Understanding Shoreland BMPs

Shoreland Best Management Practices

Number 1 of 18 in the Series

What Are Shoreland BMPs?

Best Management Practices (BMPs) are actions you can take to reduce your impact on the environment. BMPs have been described for agriculture, forest management, and construction. This series of fact sheets describes BMPs you can adopt on your shoreland property to help protect and preserve water quality. In many cases, the best management for shorelands may be retaining the natural characteristics of your property.

These BMPs are guidelines that have been established for many areas of shoreland property. As more research is carried out along shorelines to measure the impact of landuse activities on water quality, BMPs may be refined or revised. In the meantime, these fact sheets will assist you in making decisions about your property to minimize impact on Minnesota's valuable water resources.

Some BMPs are clearly aimed at residents who already live seasonally or year-round on their shoreland property and who value the resource enough to protect it. /Other fact sheets are designed for those developing new acreage in the future or for short-term visitors to Minnesota waterways. The guidelines are equally appropriate for property near lakes or rivers, and all are relevant for every Minnesotan who shares a commitment to preserve our abundant water resources.

Even if you do not live directly on the shoreline, the way you manage your household wastewater and property can have a significant impact on water quality downstream. Pathways that carry contaminants may not always be obvious. Drain tiles, ditches, storm sewers, paved roads, and shallow ground water can all carry pollutants from residential, industrial, and agricultural areas into lakes, rivers, or wetlands.

Fertilizers and chemicals applied to lawns or crops can wash down driveways or ditches and end up in surface water. Improper disposal of hazardous household waste or industrial chemicals can add toxics to our lakes. Poor landuse and construction practices result in erosion, increasing the load of sediment in our rivers. These adverse impacts on surface and ground waters not only affect water quality for human use, but also damage wildlife and fish habitat and /Other natural resources.

Use of the Fact Sheets

These fact sheets may be distributed to shoreland property owners, lake association members, local elected officials, technical staff, and /Other decision makers. Individual fact sheets may be copied and handed out at meetings or information booths. Fact sheets may be reproduced as pages in newsletters or included with mailings such as utility bills or tax statements. See reverse side for additional guidelines on use.

On the inside front cover of the folder is a property management section. Locate the appropriate information for your property and buildings and record it in the folder.

Most of the fact sheets outline simple actions to implement on your shoreland property or household to minimize adverse impacts on water quality. For help in getting started on more technical projects, fact sheet #16 *Accessing Information to Protect Water Quality* gives additional information about the agencies and organizations that can provide assistance. *Shoreland Stewardship Scorecard,* fact sheet #17, lets you measure your success in protecting water resources.

REMEMBER. . .
Everyone lives in the watershed of some lake or river, even if they don't own property directly on the waterfront. People who own shoreland property must remember that Minnesota's lakes and streams are a public resource; they have the right and responsibility to preserve those waters for present and future generations to enjoy.

Helpful Definitions

beach sand blanket--Sand that is added to form a beach; it should not be added where it would destroy fish or wildlife habitat, wild rice or /Other protected vegetation; size restrictions do apply; contact the DNR Area Hydrologist for specifics.

erosion--The process by which soil or rock material is worn down and carried away by wind or water; erosion is increased when vegetation is removed and soil is left exposed.

eutrophic--Water very high in nutrients, generally referring to lakes; lakes commonly experience algal blooms and excessive weed growth.

filter strip--Vegetated area adjacent to shoreline that helps prevent contaminants from reaching the water; preferably native vegetation.

infiltration--Water seeping into the ground through pores in soil, sand, or gravel or through cracks in bedrock; infiltration can help minimize erosion.

ordinary high water level (OHWL)--Highest water level that a lake has maintained for enough time to leave evidence on the landscape; commonly where natural vegetation changes from aquatic to upland species; for streams, the OHWL is generally the top of the bank of the channel.

riparian zone--Land area adjacent to a stream or lakeshore that may experience periodic flooding.

runoff--Water flowing over the surface of land or soil; runoff can cause erosion and is increased when surfaces are paved or covered with roofs, patios, or decks.

