



Lake Leelanau

Solutions and Stewardship

You Are the Steward

The first law of stewardship is to leave the land and water in no worse condition than you found it. If you have a younger generation in your family, then that statement needs no further explanation.

Ironically, the home on the water that represents a high quality of life to the owner (something one has worked many years to attain) and fosters a deeper appreciation of nature's beauty is itself the vehicle of nature's deterioration. As we have privilege to live on the water, so we bear the responsibility to protect the quality of the water.

The lakes of northern Michigan contain clear water for a reason—they are relatively free of nutrients that cause heavy biological activity in the lake. Nutrients occur naturally, but for millenniums the shores and tributaries of Lake Leelanau were buffered by heavy vegetation that absorbed the nutrients before they reached the lake. In short, green keeps the water clean.

Water quality degrades remarkably fast when human activity strips away the natural vegetation from the lake shore and replaces it with the conventional suburban landscape. Collectively, hundreds of home owners apply thousands of pounds of fertilizers to their new lawns. Each year, hundreds of thousands of gallons of waste water soak into the ground around Lake Leelanau from septic systems. A substantial portion of the nutrient content in fertilizers and waste water migrate into the lake. If you've ever seen the suburban lakes in metropolitan Detroit, you know that aquatic weed growth and murky water quickly follow in this devolutionary process.

But Lake Leelanau doesn't have to become another murky weed-choked lake. If we shift our thinking—embrace a new paradigm—Lake Leelanau could become an even more pleasant place to live.

This chapter contains a series of positive actions you can take as a resident to protect the quality of the Lake Leelanau watershed. They are the best of the Best Management Practices (BMP)—the technical term for living lightly on the land. These BMPs are field-tested, proven, and customized to the needs of the Lake Leelanau area. Some will apply to your household more than others, but take the time to review all the BMPs, so as to inform yourself of how to live a low impact life on nature. Common sense is the most powerful medicine for curing the non-point source pollutants.

BMPs use natural materials and natural dynamics to protect natural systems. By definition, they are flexible and vary greatly from one situation to another. If you take the time to understand the logic behind a BMP, you may even develop your own techniques. Some have to do with changing daily habits, other with simply stopping certain activities, and still other with a slightly different approach to aesthetics. In general, by using BMPs you will save money, save time, and probably increase the value of your home in the process.

A best management practice, like stewardship, is like planting a maple tree. It's a long-term investment that you probably won't see come to full maturity. The reward that you draw is the idea that some day, a great grandchild will sit in the shade on a hot summer day and thank whoever planted that beautiful tree. Only in this case, they'll be dipping their toes into the crystal clear water of Lake Leelanau—circa 2050.

Additional literature on all the following BMPs is available at the Leelanau Conservation District (page 46) or the MSU Extension office (page 48).

Landscaping and Lawn Care

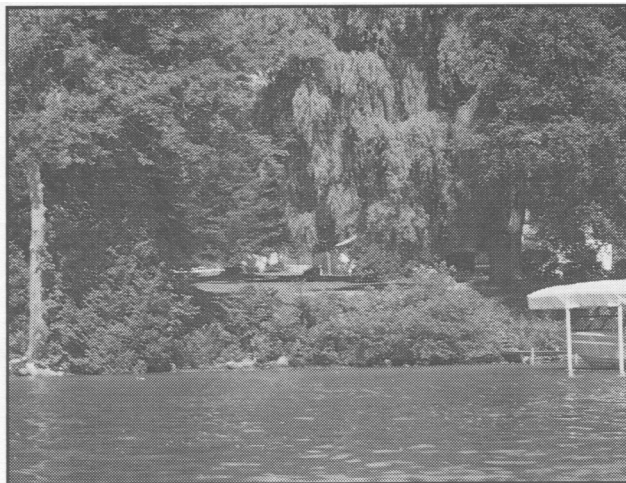
Preserve or establish green buffers around wetlands, creeks and the lakeshore.

Wetlands and green buffers in the form of shrubs, trees and ground cover can extract and lock up huge amounts of nutrients such as phosphorus and nitrogen before they enter the water. Buffers provide shade to keep the water cool, and food, and nursery grounds to sustain trout and other cold-water aquatic populations. They also provide the homeowner with a buffer (between the yard and the noise on the lake), stabilize erodible shorelines, provide privacy, and can cut your winter heating bills by breaking wind velocity.

Recommendations for the minimum width of a greenbelt vary from 15 to 35 feet, but the wider the greenbelt, the more effective it will be. Choose a mixture of plant materials (grasses, groundcover, shrubs and trees) that will vary in root depth and plant height. Native species will require less care and grow more vigorously, but only if the chosen species match the growing conditions of your site. The Leelanau Conservation District (page 46) and MSU Extension (page 48) both offer a wealth of resource materials on the design and installation of green belts.

