

BENZIE WATERSHEDS

Stewardship Guide



BENZIE
CONSERVATION DISTRICT

BENZIE WATERSHEDS

Stewardship Guide

Dear Benzie County Watershed Resident,

Benzie County boasts some of the most beautiful waterways in northwestern Michigan. In fact, our watersheds play a pivotal role in the vibrancy of our region through countless ecological rhythms and processes. Since we share the wealth of benefits flowing from our waters, we share in the responsibility to care for their future.

As a watershed resident, you play an especially important role in preserving the region's water quality and natural resources. Thank you for taking the time to read this guide and becoming a watershed steward.

Sincerely,

Your Friends at the Benzie Conservation District

*Funded through the support of
Grand Traverse Regional Community Foundation*



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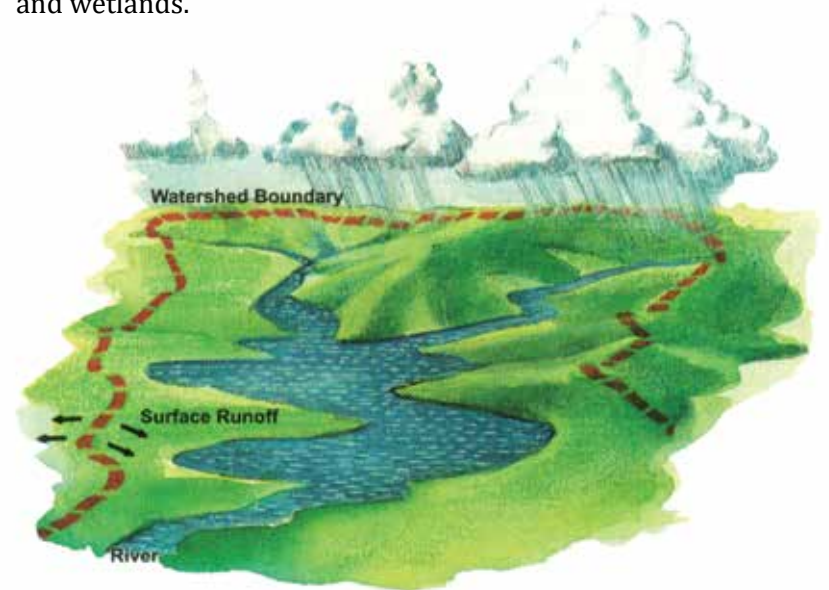
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Living in a Watershed

WHAT IS A WATERSHED?

A watershed is the land area that drains waters flowing into a particular stream, river, or lake. It can be described as a catch basin that is defined by the line of highest elevation that separates both ground water and surface waters flowing into different water bodies. Below is a diagram of a typical watershed that starts with small headwater streams in the higher elevations and flows downhill from the drainage divide into larger streams, eventually joining a river. A watershed's drainage system consists of a network of ground water, rivers, streams, lakes, storm drains, and wetlands.



Although not everyone lives next to a river or lake, we all live in a watershed. Because of the connectivity within a watershed, activities such as dumping used motor oil or fertilizing can affect water quality even when you do these things far from a body of water.

The Benzie Conservation District coordinates and conducts water resource protection projects. Our efforts have been focused at the watershed level and include the Platte River, Betsie River/Crystal Lake, and Herring Lakes watersheds. All projects follow the watershed planning and implementation approach developed by the United States Environmental Protection Agency (EPA) and the Michigan Department of Environmental Quality (MDEQ). Watershed management is integral to water resource management and protection. Benzie County is endowed with a great abundance of high-quality lakes and streams that form a critical component of our beautiful and world-renowned landscape.

In surveys conducted between 2012 and 2016 by the Benzie Conservation District, stakeholders overwhelmingly chose surface water quality as the most important resource concern in Benzie County. Although the streams and rivers of Benzie County are generally of high quality, known and potential problem sites do exist as a result of “**nonpoint source pollution**” like storm-water runoff, degraded or inadequate road/stream crossings, former dam sites, residential development, agricultural runoff, bank erosion and sedimentation, recreational impacts, point-source pollutants, and invasive species. There are three main watersheds in Benzie County: Platte River, Betsie River/Crystal Lake, and Herring Lakes. Living in these watersheds allows us direct opportunities to protect our invaluable waters.

Nonpoint Source Pollution

NPS pollution is caused by rainfall or snowmelt moving over and through the ground. As the runoff moves, it picks up and carries away natural and human-made pollutants, finally depositing them into lakes, rivers, wetlands, coastal waters and ground waters.

