded habitat along the river's edge. Along the lower West Twin River, sedge and marsh wrens nest in the wetlands and osprey, common and Forster's terns can be seen scouting for fish.

Other interesting plants and animals include snow trillium, large yellow lady's slipper, wild ginger, whip-poor-will, and gray fox. These animals all make their home here because of the habitat.

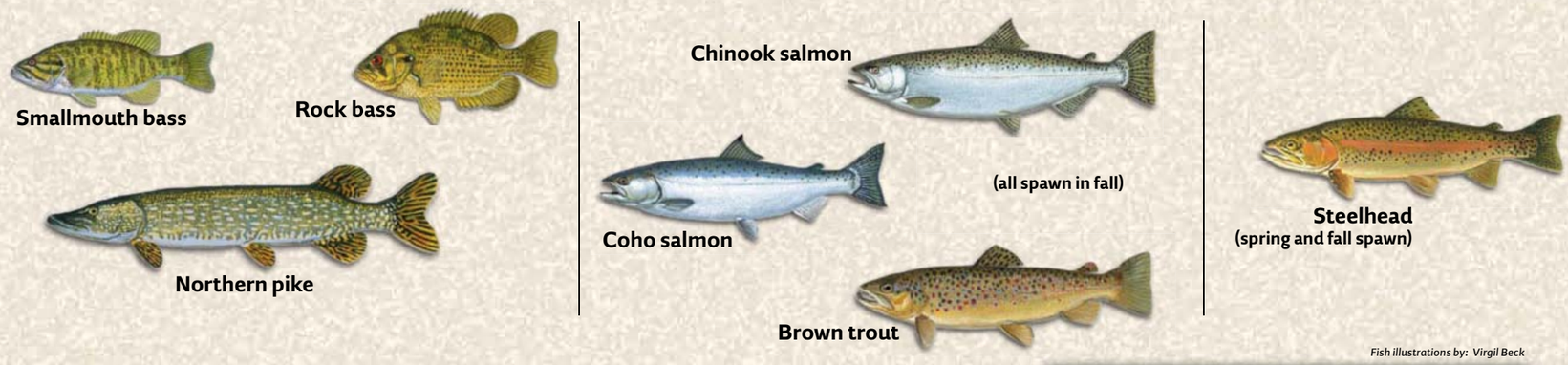
Protect the Water You Drink!

If you own property with a private well in this watershed, learn more about groundwater threats and protecting your well water. Sinkholes and cracks in the limestone bedrock may be direct conduits for pollutants to travel from the land surface to groundwater – the water you drink. Work with your neighbors to minimize impacts on your drinking water. Your health and that of your neighbors depends on it!

The "fish story"

Fishing can improve with water quality and habitat restoration in the upper reaches of the watershed, and clean-up of PCBs in the lower West Twin River. Tributaries and sections of the upper West Twin River system experience episodes of poor water quality from runoff and low or no flow. Surveys in 2002 indicated that above the Shoto dam there was a decrease in game fish such as rock bass, smallmouth bass and northern pike, but a healthy community of invertebrates such as clams, snails and insects.

This river system has great potential. It supports game fish and a diversity of other species. In several high-quality tributaries, native and stocked trout thrive. The West Twin – Neshota River system is home to a Wisconsin threatened fish, the greater redhorse, and the West Twin – Devil's River system is home to a fish uncommon in Wisconsin, the redside dace.



Fish illustrations by: Virgil Beck

The river below the Shoto dam is influenced largely by Lake Michigan tidal flows and the industrial history of Two Rivers. It supports a fishery of northern pike, smallmouth bass, rock bass, perch, channel catfish and seasonal runs of trout and salmon from Lake Michigan. Trout and salmon were stocked in Lake Michigan for controlling alewives for sportfishing.

Remember to check and follow consumption guidelines found on the DNR website:
http://dnr.wi.gov/fish/consumption

Brochure development led by Debbie Beyer, UW-Extension Basin Education Initiative. Reviewed by Steve Hogler and Mary Gansberg, Wisconsin Department of Natural Resources; Kelly Eskew, Woodland Dunes Nature Center; Patrick Robinson, UW-Extension; Jim Kettler, Lakeshore Natural Resource Partnership, Inc.; Wendy Lutzke, Wisconsin Maritime Museum; Brown County Land and Water Conservation Department; Manitowoc County Soil and Water Conservation Department; Dale Robertson, United States Geological Survey. Graphic design by Jeffrey J. Strobel and Amy B. Torrey, UW-Extension Environmental Resources Center.