Preserve natural cover and forest stands.

Trees help slow run-off from the moment the rain falls. Leaves slow the speed of falling rain, the trees then absorb and utilize large amounts of water, and the root systems slow run-off and provide paths for the moisture to enter the ground. On average, tree root systems are about the size and extend of their branches. Root systems hold the loose northern Michigan soils intact to resist erosion. Before starting a construction project, contact the Leelanau Conservation District (page 46) to learn how to protect standing trees from soil compaction by heavy equipment.



A good example of a green buffer on the Lake Leelanau shoreline.

Choose the right grass and plants for your site.

Plants suited to northern Michigan will require less fertilizers, pesticides, and additional watering, because their requirements are adapted to the natural soils, pests, and climate. Native plants will tend to provide more satisfying results in your lawn and garden. As a rule, the more exotic the plant, the more potential need for chemical use. For instance, Kentucky bluegrass requires 4-7 lbs. Of nitrogen annually per 1000 sq. ft. Creeping red fescue only requires about 2 lbs. Per 1000 sq. ft. Local nurseries, the Leelanau Conservation District (page 46), and the MSU Extension office (page 48) can help in the selection of appropriate species for your site.

Consider ground cover plants in lieu of lawn.

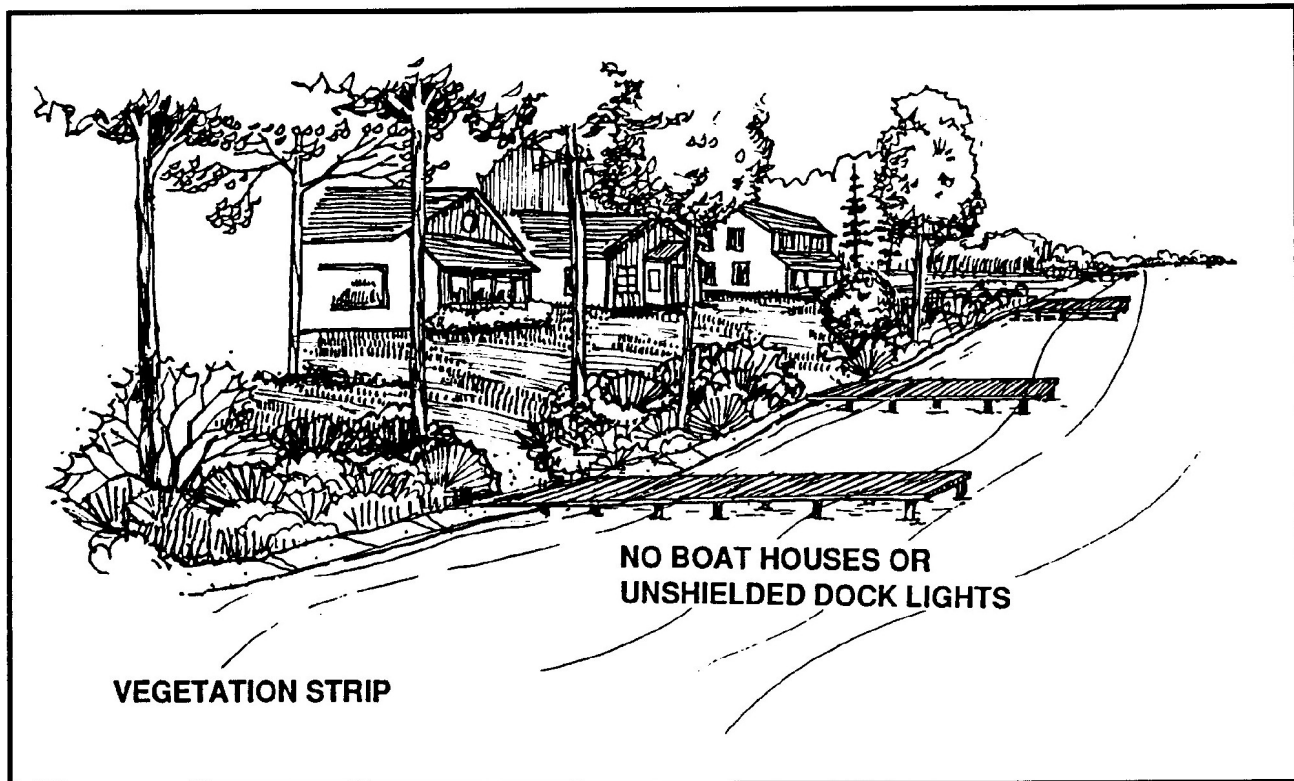
Use of groundcover, shrubbery, and the natural flora of northern Michigan can enhance the character of your landscape, create variety, and will require less maintenance and chemical use than lawns.

Establish a compost pile for organic wastes.