Benzie's Watersheds

PLATTE RIVER WATERSHED

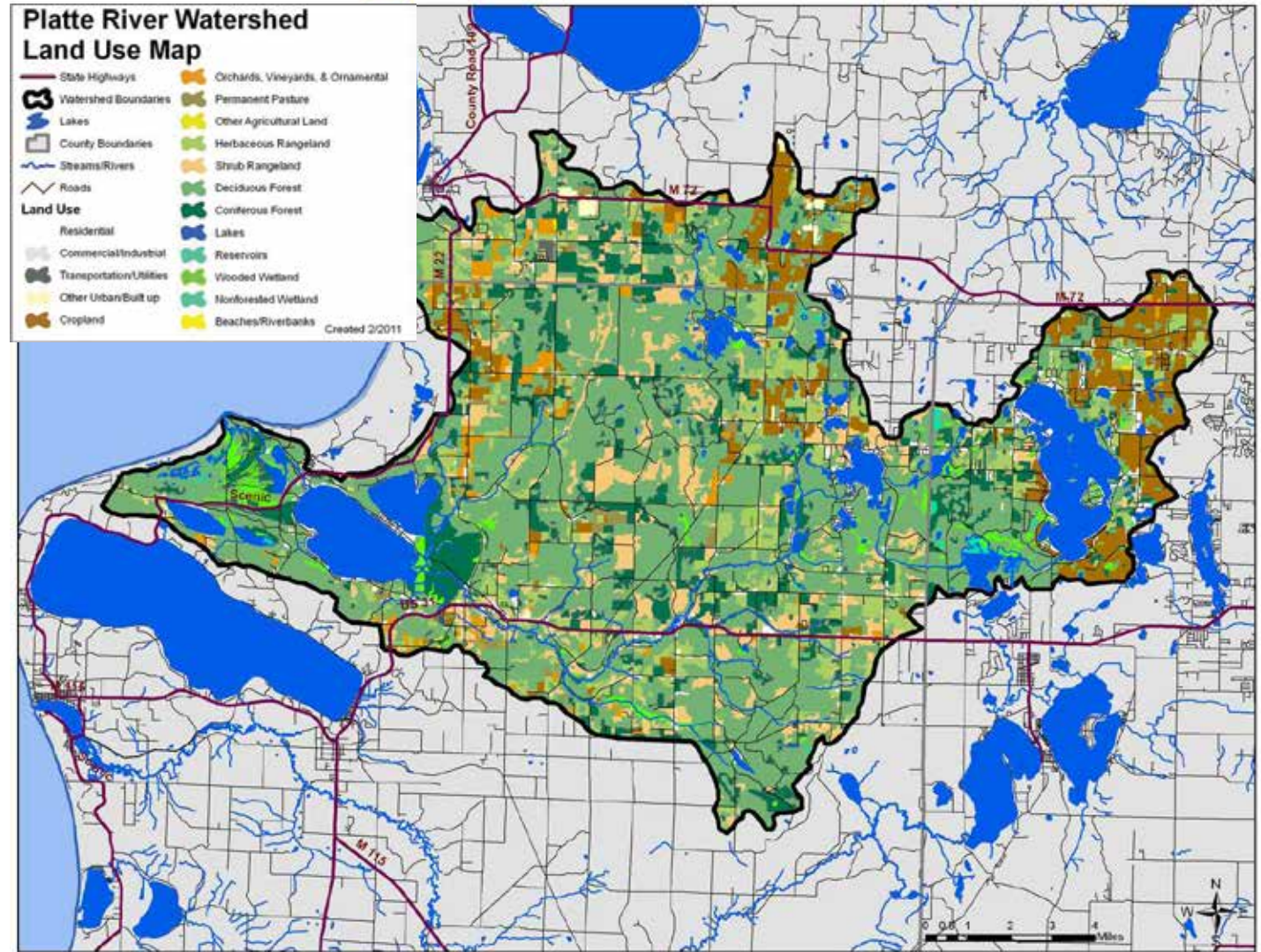
The Platte River watershed is located primarily in Benzie County, covers 193 square miles with a total of 90.5 miles of river and connecting streams. The Platte originates from a series of lakes in western Grand Traverse County and flows for about 20 miles before it reaches Platte Lake and then another five miles to the confluence with Lake Michigan. The river mouth is located in Sleeping Bear Dunes National Lakeshore and much of the river proper lies within the Pere Marquette State Forest. The Platte River is recognized as one of Michigan's Blue Ribbon Trout Streams and provides excellent fishing opportunities for trout and salmon. The Platte is a hydraulically stable river system due to the deep glacial outwash deposits of permeable soils that promote infiltration and movement of the ground water to create consistent and stable base flow throughout the year. The river drops approximately five feet in elevation per mile, thus hinting at the root of its name, “plat” being the French word for “level or flat.”

The Platte River State Fish Hatchery is located on the upper river. The facility raises Coho and Chinook salmon and is the main “egg-take” station for Coho Salmon in the upper Great Lakes.



In the past, the hatchery contributed massive phosphorus discharges into the river, resulting in a lawsuit and years of legal negotiations between the Platte Lake Improvement Association and the DNR Fisheries Division. As a result, the hatchery operations have improved to the point that it is now a zero-discharge facility.

Much of the Platte River watershed drains areas located in the northern half of Benzie County. Although it is the smallest county in the state, it is currently ranked as the third fastest in growth (Benzie County Open Space and Natural Resource Protection Plan - BCOSN-RPP). Population growth in upper watershed areas of Grand Traverse County is projected to increase significantly by 2020. The growing population is predicted to convert 36% of the current forested areas into residential, commercial and industrial land use (Long Lake Watershed Management Plan, 2009). Thus, although significant measures to control point sources from the Platte River State Fish Hatchery have been attained, the Platte River and Big Platte Lake are under pressure from projected increases in nonpoint nutrient and sediment loads throughout the watershed. The main resource concerns for the Platte River watershed are: phosphorus levels, residential development, deteriorated and/or inadequate road/stream crossings, invasive species, and runoff from urban and agricultural areas.



A variety of partners work on conservation-based projects in the watershed, including the Conservation Resource Alliance, Benzie Conservation District, Platte Lake Improvement Association, Natural Resources Conservation Service, Grand Traverse Band of Ottawa and Chippewa Indians, and other state, federal, and private entities.

