Crow Wing County

Landowner's Guide to Lake Stewardship




This *Crow Wing County Landowner's Guide to Lake Stewardship* was produced as a project of the Crow Wing County Water Plan. Thank you to Aitkin County for the use of excerpts from their *Aitkin County Shoreland Homeowner's Guide to Lake Stewardship.*

Funding for this publication was provided by the Minnesota DNR Shoreland Habitat Program, Crow Wing Soil and Water Conservation District, Crow Wing County Water Plan, Whitefish Area Property Owners Association, Thirty Lakes Watershed District, and Crow Wing County Lakes and Rivers Alliance.

Printed: August, 2008

Production Credits:

Content: Paula West

Design: The Paper Plan-it

Printing: Range Printing

Printed on 10% post-consumer recycled fiber content.

Table of Contents:

Photo Credits:

Cover photo: John Szafranski, a morning mist reflection over Wilderness Point on Middle Cullen Lake

Smaller photos, front cover: Brenda Leavelle, turtles on Sibley Lake; Terri Christian, Columbine on Medicine Lake.

Smaller photos, back cover: John Szafranski, loon in the mist on Cullen Lake; Laurel Mezner, reflections from the raft on White Sand Lake.

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Water is Crow Wing County's greatest natural resource. Of the County's 731,000 surface acres, 14 percent, or approximately 102,000 acres, are covered by this liquid heritage of scenic lakes, rivers and streams. An additional 14 percent of the County is covered by wetlands. These combined resources covering 28% of the surface of Crow Wing County are the economic engine that drives an annual $150+ million tourism economy, provides recreational enjoyment for residents and visitors alike, and are the lifeblood to sustain our quality of life. For many families, multiple generations have enjoyed the lakes of Crow Wing County.

Yet today, with population increases projected at up to 60% in Crow Wing County by 2030, very little undeveloped lakeshore left, and limited land for growth, we must ask the question: what will our water resources be like 25 years from now? Will the water still be clean, fish and wildlife abundant, and the Brainerd lakes area still an enjoyable place to live or visit? The answer to those questions will depend on all of us—everyone who values our water resources—to keep them healthy and productive for future generations to enjoy.

Everyone Lives in a Watershed

It doesn't matter if you live on the shores of a lake or not, your actions can have an impact on water quality because we all live in the watershed of a lake, and our collective actions on the land near the shore and within the watershed will determine the future quality of our waters.

What is a watershed? A watershed is the area of land that drains to a particular waterbody. Think of a watershed as a funnel with a glass at the bottom representing a lake. Anything that falls into the funnel will find its way in to the glass at the bottom. Now think about what happens when it rains or snow melts. Some of the water evaporates back into the atmosphere, some of it soaks down into the ground to replenish groundwater, and the rest runs off the land as stormwater. How we use the land within the watershed affects the types of sediments, nutrients, and other pollutants that can be picked up with stormwater and eventually washed into the lake. Runoff from parking lots, highways, streets, parks, lawns, farms and feedlots, forests, and wetlands all impact water quality. **The bottom line is—everyone lives in a watershed and we're all interconnected by water.** If you live in Crow Wing County your actions on the land will have an impact on a nearby lake, river, stream, or wetland.

To ensure that 25 years from now we can still say our water resources are the gems they are today, everyone must manage land responsibly to reduce impacts to the waters of Crow Wing County. Local governments (county, city, and township) must set good land use regulations and enforce them. State and federal agencies must partner with local governments and citizens to meet mutual natural resource management goals. And, private property owners must be responsible land stewards, managing their land in a way that reduces stormwater runoff and protects water quality. **The future is up to us!**

Within a watershed, our activities at work and play directly affect the quality of water in our rivers, lakes, wetlands and groundwater. *Source: Minnesota Department of Natural Resources.*

"Conservation is a state of harmony between men and land...

A land ethic reflects the existence of an ecological conscience, and this in turn reflects a conviction of individual responsibility for the health of the land. Health is the capacity of the land for self-renewal. Conservation is our effort to understand and preserve this capacity...

We abuse land because we regard it as a commodity belonging to us. When we see land as a community to which we belong, we may begin to use it with love and respect."

Aldo Leopold, *A Sand County Almanac,* 1949

"A lake is the landscape's most beautiful and expressive feature. It is earth's eye; looking into which the beholder measures the depth of his own nature."

Henry David Thoreau in *Walden*

" ....we must never forget that the land and the water are ours for the moment only, that generations will follow who must themselves live from the land and drink that water. It would not be enough to just leave something for them, we must also leave it a little better than we found it."

L. L'Amour

Keeping Our Lakes Healthy

A healthy lake depends on a healthy watershed. A healthy lake doesn't just happen. It comes about when shoreline property owners and others living in the watershed take steps to ensure the lake's ecological health.

As landowners we all have certain rights. When it comes to lakes, we all have the right to use the surface waters of Crow Wing County and Minnesota, and to fish, boat, and swim in those waters. If you live on the lake, you also have the right to put out a dock to reach navigable water. But these rights must also be exercised in compliance with the rules and regulations of Crow Wing County, the municipality or township in which you live, and the State of Minnesota. Along with those rights also comes the responsibility to protect, improve, and enhance the quality of the waters that we enjoy and to ensure future generations will also have that same right. **That's called stewardship: the individual responsibility to manage one's life and property with regard for the rights of others.**

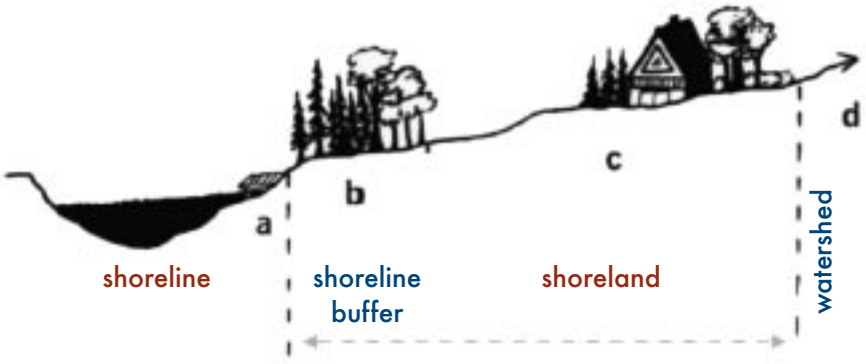
This Guide provides private landowners with basic information on good lake stewardship, which if practiced by those living on the shore of lakes and within the watershed, will keep our lakes healthy and preserve their ecological integrity.

Zones of Lake Protection

There are four zones where land use activities impact lake quality: 1) At the shoreline interface of land and water; 2) the shoreland buffer zone, the land immediately adjacent to the water; 3) the shoreland zone—1,000 feet from a lake and 300 feet from a river; and 4) the lake's watershed.

The 4 Zones of Lake Protection

The 4 zone approach to lake protection is most restrictive at the shoreline, and it is more flexible as one progresses further up the watershed.



This Guide will look at two primary ways landowners can manage their property to protect water quality. They are:

1. Curbing pollution at the source; and
2. Reducing, capturing, and cleansing runoff.

Proper lawn care, pet waste disposal, and the use of non-hazardous household products; reducing shoreline erosion; and septic system maintenance can help curb pollution. Runoff that can pick up pollution and carry it to the lake can be reduced by minimizing hard surfaces and limiting clearing and grading. Runoff can also be captured and cleansed so it doesn't reach the lake by using shoreland vegetative buffers; by redirecting and reusing rain water; and utilizing rain gardens. Land uses within the watershed can keep water clean to ensure enough water for drinking and other domestic purposes, and intact wetlands reduce flooding and hold back pollutants and nutrients that accelerate weed and algae growth in the lakes.

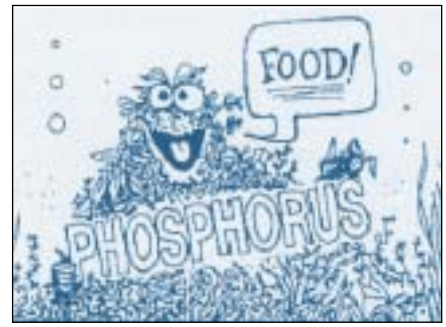
Practice the recommendations in this Guide and follow the regulations that are outlined and we'll all be enjoying Crow Wing County's water resources for many years to come.

Curb Pollution: Reduce Phosphorus and Other Pollutants

Nitrogen, potash, and phosphorus are the nutrients necessary for plant growth. Phosphorus is the key nutrient needed for aquatic plant and algae growth. When excessive phosphorus reaches the lake, it fuels the overgrowth of aquatic plants and algae, those microscopic organisms that give water a greenish tinge and can cause blue-green, toxic scums along the shore. Excessive plant and algae growth decreases water clarity, interferes with the recreational use of the lake, and diminishes oxygen for fish in the water, generally causing declining water quality.

Natural rainfall contains high amounts of phosphorus, which we can't control, but we can control our own shoreland practices that can contribute phosphorous to the lake. Excessive phosphorus can get into lakes from shoreland properties in a number of ways, including:

- excessive application to and runoff from lawns;
- decomposition of leaves and other plant material;
- erosion of soil, which has phosphorus particles attached to it;
- improper human and pet waste management, both of which contain high amounts of phosphorus; and the
- use of household products high in phosphorus.



One pound of phosphorus can feed the growth of over 500 pounds of algae.

Apply Fertilizer Sparingly and Use Zero-Phosphorus Lawn Fertilizer—It's the Law in Minnesota

By law since 2005, Minnesota homeowners cannot use fertilizers containing phosphorus, except for exemptions for new lawns or when a soil test indicates a need for phosphorus. In much of our area, soils are naturally high in phosphorus so lawns generally don't need extra phosphorus.

When shopping for fertilizer, buy a brand that has a middle number of zero i.e. 22-0-15. The law did not prohibit retailers from selling phosphorous fertilizers, and even though most retailers are carrying more zero phosphorus fertilizers, it's up to you to make sure you comply with the law.

If you have left over phosphorus fertilizer, using it on the garden is a good way to dispose of it.