It may seem safer to burn leaves and brush at the lakeshore, but the ashes and smoke particles concentrate nutrients into soluble forms that will dissolve quickly into the water. A compost pile located away from the water will provide you with



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from the water will provide you with a constant source of organic material for your garden and lawn and reduce your need for fertilizers. Also, discarding the organic kitchen wastes in the compost pile (except meat scraps) will reduce your volume of rubbish or lighten the load on your septic system.

Gauge watering to plant requirements.

A small rainfall gauge set up in the garden or lawn will help you determine how much water a sprinkler delivers over a period of time.

Overwatering will leach nutrients from the soil and cause run-off, and with the excess water goes the nutrients away from the plants and into the watershed. In the process, the homeowner will be forced to apply more supplemental fertilizer, and the cycle will begin again. Frequent shallow watering will encourage shallow rooting, crabgrass invasion, and disease. Moisten the soil to a depth

This illustration from the "Grand Traverse Bay Region Development Guidebook" depicts an environmentally and esthetically sensitive approach to shoreline development: green buffer at water's edge, setbacks, and preservation of native plants.

of four to six inches (usually about one inch of water), preferably with water drawn from the lake.

Avoid the use (fertilizers. Most soils in Michigan don't require artificial fertilizers to support healthy grass. Choosing hardy grass varieties with low nitrogen needs (such as red fescue), cutting the lawn no shorter than two and a half inches, mulching the clippings back into the lawn, and watering with lake water will eliminate the need for fertilizer altogether. Again, lake water supplies far more nutrients to the turf than well water. At the very least, apply fertilizers no closer than 20 feet from the water.

If you must fertilize, test your soil annually.

Test results will allow you to calibrate fertilizer application to exactly the amount necessary. If you must fertilize, then test first. In fact, your lawn and garden may not need fertilizer at all (or only a single component), but the addition of some other lacking element, such as calcium (lime). Depending on the requirements of your soil, you may be able to use low phosphorous and nitrogen fertilizers, or consider alternative organic fertilizers that contain less soluble forms of these elements. Test kits are available at garden shops and nurseries, or you may want a more sophisticated test performed on the soil sample by a laboratory (arrange lab tests through the Leelanau County MSU Extension Office, see page 48).

Use the right fertilizer at the right time.

Once you're sure of which fertilizer your soil requires, read the instructions for application carefully. Seasonal changes, temperature, and moisture requirements can vary greatly from product to product. Misapplication will cost you money in wasted fertilizer and accelerate the entry of nitrogen and phosphorous components of the fertilizer into the watershed. Avoid fertilizing in the fall. Late in the year, turf does not require supplemental nutrients because it is moving into a dormant stage.

Consider alternatives to chemical use to control specific insects and weeds.

Instead of blanket speakings of pesticides and herbicides to control insects and weeds, integrate chemical use with techniques that minimize favorable conditions for pests and maximize natural obstacles to pests. Careful observation is to pest control what soil testing is to fertilizing. Make use of the following tactics to reduce or eliminate the need for pesticides: encourage natural predators, change habitats favorable to pests, time planting and harvesting to avoid peaks of pest presence. choose pest-resistant plant varieties, maintain growing conditions to maximize plant resistance to disease, diversify plantings to avoid susceptibility to one type of pest, apply natural parasites and insect hormones to attack and confuse the normal life cycle of pests.

NATIVE PLANT SPECIES

Suitable for Lakeshore Greenbelts on the Moist Soils Surrounding Lake Leelanau

Groundcovers:

- turf grass
- periwinkle
- wintergreen
- lily of the valley
- ostrich fern
- forget-me-not

Shrubs

- gray dogwood
- silky dogwood
- crab apple
- Canada yew
- red osier dogwood
- blueberry
- highbush cranberry
- potentilla

Trees

- red maple
- yellow birch
- white birch
- sugar maple
- American beech
- white pine
- balsam fir
- white spruce
- black spruce
- white ash
- American basswood
- white oak
- black willow
- white cedar
- black ash
- tamarack (larch)

Note: Some of the species listed are better adapted to specific conditions (shade, fertility of soil, etc.). Consult with Leelanau Conservation District (page 46) to make choices for your site.



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If you must use them, follow pesticide directions carefully.

Pesticides and herbicides are, by definition, poisons. They can wreak havoc in the natural food chain, and should be handled with appropriate caution. Apply only the amount directed by the label overuse or misuse can hurt your plants as well as the environment. Keep pesticides well away from wells, streams, wetlands or any other body of water. Apply pesticides only when there is no forecast for rain, and never apply pesticides to bare ground. If you can, avoid them, and keep their application at least 20 feet from the water.

Buy only as much pesticide as needed.