BETSIE RIVER/CRYSTAL LAKE WATERSHED

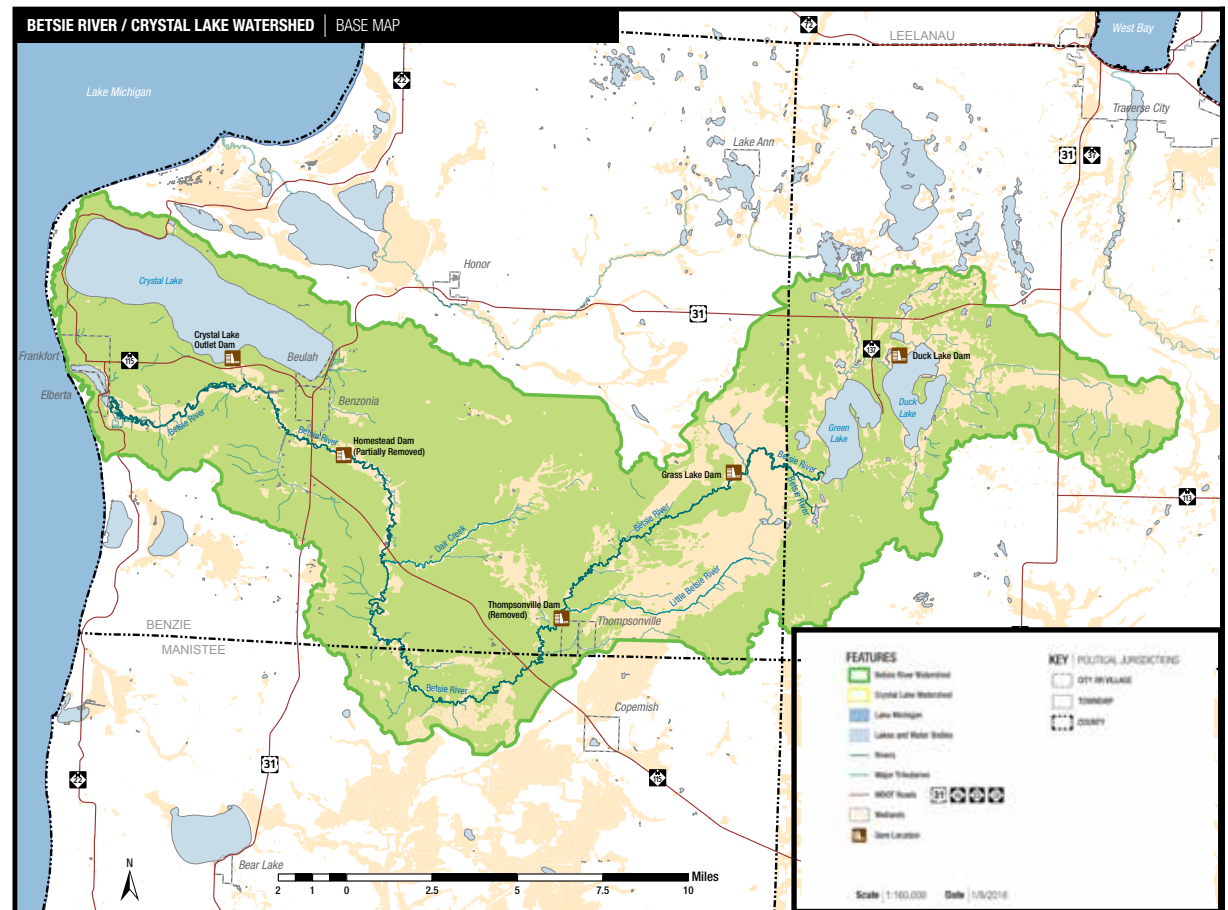
The Betsie River watershed is located in Benzie, Grand Traverse, and Manistee counties, and drains roughly 242 square miles. The Betsie River originates at Green Lake in Grand Traverse County and flows for nearly 50 miles to Betsie Lake and Lake Michigan near Elberta and Frankfort in Benzie County. The two largest tributaries to the Betsie River are the Little Betsie River and Dair Creek. The Betsie River has been a state-designated Natural River since 1973. Though it is of modest size, the watershed is exceptionally diverse, extending from unpopulated wetlands and remote trout streams in inland forests to the busy Lake Michigan recreational harbor at Frankfort.

The Crystal Lake and Crystal Lake Outlet subwatershed – including the 9,850-acre Crystal Lake and its associated drainage area – occupies the northern margin of the overall Betsie/Crystal Watershed, including the village of Beulah and part of Benzonia village. This deep lake has exceptional water clarity and 21 miles of shoreline with some of the highest shoreline property values in northern Michigan. A small segment of the Sleeping Bear Dunes National Lakeshore lies in the Crystal Lake watershed. The Crystal Lake Outlet joins the Betsie River five miles before the river reaches Betsie Lake.

The Betsie River/Crystal Lake watershed in north-west Michigan retains excellent water quality and significant natural features which support both a quality of life and a local economy heavily reliant upon tourism and outdoor recreation. This water quality persists despite the fact that humans have been altering the region's landforms and watercourses for more than 150 years.

The Betsie River has two former hydroelectric dam sites, a waterfowl flooding dam in the headwaters, and an additional former dam site on Dair Creek. In

1989, the hydroelectric dam near Thompsonville washed out, adding thousands of cubic yards of sediment to the river. There have been more than 20 years of efforts to reduce sediments and restore erosion sites. Some of the resource concerns for the Betsie River watershed are: sedimentation and bank erosion, former dam sites, deteriorated and/or inadequate road/stream crossings, invasive species, recreational use, and residential development.

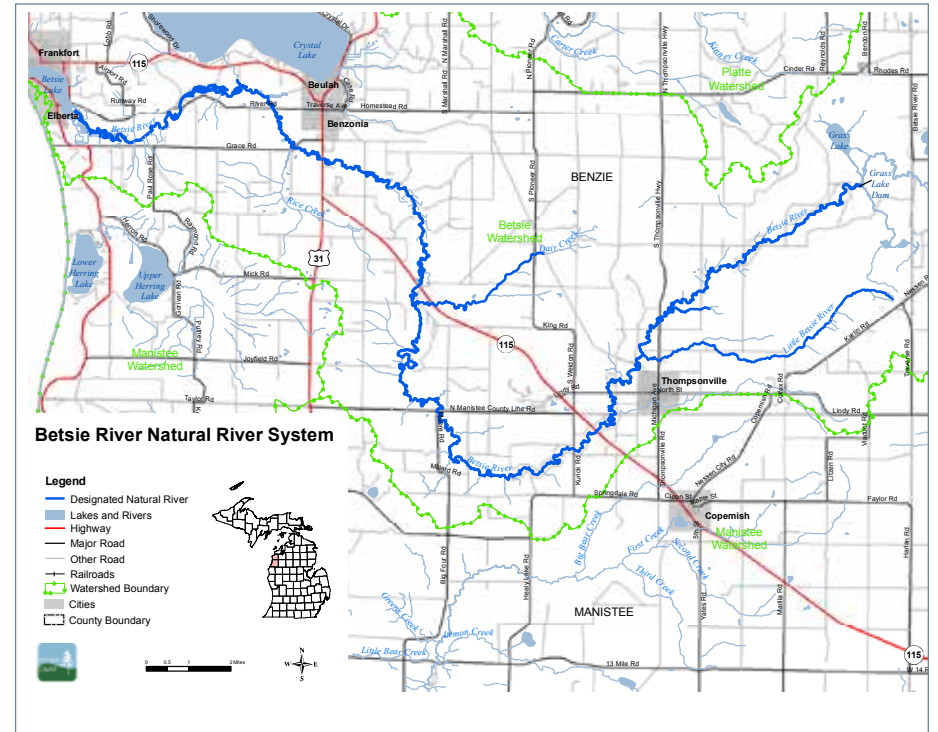


The Betsie: A Natural River

Michigan sportspersons are fortunate to be surrounded by more than 36,500 miles of rivers and streams, 12,500 miles of which are classified as cold-water trout streams. We are also fortunate that Michigan has many programs focused on the protection and enhancement of those river resources. One of those programs is the Natural Rivers Program, which is part of the Fisheries Division, within the Department of Natural Resources (DNR).