Other herbicide and pesticide precautions to follow:

- Eliminate the use of fertilizers near water or wetlands.
- Before you consider fertilizing your lawn, aerate it first and see if that improves its health.
- Use the minimum amount needed to replenish the soil and apply at the right time of year, usually spring and early fall. Water lightly after fertilizing to ensure absorption by the roots before a heavy rainfall.
- Sweep fertilizer that has spilled on hard surfaces back onto the lawn to prevent runoff.

The shoreland zone where you live is the lake's first line of defense.

Managing water quality means appropriately managing the land use around the lake and within the watershed to reduce the amount of pollution that enters the lake.

Reduce the Use of Herbicides and Pesticides

- Keep lawn healthy to avoid the need for herbicide applications.
- When necessary, use the least toxic and most degradable herbicide and follow directions carefully.
- Use corn gluten meal, a byproduct of the corn milling process, as a natural pre-emergent herbicide that stops the root growth of germinating plants. If you can't find it in major retail stores, ask them to carry it.
- Remove dandelions and other unwanted plants from your lawn using hand-tools instead of chemical applications. If you feel you must use a herbicide for control, do not apply it to the whole lawn. Instead, use an applicator which allows you to direct a small spray towards each unwanted plant.
- Identify the pest and learn about the best way to control it; there are many methods of control other than pesticides. See Integrated Pest Management resources.
- When you use pesticides outside your house, on the lawn and in the garden, use them according to the instructions on the label to prevent spillage on the ground, where watering or rain can percolate it into the groundwater or wash it into the lake with runoff.

Keep Grass Clippings, Leaves, and Washed Up Aquatic Plant Material Out of the Lake

Grass clipping, leaves, and aquatic plant material that wash up on shore all contain phosphorus, which is released when the plant material decomposes. To prevent phosphorus from getting into the lake:

- Use a mulching lawn mower and leave grass clippings on the lawn as natural fertilizer.
- Collect and compost leaves and clippings, or haul them away from the lake to a disposal site.
- Rake up aquatic plants, leaves, and other organic matter on the shore and dispose of away from the lake. *Hint:* It makes great mulch on the garden which can later be worked in as a soil amendment.
- Do not burn leaves near the lake; it destroys the organic matter releasing the phosphorus, which could then be washed into the lake.

Never use fertilizers, pesticides, or herbicides near the lake. Runoff can carry these products into the lake and harm fish, plants, and other wildlife.

Locate Fire Pits Away from the Shore and Dispose of Ash

The leftover ash from burning wood is very high in phosphorus. If the fire pit is located near the lake, rain can wash the ashes into the lake.

- Locate the fire pit at least 50 feet away from the lake; and,
- Remove ashes from the fire pit to prevent the nutrient-loaded ashes from being blown or washed into the lake.

Properly Dispose of Pet Waste

Improper disposal of pet waste not only jeopardizes water quality, but your health as well. Pet waste contains phosphorus and may contain disease causing organisms, which, if washed into the water, can make it unsafe for swimming.

- Pick up pet waste in the yard or near the shore and dispose of it properly.

Practice Low-Impact Boating

To reduce the pollution impact of motorized watercraft on the lake:

- When fueling the boat, take precautions not to overfill the fuel tank. If you do spill, wipe it up with a rag, do not hose into the water.
- Boat slowly; motors stir up sediments releasing nutrients that can lead to deterioration of water quality—a 50-horsepower motor operated full throttle can stir the water column to a depth of 15 feet.
- Keep your motor well-tuned; use four-cycle motors.
- Inspect your boat and trailer to avoid transporting aquatic invasive species, like Eurasian watermilfoil, Curlyleaf pondweed, or zebra mussels into the lake if you've had your boat in another waterbody.

Use Natural, Non-toxic, and Phosphorus-Free Household Products

Use phosphorus-free products in the home. A variety of products are available at local grocery and retail stores, including dishwasher soap and other cleaning products. Seventh Generation is a popular brand to watch for. Laundry soaps contain no phosphorus. Reduce the use of commercial cleaners, use natural and non-toxic household alternatives instead. You can save money and avoid exposure to toxic chemicals.

Dispose of Household Hazardous Waste Properly

Many of the products that we use at home contain substances that are hazardous. Paints, cleaners, garden chemicals, automotive products and aerosol cans are all examples of products you may have around the home that are hazardous. When these products are no longer useful, they become household hazardous waste (HHW). Household hazardous waste not only threatens the health and safety of our families and ourselves, it can also cause damage to the air we breathe and fish and wildlife in our waters. Products are considered hazardous when they have at least one of the following properties and words on the label:

- **Flammable:** The label may say "Combustible," "Inflammable," "Petroleum Distillates," etc. These products could easily catch on fire.
- **Toxic:** "Poisonous," "Harmful or fatal if swallowed," etc. These products may cause immediate harm or cause long term health problems, such as cancer.
- **Corrosive:** "Acid," "Lye," "Alkali," etc. These products can eat through skin or other materials, such as metal.
- **Reactive:** "Do not mix with other chemicals." These products can react with other chemicals, possibly releasing toxic or flammable gases, igniting, or even exploding.

Before buying or using a potentially hazardous product, read the entire label, buy the least hazardous product you can, purchase only the quantity you need to avoid storing, and follow the use directions carefully. Store those products you do use in a safe place, away from heat, flames, cold temperatures, and in dry areas. Store in original containers.

Don't Burn Garbage

Burning household garbage in burn barrels, wood stoves, and fire pits creates pollution that's dangerous to human health and contaminates the air, water, and soil. It's also against the law in Minnesota.

Garbage today contains a lot of plastics; paper treated with chemicals, coatings, and ink; and many other chemicals. Backyard burning is a low-temperature fire that receives very little oxygen and produces lots of smoke. Under these conditions, a variety of toxic substances is produced and released primarily into the air close to ground level, where they are easily inhaled—with no pollution controls! Dioxin, a potent human carcinogen, is the major health risk posed by residential garbage burning. U.S. EPA research shows that burn barrels are the #1 source of dioxin in the U.S. Just one burn barrel can produce as much or more dioxin as a full-scale municipal waste combustor burning 200 tons/day.

- Instead of burning garbage, dispose of it properly.
- REDUCE, REUSE, RECYCLE. Reduce the amount of waste you create by buying products with less packaging and buying items that last longer instead of disposable ones. REUSE the durable packaging you get (like wash out that sour cream container and use it to put leftovers in). RECYCLE all the materials you can, like cardboard, newspapers, plastic grocery bags, cans and bottles.

To protect the environment, HHW must be disposed of properly. Dumped in the trash can, on the ground, or down the drain can contaminate ground and surface waters. Learn more about how to handle HHW and dispose of it properly on the Crow Wing County website: http://www.co.crow-wing.mn.us/solid_waste

Crow Wing County Household Hazardous Waste Facility, located at the County Landfill, is a free service to the residents of Crow Wing County.

May - October:
2nd Wednesday &
2nd Saturday of the month
Hours of Operation:
8:00 AM - 4:00 PM

November - April:
By appt only; 218-824-1290

Curb Pollution: Protect Our Wetlands and Drinking Water

Crow Wing County still has more than 80% of its original wetlands.

Statewide, Minnesota has lost over 50% of its pre-statehood wetlands and has about 9.285 million acres of wetlands remaining. Let's protect what we have left.

Wetlands are valuable because:

- they clean the water
- recharge water supplies
- reduce flood risks
- provide fish and wildlife habitat
- provide recreational opportunities and aesthetic benefits.

Minnesota's policy is no net loss of wetlands

What are Wetlands?

Wetlands are a vital transitional link between land and water. When you think of wetlands you probably think of wet, swampy, marshy areas. This would be true for some, yet other types of wetlands may be dry most of the year and support trees and shrubs. Generally, a wetland is defined as an area that is mostly wet soil, is saturated with water either above or just below the surface, and is covered with plants that have adapted to wet conditions. Wetlands are classified into different types based on soils, vegetation, and water conditions.

Wetlands have extremely valuable benefits, including:

- **Water Quality Protection:** Wetlands filter and absorb polluted surface water runoff before it enters groundwater, lakes and rivers.
- **Flood Control and Groundwater Recharge:** Wetlands serve as holding areas for water, slowing flood damage and soil erosion during heavy rain falls. In droughts, wetlands maintain stream flows and recharge groundwater.
- **Fish and Wildlife Habitat:** Wetlands provide homes, nesting, and feeding areas for many species of fish and wildlife.
- **Public Recreation**

Despite their beneficial functions, wetlands have been considered nuisances and until only recently have been filled or drained for development or agricultural production. In 1991, the Minnesota Wetland Conservation Act (WCA) was passed to stop the loss of wetlands and protect the benefits that they provide. Today, Minnesota's policy is no net loss of wetlands.

To accomplish this, anyone proposing to drain, fill, or excavate a wetland must first try to avoid disturbing the wetland; second, try to minimize any impact on the wetland; and finally, mitigate, or replace, any lost wetland acres, functions, and values.

Who has permit authority?

Federal (Section 404 Army Corps of Engineers), state (Minnesota DNR Public Works Program), and local authorities (Crow Wing County Soil and Water Conservation District, Crow Wing County, City of Pequot Lakes or City of Brainerd) regulate certain activities that affect wetlands. Work that affects lakes, rivers, streams and wetlands may require a permit from one or all of these agencies.

WCA applies to all Minnesota wetlands, except those listed on the Minnesota DNR's inventory of public waters and wetlands. WCA is administered and enforced in Crow Wing County by the Crow Wing County Soil and Water Conservation District (SWCD), Crow Wing County, City of Pequot Lakes and the City of Brainerd. Because Minnesota's rules pertaining to wetlands are detailed and complicated, and some exemptions may apply, it is recommended that you contact the Crow Wing SWCD since they are the clearinghouse for wetland information in Crow Wing County. The SWCD also provides technical assistance to all of the WCA authorities in Crow Wing County, and they can help you determine if wetlands are on your property, what permits may be needed, and direct you further if necessary.

The DNR's Public Works Program will require a permit for any work done below the ordinary high water level (OHWL) in lakes, rivers, streams or public waters wetlands. That includes filling, excavation, shoreland protection structures, dredging, and water level controls.

Protect Water Supplies

Even though Crow Wing County is blessed with a lot of water in its over 500 lakes, most of the County's residents rely on groundwater for drinking water. Groundwater is also important to lake levels, livestock, agriculture and industry. With the State's projection of up to a 60% increase in population in Crow Wing County by 2030, it is important to make sure there will continue to be safe quality and sustainable quantity of drinking water supplies.