Over time, pesticides will deteriorate and lose their effectiveness sitting on a shelf and the leftovers will simply be more hazardous chemicals to dispose of later. Pesticides and herbicides should be stored in their original containers, well away from living quarters, in a well-ventilated area, and OUT OF CHILDREN'S REACH!

Choose the least toxic chemical for the job.

Chemicals with labels that use the word "caution" are considered less toxic, whereas the term "warning" indicates more toxicity. Insecticidal soap, *Bacillus thuringiensis* (BT), milky spore and oil sprays are effective and relatively safe alternative pesticides for many situations.

Choose lawn care providers wisely.

Select a lawn care company that will truly customize its service to your lawn's needs. Require that the company perform a soil test before applying any fertilizer or pesticides.

Stormwater Runoff Control

Divert runoff from driveways, roof gutters, roads and other impervious surfaces away from the lake, not into it.

When heavy concentrations of runoff accumulate on a roof or driveway, our first compulsion is to channel the flow into the lake as quickly as possible. Nothing could be worse for the lake. Runoff carries sediment and nutrients. So a better method is to direct the runoff into areas where it will filter through vegetation or soak into the ground.

Design a stormwater runoff "handling" system for you property.

First, slow the runoff down by replacing concrete or asphalt channels with grass lined ditches. Then, set up the drainage pattern to direct the flow into a area where the runoff can harmlessly collect and temporarily flood. This is called a retention pond. The retention pond should lie on a porous substrate, such as sand, and be lined with thick vegetation (turf will do). The water in the retention pond will soak slowly into the ground and work its way into the lake, but only after most of the nutrients have been filtered out. An overflow pipe can protect adjacent areas or buildings from flooding during times of extraordinary run-off.

Design and landscape to minimize rainwater run-off.

Wood deckings concrete lattice pavers, brick, and porous asphalt can all provide an attractive hard surface for patio areas. while still allowing rainwater to permeate the ground and reduce run-off problems. Concrete and sealed asphalt gather, concentrate, and accelerate rainwater run-off and exacerbate erosion problems. Paved areas should divert run-off into grass or vegetation-covered land to allow gradual absorption into the ground. Be a zero discharge landowner.

Shoreline Stabilization

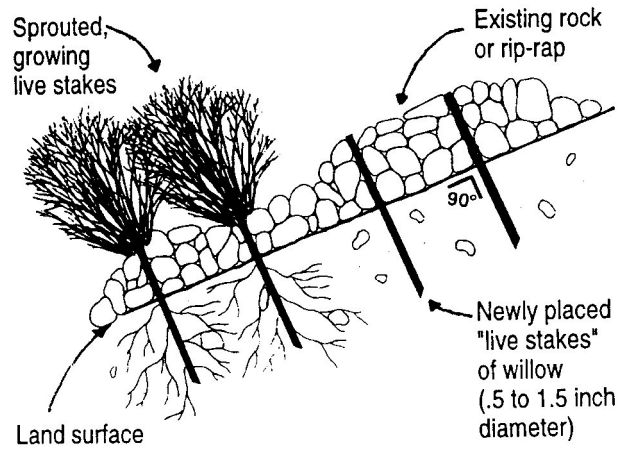
Leave natural vegetation on shorelines.

As a rule of thumb, the size of a plant's root system is approximately the size of its trunk and branches. It follows that the extensive root system of a mature tree or shrub can consolidate and strengthen a substantial portion of shoreline. Leave natural vegetation in place and prune very selectively to establish a view. Leaving shoreline vegetation is substantially easier than reestablishing it, and in the process you will probably avoid shoreline erosion problems before they begin.

When a wave sweeps into a shoreline wetland, a myriad of stems, branches and leaves absorb the energy of the wave before it can reach the soil level. In the winter, shallow wetlands freeze solid and resist the tons of pressure that result from wind-driven ice pushing up against the shore. Similarly, shallow sloping shores also deflect and frustrate the force of water. When these natural barriers are removed, we are left with a naked power struggle between man-made contrivances and the forces of nature. In the struggle between the natural forces of wind, water, and ice, on the one hand, and man made structures, like seawalls, rocks, or the unreinforced lip of a yard on the other, the forces of nature will always win. Man-made obstacles need regular maintenance. Natural obstructions maintain themselves, and work better, too.

Use plant material to stabilize shorelines.

A wide variety of techniques have been developed over recent years that combine plants with physical structures to stabilize shorelines. Usually, the structure is temporary in order to allow the live plant material to root and eventually replace the structure as the principal means of stabilization. One technique uses live stakes (cuttings of species that will sprout from branches) driven into a rip-rap reinforced embankment (see figure above). The buried ends of the stakes root, the exposed ends of the stakes leaf, and eventually the bank becomes an unbroken thicket of willow trees.



Live stakes installed through rip-rap from Tip of the Mitt Watershed Council's guidebook on shoreline erosion (231)347-1181.

