

A clean water guide for people living and working in the Silver Creek watershed.



Silver Creek Park

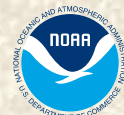


Bald Eagle



Photos (from left): Debbie Beyer and Jeffrey J. Strobel

Explore & Restore



What do you value about your local stream?

Read on to learn more about Silver Creek watershed. Take time to explore and restore this water resource – there's no time like the present!



Jeffrey J. Strobel

Painted turtle

You may see Silver Creek or one of its tributary streams, ditches, or seasonal waterways every day, but you may not stop to really think about it. As you peer out your window or step outside, what do you see? Is the water scenic, or unsightly? What do you hear? What do you smell? Does the water add to or decrease the economic value of your property? Have you thought about how this water connects you to the rest of the world?

The Silver Creek watershed is in the Great Lakes Basin

Silver Creek and its tributary streams provide 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 and almost 25% of agricultural production in Canada and 7% of production in the United States.

Sources: 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.

The Silver Creek watershed supplies water to Lake Michigan

Silver Creek flows directly into Lake Michigan – one of the greatest of 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 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 for 11 million people, including those living in nearby communities of Green Bay, Two Rivers, Manitowoc and Sheboygan. 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 retains water for about 99 years before it cycles out to Lake Huron. Polluted water entering Lake Michigan almost 100 years ago is still affecting the lake now. The quality of water entering Lake Michigan today impacts how you, your grandchildren and even your great-great grandchildren will be able to use and enjoy the lake.

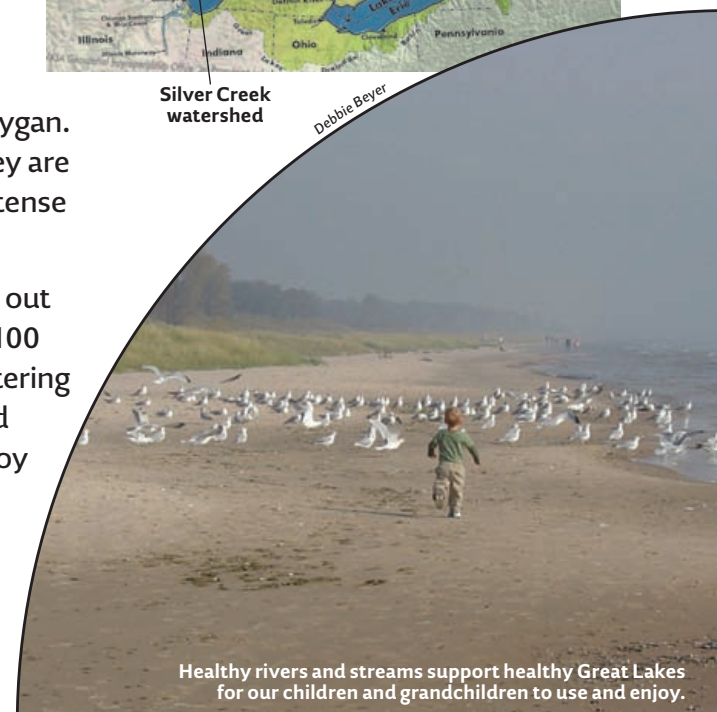
Water quality in Silver Creek and its tributaries contributes directly to the health of Lake Michigan. Activities that support healthy streams support healthy Great Lakes.



Great Lakes Basin

Silver Creek watershed

Debbie Beyer



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

What threatens the health of water in the Silver Creek watershed?

Polluted runoff from the land, habitat loss and fragmentation, and invasion by alien species are the greatest threats to lakes and streams in the Silver Creek watershed.

Runoff from agricultural and urban areas

Agriculture makes up more than 76% of land use in the Silver Creek watershed. Runoff from agricultural lands may contain fertilizers, pesticides, herbicides, manure, land-spread industrial waste, and sediment from soil erosion.

From 1986 to 1996 Silver Creek watershed was included in a special initiative to reduce agricultural runoff. Prior to the project, phosphorus levels were more than 20 times the acceptable level. The project included modifying barnyards, constructing manure storage facilities, protecting streams from cattle, establishing streamside buffers, and restoring wetlands. Landowner participation was great and there was a 35% reduction in cropland runoff, 72% reduction in barnyard runoff, and 64% reduction in winter-spread manure. More of these actions are needed to continue to improve water quality in Silver Creek.



Silver Creek carrying a heavy sediment load after a storm.

Sources: State of the Lakeshore Basin, Wisconsin Department of Natural Resources, 2001 and Manitowoc County Soil and Water Conservation Department.

Reduce Runoff & Protect the Water You Drink!