setback--The required distance between the shoreline and property development; different distances apply for dwellings, septic systems, outbuildings, and wells; required setbacks vary for different water bodies; county and municipal ordinances may vary.

shore impact zone--Land area adjacent to a shoreline in which certain regulations apply; some activities are prohibited.

shoreland regulations--DNR regulations determining the type and extent of development allowed near shorelines; counties or municipalities may adopt more restrictive ordinances.

topography--Shape or contour of the land; topography and slope influence how property should be developed; construction or /Other activity on steep slopes increases runoff and erosion.

water bar--A small, raised ridge on the road surface used to deflect water flow into a ditch; designed to reduce erosion by minimizing flow down the road.

watershed--The drainage basin or area in which surface water drains toward a lake or stream; ground water flow may or may not

parallel surface topography.

For More Information...

call
county offices:

- University of Minnesota Extension Service
- Soil and Water Conservation District (SWCD)

regional offices of MN State agencies:

- MN Board of Water and Soil Resources (BWSR)
- MN Pollution Control Agency (PCA)
- MN Department of Natural Resources (DNR)
- MN Department of Health (MDH)

federal agencies:

- Natural Resources Conservation Service (NRCS)
- Environmental Protection Agency (EPA)
- U.S. Army Corps of Engineers (USACoE)

Part of a series. . .

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1. **Understanding Shoreland BMPs**
2. Maintaining Your Shoreland Septic System
3. Installing a Shoreland Septic System
4. Ensuring a Safe Water Supply
5. Limiting Impact of Recreation on Water Quality
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Minnesota Board of Water and Soil Resources
Minnesota Department of Health
Minnesota Department of Natural Resources, Division of
Fish and Wildlife, Division of Waters, Division of Forestry
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Use Of Publication...

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Next Section: #2 Maintaining Your Shoreland Septic System
Home

Maintaining Your Shoreland Septic System

Shoreland Best Management Practices

Number 2 of 18 in the Series

What Are Shoreland BMPs?

Best Management Practices (BMPs) are actions you can take to reduce your impact on the environment. BMPs have been described for agriculture, forest management, and construction. This fact sheet describes BMPs you can adopt on your shoreland property to help protect and preserve water quality. In many cases, the best management for shorelands may be retaining the natural characteristics of your property.

Why Are Septic Systems a Problem?

In shoreland areas it is particularly important to maintain your septic system properly because soil and water conditions near shore may make the system less efficient in treating wastewater. Incomplete treatment can result in health risks for humans and water quality problems.

Potential health risks are the most serious concern related to failing septic systems. Hepatitis, dysentery, and other diseases may be spread by bacteria, viruses, and parasites in wastewater. These disease-causing organisms, called pathogens, may make nearshore water unsafe for recreation. Flies and mosquitoes that are attracted to and breed in wet areas where wastewater reaches the surface may also spread disease.

Many of the synthetic cleaning products or other chemicals used around the house can be toxic to humans, pets, and wildlife. These products may reach the ground surface or end up in the water.

Excessive nitrate levels in drinking water can result in serious health problems for infants. High nitrate levels in ground water can result from inadequately treated wastewater.

Inadequate treatment can also allow excess nutrients to reach your lake or stream, promoting algae or weed growth. Algal blooms and abundant weeds not only make the lake unpleasant for swimming and boating, but they also affect water quality for fish and wildlife habitat. As plants die, settle to the bottom, and decompose, they use up oxygen that fish need to survive.

How a Septic System Works

The purpose of an on-site wastewater treatment system, commonly known as a septic system, is to treat sewage from your household. A septic system has two parts: the sewage tank and the soil treatment system. The most common sewage tank in Minnesota is a septic tank that receives raw sewage from the household. Three layers form in the tank: solids settle to the bottom and a layer of scum or grease floats on the surface of a liquid layer (Figure 1). As raw sewage is added to the tank, an equal amount of liquid flows out into the soil treatment system.