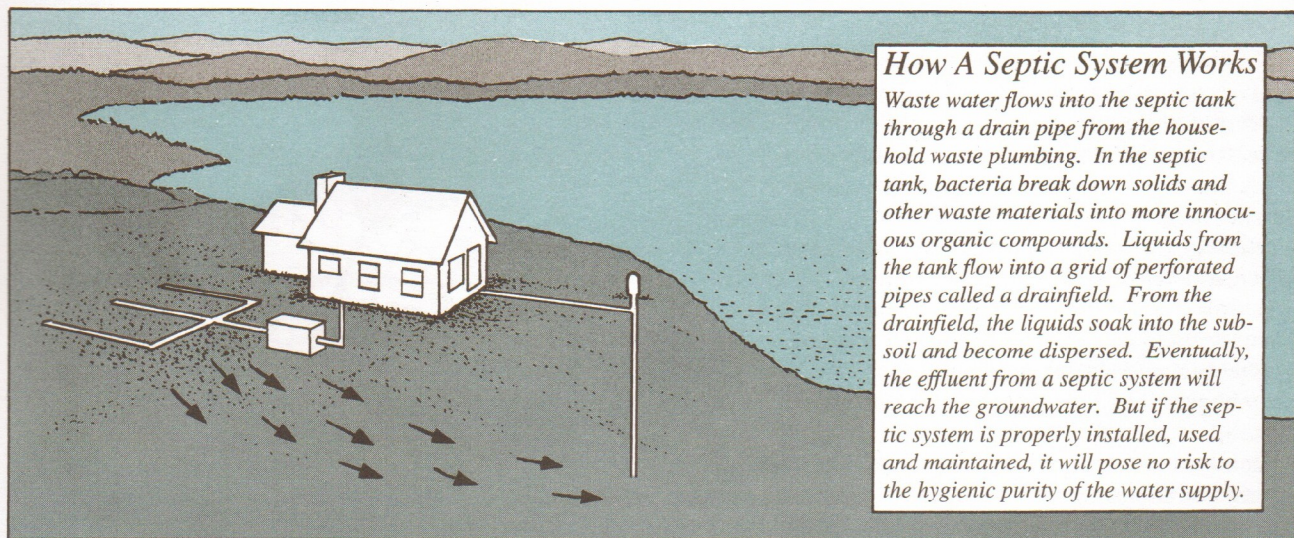
Even if you already have a seawall, you may want to consider replacing it with a plant supported embankment. Seawalls do little to filter nutrients from runoff and migrating groundwater. The shallow water in front of seawalls affords no cover for baitfish or the fry of fish species, and the turbulence stirs up sediment and discourages the rooting of plant life. Biotechnical erosion control measures (the technical name for the above mentioned stabilization technique) make a perfect shoreline buffer when installing a shoreline greenbelt.

Avoid installing beach sand.

If your slice of the shoreline was suitable for a sandy beach, chances are that nature would have already established one there. Artificial beaches are very poor filters of nutrients, attract the snails and water-fowl that cause swimmer's itch. Since an artificial beach usually abuts a fertilized lawn, it acts as a racetrack for nutrients washing into the lake. Dumping sand at a shoreline will probably require a permit, so contact the Leelanau Conservation District (page 46) if your heart is set on it. Better yet, anchor a swimming raft in the deeper water and take the kids to the Lake Michigan shore when they want to play on the beach.



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Waste Water and Healthy Septic Systems

Septic systems do an excellent job of destroying the bacteria of human waste that can harm you and your family. Unfortunately, even a properly designed and operating septic system will still allow waste water to carry nutrients into the lake. Nevertheless, you can minimize the nutrient release of your waste water system by following a few simple recommendations.

Work only with reputable and conscientious contractors.

Be wary of contractors who offer to save you money by cutting corners. A properly located and installed septic system provides a safe and effective method of wastewater treatment. An improperly installed septic system can spell disaster for the entire neighborhood, by polluting the surface and/or groundwater with nitrates, fecal bacteria and viruses. Properly operating septic systems require sludge removal every 3 to 5 years, when the sludge level exceeds 1/3 of the tank volume. Talk to your neighbors about coordinating maintenance and reduced cost through a group pumping program.

Make sure you know where your septic tank and drain field are located in the yard. That way you will be able to keep track of potential problems. See page 17 and the illustration above for a simple explanation of the operation of your septic system. (Some forms of clear waste water, such as the outflow of a sump pump or a foundation drain, do not need to drain into your septic system and can be routed elsewhere.)

Keep drainfields clear.

Drainfields are one of the few places you don't want to plant trees. Root systems will clog and interfere with the flow through the pipes. Keep cars and heavy equipment off the drainfield to protect it from compaction. Direct rainwater from gutters and run-off from paved areas away from the drainfield. Too much water on the drainfield will accelerate the leaching of nutrients. Never build or pave over a drainfield or septic tank.