If you own property with a private well in this watershed, learn more about how runoff threatens groundwater and how to protect your well. Work with your neighbors to minimize surface runoff and impacts on your drinking water. Your health and that of your neighbors depends on it!

In residential, urban, and industrial areas, runoff is also a threat. Soil erosion at construction sites and chemicals that run off 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 fish, waterfowl and other aquatic organisms. Remember that what goes into storm sewers flows untreated directly into lakes, rivers and streams.

Loss of forests and wetland habitat

Prior to European settlement, the Silver Creek 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 streams, keeping their waters cool.



Jeffrey J. Strobel

Wetlands absorb flood 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.

Biologists estimate that at least 50% of historic wetlands have been lost in this region. Historically, wetlands large and small dotted the watershed, absorbing floodwaters and releasing them slowly into surrounding lakes, streams and groundwater. Wetlands and their flood-control benefits are greatly diminished today. Flash floods are becoming the norm when rainstorms rage or snow thaws.

Invasion by alien species

Carp and rusty crayfish are likely to be present in waters throughout the entire watershed. Other aliens like zebra mussels, sea lamprey and round goby coming from

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



Jeffrey J. Strobel

Debbie Beyer

Lake Michigan are probably limited to lower Silver Creek, in the stretch from Lake Michigan to Silver Lake. These aliens replace native species like emerald shiners, sculpin, and northern clearwater crayfish.

Purple loosestrife, Eurasian water milfoil, phragmites, bush honeysuckle and buckthorn are alien plants in the watershed that displace native plants that provide valuable food and cover habitat 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 DEPARTMENT

Manitowoc County: 920-683-4183 www.manitowoc.wi.us
 Soil erosion control and water protection information, technical assistance and cost sharing opportunities for farmers, rural landowners and homeowners with private wells

UNIVERSITY OF WISCONSIN – EXTENSION COUNTY OFFICE

www.uwex.edu/ces
 Manitowoc County: 920-683-4169
 Information on drinking water and private wells, water resources, forestry, and earth-friendly yard care. Information and training for farmers, crop advisors and manure haulers.

WISCONSIN MARITIME MUSEUM 920-684-0218 X115
www.wisconsinmaritime.org
 (focus on Manitowoc River and Silver Creek)

WOODLAND DUNES NATURE CENTER 920-793-4007
www.woodlanddunes.com
 (focus on East and West Twin rivers)

Take action on land to restore healthy water to Silver Creek

Volunteer...

- Observe and record changes in a portion of Silver Creek, a tributary stream, or lake.
- Help restore Silver Lake Park.
- Label "Dump No Waste – Drains to Stream" 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. (Need to follow city and county ordinances and may need a shoreline permit.)



Unnatural shore – degrades water quality



Natural shore – protects water quality

At home...

- Use lawn care practices that minimize the use of chemicals, especially phosphorous.
- 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 any stream bank or lakeshore.
- 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, oil 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, streams, or wells.
- Build berms to divert water away from wells.
- Restore wetlands and woodlands.



Rural stream buffer



storm drain stenciling

In town...

- Avoid dropping or pouring anything into storm drains.
- Encourage city officials to create stormwater management ordinances, programs and incentives.
- Report pollution runoff to the Wisconsin DNR Spill Hotline 1-800-943-0003 (24 hrs/day) or your county conservation office.



Volunteer stream monitoring

Explore the Silver Creek Watershed

Local water, global connections

Silver Creek and its tributary streams, ditches and seasonal waterways drain 17,122 acres of land in Manitowoc County. Silver Creek meanders for almost 15 miles before it flows into Lake Michigan, contributing to the health of the Great Lakes-St. Lawrence River system. This water eventually finds its way to the Atlantic Ocean!

Map developed by the Manitowoc County Soil and Water Conservation Department.



Two sources of water

Streams in the Silver Creek watershed are fed mostly by surface runoff. Rain and snowmelt that does not soak into the ground, but quickly runs off the surface of the land is *surface runoff*. This results in increased water depth and flow after rainstorms and winter or spring thaws.

During dry periods when stream levels are low, water you see remaining in streams is likely *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. Both surface runoff and groundwater can deliver pollutants to lakes, rivers and streams.

What is your watershed address?

The watershed, the landscape that drains into Silver Creek, covers almost 27 square miles. Check the map to see where you live or work. If your address was based on watersheds, rather than city and state, what would it be?*

Boating and canoeing

The best opportunities in this watershed for boating, canoeing and kayaking are found on its lakes. Gas motors are allowed on English Lake, but only electric motors and paddles are allowed on Silver Lake. This helps keep Silver Lake clean and quiet.