In 1970, the Natural River Act, now known as Part 305 of PA 451 of 1994, was passed into law. The new law authorized the DNR to develop a system of Natural Rivers in the interest of the people of the state and future generations, for the purpose of preserving and enhancing a river's values for a variety of reasons, including; aesthetics, free-flowing conditions, recreation, boating, historic, water conservation, floodplain, and fisheries and wildlife habitat. Since 1970, 2,091 miles on sixteen rivers or segments of rivers have been designated into Michigan's Natural River Program.

The **Betsie River** is located in Grand Traverse, Benzie and Manistee counties. The stream originates at Green Lake near the village of Interlochen and flows in a westerly direction to its outlet into Betsie Lake and Lake Michigan near Elberta and Frankfort. A large part of the river lies within the boundaries of the Fife Lake and Betsie River State Forests and flows through the Betsie River State Game Area near its mouth. The Betsie River drains a surface area of approximately 165,800 acres and includes about 93 linear miles of streams, 52 miles of which is the main river.



A thing is right when it tends to preserve the integrity, stability and beauty of the biotic community. It is wrong when it tends otherwise. ~ Aldo Leopold

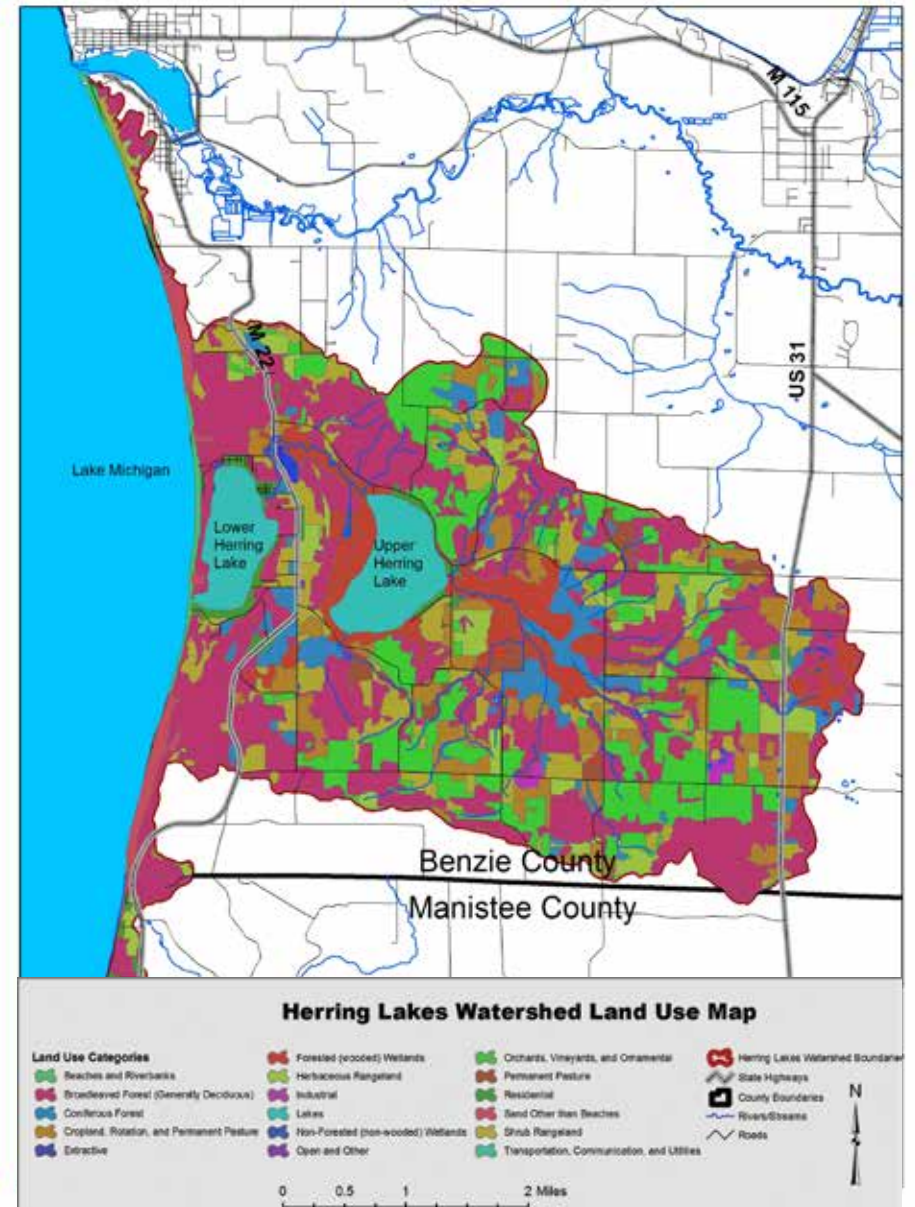
HERRING LAKES WATERSHED

The Herring Lakes watershed is located almost entirely in the southwest corner of Benzie County and encompasses 25 square miles. Herring Creek flows through both Upper Herring Lake and Lower Herring Lake before reaching Lake Michigan. The upper watershed consists of a myriad of small tributaries flowing through primarily agricultural land, forests, and a large wetland. Herring Creek forms at the junction of various tributaries just upstream of Upper Herring Lake. Herring Creek and its tributaries drain a large area of the watershed which includes 41% forest land, 27% agricultural and livestock farms, 14% open land, 6% residential land, 7% wetlands, 3% barren land, and 2% water.

The primary resource concerns in the Herring Lakes watershed are fecal matter, nutrient, and pesticide contamination from residential and agricultural areas, invasive species, shoreline erosion, road/stream crossings, and sedimentation.



Upper Herring Lake Shoreline



Best Management Practices

Any time a natural ecosystem is altered the water quality within that watershed may be impacted. In order to enjoy the beauty of our freshwater resources in Benzie County it is common for us to build homes on the shores of our favorite bodies of water and to clear the vegetation that blocks our view. However these practices disrupt the natural function of our watersheds, in turn threatening the water quality, wildlife, and natural aesthetics that attracted us to the area in the first place. Poor management practices can also lead to conditions that devalue yours and neighboring properties. Common and necessary practices such as construction, waste removal, and using fertilizers or pesticides can also degrade water quality. However, a little knowledge, planning, and effort can go a long way to preserve the economic and ecological value of your property while helping maintain our high quality waterways for everyone to enjoy for years to come.