Watch for signs of septic system damage or failure.

Foul odors around the septic tank or drainfield, sewage odor in the basement, depressions in the surface of the ground in and around the drainfield, lush green grass over the drainfield, spongy or soggy

lush green grass over the drainfield, spongy or soggy areas in the drainfield, cladophora growth near your shoreline, and a backed-up or sluggish toilet, are all indicators of possible problems in the septic systems. Immediately secure the help of a professional if you suspect any problems.

Be careful of what goes down the drain or toilet.

Anything disposed of in the drain or toilet ends up in the septic tank. Household chemicals and cleaners, like bleach or drain cleaner, should be avoided because they kill off the bacteria that break down the solid waste in the septic tank. Without the bacteria to break them down, solids will build up and can cause back-ups. Garbage disposals can overload the septic system and make frequent maintenance necessary. The following items should never be put down the drain as they will not break down in the system: grease, hair, cigarette butts, facial tissues, paper towels, feminine hygiene supplies, bandages, paint, solvents, motor oil, or any other household hazardous waste. Don't use toilets as trash cans!

Conserve water.

The more water that flows through the septic system, the faster and more intense will be the release of nutrients into the ground. As a rule, by conserving water you will reduce nitrogen releases. Water conservation will also cut electricity bills, since the water well uses AC power to pump the water into the household. Distribute laundry loads throughout the week to avoid overloading the system and always use detergents without, or very low in, phosphates.

Beware of the "quick fix."

Commercial chemical products that claim to clean septic tanks are no substitute for proper maintenance. These products convert the organic material in the septic tank into a liquid that will move quickly through the drainfield. Accelerating the normal decay process from solid waste to liquids will send much larger amounts of nutrients into the water systems and could contaminate nearby surface and groundwater.

Water Conservation Tips

As water moves, so do the nutrients and non-point source pollutants. Therefore, by cutting our general use of water, we can reduce the amount of nutrients going into the watershed. Here are a few specific recommendations on cutting water use.

Test-for leaks.

Test for leaking toilets by adding food coloring to the tank. Without flushing, note whether any color appears in the bowl after a half hour. Small leaks in faucets can result in sizable accumulations. Put a measuring cup under a dripping faucet for half an hour. The quantity in the cup multiplied by 48 is how much that faucet leaks in a day.

Watch your habits.

Avoid running the water continuously while washing the dishes. If you have a dishwasher, run it only when you have a full load the same goes for the clothes washer. Set water control levels on appliances to their lowest effective setting. Take more showers, baths use 30 to 50 gallons each. Avoid running the water continuously while shaving, brushing teeth, washing hands, or washing your car. Water the lawn only when necessary.

Replace equipment and fixtures with conservation models.

Install a water conservation shower head, they can reduce the volume of flow by 25% with little noticeable effect on performance. Two half-gallon plastic bottles filled with water and placed in your toilet tank can cut the number of gallons per flush from 5 to 4. Look into a "suds saver" washing machine next time it's slated for replacement. A seeping hose will put irrigation water exactly where you want it without loss from evaporation. Compost your garbage rather than using a garbage disposal. Garbage disposals use a great deal of water and add solids to an already overloaded septic or sewer system.



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LEELANAU COUNTY RECYCLING CENTERS

Community	Location of Recycling Center	Hours
Cedar	Cedar Boat Launch	Sa 1-5
Empire	Fisher St., east of Lacore St.	Th 3-7
Glen Arbor	Old Homestead Rd., M-22	W 3-7
Greilickville	Cherry Bend Rd., at the Fire Station	F 3-7
Lake Leelanau	Popp Rd., south of Duck Lake Rd.	Tu 3-7
Northport	Eighth St., west of Mill St. (M-201)	F 3-7
Suttons Bay	South Richter Rd.	Sa 8-12

For more detailed & recent information call recycling call (231)256-9812 or (866)256-1717(ext.6) or consult the Leelanau County Solid Waste website: <http://www.leelanau.cc/solidwaste.asp>

Materials Accepted	Notes on Preparation
Newspaper	Stacked in grocery bags or tied.
Office/Bond Paper	Copier paper, notebook paper, opened mail.
Magazines/Glossy Paper	Magazines, catalogs, glossy/colored newsprint, phonebooks Flattened gray or corrugated cardboard.
Cardboard	Remove wax and plastic liners from cereal boxes.
Metal Cans	Rinsed, labels removed, ends removed and flattened. No mixed tin and aluminum or aerosol cans
Aluminum	Cleaned and flattened cans, foil, TV dinner trays, pie plates. No aerosol cans accepted.
Glass	Green, amber, and clear glass, rinsed, sorted by color and with caps and rings removed.
Plastics	#2 HDPE only, rinsed, caps removed, flattened for easier storage, including milk jugs, juice jugs, water jugs. and detergent containers.