Lessons from Silver Lake

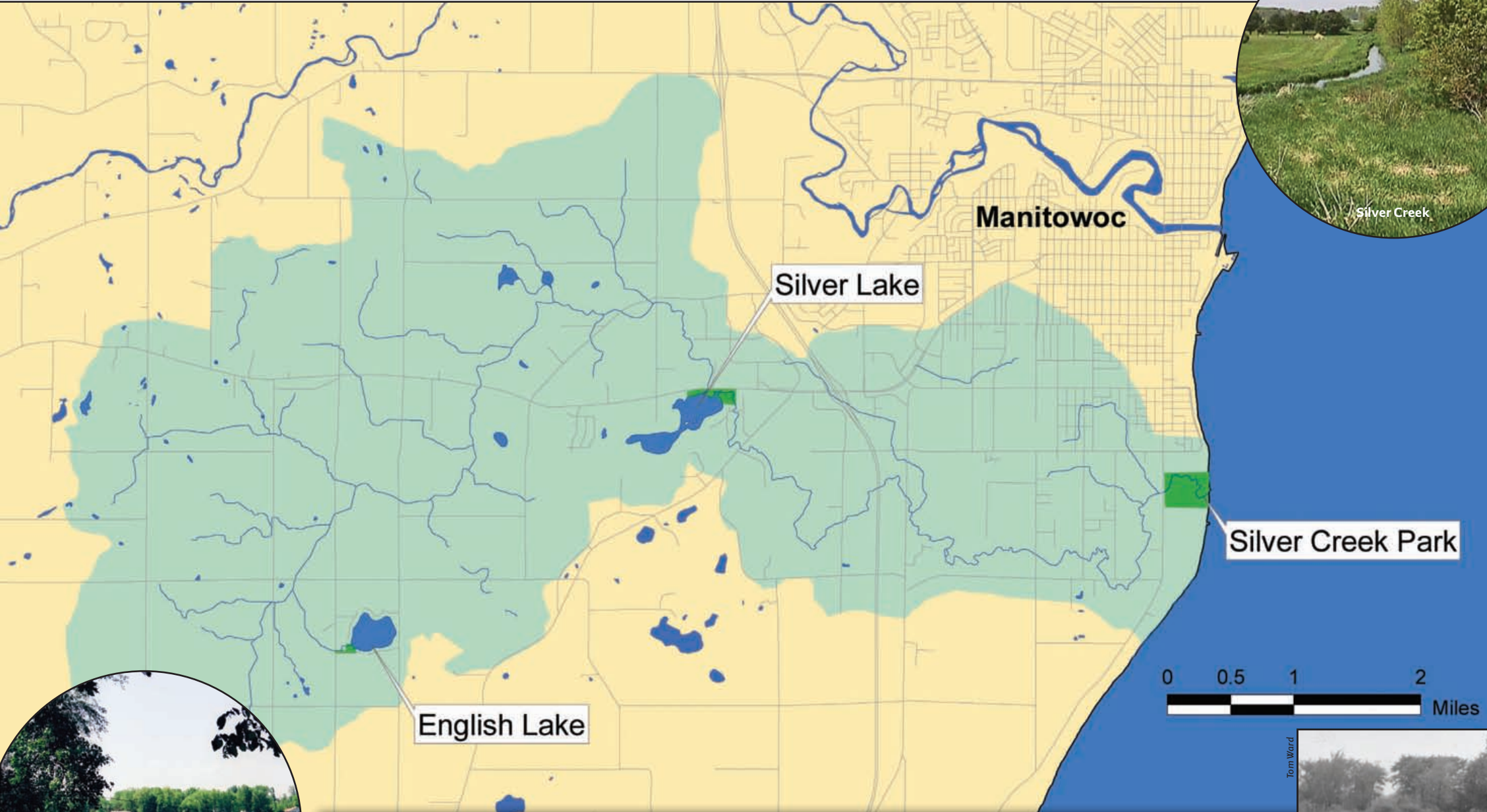
The vulnerability of Silver Lake increased dramatically during the construction of Highway 151 in the 1920s. Wetlands along Silver Lake and the Silver Creek channel were likely altered.

By the 1960s, Silver Lake was showing symptoms of poor health. The lake was being choked by soil erosion and pollution from fertilizers. Changes on the land were causing changes in the water. Fish kills began occurring in the 1950s, reducing the lake's population of pike, perch and bass to almost nothing. At the same time, the carp and

bullhead population increased dramatically. Carp and bullhead are able to live in poor quality water.