Threats to the quality and quantity of drinking supplies include: runoff from construction, impervious surfaces, and feedlots; malfunctioning septic systems; combined use of fertilizers and irrigation for golf course landscaping and crop production; overuse; leaking underground storage tanks; and abandoned wells.

Test Drinking Water Supplies

Public water supplies in Crow Wing County must meet U.S. Environmental Protection Agency drinking water standards. For the high percentage of County residents who rely on private wells for drinking water and other domestic uses, there is no regulation on water quality. Well contractors are required to have a water sample tested for bacteria and nitrate when a new well is constructed; after that homeowners are responsible for periodic well testing.

Wells should be routinely tested for nitrate and bacteria, indicators of possible contamination, every two to three years by a laboratory certified by the Minnesota Department of Health (MDH). Test more frequently if nitrate has been previously identified. Test the water annually if you are a pregnant women or anticipate getting pregnant, or if infants will be drinking the water. Also test the water if there is a change in taste, odor, or appearance. Private wells should also be tested once or twice to determine if high arsenic levels are present. Northeast Crow Wing County has high naturally occurring arsenic levels in the soil.

The design, location, construction and abandonment of wells are regulated by the Minnesota Department of Health (MDH). Wells must be constructed by a state licensed well driller, who will be responsible for getting a permit from the MDH and insuring that the well complies with setbacks from septic systems and buildings. For specific setbacks, see the Crow Wing County website.

There are several certified water testing laboratories in Crow Wing County; consult the yellow pages. Watch for periodic well testing offered throughout the County. For questions about well testing or construction, contact a well specialist at the Bemidji Regional Office of the Minnesota Department of Health at 218-308-2100.

Protect Water Supplies for Future Use

There will be no new water supplies, and once water is contaminated it is not suitable for drinking water. Practice water conservation in your home to insure adequate quantities of groundwater for future use. Limit lawn watering—native vegetation and smaller lawns will reduce the need for watering. Apply mulch to landscaping to reduce evaporation. Do not hose down outside areas. Collect rainwater in rain barrels for outside watering needs. Seal off all abandoned wells. See page nine for water conservation recommendations and follow other recommendations throughout this Guide to minimize runoff and potential contamination of groundwater supplies.

Drinking water over the public health safety limit of 10 mg/L of nitrate-nitrogen may be harmful for infants under the age of six months, and can cause "blue baby syndrome," a condition that interferes with the blood's ability to carry oxygen.

Curb Pollution: Inspect and Maintain Your Septic System

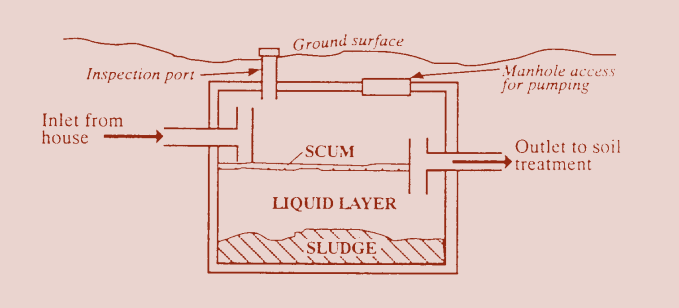
Most homes in shoreland areas rely on Subsurface Sewage Treatment Systems (SSTS), commonly known as the septic system. Your septic system, if designed, installed, and maintained properly, will effectively treat wastewater before it is returned to the environment to protect public health and prevent pollution of a nearby lake or river.

Understand How Your Septic System Works

Understanding your system is essential to proper operation and maintenance. The basic components of most systems are the:

- **The Septic Tank** receives the wastewater from the household plumbing. In the tank, the solids are separated from the liquid. Here, naturally occurring bacteria decomposes food particles and human waste and the remaining solids settle to the bottom until they are pumped out on a regular basis. The tank will have an inspection pipe for monitoring of the tank and a manhole for access when pumped. The size of the tank is based on the home's potential water use and types of appliances installed. When the capacity of the tank is reached the excess liquid flows, or is pumped, over into the drainfield.

- **The Soil Treatment System (drainfield)**, which is typically a network of perforated pipes surrounded by small rock and soil. The liquid, which contains pathogens (disease-causing organisms), nutrients such as phosphorus, and fine solids, is cleansed naturally by bacteria as it percolates down through the soil. The design of the treatment system (trench, mound, etc.) is based on the soil conditions on your property, which must allow for at least three feet of unsaturated soil for the wastewater to percolate through for proper treatment. The correct type of system needed for your property will be determined by a state-licensed septic designer. Where gravity flow is not enough to move the liquids from the tank to the soil treatment system, pumps or lift stations are common—this is typical with mound systems.



Source: University of MN Extension Protecting Our Waters Series, #2

What Causes a Septic System to Fail?

Septic system failure is most commonly the result of:

- Improper design or installation of the system;
- Overuse of water in the home; and/or
- Improper maintenance.

When your system, or a neighbor's system fails, untreated wastewater could come in contact with people, causing a public health hazard, or enter the groundwater and eventually the lake, adding pollution that can contribute to increased algae and aquatic plant growth and declining water quality.

What are the signs of a failing system?

- Sewage backup into the house or slow toilet flushing,
- Frozen pipes or soil treatment areas,
- System alarms sounding,
- Wet and/or black areas around a septic mound,
- Algal blooms and excessive plant growth in the water near shore,
- Sewage odors indoors or outdoors,
- Water or sewage surfacing in the yard or a nearby low spot, or
- High levels of nitrates or coliform bacteria in well water tests.

If you have a problem:

- **Contact your local Planning & Zoning Office for advice and/or licensed septic inspector.**
- **If the drainfield or household pipes are not clogged, have the system pumped for both solids and liquids as a temporary measure.**
- **If there is surface pooling of wastewater, fence off the area to prevent contact with humans or pets.**

Properly Operate and Maintain Your System

Proper operation and maintenance will extend the life of your system for many years and prevent costly repairs.

✓ Pump the Tank Regularly

Have a licensed professional pump the solids (floating scum and sludge) that have accumulated from the septic tank every one to three years—the more use, the more often pumping is needed. Make sure they pump through the manhole. While garbage disposal use is not recommended with septic systems, pump annually if you are using one. Failure to remove the solids can cause them to enter the drainfield, which can result in expensive repair or replacement. For licensed and certified septic system maintenance services, refer to the yellow pages under septic tanks and systems-cleaning.

✓ Practice Water Conservation

Too much water flowing into the tank will cause the tank to back up and lead to ineffective treatment of wastewater. To prevent this:

- Repair all leaky faucets, fixtures, and appliances.
- Install low water-use fixtures and appliances (especially toilets and shower heads).
- Do not empty roof drains and sump pump water into the septic system.
- Wash only full loads of clothing and dishes, and spread out water use, such as laundry, throughout the day and week. Consider front loading machines; they use less water.
- Reduce the length of showers and the number of toilet flushings, especially during high use periods.
- Reroute water softener discharge water out of the septic system.
- Do not hook floor drains or drain tile into the septic system.

✓ Limit What Goes Down the Drain

- Do not put household cleaners, paint, solvents, medications, and other chemicals down the drain.
- Limit the use of antibacterial products. As the name suggests, they can reduce the amount of working bacteria in the septic tank.
- Use only the recommended amounts of liquid non-phosphorus detergents and cleaners.
- Prevent food particles, grease, lint, coffee grounds, plastics, and other non-degradable solids from getting into the system.
- Use single-ply toilet paper for the best decomposition.

✓ Do Not Use System Additives

It is not necessary to use starters, feeders, cleaners, or other septic additives to enhance the performance of your system. If your system is properly maintained and operated, it will operate at maximum performance with the use of naturally occurring bacteria.

✓ Protect Your Drainfield

Compacting or obstructing the soil over the treatment area can cause malfunctioning of the drain field. To protect it:

- Keep heavy vehicles off the drainfield.
- Maintain vegetative cover, but do not plant trees or shrubs on the drainfield because the roots may penetrate and clog the distribution system.
- Mow the area, but do not fertilize or water.
- Reroute roof drains and drain tile away from the drainfield.

Protect Your System from Freezing in the Winter

Common causes of septic system freezing during the winter can be lack of snow cover, extreme cold, compacted snow, irregular use of the system, leaking plumbing fixtures, pipes not draining properly, or a water-logged system.

What to do if the system freezes? Unplug your pump and call a septic system professional. Do not add antifreeze, additives, or continuously run water to try to unthaw the system.

To prevent freezing, follow these general guidelines:

- Fix any leaking plumbing or appliances prior to winter.
- In the fall, leave the grass longer over the tank and drainfield for better insulation.
- Add a layer of hay or straw mulch (8-12 inches) over the pipes, tank, and soil treatment area.
- Keep ATVs and snowmobiles off the drainfield.
- Spread hot water use (laundry, showers, dishwasher) out over the day and week. If you'll be gone for extended periods, consider having someone stop by to run hot water regularly.
- High efficiency furnaces, water softeners, and iron filters have the potential to cause problems in the winter because of slow and/or periodic discharges of water. For suggested precautions, see: http://septic.umn.edu/homeowner/factsheets/furnaces-softnersironfilters.html
- Talk with a professional before installing heat tapes or tank heaters.

County Requirements

Who regulates? The design, inspection, and installation of septic systems are regulated by your county and must be done by professionals licensed by the state. Lists of licensed professionals and permits for septic system installation can be obtained from the Planning & Zoning Office.

What records are required? A septic system must have a "Certificate of Compliance" indicating it meets the county's SSTS and Wastewater Ordinance, sometimes referred to as being "up-to-code." A Certificate is good for five years from the date of original installation and it must be renewed every three years thereafter.

When are inspections required? If you are applying for a building permit for new construction, a compliant septic system is required. A building permit for any addition to current buildings, including a deck or garage—attached or non-attached, requires a current Certificate of Compliance for the septic system. If one is not on record or it is not current, an inspection of the septic system will be required and, if the system is found to be noncompliant, modification or replacement of the system may be necessary before a building permit is issued.