Note: Please rinse and remove caps and lids from all materials. All metal and plastic containers must be flattened. Sort your materials before you get to the recycling center and please don't leave materials after hours. Site attendants will not accept improperly prepared materials or other household trash.

Household hazardous wastes are collected twice a year as part of the Leelanau County recycling program. Call the Leelanau County Planning Department for more information at (231)256-9812.

Reuse and Recycling

If there is one thing that you can do to go easier on the earth, it's to reuse and recycle. Not only do you avoid burying garbage, but you reduce the need for retuning new raw materials, save huge amounts of energy, and can save money in the process. When you hear the debate about acid rain, the greenhouse effect, strip mining, and the cutting of the rain- forests, the real crux of the issue is material consumption. Recycling is the way to lessen demand.

Lake Leelanau watershed residents have a special reason to participate in recycling. Virtually all the solid waste collected in the watershed is buried in the watershed at a landfill site just south of M-72. The landfill is designed to encase the garbage, mixed with soil, in huge cells of heavy watertight fabric.

The facility covers dozens of acres and rises high above the natural grade of the countryside. It uses state-of-the-art techniques to protect groundwater from contamination by chemicals in the refuse, but the landfill will be there forever, and forever can include a lot of variables.

The chart on the previous page summarizes the Leelanau County recycling program. Most residents of the Lake Leelanau watershed will find a convenient location on the chart that can handle their household recycling needs. However, the chart is only meant to be a guide. If you have never recycled before, visit a center and meet the attendant. He or she will gladly give you advice and provide a tour of the facility.

Since the spring of 1995, landfills are no longer allowed to accept lawn and garden wastes. Open burning may be a convenient way to dispose of these wastes, but the ashes of brushfires contain concentrations of the nutrients that pollute the water. Establish a compost pile in your yard, not just for lawn clippings and brush, but for organic kitchen wastes as well, and your garden will be the more beautiful for it.

Hazardous Household Chemicals

Whether buried in the landfill, poured down the drain or dumped on the driveway, hazardous household chemicals pose a serious contamination danger to the groundwater. Here are a few guidelines for the safe handling and disposal of household chemicals.

Read the label.

As with pesticides, it pays to read the label before use. Many common products like drain cleaner, furniture polish, oven cleaner and spot remover are toxic to people and the environment. Compare products and know what you are buying before you bring it home from the store.

Reduce the use of hazardous materials.

Use discretion in selecting household chemicals. Often, less toxic alternatives exist for many of the hazardous household chemicals. For instance, try remedying plugged drains with a plunger or metal snake before resorting to a drain cleaner. Ovens can be cleaned by applying table salt to spills and then scrubbing with a solution of baking soda and water. A combination of linseed oil and lemon makes a good furniture polish. The book, *50 Simple Things You Can Do To Save The Earth*, features many alternatives to chemicals around the house.

Use care in storage and disposal of chemicals.

Household chemicals should be stored in their original containers with their original labels and **OUT OF CHILDREN'S REACH!** Dispose of household chemicals in sanitary landfills or during hazardous waste collection programs. Pour liquids, such as cleaning fluids, into a plastic container filled with kitty litter or stuffed with newspaper. Allow it to dry outdoors before taking it to the landfill. Some auto service stations will accept waste motor oil and antifreeze for a small fee.



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Angling

Respect creel limits and fishing regulations.

The aquatic systems that support gamefish are finite there are only so many adult individual fish of any given species in Lake Leelanau. It may be difficult to believe, but humans are the principal predator of the gamefish population in the lake. Humans are the only predator that customarily keeps the finest and largest individuals of their prey, whether it be a northern pike, lake trout or perch. The impact of overfishing patterns has far reaching consequences that can result in situations like a stunted panfish population.

Fishing regulations are a dynamic and evolving code to protect the integrity of the fisheries, while still allowing as much access as possible to anglers. Since fisheries biologists can't customize regulations for each lake, they settle on reasonable albeit generalized rules that apply to entire regions. Thus, anglers should look beyond the letter of the law to the spirit of the law. For instance, just because bass season is open, catching late spawning bass off their beds will destroy not just one individual, but a whole new generation what's legal may not be proper. Some anglers find the temptation to ignore daily creel limits to be irresistible when they no longer have to disembark at a public boat launch and risk the inspection of a DNR officer. Nevertheless, private access to the lake should carry more responsibility and interest in following intelligent procedures, not less. Whether or not violators are caught, they do the same damage.

Take precautions on the consumption of your catch.