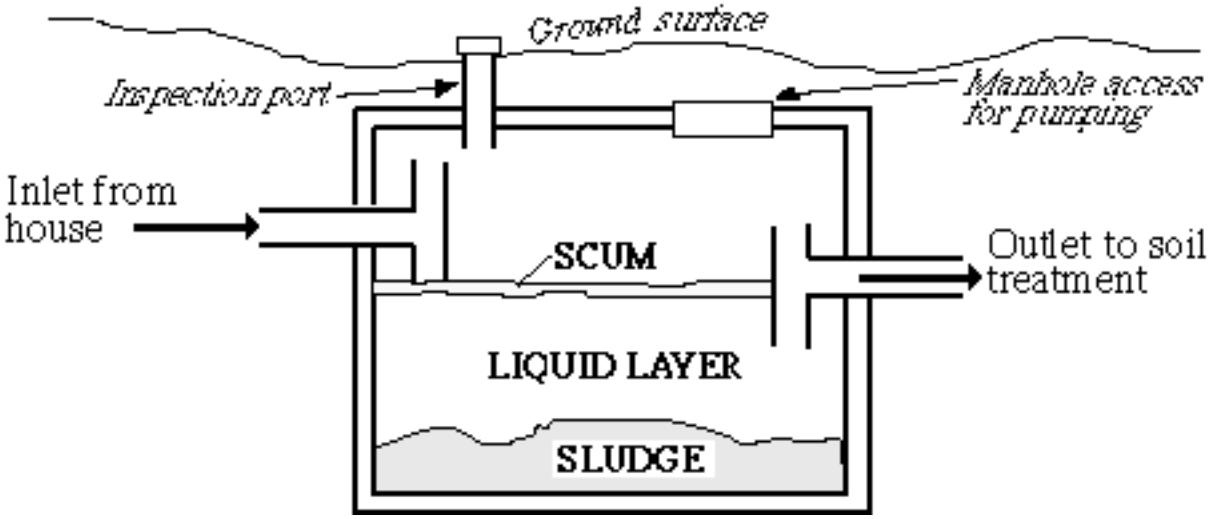

Figure 1: Typical cross section of a septic tank showing the layers of sludge, liquid, and scum. Newer tanks will have access ports for pumping. Older tanks may have a manhole cover that should be removed for pumping. Inspection ports on older tanks are ***not*** *suitable for pumping.*

Wastewater treatment is completed in the soil absorption area. There are three basic types of soil treatment systems. **Drainfield trenches** are the most common and do the most effective job of treating wastewater. They take full advantage of evaporation and plant life to help treat sewage. **Seepage beds** do not require as large a lawn area, but they have a smaller capacity and are less efficient than drainfield trenches. **Mounds** are elevated systems that may use pressure to distribute sewage effluent. Seepage pits, dry wells, and cesspools are no longer approved and may not be installed. On-site systems with seepage pits should be upgraded to include the proper size tank and drainfield to accommodate the house size and number of residents.

In the soil, microscopic organisms break down remaining biological contaminants such as bacteria or viruses. Nutrients are absorbed by soil particles or taken up by plant life. These processes only work in soil that is not saturated with water. If the soil is too wet, biological breakdown may be incomplete and nutrients may move much greater distances, sometimes hundreds of feet from the drainfield or mound and possibly into surface water (Figure 2). Even systems that appear to be working well or are in compliance with the health code may allow nutrients or bacteria to reach the water.