What about property transfers? A Certificate of Compliance is required before a title transfer can occur on any shoreland property with a septic system. If the system is not compliant, it must be brought into compliance, or an agreement must be filed to update/escrow for later compliance before occupancy and title transfer to the new owner.

Call the Crow Wing County Planning & Zoning Office for questions about septic system requirements, including setbacks from property lines, wells, lakes, rivers, and streams.

Reduce Runoff

Managing stormwater on your property is the best way to reduce runoff and pollutants before they reach the lake.

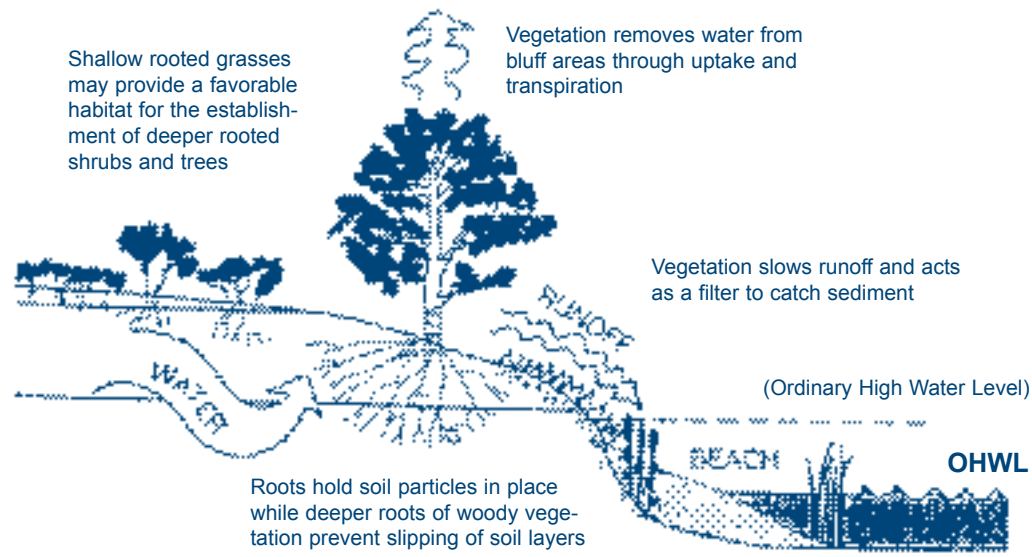
If we love our lakes we have to change our ideas about what is a good lawn at the lake.

That beautiful manicured lawn takes more chemicals and more work to maintain and does not provide good habitat for the wildlife that share the shoreland with us.

What is runoff?

Snow melt or rainwater that does not soak into the ground and instead runs off hard surfaces such as roofs, driveways, sidewalks, and compacted soils or washes off lawns and steep slopes is called runoff. It is also referred to as stormwater. When runoff reaches the lake, it can carry with it nutrients, eroded soil sediments, toxic materials, bacteria and other pollutants that can be detrimental to water quality and fish and wildlife habitat. **Reducing runoff decreases the pollutants that can eventually reach the lake.**

Managing stormwater on your property so it soaks into the ground (infiltrates) rather than running off is the best way to reduce runoff and filter out pollutants before they reach the lake. Hard or paved-over surfaces do not allow the absorption of water. Any green space, including gardens, trees, shrubs or landscaping allows water to infiltrate slowly down into the soil and roots.



Shoreland Best Management Practices Fact Sheet #5, University of Minnesota Extension.

Practice Good Lawn Management

Reduce the Amount of Lawn

Bringing the suburban lawn mentality to the lake has also brought more opportunities to degrade the quality of our lakes. Limit the amount of lawn and keep as much natural vegetation as possible, or replant natural vegetation—especially near the lake. Not only will you reduce runoff, you'll reduce the amount of yard work, freeing you up to recreate instead.

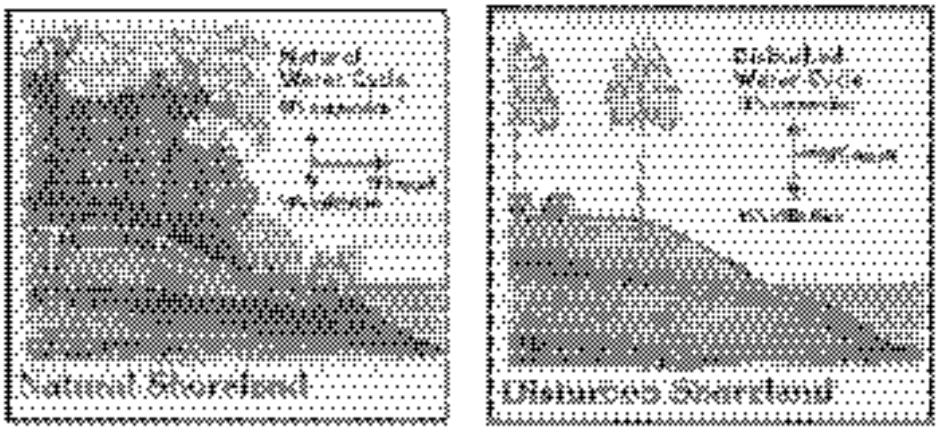
Maintain a Healthy Lawn to Absorb More Water

- Mow to a height of two to three inches; mow when dry to prevent clumping. Taller grass provides shade for better root growth, which helps with water absorption.
- Consider replacing some of the grass in your lawn area with clover, native grasses, or other groundcovers that don't need watering.
- If watering is necessary, water deeply, but infrequently, to encourage deep root growth. Water with lake water. (*Hint:* use the nutrients in the lake to make a healthy lawn instead of frequent fertilizer applications.) Water in the morning, not mid-day or evening.
- In hot weather, allow lawn grasses to go into a state of dormancy so that they require less water and nutrient intake for survival. Water 1/4 to 1/2 inch every two or three weeks to keep crowns from dehydrating beyond the point of recovery.

Maintain Natural Vegetation

Natural vegetation will naturally reduce runoff by holding back the water to provide time for it to soak into the ground.

- When clearing your lot, minimize the removal of wooded areas, trees and low growing shrubs. Their removal causes more rain to fall to the ground instead of landing on leaves and branches.
- Grading large areas of land removes the natural depressions of land where water can pond and soak in.
- Carefully landscape your yard near roads, driveways, and along the shoreline to direct runoff away from the lake.



When there is precipitation, water will evaporate, run off the land, or soak (infiltrate) into the ground. The amount of vegetative cover on the ground will significantly impact the amount of runoff and infiltration. Natural vegetation will hold back the runoff providing time for it to soak into the ground.

Make Friends With the Ice Ridge

Ice ridges are formed by the pushing action of the lake's winter ice sheet against the shore and can be more pronounced in years when there is little insulating snow cover. Unless the ice ridge is impeding your use of the lake or access to your dock area, consider making friends with the ice ridge and leave it alone. They are natural features of lakeshore that have been forming for thousands of years. The ice ridge has many benefits to the lake. It is a natural berm to protect the lake from runoff. Nutrients collect on the landward side of the mound, producing fertile soil where trees and plants thrive and provide roots systems to hold soil in place. They provide a natural form of shoreline protection. If you do decide to remove an ice ridge, contact the Crow Wing Soil and Water Conservation District before beginning work; a permit will be needed. An ice ridge cannot be altered if it is older than one year; historical ice ridges cannot be removed.

Precaution During Construction

To reduce runoff during construction projects, erosion and sediment containment is required. If more than one acre of land is disturbed, an MPCA stormwater permit will be required along with a stormwater management plan. Follow these temporary practices to reduce construction runoff.

- Seed exposed areas with annual grass or mulch during long-term projects where soils will be exposed for more than a couple of weeks; for small areas of dirt piles, cover with plastic or a tarp.
- For large exposed stockpiles of direct close to a ditch, stream, wetland or lake, build a berm or install a silt fence to prevent sediment runoff. Berms are typically built about 3 feet tall at the crest and 1.5 to 2 times the height in width. Stockpile material can be used to build the berm; then stabilize it with shredded mulch.
- Install down slope perimeter control prior to soil disturbance. A silt fence installed to manufacturer's specifications or a stabilized top soil berm are a couple of options.

The Wisconsin DNR calculated runoff volume from an undeveloped shoreland lot compared to a large lake home (approximately 4,000 square feet of impervious surfaces) on a lot entirely converted to lawn. They found up to a:

- 500% increase in runoff volume,
- a 700% increase in phosphorus washing into the lake, and
- a 900% increase in sediment flowing to the lake on the large home lot.[2]

Reduce Runoff: Curb Erosion

Any exposed soil can be washed away with stormwater. When soil washes into the lake, it carries with it phosphorus—the desired nutrient for weed and algae growth—along with debris and other toxic materials that may be on the land. It causes sediment build up in the lake; increases turbidity after rain events, which interferes with normal lake functions; and impacts fish and wildlife habitat. Degradation to water quality is a result. Curbing the erosion of soil will reduce pollutants reaching the lake.

Naturalizing your shoreline or maintaining the natural shoreland vegetation is the most important way to reduce shoreland erosion.

Monitor Construction or Renovation Projects

Have an erosion control plan and carefully monitor all construction or renovation projects to ensure that soil and construction materials do not runoff the exposed soils.

- Properly dispose of all construction materials each day.
- Use nontoxic, biodegradable or recycled materials.
- Wash or clean any liquid materials in-doors or directly into a container.
- Install silt fences along the shoreland to capture any sediment runoff that might occur.
- After construction, establish vegetation right away.
- Minimize land alteration around your construction projects to take advantage of existing soil stability.

Stabilize the Soil in Steep Areas

The erosion potential on steep slopes and bluffs can be reduced by:

- Diverting water away from steep slopes by rerouting drainpipes and gutters. If diverting water away from the bluff is impractical, it should be routed through a non-perforated plastic drain pipe that outlets at the very bottom of the bluff into rock drainage.
- If you need a walkway to the shore, follow the natural contours of the slope to go across or around the slope, or use steps when a walkway must go directly up and down a slope, but minimize destruction of natural vegetation during construction.
- Keep the moisture- and nutrient-absorbing natural vegetation on steep slopes by limiting clearing and grading.
- Replant vegetation on barren slopes.
- Create a view corridor through the trees with selective pruning for an excellent view while maintaining the natural trees and shrubs.