Although Lake Leelanau carries no official warning on the consumption of its fish, common sense would dictate caution. Toxic chemicals are found in the adults of virtually all foraging fish species in large Michigan inland lakes. Fish like

lake trout live relatively long lives at the top end of the food chain. Over the years, the small quantities of toxic chemicals in their food sources, such as baitfish, accumulate in the predator's body tissue. As a rule of thumb, the older and larger the fish, the more undesirable chemicals it will contain. The fatty tissues accumulate the highest concentrations of contaminants, so anglers are encouraged to filet and trim as much fat off the fish as possible. Small children and fetuses are most susceptible to damage from toxic chemicals and pregnant or nursing mothers will pass these chemicals on to their babies.

Take precautions to eliminate hitchhiker species when 'moving your boat from one lake to another.

Get in the habit of scrubbing the propeller, trailer, hull and live box when you haul your boat out of the water and flush the water from the engine's cooling system. All it takes is one contaminated boat and Lake Leelanau could be the next lake to make room for zebra mussels. Zebra mussel larvae will die fairly quickly when the boat dries out, but the same larvae can live extended periods in the engine's coolant system if it holds water.

The risk of invader species is not confined to zebra mussels. Other non-native plant species and even diseases (in fish slime on the walls of the livebox) could be inadvertently unleashed on the Lake Leelanau ecosystem.

Watercraft Operation

Respect speed limits no wake zones, and other water safety regulations.

On Lake Leelanau, all watercraft must maintain a 100 foot distance from the shoreline, docks, swimmers, swimming areas, fishing boats, sailboats, or moored vessels (200 feet from diver's buoys). Michigan enforces noise limits for watercraft. All Michigan inland lakes have a general speed limit of 55 MPH. and common

sense always applies. No wake areas, such as in the Narrows, Cedar River, and Leland River, among others, protect sensitive shore-lines from erosion and the nesting and spawning areas of our wildlife. Unless you fully understand how to operate your boat according to marine laws, leave it at the dock ignorance of the law is no excuse. Don't hesitate to report violations to the Leelanau Sheriff's Department (where you can also get a copy of the Michigan Water Safety Act). Violators of the marine safety code need to be challenged – for their own good and the safety of all.

Did you know?

- A person must be 12 years old to operate a jetski or motorboat. Persons 12 to 16 years of age must have direct adult supervision while running a jetski or carry a boating safety certificate.
- Sailboats and other nonmotorized watercraft always have the right of way over motorboats.
- The owner of any vessel is personally liable for any damage to life or property resulting from the wake created by negligent operation of his vessel.
- Circular boat operation, such as waterskiing, must be in a counter-clockwise fashion insofar as it is reasonably possible.

Keep fuels, solvents, detergents and sewage away from the lake.

Contrary to popular practice, dockside is not the ideal place to wash your boat. Rinse and scrub your boat with lake water, but never use detergent on your boat and rinse it directly into the water. The same rule goes for paint jobs, varnishing and stripping all of which require chemicals that must be kept out of the water. Fuels should always be stored and handled in an area where there will be no risk of spills into the lake water.

Relieving oneself in the lake is not only poor hygiene, but is also illegal. If you intend to be on the lake for an extended periods then you should make contingency plans for toilet needs. State law prohibits the operation of watercraft with toilet facilities unless wastewater is contained in a holding tank. Dispose of wastes only in a proper

facility. On a similar note, bathing in the lake with a bar of soap causes the same type of degradation in water quality as washing your boat with detergent.

Piloting a boat under the influence of alcohol can be more dangerous than in wheeled vehicles – and is just as illegal.

Research has shown that several hours of exposure to boat engine noise, wind, sun, and motion on the water produces an effect called “boater's hypnosis.” The condition is a type of fatigue that slows reaction time and judgment in a similar way to alcohol. The addition of alcohol consumption to boater's hypnosis can accelerate the effect of alcohol at much lower blood levels. Over 50% of all boating fatalities involve alcohol.

In the event of an emergency, alcohol intoxication can greatly complicate survival. With alcohol in the bloodstream, the body loses heat at a higher rate and will accelerate the effect of hypothermia from a fall into cold water or being stranded in a chilly rain. Alcohol also intensifies the effect of caloric labyrinthitis, the disorientation caused by water entering the ear. An intoxicated person can easily become disoriented to the surface and swim downward to their death.

Respect wildlife.

Consider all the challenges of survival for species trying to live in the natural world. The last thing they need is to have someone bear down on them in a motorboat just to watch them take off. Unnecessarily disturbing wildlife causes them to burn energy for no purpose, can disrupt nesting and feeding patterns, and in the worst case harm the animals directly. Wildlife are already under tremendous pressure give them wide berth and let them be.

Note that one exception is a program on Lake Leelanau to deliberately chase mergansers off the lake during the nesting season. This is a program supervised by professionals to reduce the swimmer's itch problem.