This guide is meant to provide Benzie County residents with some common knowledge and Best Management Practices (BMPs) for our homes, properties, and actions aimed to keep our water and watersheds healthy. The term “best management practice” is defined as methods or techniques found to be the most effective and practical means in achieving an objective (such as preventing or minimizing pollution) while making the optimum use of natural resources. This is not a regulatory nor comprehensive guide of all BMPs for you and your home, but serves as a reference and educational tool for all whom wish to protect and enhance the watersheds of Benzie County.

Best Management Practices

BMPs are methods or techniques that are the most effective and practical means to achieve an objective (preventing or minimizing pollution) while making the optimum use of natural resources.

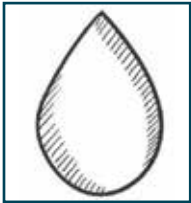
YOUR HOME: THREATS TO THE WATERSHED

Although not as obviously connected to the water as your land, your home presents many potential threats to the water. This is where we find some of our least noticeable degraders of water quality. However, maintenance of your household water system, a little septic sleuthing, and some knowledge of the best management practices will go a long way towards making sure your home is watershed friendly!

Chemicals used in the home such as household cleaners, detergents, and automotive fluids can be transferred into the ground or surface water through old leaky septic systems, incorrect usage, runoff, and/or spills. Your home’s septic system plays an important role in keeping your ground and surface waters clean. Septic systems that are overused, undersized, out-of-date, or not properly maintained may not only be tainting the ground water with bacteria, but also polluting a nearby water body. Bacteria and nutrients from a leaky septic system can contaminate a water body making it unsafe for human contact and can cause algal blooms and degraded water quality.

By following these BMPs for your home you can avoid some of the most serious threats to the surrounding watershed.

Best Management Practices: Water System



Be aware of changes in color, odor, and cloudiness of your water; if such changes occur, stop drinking it immediately and have it tested by the local health department. Some water quality changes may not be easily detected visually or by odor alone, thus the need for routine testing.



Have your well water tested periodically. Remember that your results may differ from your neighbors so do not rely on their water quality results for your well. A good rule: test your water supply on the same schedule as your septic pumping. For a fee, testing service is provided by the Benzie-Leelanau District Health Department, located in Benzonia.



Never dispose of toxic chemicals in your drain or by spreading on the ground or driveway. Even small amounts of chemicals such as gasoline, motor oil, anti-freeze, solvents, etc. can migrate deep into the ground and taint a large amount of ground or surface water.



When installing a well always work with a licensed driller and obtain required permits. A reputable driller will be knowledgeable about groundwater flow and the inadequacy of the legal distance of well from septic systems. Make sure that the placement of a well makes sense in terms of groundwater flow, not just of regulated distances. You may wish to contact the Benzie-Leelanau Health Department for references.

Best Management Practices: Septic System

Familiarize yourself with the location, operation, and design of your septic system. Knowing how your system operates is the first step in properly using and maintaining your septic and is crucial for detecting a problem when it occurs.



Learn the location of your system drainfield and keep the area clear. Keep all automobiles and heavy vehicles off of the area.

Do not plant trees on your septic or in your drainfield. Root systems will clog and interfere with the flow through the pipes. However, dense, shallow-rooted plants are beneficial over a drainfield.

Down spouts and drains should be directed away from drainfield areas. Puddles or standing water over drainfields disrupt proper function.

Snow, soil, or other debris should not be stockpiled on top of drainfields because they require free air circulation for proper evaporation and treatment of wastewater.

Check your septic tank sludge depth annually. If the sludge depth is within 6 to 12 inches of the outlet baffle, the drainfield may be clogged with sludge and require replacement. If the depth is within 12 inches of the outlet baffle, the tank requires pumping/cleaning. Also, if the bottom of the scum layer is within 6 inches of the outlet baffle, the tank should be pumped.

Avoid over-burdening your system. Heavy use and products that don't breakdown easily add stress to your system which may cause it to not function properly.

Products that fill up a septic system and are not biodegradable are cigarette butts, fats, paper towels, tissues, diapers, sanitary napkins, grease, and coffee grounds.



Garbage disposals place additional loads on septic systems.

Washing machines with lint traps are the best. Modern washing machines are more efficient

and can help reduce the load on your septic system.

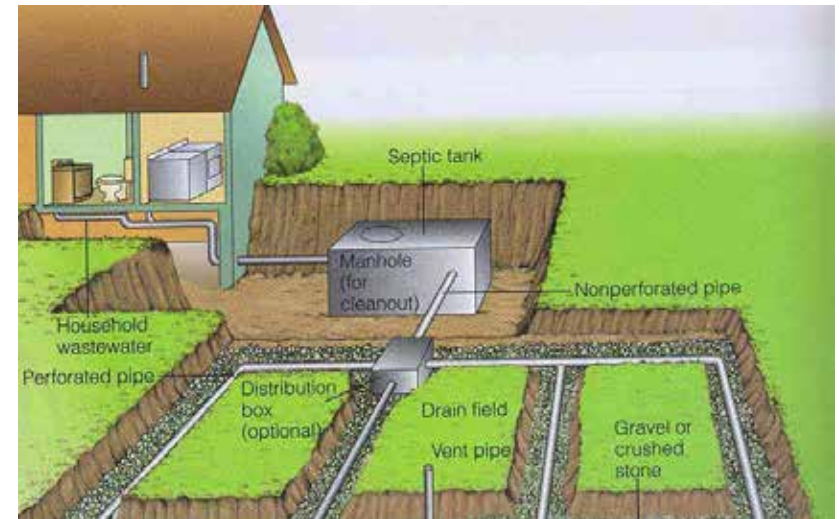
Distribute laundry and dishwasher loads throughout the week to avoid overloading the system and always use detergents without phosphates.

Low-volume toilets and showerheads are an excellent way to reduce the loading of your septic system.

Do not put materials that harm or kill bacteria in your septic system. Products such as solvents, oils, paints, strong cleaning agents (drain cleaner, bleach, etc.), and disinfectants can kill the bacteria in your septic system causing your system to stop functioning.