Source: Lakescaping for Wildlife and Water Quality[3]

Reduce Shoreland Erosion

If your shoreland is eroding away, stabilizing the shoreland will be necessary to reduce erosion. Possible causes may include:

- fluctuating water levels,
- increased wave or wake action, ice pushes in the spring, or
- loss of natural vegetation to hold the soil in place.

Each shoreland situation is different. Consulting shoreland landscaping professionals, the DNR Area Hydrologist, or the Soil and Water Conservation District is encouraged to determine the best solution for your shoreline erosion situation.

Rip rap and retaining walls are usually not the best choice for stabilizing shoreland erosion. They can negatively impact the lake by creating an unnatural barrier between upland areas and the shoreland environment that destroys vegetative transition areas and eliminates critical habitat for many species. Retaining walls deflect wave energy back to the lake instead of diffusing it, which can undercut the base of the wall and cause increased erosion at the ends making the water more turbid. Neither rip rap or retaining walls will prevent ice ridges from forming—rock cannot withstand the up to 30,000 pounds of ice pressure per square inch. Natural shoreline vegetation is the best protection from both wave erosion and ice heaves, and it's less expensive and longer lasting.

Slow the Boat Down

Boat wakes can cause tremendous shoreland erosion, so boat slower. In shallow areas (less than 15 feet), motor at slow-no-wake speeds (5 mph or less) to reduce the boat wake and the consequent wave action that can erode your shoreline and other's around the lake. Observe all posted "no-wake" and low-speed zones. For personal watercraft, running at slow, no-wake speed within 150 feet of the shore is the law.

Boating slowly makes less wake, less noise, reduces pollution and is less disruptive to wildlife and other people—plus you'll see more and enjoy the lake longer. When running at higher speeds, keep the motor properly trimmed to reduce noise and the boat wake.

On steep bluffs, selectively prune trees to create a view corridor of the lake. Keep the vegetative undergrowth to stabilize the soil on the bluff.

Shoreland Alternations are Regulated

Be aware that any type of shoreland or bluff alteration in the impact zone,* including grading, filling, or removal of vegetation other than dead or diseased trees, limbs, or branches, is regulated and will require a permit. Violators will be issued fines and required to restore the alteration.

* The *shore impact zone* is the area adjacent to the water for a distance equal to one half of the required structure setback.

* The *bluff impact zone* includes the bluff itself and an area within 30 feet from the top of the bluff in Crow Wing County.

Reduce Runoff: Preserve or Restore Native Shoreline Vegetation

A natural shoreline is a bridge between two worlds—the land and water. Studies show that there can be as much as 500% more diversity of plant and animal species along a natural shoreline compared to upland areas.

A native vegetation buffer between the land and the water restores and maintains the ecological function of lakeshore.

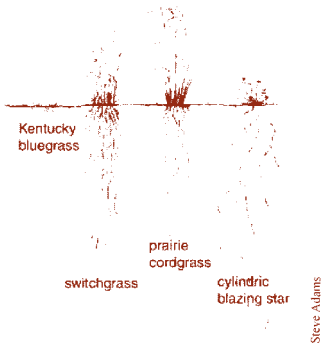
A natural shoreline is a complex ecosystem that helps protect the entire lake. Preserving or restoring your shoreline with native vegetation is the best way to reduce shoreland erosion, protect water quality, and improve the health and diversity of shoreland and upland birds, wildlife, and aquatic plants.

A natural shoreline is a bridge (a buffer) between two worlds—the land and water. It reduces runoff to prevent erosion and sedimentation to the lake and intercepts nutrients that can degrade water quality by increasing algae and aquatic plant growth. Studies show that there can be as much as 500% more diversity of plant and animal species along a natural shoreline compared to upland areas.

A mostly natural landscape has only 10% runoff.

If your shoreland is already natural vegetation, congratulations—please keep it that way. If you have lawn to the water's edge, or very little native vegetation near the shore, consider a natural shoreland landscaping project to restore the native vegetation by creating a shoreland buffer zone—an area of native vegetation along the water's edge.

Creating and maintaining a natural buffer zone along your shore does not mean your property has to look messy, but it may mean you have to re-think what your shoreland should look like. Buffers of native trees, flowers and shrubs can bring natural beauty to your yard. One of the greatest benefits of establishing native vegetation is their deep root systems that stabilize the shore from erosion and ice damage and provide an area for rain to soak into the ground instead of running off to the lake.



Native plants are more effective at stabilizing soils and banks because their roots are longer (3-5 feet) and more dense than typical Kentucky bluegrass(2-3 inches). They hold the soil particles together to prevent erosion and reduce ice damage.

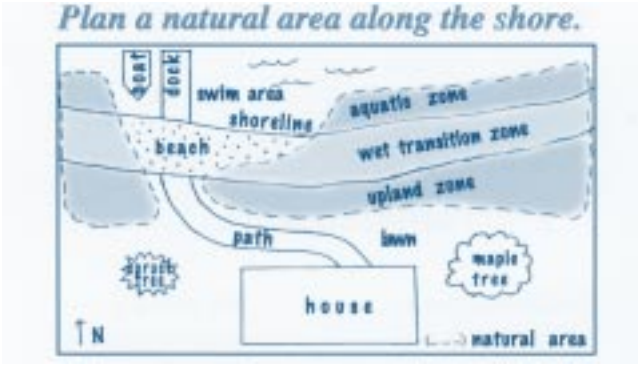
Even if your neighbors are not restoring their shoreland, it is important for you to proceed because its helps improve your property and water quality, and you can serve as a good role model for others to follow. The individual choices by many can have cumulative impacts on the lake and its ecosystem. Ultimately, keeping the water clean can be far less costly than cleaning up a damaged lake, and clean waters framed by natural vegetation often have the highest property values.

What is a shoreland buffer zone?

A buffer zone is an unmowed strip of native vegetation that extends both lakeward and landward from the water's edge. A buffer zone of native plants that extends 25-50 feet landward from the shore is preferable, but even adding a buffer as narrow as 10-15 feet can restore many functions critical to the health of the lake that may have been eliminated previously by sod, hard structures, or mowing. **When it comes to shoreland buffers, wider is better for more benefits.**

A shoreland buffer zone consists of:

- The shallow **aquatic zone** of the emergent, submerged, and floating leaf aquatic plants that provide food and shelter for ducks, songbirds, frogs and other amphibians, and fish. The taller plants, like bulrush, sedges, and cattails can reduce the energy of wave action to minimize erosion and help maintain water quality.
- The **wetland transition zone** of more water-loving plants that bind the lake bed to the upland soils.
- The **upland zone** of native trees, shrubs, grasses, and wildflowers slows rainwater running over-land, making sediment drop out, absorbing water and nutrients, and breaking down pollutants.



Source: University of Minnesota Extension Service, 2005; Item #08308

Getting Started Creating a Shoreland Buffer

Before You Start

There are a number of ways to create a shoreland buffer depending on the characteristics of the shoreland and the desires of the property owner. Before you decide how to approach establishing a shoreland buffer, thoughtfully assess your shoreline and what you want to accomplish.

- Do you have erosion problems to correct? Problems with Canada geese? What kind of wildlife would you like to attract?
- Consider the specific conditions at your site, including light, moisture, orientation, and degree of slope.
- Identify soil type and the type of lake bottom (mucky, sandy, rocky).
- Think about where you're located on the lake – do you get a lot of wind and wave action, or direct sunlight for much of the day? Shoreline revegetation is most likely to succeed in areas that are sheltered and experience little or moderate wave action, do not experience significant changes in water level during the growing season, and are not very steep.
- Also consider the different ways you use the shoreland area and the amount of shoreland that you want to restore. How much area is really needed for lake access for boats and swimming? Limiting the beach and dock area to 15-20 feet and leaving the rest of the shoreline natural is ideal to have both the benefits of the buffer zone while having recreational access to the lake. Resource professionals recommend that you maintain a shoreland buffer along 75% of the shoreline frontage.

Resource professionals recommend that you maintain a shoreland buffer along 75% of the shoreline frontage.

Next, decide how you want to establish a shoreland buffer. Here are some options.

Don't Mow, Let It Grow A simple, no-cost way to get started in restoring your shoreland is to stop mowing for the width of the desired buffer strip. Turf grasses will grow 12-24 inches before going to seed, after which seeds in the soil will germinate and valuable native plants will begin to appear. You can note the types of native plants and wildflowers growing on natural shorelands around lake to get an idea of what is likely to appear or will be suitable for growing in your area. While the buffer is getting established, you may need to weed out nuisance species or add native plants for diversity, but not mowing will get you started. Over time, shrubs and trees will naturally fill in and provide a more diverse plant cover.

Additional benefits of shoreland buffers:

- Less time spent mowing; more time enjoying the lake.
- Attracts birds and butterflies.
- Enhances your view of the lake by adding interest, texture and color.
- Provides more privacy from people using the lake or neighboring properties.
- Protecting water quality is protecting your real estate value.
- Taller native plants create a biological barrier that will deter Canada geese from loitering on the lawn.
- Well-established emergent aquatic plants discourage the establishment of non-native invasive species.

Building a home and establishing a lawn to the water's edge can cause seven times the amount of phosphorus and 18 times the amount of sediment to enter the water compared to a natural shoreline.[4]

Do-It-Yourself

Many of the local nurseries and garden centers now carry native plant stock and can recommend the best plants for your site. Plants used should be indigenous to this region of Minnesota—don't buy plants from a mail order catalog grown in another part of the country and expect them to grow. The DNR website has a list of native plant suppliers and landscapers. Consult with the Crow Wing County Extension office, DNR Shoreland Restoration specialists, or the Crow Wing Soil and Water Conservation District for resources and fact sheets on designing your project, selecting plants, preparing the site, and planting. Take one of the many classes offered throughout the summer on the basics of shoreland restoration. Professionals teaching the classes will help you design your own project and may later be available for further consultation. Many classes include an opportunity to participate in the planting of a restoration project to give you experience for planting your own project.

The book *Lakescaping for Wildlife and Water Quality* and the CD *Restore Your Shore* are two highly recommended resources to get you started. Financial assistance for your project may be available; check with the Crow Wing Soil and Water Conservation District or the DNR Shoreland Habitat Restoration Grant Program.