Scientists estimated that at least 266 tons (15 dump-truck loads!) of soil washed down Silver Creek and into Silver Lake each year, smothering lake plants and fish spawning sites. Additionally, enough phosphorus fertilizer entered the lake to grow 900,000 pounds of algae each summer. The growing and dying mats of algae depleted oxygen in the lake, making it unfit for many forms of aquatic life.

More than \$1 million has been spent since in the 1980s to restore Silver Lake and Park. Restoration efforts are expensive and still the lake may not return to its early 1900s glory. The task now is to watch, wait, and continue to reduce impacts from surrounding land uses.



THE SILVER LAKE STORY teaches us how important it is to protect lakes and streams. Silver Lake was a vacation destination in the early 1900's. Fishing and boating were very popular. The lake was clear and clean – fish and wildlife abounded. Nearby marshes served as spawning grounds for Silver Lake's thriving northern pike fishery.



Places to Explore and Enjoy

There are three public natural areas to explore and enjoy the upper, middle and lower stretches of this watershed.

English Lake

English Lake is a 51 acre lake that is up to 80 feet deep in some places. Much of the English Lake shoreline is developed with cottages and year-round residences. The lake experiences heavy use from boaters, water-skiers and anglers. Dominant fish species and populations have fluctuated widely through the years. The most recent survey in 2004 showed that largemouth bass and bluegill were the most common species at that time. A public parking lot, piers, picnic area and boat launch provide access to this popular lake in the upper reaches of the Silver Creek watershed.

Silver Lake Park

In the middle of the watershed, newly renovated Silver Lake Park provides access to the lake and 12 acres to enjoy and learn about nature. The park includes a boat launch and fishing pier, trails, restrooms, picnic area, and shoreland restoration plantings.

In 2008, the WDNR stocked largemouth bass, northern pike, walleye, yellow perch, white sucker, and fathead minnow in Silver Lake as part of the restoration. The stocked fish appear to be growing well and some are reproducing. It is suspected that bluegill and pumpkinseed sunfish have been illegally released into the lake. This may actually slow down restoration of the fish population.



Learn more about Silver Lake's history and restoration efforts by viewing outdoor exhibits throughout the park. Relax and enjoy the lake scenery as you see and hear birds, frogs and other wildlife.

Silver Creek Park

The mouth of Silver Creek can be explored at Silver Creek Park, a 79-acre city park on the south side of Manitowoc. Hike through scenic wooded hills and explore Silver Creek and Lake Michigan beach. This is a great place for viewing migrating birds and fish in spring and monarch butterflies in fall.

In March and April, this park is a favorite spot for anglers in search of trout, northern pike, suckers and smelt. With the change of seasons, anglers once again fish Silver Creek in late September and October for migrating Chinook salmon.

While exploring the park, take note of wetlands along the beach and stream. These are called *coastal wetlands* and are different from inland wetlands because of their interaction and history with Lake Michigan. They provide important spawning habitat for fish, stopovers and staging grounds for migratory and breeding birds, and critical habitat for rare plants and animals.

People and the watershed

People have been drawn to resources in this watershed for thousands of years. The vast forests, wetlands, streams and Lake Michigan provided food, shelter and clothing resources for native people. One clothing resource, fur, drew the first waves of European

people – French and then British - to this area and all of Wisconsin from the 1600s through the early 1800s.

Major changes to the land and impact on the water began to happen in the mid-1800s when Wisconsin's vast timber resources were sought for building cities like Milwaukee, Chicago, and St. Louis. Within the course of about 60 years Wisconsin's forests were cut over. With soils left unprotected, rivers, lakes and streams likely experienced the first major flush of human-induced soil erosion.

The next wave of European settlers was drawn to the cleared land and productive soils for farming. Agriculture was promoted and it remains an important part of the state's economy today. The challenge today is to protect land and water resources while achieving optimal agricultural production.

Water-based recreation has drawn several generations to this watershed. For many years, English Lake and Silver Lake in particular, have attracted people for fishing, swimming and relaxation.

What drew you or your family to this area?



The "fish story"

Fishing can improve in Silver Creek by restoring good water quality – water that is cool and clean with high levels of dissolved oxygen. Water quality can be improved by reducing runoff and soil erosion from the land and restoring wetlands. Avoiding channeling and ditching and allowing streams to return to a more natural condition will create more pools and rapids, habitat components that fish need.

Fish populations in the watershed's lakes may also improve if soil and runoff pollution are stopped from entering the streams that flow into the lakes. Fish habitat in the lakes can be improved by protecting natural habitat on the shore and in

shallow water, by restoring natural shorelines, and by following fishing regulations. As the "Silver Lake story" shows us, once water quality is degraded and good fish habitat is lost, it is difficult and expensive to restore.

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