Do not flush unused pharmaceuticals or vitamins. Studies have shown that human drugs can affect the biology of aquatic organisms, even at very low concentrations.

Do not use chemical agents and additives to clean the system. Additives will not extend the amount of time required between pumping. Although not harmful to the septic tank they could contaminate the soil.



Above: Subterranean view of a household septic system and its drainfield. Below: Landscaping option for over your septic drainfield: a meadow of native wildflowers.



YOUR LAND: THREATS TO THE WATERSHED

People don't often consider their lawn or garden as contributing to pollution or degraded water quality. However, the practices involved in maintaining a perfectly manicured lawn may be contributing to the problems within a watershed. Shallow-rooted turf grasses are less suited to prevent erosion and filter runoff than native grasses and broad-leaf plants which have denser and deeper root systems. Native plants that are adapted to climate and soil conditions of Benzie County also support a wide range of native insects, birds, and animals. The improper use of lawn and garden chemicals may find their way into the ground water or a nearby lake or stream. Gasoline powered mowers and trimmers create noise and air pollution that can be harmful and disturbing to nearby people and wildlife.

One of the greatest threats to Benzie's lakes and streams is the alteration and loss of natural functioning shorelines. Natural shoreline vegetation filters sediment and pollutants in runoff, offers protection from shoreline erosion caused by waves and ice, and provides vital habitat for fish and wildlife. When this vegetation is removed the natural transition from aquatic to terrestrial vegetation is disrupted and an abrupt divide between lake and land is formed. This division can be exacerbated by sea walls and the addition of sand. The loss of this transitional zone can negatively impact water quality and the ecological balance of the lake.

There are numerous benefits to having a healthy functioning shoreline. Many northern Michigan fishes, such as bass, pike, bluegill, and forage fish use shoreline vegetation and wood (fallen trees) as spawning and feeding habitat. Waterfowl, amphibians, and mammals such as loons, frogs, and otters also depend on these transitional zones as nursery and feeding grounds. When natural shorelines are removed the compounding effects of the habitat



Native river otter

loss, increased erosion, and runoff of pollutants can have major damaging effects on the water quality and naturally functioning ecosystem of the lake.

Stormwater is another potential threat because it carries excess soil, nutrients, chemicals, and other contaminants to nearby surface waters. Stormwater is the water from rain or melting snow that does not soak into the ground. Although



This homeowner has landscaped their aquatic and upland buffer zones to avoid stormwater damage to their shoreline.

stormwater is a natural phenomenon, impervious surfaces (areas that do not allow water to soak into the ground) can intensify the problems caused by stormwater runoff. The goal of managing your stormwater is to slow the water to allow it to soak into the ground and be filtered before entering a lake or stream. Planning rain gardens or catchment ponds to collect excess water can provide appealing, low maintenance solutions for stormwater on your property.

By following these best management practices you can maintain an aesthetically pleasing landscape while benefiting the natural ecosystem.

Best Management Practices: Shoreline

Promote and maintain natural vegetation. Native shoreline plants are deep rooted and help stabilize banks preventing erosion and sedimentation. Natural shorelines help prevent bank erosion and provide habitat for native wildlife.

Clean up outdoor pet waste. Pet waste can increase E. coli and nutrients in the water.

Avoid removing trees near shorelines. Trees help reduce erosion, runoff, and provides habitat and shade for wildlife. Wood litter in lakes and streams create important habitat for many aquatic organisms.

Only install erosion-control structures if conditions require it. Seek advice on designs that are environmentally and aesthetically acceptable and meet requirements of local ordinances and the MDEQ.

Keep slopes gentle. The gradual slope of a natural shoreline absorbs the energy of waves. A steep, eroded slope or retaining wall allows waves to crash into the shore, drastically increasing erosion damage on adjacent shorelines.

Limit construction that requires grading. This can create excessive amounts of runoff that carries soils directly into a lake or stream. Work with your zoning administrator and the Benzie County Soil Erosion, Sedimentation, and Storm Water Control administrator to develop an erosion prevention plan for construction.



BENEFITS OF A NATIVE BUFFER

- ▶ **LOW MAINTENANCE LANDSCAPE**
Once established, native plants do not require watering, fertilizers, pesticides and lawn maintenance equipment.
- ▶ **SAVE MONEY OVER THE LONG RUN**
No replacement necessary like annuals. No mowing, fertilizing or watering.
- ▶ **PROVIDE HABITAT**
Bees, butterflies, birds and other wildlife use the plants for their nectar, pollen and seeds.
- ▶ **STABILIZE SHORELINE**
The extensive root systems of native plants help slow down incoming waves, reduce soil erosion along the shore and absorb dirty runoff from your lawn before it goes into the lake.
- ▶ **CLEAN WATER**
The extensive root systems of native plants can help rain water (stormwater) soak into the soil, decrease soil compaction and flooding and filter out pollutants from dirty storm water run-off.



Natural shoreline landscaping benefits our watersheds.

Best Management Practices: Yard

Mow high. Mowing your grass at least 3" high will help crowd out weeds and promote deeper roots, which enables your lawn to survive droughts.

Get your soil tested before planting and fertilizing. Knowing the soil type of your lawn will help you determine which types of plants will grow best. It also helps you determine the type and amount of fertilizer to use, if at all.

Minimize how much you water your lawn:

Choose plants that grow best based on the amount of water that is available.

Don't soak your yard. Watering shouldn't create puddling.

Shorter and more frequent watering is best. Avoid watering when the sun is at its hottest, evenings is best.

Be patient during drought, your grass will survive after some browning.

Only water after extended drought conditions.

Minimize the use of fertilizers. Get your soil tested for proper fertilizer recommendations:

Do not use a fertilizer containing phosphorus. Zero-percent phosphorus fertilizers are available from local garden supply stores.

Return your lawn clippings and leaves to recycle nutrients.

Fertilize in the fall for best results.

Don't fertilize if the ground is frozen or saturated with water.

Preserve green buffers around wetlands, streams, and lakeshores. Recommendations for the minimum width of a green buffer vary from 15 to 35 feet, but the wider the buffer the more effective it will be.

Maintain a NO APPLICATION zone for fertilizer and herbicides near lakes, ponds, and streams.

Do not dispose of grass clippings or leaves in or near the water.



Various native plants provide beneficial erosion control through their deep root structures. Typical lawn grass is represented at the far left for context.