Hire a Professional

Shoreland restoration is a rapidly growing field among landscape professionals and a number of professional resources are available in Crow Wing County. Consult the yellow pages, Crow Wing County Extension, or watch for advertisements. Ask for recommendations from other property owners who have completed revegetation projects. When working with a professional you should expect a detailed site analysis, a site plan developed with you and your interests taken into consideration, and professionally installed plantings. They may also be available for maintenance of your site as it's getting established. If your site has a steep slope or other unusual characteristics, getting professional assistance will be important to the success of your project.

Maintaining Your Restored Shoreland

A shoreland restored with native vegetation should maintain itself once it is established. Apply mulch to new planting beds to prevent soil erosion, hold moisture in the soil, and control weeds. You may need to water and weed the first season, but once the plants are established, they will be able to out-compete most weeds. Native species should never be fertilized because they are adapted to the nutrient levels found in local soils, and fertilizers and pesticides applied to areas near shore can be a threat to aquatic life and water quality. Plants left standing in fall and winter provide seeds and shelter for wildlife, add interest to the winter landscape, and protect the soil from wind erosion. If some plants do not survive the first year, replant as quickly as possible to maintain a continuous vegetative cover. As your shoreland buffer grows, you may want to trim some tree branches or shrubs to keep your view of the lake clear while maintaining the benefits of a natural shoreline.

Protect the Aquatic Zone

The aquatic zone is a vital part of the shoreland buffer. Emergent vegetation helps purify the lake by removing contaminants and calming the water, which allows suspended soil particles to settle to the lake bottom. They provide shelter and spawning areas for fish and other wildlife and add oxygen back into the water. If submerged aquatic plants are interfering with swimming, clear by hand only what is needed to provide a small swimming area. Leave other submerged plants in place. Any chemical treatment of aquatic plants or the destruction of cattails, bulrushes, or wild rice will require a permit from the DNR Brainerd Fisheries office.

As part of your project, you may want to plant more aquatic vegetation. This will require a permit from the DNR, but generally a permit fee is waived because this activity is encouraged. Once planted, it may be necessary to install wave break structures to protect young plants from wave damage until their roots are established.

Learn to identify aquatic invasive species, such as Curlyleaf pondweed and Eurasian watermilfoil, and report any suspect plants to the DNR. These invasive species can replace native plants that are vital to the lake ecosystem, and they create recreational nuisances and impact water quality.

Leave Fallen Trees and Branches Alone

Unless they are interfering with your recreational access, leave trees and branches that have fallen into the water alone. They form critical habitat for aquatic organisms that fish and other aquatic life feed on, provide cover from predators for small fish, and they serve as a dock for turtles, kingfishers and other interesting wildlife. The fish and wildlife will appreciate you.

Common Plants for Shoreland Buffers

These plants are commonly used in creating shoreland buffers or are found naturally along shorelines. There is a wide variety of other sedges and plants native to Minnesota that can also be used.

Aquatic Zone	Wet Transition Zone	Upland Zone
Bulrush	Marsh marigold	Wild rose
Pickerelweed	Swamp milkweed	Canada anemone
Water shield	Blue flag iris	Little Bluestem
White and yellow water lily	Canada bluejoint grass	Wild bergamot
Arrowhead	Blue vervain	Black-eyed susan
Bur-reed	Sedges	Red-osier dogwood
		High bush cranberry

The Brainerd lakes area has lost more than 65% of its emergent vegetation as a result of shoreland development.

Capture and Cleanse Runoff: Manage Your Stormwater

Low Impact Development (LID) gets water into the ground near where it falls through:

- Infiltration
- Rain gardens
- Less impervious surface
- Pollution prevention

The new way of managing rainwater (stormwater) is to get the water into the ground near where it falls instead of letting it run off to eventually make its way to a nearby waterbody carrying with it pollutants, chemicals, soils laden with nutrients and other materials that can impact water quality, aquatic life, and wildlife. Learn to view rainwater as a resource. This approach to stormwater management is called **Low Impact Development (LID).**

This new way of thinking about rainwater mimics the natural water cycle and pre-development patterns on a property, keeping the drop of water as close to where it fell in the watershed so it can soak into the ground. This principle gets closer to the natural cycle of 50% infiltration/10% runoff for vegetated shorelands that is discussed on page 11.

Key LID concepts include:

- Conserve: preserve native trees, vegetation, and soils, and maintain natural drainage patterns.
- Control at the source: minimize runoff volume at the source by collecting or directing it to vegetated areas where it can infiltrate (soak in to) the ground slowly.
- Customized Site Design: each home or commercial/industrial site can help protect the watershed through the appropriate combination of LID techniques.
- Pollution Prevention and Maintenance: reduce pollutant loads to waterbodies and increase efficiency and longevity of infrastructure with proper and timely maintenance.

LID uses techniques that **infiltrate** (soak in to the ground), **filter, store, evaporate,** and **detain** runoff close to its source. These include the use of infiltration basins, rain gardens, rain barrels, grassy swales, and general reduction of the amount of impervious pavement. In addition, LID also emphasizes protecting natural areas important for water transport and filtering, such as wetlands, streams, and vegetation buffers near water. Remember—every part of your lot is part of a larger watershed. The degree to which water is properly managed at the lot scale is the degree to which habitat and water quality degradation can be minimized to the adjacent lake or river, or other waterbodies in the watershed and groundwater can be recharged.

When Building or Altering the Landscape:
Any new development or alteration of the landscape should have site design and planning that takes the natural vegetation and drainage patterns into consideration.

- Minimize grading and clearing. Carefully assess the property and its natural drainage patters before designing the house and its placement on the lot.
- Keep wetlands and as much native vegetation as possible. Wetlands filter out nutrients and native trees provide shade, filter and soak up water, and are habitat for birds and wildlife. They require less care and can tolerate a wide range of conditions.
- Conserve the soils that will allow good infiltration of rainwater and place rain gardens and swales in those locations.
- Slope paved surfaces toward vegetated low areas to allow water to soak in.
- Landscape with rain gardens to hold runoff on the lot and to filter rainwater and recharge groundwater.
- Retain rooftop runoff in a rain barrel for lawn and garden watering—your garden will love the natural nutrients.
- Combine rain gardens with grassy swales to replace curb and gutter.
- Reduce impervious surfaces. When building, construct smaller houses or building footprints; build up rather than out. Minimize the amount of driveway, roof area, and

sidewalks. Cover worn paths that may be compacted with mulch to absorb water. For patios and walkways, use permeable pavers or interlocking pavers or flat stones set in sand instead of concrete.

- Minimize or discontinue using fertilizers and herbicides. These chemicals easily run off into lakes and streams, triggering algae blooms and fish kills.

Assess Stormwater Management on Your Lot

Take a look at your current landscaping and drainage patterns. Are there locations on your property where significant volumes of stormwater runoff are being generated? If yes, begin thinking about how you might reduce runoff using the techniques outlined in this Guide. Could you move or remove what is causing the runoff or managing the runoff using diversion, infiltration, and/or storage practices? Are the soils on your site suitable for infiltration stormwater management practices? In general, sandy and gravelly soils work quite well, while soils with more than 30 percent clay or more than 40 percent silt and clay do not infiltrate well.

Crow Wing County Showcases LID Techniques

The new Crow Wing County Judicial Center uses a combination of three rain gardens, planted in May 2007, and other LID techniques to infiltrate the parking lot runoff. The curb cutouts allow rainwater and snowmelt runoff to enter this rain garden located in the center of the parking lot by the Judicial Center in Brainerd.

Lakes Area Clean Waters Council

The Lakes Area Clean Waters Council was recently established to provide education on stormwater management focused on homeowners, businesses, and contractors. The Council is made up of representatives of Crow Wing and Cass County local governments, businesses, nonprofits, and interested citizens.

For homeowners, the Council is encouraging the installation of rain gardens, rain barrels, and shoreland buffers as a means to control stormwater runoff. By 2010, the Council has a goal of awarding 1,000 residents in Crow Wing and Cass Counties with signs and space on their website to showcase their projects. Registered projects will receive appropriate signage for their property.

Contact the Council at: www.dropstopabsorb.org or call:

Eleanor Burkett, University of Minnesota Extension
218-828-2326

Jackie Froemming, Crow Wing County Extension
218-824-1068

Beth Hippert or Jim Chamberlin, SWCD
218-828-6197

Marty Peisch, Thirty Lakes Watershed District
218-828-0243

Capture and Cleanse Runoff

Garden with water quality in mind!

When It Rains, It Pollutes

Rain naturally contains pollutants, including phosphorus and mercury. You cannot do much about this source of the pollution, but you can **capture** some rainwater and allow it to be **cleansed** through natural soil processes to prevent it from running off into the lake, where it can be detrimental to water quality.

The best way to do this is to: divert rainwater off roofs, driveways, and other hard surfaces into rain barrels or to the lawn, or create a special garden—a rain garden—designed to capture and clean the rainwater naturally.

Divert Rainwater Off Roofs and Driveways

Roofs of houses and other buildings, especially larger houses, and driveways comprise most of the impervious (impermeable) surfaces. Redirect rainway flow from drain spouts, roof gutters, and driveways onto vegetated areas and away from the lake, steep slopes, and bluffs. There it can be captured and have time to infiltrate naturally into the soil or be used later for watering, instead of getting to the lake.

How much rain do I need to fill a 50-gallon barrel?

For every inch of rain that falls on one square foot of your roof, you can collect just over half a gallon of rainwater (0.6 gallons).

For example, if you have a shed that is 10' x 10' and you collect roof runoff from all 100 square feet of your roof, you can collect 60 gallons of rainwater during a 1-inch rain event.6

Install a Rain Barrel

A rain barrel is any type of container used to catch water flowing from a downspout and store it for later use.

The rain barrel is placed underneath a shortened downspout diverting the roof runoff into the barrel. The rain barrel has a spigot to collect the stored water for use in watering flower gardens, house plants and lawns—it's a natural way to fertilize.

Due to lack of research at this time, water collected in a rain barrel is not recommended for watering vegetable gardens. Humans and pets should not drink the stored water. Non-toxic mosquito dunks are available at garden supply stores and mail order catalogs to prevent the breeding of mosquitoes in rain barrels.

Rain barrels need to be cleaned routinely during spring and summer months to reduce algae growth. During winter months, take your barrel out of operation by simply turning it upside down at the same location or storing elsewhere.

Rain barrels can be purchased at garden centers, ordered online from garden catalogs, or you can make your own (see resources).

Plant a Rain Garden

A rain garden is just what it sounds like—a garden to soak up rain water. It is a recessed planting bed, shaped like a saucer or shallow bowl, designed to collect runoff from driveways, roofs, and other hard surface or sheet flow of rain from lawns. The collected water is then infiltrated into the ground instead of running off to the lake.

Rain gardens are planted with hardy, water-loving native perennial plants that have deep roots, which along with the soil, work to provide a filter system to catch pollutants such as phosphorus, oil, mercury and other heavy metals in rainwater that run into the garden area. Rain gardens allow sediments that are carried with runoff to settle so plants can absorb the nutrients. During a rainfall, the highest concentration of pollutants is during the first inch, or first flush of a storm, which is retained in the rain garden.

Use rain gardens in combination with natural shoreland landscaping for optimal runoff control on your shoreland property.

In general, typical rain garden should be located at least 10 feet from the house and will range from 100 to 300 square feet in size with a depth of 6 inches to 12 inches. As a rule of thumb, one garden will handle the runoff from a hard surface that is about 10 times their size. For larger surfaces, more than one rain garden may be needed to handle the runoff, perhaps locate one rain garden near each down spout. Rain collected will infiltrate into the ground within a few days, sometimes even hours depending on your soil type.

To be effective, rain gardens must be properly designed for the right shape and size to accommodate the amount of roof, driveway, and other hard surfaces on your property as well as your soil conditions. Plants must be used that are appropriate for your soil type and will also tolerate standing water for up to 48 hours.

For proper design, it is recommended to consult resources to help you determine the proper plants and dimensions. Talk with the local extension agent or a landscaping professional knowledgeable about rain gardens. See the “How-To” resources (on page 16) or do an internet search for amazing resources.

Rain Garden Tips:

- Don’t worry about mosquitoes. Most rain gardens will not hold water long enough for mosquitoes to reproduce.
- When first planted, hand weed biweekly until native plants are established.
- Don’t fertilize near the rain garden, it will stimulate weed competition without benefiting the native plants.
- During heavy rains, your rain garden may fill up and overflow. Make sure the overflow drainage follows the drainage designed for your lot.

Source: Taylor Creek Restoration Nurseries

Locate utilities before you dig—call Gopher One State, Minnesota toll free 800-252-1166.

What Can I do on a Shoreland Property? What Permits are Required?

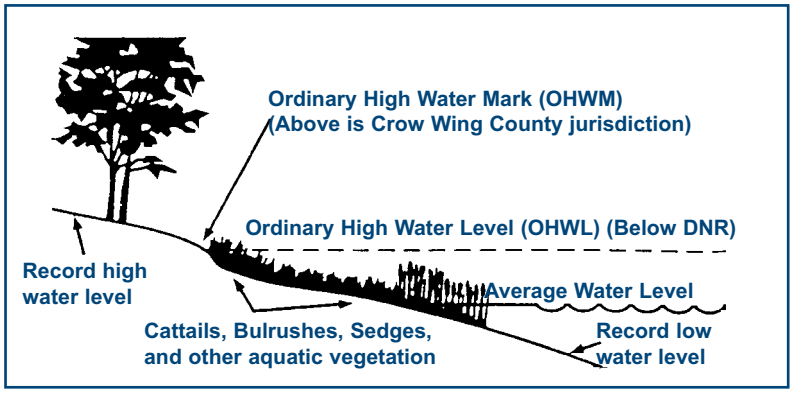
Knowing what you can and cannot do in the water and on the adjacent shoreland area, and following the regulations that apply, is an important stewardship practice.

Any activity that disturbs land, plant or animal life or chemicals applied in the water is a regulated activity to ensure that the quality of the environment is not compromised by the activity.

Who Has Regulatory Authority in the Shoreland Zone?

The shoreland zone is defined as the land within 1,000 feet of a lake and 300 feet of a river or stream plus the near shore waters.

- **For any actions in the water or on the land below the ordinary high water level (OHWL)** of a public water (lakes, rivers, streams, wetlands), check with the appropriate Minnesota Department of Natural Resources (DNR) office for permits that may be required.
- **For any actions on the land above the OHWL (the upland areas of your property) and within the shoreland zone,** contact the appropriate county office. If located within the boundaries of a city, contact city offices.



See the Shoreland Homeowners Checklist for the appropriate authority in various situations.

How do I know where the ordinary high water level (OHWL) is? For lakes and wetlands, the OHWL is the highest water level that has been maintained for a sufficient period of time to leave evidence on the landscape; it is not necessarily the highest place the water has been. It is commonly that point where the natural vegetation changes from predominately aquatic to predominantly terrestrial.

The OHWL is a reference elevation that defines the DNR's regulatory authority, and it is used by Crow Wing county to determine their regulatory zone and appropriate setbacks for buildings.

If there is a question about the OHWL on your property, contact the DNR Area Hydrologist or check with the Crow Wing Soil and Water Conservation District (SWCD).

Commonly Asked Questions about Shoreland Activities:

What are the requirements for installing a retaining wall or rip rap for erosion control? A DNR public waters work permit is required to build a retaining wall along your shoreline if the structure is proposed below the OHWL. Retaining walls are discouraged, particularly on relatively undeveloped lakes. Planting vegetation for erosion control is preferred; rip rap (coarse stones, boulders, or rock placed against the bank or shore) may be allowed without requiring a DNR permit if specific conditions are followed in installation. For either a retaining wall or rip rap installation, you will need technical advice for the best success. Contact both the DNR Area Hydrologist and the Crow Wing County SWCD for assistance. Refer to the DNR Shoreland Alteration fact sheet.

Do I need a permit for a sand blanket or beach development? Everyone wants a nice sandy beach area, but trying to create a sandy beach where it has not existed naturally may not always be successful. Before making your decision, be aware that wave action can erode the beach, and sand will migrate down shore, possibly damaging fish and wildlife habitat. If the lake bottom is soft, the sand will only sink into the muck and disappear. Sand blankets cannot be applied over bulrush and cattails; vegetation will constantly emerge.

Before installing a sand blanket below the OHWL, contact the Area DNR Waters office for installation and possible permit requirements. Refer to the DNR Shoreland Alteration fact sheet for specifications. A permit will be needed from the Crow Wing Soil and Water Conservation District if you are installing a sand blanket.

What rules apply to docks? Docks are privately owned structures, which are allowed to be placed in public waters of the state to provide access to the use of the water. Dock rules are established by the DNR to prevent the deterioration of the lake's ecosystem from excessive or inappropriate dock placement. Local governments have the authority to regulate docks; Crow Wiing currently defers to state rules.

In choosing the right dock and boat lift configuration for your property, it is important to keep in mind that a dock is private property placed on a public resource, and they can have detrimental impacts on the lake. They may shade out important aquatic plants and cause fragmentation and destruction of important emergent and submerged aquatic vegetation that provides habitat where fish spawn, feed, grow, and find shelter from predators. Keep dockage appropriately balanced between reasonable access and resource protection. Do not use docks for activities that are better intended for land, such as barbeques and porches.

No DNR permit is needed to install, construct, or reconstruct a dock on shoreline if:

- The dock, not including the watercraft lift or canopy, is not wider than 8 feet and is not combined with other structures that create a larger structure.
- The dock is no longer than is necessary to reach navigable water depth, is not a safety hazard, it does not close off access for others to the lake, allows for free flow of water under it, and is not intended for use as a marina.

A temporary 2008 general permit allows for a modest platform at the lake end of the dock under the following circumstances: 1) a single temporary platform up to 120 square feet measured separately from the access dock, or; 2) 170 square feet including the area of the adjacent access dock. The access dock must be 5 feet or less in width and is located on a lake with a classification of General Development or Recreational Development. If a dock exceeds these conditions, a DNR Waters permit will be required. For more information, see "Dock Rules" in the Resource Section.

Can I control aquatic plants in front of my shoreline? The removal or destruction of aquatic plants is a regulated activity under the DNR's Aquatic Plant Management Program. Aquatic plants are a valuable part of the lake system. They stabilize bottom sediments, protect water clarity, prevent shoreline erosion and provide fish habitat.

You are encouraged to keep destruction of aquatic plants at a minimum. Unless aquatic plants are interfering with lake access, swimming, or other water recreation activities, they should be left alone. If you are seeing unusually high plant growth where it has not previously occurred, look for possible sources of phosphorus getting into the lake from your property that might be fueling this growth, such as excessive runoff, a septic system, or shoreland erosion.

If management is desired, consider managing plants only in the swimming area; it is not necessary to have the entire shoreline devoid of submerged aquatic plants. For management, you need to know:

- No emergent plants can be destroyed (bulrushes, cattails, wild rice) unless authorized by a DNR permit.
- Submerged vegetation can be manually controlled (hand cutting or pulling) in a area not exceeding 2,500 square feet or wider than 50 feet along the shore or half the width of your property, whichever is smaller; more than that requires a permit.
- Cut or pulled vegetation must be removed from the water and the cleared area must remain in the same place from year to year.
- A permit from DNR Fisheries is needed to:
  - Use any chemicals or automated mechanical devices (such as the Crary WeedRoller, Beachgroomer or Lake Sweeper).
  - Use copper sulfate for swimmers itch control.
  - Remove floating leaf vegetation in an area larger than a channel 15 feet wide to open water.
  - Remove or relocate a bog of any size that is free floating or lodged elsewhere than its original location.
  - Plant aquatic plants below the OHWL as part of a shoreline restoration project. This activity is encouraged and there is generally no permit charge.

These activities are not allowed in any circumstances:

- Excavating the lake bottom for aquatic plant control, using lake-bottom barriers to destroy or prevent the growth of aquatic plants,
- Removing vegetation within posted fish-spawning areas,
- Removing aquatic plants from an undeveloped shoreline, and
- Removing aquatic plants where they do not interfere with swimming, boating or other recreation.

If you see violations of these permit requirements, or any other permit requirements, contact your Conservation Officer immediately. Photo documentation is appreciated.