Conservation Research Institute

Best Management Practices: Impervious Surfaces

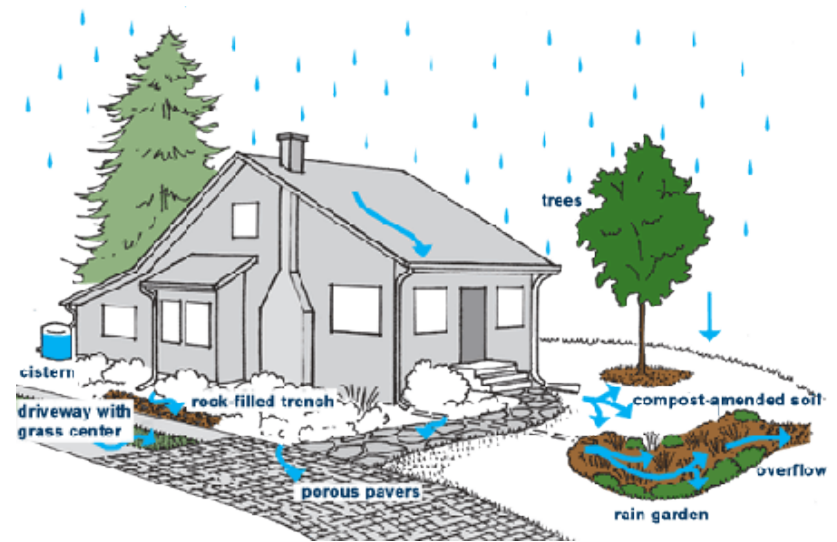
Minimize the amount of impervious surfaces on your property. These include buildings, paved, and compacted areas. The more area on your property that is impervious to water, the more likely you are to have issues with excessive runoff that will carry contaminants to nearby surface waters.

Consider using a sand mix, rather than de-icer chemicals on your driveway in the winter months.

Map out your stormwater. Next time it rains go outside and follow the water as it flows off your house, driveway, and other hard surfaces. Use this information to plan your next landscaping project.



Examples of common residential impervious surfaces: Driveway, sidewalk, and roof.



Design a stormwater system on your property:

***Plan rain gardens** in areas that receive large amounts of runoff.*

***Divert runoff** from gutters, driveways, and other impervious surfaces away from a nearby lake or stream.*

***Plant dense wetland plants** where runoff enters a lake or stream. These plants help filter the runoff before it enters the water.*

Dig small ponds in drainage ways. Holding areas slow the flow of water allowing the sediments to settle out before it seeps into the ground or enters surface waters.

Replace impervious surfaces with porous surfaces that allow the stormwater to absorb into the ground.

YOUR ACTIONS: THREATS TO THE WATERSHED

Not only does everybody live in a watershed, but everywhere you go you are in a watershed. Your actions, whether you are in your front yard or visiting from afar, can impact the waters that make Benzie County unique. There are many ways to enjoy the beautiful waters of northern Michigan, including boating, fishing, swimming, hiking or just relaxing and taking in the scenery. Although obvious things such as littering, poaching, or destroying habitat can be harmful, even subtle actions can impact a watershed in a major way. For example, travelling from one lake to another can cause the spread of invasive species or disease across the state. However, a little prior knowledge and action can help protect the waters that we all enjoy!



Our region has seen a restoration of bald eagle populations over recent years, thanks to improved environmental awareness and effort.

BENEFITS OF NATIVE VEGETATION: AIDING OUR LOCAL POLLINATORS

Watersheds are often used by pollinators for sustenance along major seasonal migration pathways. Not only that, what we choose to plant in our particular ecological zone can impact the region's pollinators. Therefore, as watershed residents and northern Michiganders we need to pay twice as much attention to our activities.

In this particular region, we greatly rely on the ecological services of pollinators for honey production and a multitude of agricultural crops ranging from soy to cherries. It benefits the environment and the economy to provide for and protect pollinator populations. Unfortunately, both commercial and wild pollinator communities have been declining. The combination of habitat loss, chemical toxicity (e.g. pesticide overuse) and disease (e.g. Colony Collapse Disorder) have taken a major toll on these beneficial insect populations.



However, we can improve their situation through smart landscaping. No matter how small or large – well planned vegetation can help!

Here are some recommended plants for our ecological zone:

Common buttonbush
Shrubby cinquefoil
Red and purple columbine
Harebell
Marsh marigold
Joe pye weed
Butterfly weed
Milkweed
Cardinal flower

Planting native wildflowers helps increase the pollinators' habitat, population, and productivity!



Other Smart Gardening Tips:
Consider structuring your property to have windbreaks and snags which provide winged pollinators respite and shelter. Think which plants provide blooms through the range of seasons, for a steady food supply. (Not to mention the added beauty to your property!) Attempt to use pesticides which will not harm beneficial pollinators, whenever possible.

Best Management Practices: Boating, Fishing, and Water Recreation

Learn local rules and regulations. Although it is helpful to know general Michigan boating and fishing regulations, individual lakes and streams often have specific rules. Check local regulations and read signs posted at access sites. Ignorance is not an excuse for not following local regulations.

Help prevent the spread of invasive species:

Wash your watercraft and trailer before visiting a new body of water. Even if you checked for “hitch-hikers,” many invasive species can be transported as seeds, eggs, or larvae that cannot be easily detected.

Empty and clean your bilge before moving to another water body.



Using a “hot” water boat wash can help kill fish diseases such as Viral hemorrhagic septicemia (VHS).

Do not transfer bait or fish among water bodies. Dispose of extra bait on land or in the trash.

Familiarize yourself with the top aquatic invasive species listed on the MDNR’s website.

Consider participating at Clean Boats, Clean Waters events in your area; volunteering; or joining the CBCW network of hosts.



Clockwise from top left: Zebra mussels, non-native Phragmites, Eurasian water milfoil, and New Zealand mudsnails, compared to a penny.