Crow Wing County Permit Requirements

For properties within municipal boundaries, check with the city's Planning & Zoning office for proper permit requirements. Residents in Irondale or Crow Wing Townships must contact their township for land use permits. Additional permits for projects may be required on properties within the Thirty Lakes Watershed District; check with them before starting any construction or dirt moving project. For all other unincorporated areas of Crow Wing County, the following permit requirements apply.

Building Permits for New Construction & Remodeling

Contact Crow Wing County Planning & Zoning

Any new building or structure added to an existing building will need a building permit. For specific shoreland setback requirements (within 1,000 feet of a lake or 300 feet of a river) see building permit information on the Planning & Zoning web pages. Maintenance of a structure (re-siding, shingling, changing doors/windows, etc.) is allowed without a permit, but call to verify that a permit is not needed to avoid complications later. Remodeling of a home's interior does not need a permit; however, a change in use would require a permit.

Variances for Building Permits

Contact Crow Wing County Planning & Zoning

For projects that do not conform to the County land use regulations, a variance will be needed from the Board of Adjustment. Contact Planning & Zoning for an appointment to discuss your request and to obtain an application and fee information. Upon receipt of a complete application, a review (which may take up to 10 working days) is begun on the property. Any violations on the property must be resolved before an application can proceed. The Board of Adjustment meetings are held only once a month; plan ahead accordingly.

Accessory Structures e.g. Boat Houses

Contact Crow Wing County Planning & Zoning

All new structures are required to meet the building setbacks. There has been a change to the state statute that allows non-conforming, pre-ordinance buildings to be rebuilt in the exact same footprint and the exact same size, but a permit is needed before construction. Call for more details. No new boathouses are allowed without a variance .

Dirt Moving in the Shoreland Zone (such as ice ridges, shoreland landscaping, etc)

Contact the Soil & Water Conservation District (SWCD)

Dirt moving, including ice ridge manipulation, in the Shore Impact Zone (SIZ) requires a permit. An approved plan with recommendations from the SWCD must be received along with a site plan before a permit will be issued.

Wetland Alterations and Delineation

Contact the Soil & Water Conservation District (SWCD)

No wetland filling is allowed within the shoreland building setback. Generally, wetland filling is not allowed in other zones, but some exceptions may apply. Contact the SWCD for specifics.

Vegetation Removal in the Shoreland Impact Zone

Contact Crow Wing County Planning & Zoning

In shore and bluff impact zones and on steep slopes, limited clearing of trees and shrubs and cutting, pruning and trimming of trees is allowed to provide a view to the water and to accommodate access to the water with provisions.

Placement of Wells

Contact Regional Office of Minnesota Department of Health (MDH)

Placement and installation of wells is regulated by the Minnesota Department of Health. Check on minimum setback requirements from septic systems, building, etc. for wells before proceeding with a licensed well drilling company. The well driller will obtain the required permits needed from the Minnesota Department of Health.

Septic Systems

Contact Crow Wing County Planning & Zoning

Prior to any permit being issued, or anytime a new deed is generated, there must be either a new installation certificate on file dated within 5 years, or a compliance inspection report dated within 3 years. Prior to any new construction, a septic design must be submitted and approved before the permit will be issued. If you are planning on using an existing septic system, it must meet current standards. Check with the Planning & Zoning office before installing a septic system to make sure all requirements are being met. See "Septic Systems" on the Planning & Zoning web pages.

New Construction and Parcel Development

Contact Crow Wing County Planning & Zoning

Before purchasing a parcel or building, check with Planning & Zoning to make sure the parcel is suitable for building and in compliance with regulations. Please inquire if all of the existing structures on the property have received a permit. If building in the shoreland area, the required setback from the lake, maximum impervious surface coverage, and minimum parcel width requirement will vary depending on the lake classification. Additional setbacks and vegetation protection apply to building near a bluff.

Before purchasing a property, especially if it is shoreland, ask these questions and/or check with the Planning & Zoning office.

- Do all of the structures meet the setbacks?
- Does it meet minimum area and width requirements?
- Have all existing structures on the property been built with a permit?
- Is the septic system compliant with regulations?

It is better to ask in advance then to find out later you will not be able to build what and when you planned.

Crow Wing County Landowner's Checklist:

Contact Crow Wing County Planning & Zoning before:

- Buying, clearing, or developing shoreland property.
- Building a new structure, remodeling or adding on to an existing structure.
- Installing a septic system.
- Building a boardwalk, raised path to the lake, or anything that does not meet setback requirements. Building or repairing any accessory structure near the shore (boat house, gazebo, storage locker).

Contact Crow Wing Soil and Water Conservation District (SWCD) before:

- Draining, mowing, or filling a wetland anywhere in Crow Wing County.
- Any kind of dirt moving or changing the appearance of your shoreland building setback zone (shoreland impact zone) or near shore area by clearing, cutting, planting, grading, or filling.
- Installing a sand blanket above the ordinary high water level.

Contact the Thirty Lakes Watershed District before:

- Starting any project that touches upon or affects any lake, stream, wetland, irrigation, drainage ditch, other surface waters, any well or other ground waters of the Thirty Lakes Watershed District; additional permits may be required. See www.30lakes.org for a district map.

If you are in doubt or need clarification about any activity, contact the Crow Wing County Planning & Zoning office.

Contact the Minnesota Department of Natural Resources before:

- Removing emergent vegetation (cattails, bulrushes, wild rice).
- Using chemicals to control aquatic vegetation.
- Altering a lake bed.
- Any work done below the ordinary high water level (OHWL).

References:

1. *Protecting Your Waterfront Investment,* Center for Land Use Education, UW Extension; 2005.
2. *Shoreland Property: a guide to environmentally sound ownership;* 2002; Southeast Wisconsin Fox River Basin Partnership Team, University of Wisconsin-Extension and Wisconsin Department of Natural Resources.
3. *Lakescaping for Wildlife and Water Quality,* State of Minnesota, Department of Natural Resources; Henderson C; Dindorf C; Rozumalski, F.
4. Minnesota DNR Shoreline Alternations Fact Sheets: Natural Buffers, Lakescaping; Riprap, Sand Blankets.
5. *The Shoreland Stewardship Series: A fresh look at shoreland restoration;* DNR FH-430-00; RP-03-10M-50-S; University of Wisconsin-Extension, Wisconsin Lakes Partnership, Wisconsin Department of Natural Resources and the GMU Teams, and the Wisconsin Association of Lakes.
6. Rain Barrel Fact Sheet, Crow Wing County Extension, 2007.

Frequently Called Contact Information:

Crow Wing County Offices
www.co.crow-wing.mn.us

Crow Wing Planning & Zoning Office
(218) 824-1125
(located in Land Services Building, behind Courthouse)
http://www.co.crow-wing.mn.us/planning_zoning/index.html

Crow Wing Soil & Water Conservation District
(218) 828-6197
7118 Clearwater Road, Brainerd, MN 56401
http://www.mn.nrcs.usda.gov/partnerships/crowwing/Partners.htm

Land/Park Department: (218) 824-1115
Public Health: (218) 824-1080

Solid Waste Management (Recycling, Household Hazardous Waste)
(218) 824-1290

Crow Wing County Extension:
(218) 824-1065
Mnext-crowwing@umn.edu

Other Crow Wing Contacts:

Thirty Lakes Watershed District
(218) 828-0243, www.30lakes.org

Crow Wing Township
(218) 828-3064
cginstitute@communitygrowth.net

Irondale Township
(218) 839-3042, louann@dialomni.com

Minnesota State Offices
Minnesota Board of Soil and Water Resources, Brainerd
(218) 828-2383

Minnesota DNR
Area Hydrologist/Public Work Permits:
(218) 828-2605
Area Fisheries Office/Aquatic Plant Permits:
(218) 833-8614
Shoreland Habitat Restoration Grant Program:
(651) 259-5212
Wetland & Invasive Species Enforcement:
(218) 546-5926
Conservation Officers: (888) 646-6367
Turn in Poachers (TIP): (800) 652-9093

Minnesota Department of Health/Bemidji;
218-308-2100
Minnesota Pollution Control Agency, Brainerd: (218) 828-2492
Minnesota Water Line: (800) 455-4526

Additional Resources:

Aquatic Plant Management: http://www.dnr.state.mn.us/shorelandmgmt/apg/permits.html

DNR Water Permits Requirements:
http://www.dnr.state.mn.us/permits/water/answers.html#ohwl

Dock Rules: See “Dock Information” at
http://www.dnr.state.mn.us/waters/index.html

Erosion Control for Home Builders: http://cleanwater.uwex.edu/pubs/storm.htm#erosion

General Shoreland Homeowner Information:
www.shorelandmanagement.org

Non-Toxic Household Product Alternatives:
http://www.reduce.org/toxics/index.html

Rain Barrels/Gardens:
Constructing a rain barrel: http://www.shorelandmanagement.org/quick/easypdf/rain_barrel_const.pdf
Rain Garden: A How -To Manual:
http://cleanwater.uwex.edu/pubs/pdf/home.rgmanual.pdf
Rain Garden Design Fact Sheets:
http://www.appliedeco.com/NLD.cfm

Septic System Design and Maintenance:
http://septic.umn.edu/homeowner/index.html or call 800-322-8642.

Shoreland Alterations Fact Sheets
(Docks, Rip Rap, Sand Blankets, Ice Ridges, Lakescaping)
http://www.dnr.state.mn.us/waters/index.html; see Shoreland Management Section.

Shoreland Landscaping:
The Water’s Edge: http://files.dnr.state.mn.us/assistance/backyard/shorelandmgmt/savewateredge.pdf
Lakescaping for Wildlife and Water Quality: Available in bookstores or from Minnesota Bookstore, 800-657-3757, http://www.comm.media.state.mn.us/bookstore/bookstore.asp
Restore Your Shore CD: www.dnr.state.mn.us/restoreyourshore/index.html
Living Shore Video/DVD: A 17-minute video showing the importance of leaving a natural buffer zone on the shore; check with your county Extension Office for a loaner copy.
Native Plants for Sustainable Landscapes
www.extension.umn.edu/distribution/horticulture/DG7447.html

Stormwater Management:

Lakes Area Clean Water Council;
www.dropstopabsorb.org
http://www.pca.state.mn.us/water/stormwater/stormwater-manual.html
Wetlands: See “wetlands” tab at www.bwsr.state.mn.us