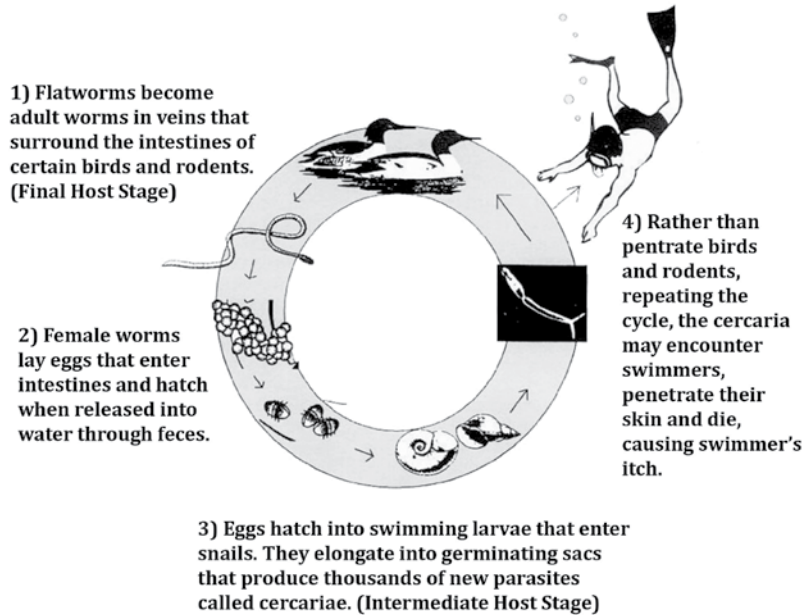
Check your boat for gas or oil leaks before going out on the water. One quart of oil can contaminate 250,000 gallons of water.

Use reasonable watercraft speeds. Creating unnecessary wake can disturb wildlife, cause property damage, and shoreline erosion.

Maintain a respectful distance from wildlife. Many birds, amphibians, and mammals live and nest along shore. Bring binoculars and enjoy the wildlife without disturbing them.

SWIMMER'S ITCH

Here is the cycle of swimmer's itch that leads a parasite to enter the skin of vulnerable lake swimmers, causing a painful itch.



Take precautions to avoid swimmer's itch:

Towel off vigorously after swimming and change into dry clothes.

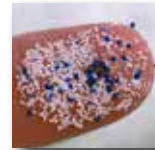
Avoid swimming in warm shallow water or during midday. The parasites that cause swimmers itch, called cercaria, are most active in warmer water during midday.

Do not feed waterfowl and attract them to swimming areas. Waterfowl and snails are the host for the parasite that causes swimmers itch.

PLASTICS IN OUR WATER

A **microplastic** is a tiny plastic particle that is less than 5 millimeter in size. They exist nearly everywhere, specifically in lakes, streams, and aquatic animals. **Microbeads** are a fraction of a millimeter, spherical-shaped, and manufactured to be used in products.

Sources of Microplastics



Cosmetics and personal care products: toothpaste and facial scrubs

Fibers from synthetic clothing: fleece jackets and polyester

Degraded Litter: bags, bottles, styrofoam and wrappers

What Can You Do?

Buy products without microbeads

Choose clothing made from natural materials as opposed to synthetic fibers

Reduce your use of single-use plastic items such as plastic bags, bottles, and straws

Seek out alternatives such as glass or cloth; bring to-go mug

Pick up plastic litter whenever you see it; talk to people about this and support plastic bans!

Volunteer at beach cleanups

Impacts on Our Waters

There are 112,000 particles of plastic per square mile of Great Lakes water

Microplastics have been found in 12% of freshwater fish. An average of nine particles of plastic has been found in the stomachs of perch from the Great Lakes



Fibers and line threads make up 70.9% of microplastics in rivers

Contaminants such as PCB's, PAH's and metals can accumulate on microplastics

It takes 500 to 1,000 years for plastic to degrade

source: <https://owi.usgs.gov/vizlab/microplastics/>

Your Resources

Following is a list of resources to help manage your land.

Benzie Conservation District

<http://www.benziecd.org/>

231-882-4391

General questions, watershed & lake associations, water quality

Michigan Department of Environmental Quality

<http://www.michigan.gov/deq/>

231-775-3960 Cadillac Office

Permits, water quality

Michigan Department of Natural Resources

<http://www.michigan.gov/dnr/>

231-775-9727

Burn permits, fisheries and wildlife, general questions

Michigan Natural Shoreline Partnership

<http://www.mishorelinepartnership.org/>

Michigan State University Extension

<http://msue.anr.msu.edu/county/info/benzie>

231-882-0025

Herbarium: www.michiganflora.net/home.aspx

Soil testing, native & pollinator plants, and plant identification

Natural Resources Conservation Service

<https://www.nrcs.usda.gov/wps/portal/nrcs/site/mi/home/>

231-889-9666

Agriculture, native plants

Northwest Michigan Invasive Species Network

<http://habitatmatters.org/>

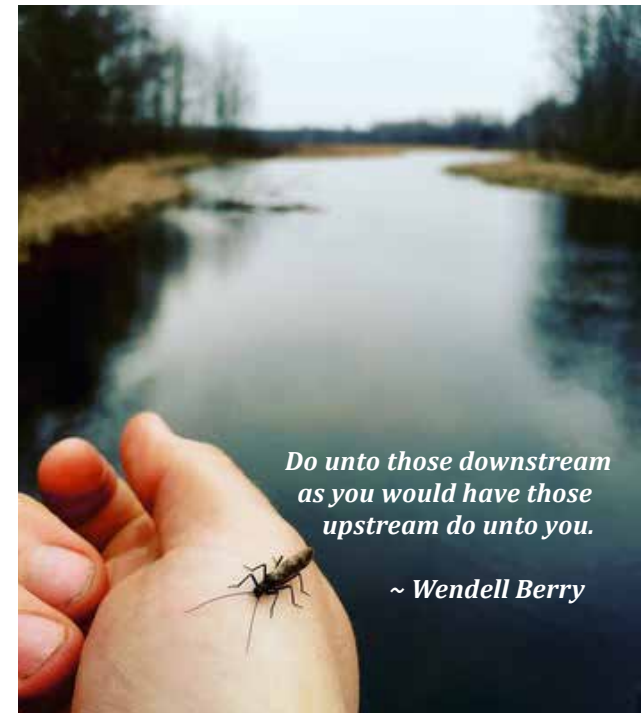
231-941-0960

Invasive & native species, and nurseries

Plant It Wild

<http://plantitwild.com/>

Native Plant info, and regional nursery list



*Do unto those downstream
as you would have those
upstream do unto you.*

~ Wendell Berry



*Michigan state fish,
brook trout*