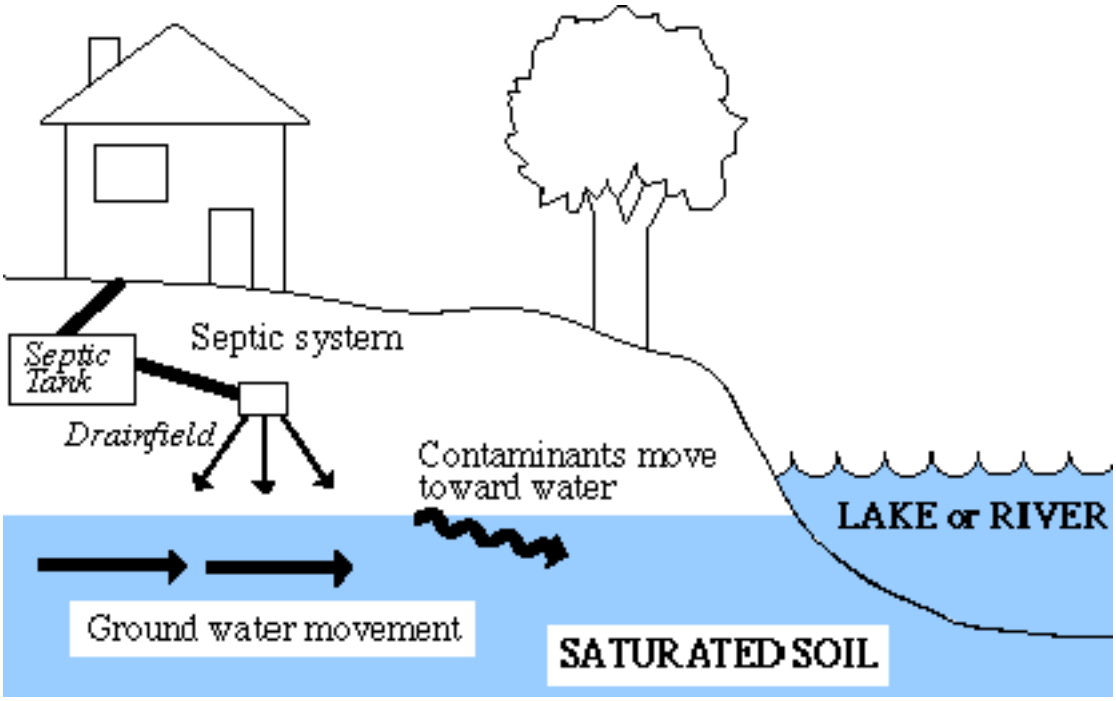

Figure 2: Avoid water contamination from inadequate wastewater treatment! If your system is improperly designed or located too close to the water, contaminants may reach your lake. This figure shows how ground water moving toward the lake can carry contaminants in saturated soil.

How to Tell If There Is a Problem

THESE CONDITIONS INDICATE YOUR SEPTIC SYSTEM MAY BE FAILING

- **Sewage backup in your drains or toilets.** This may be a black liquid with a bad odor.
- **Slow toilet flushing.** Even if you use plungers or drain cleaners, drains may run slower than usual.
- **Wet areas or water seeping near drainfield.** It may or may not have an odor.
- **Excessive growth of aquatic weeds or algae in the lake near your home.** Incomplete treatment of nutrient-rich water seeping from your system promotes this growth.
- **Unpleasant odors around your house.** This may result from improper venting or a failing system.
- **Bacteria or nitrates are found in your well water.** This indicates a serious water contamination problem that may come from your own or a neighbor's failing system.
- **Biodegradable dye flushed through the system shows up in the lake or river.**

What to Do If Your System Fails

Immediate Actions

- **Call the local health or zoning and planning department.** They will help you get the expert advice you need to solve your problem.
- **Have the septic tank pumped, making sure that sludge as well as liquid is removed.** This will often help solve the problem temporarily, particularly if you also cut back significantly on water use. If the drainfield or household piping is clogged or if high water levels are a problem, this won't help.
- **Fence off the area to minimize contact with wastewater** (for humans, pets, wildlife).
- **Don't use additives.** Additives are no benefit and may harm the system.

These actions may help if the system fails

- **Increase the absorption field size of the existing system.** This will help if the original field was sized too small for the household or if water doesn't percolate well through the soil.
- **Connect to a community or lakeshore "cluster" sewage system.** Although initial costs may be high, this strategy offers long-term protection for your water resources and environment.
- **Installing a holding tank system** is considered a temporary alternative in many counties, and is not a method of treating wastewater.

Long-term BmPs

The only practical long-term solution may be to upgrade your septic system by redesigning and replacing part or all of it. This work must be done by a registered contractor or a business licensed to design and install individual sewage treatment systems. In many counties, a permit is required for all new construction and replacement.

When remodeling your home or cabin, be sure to expand the capability of your septic system to meet the new demands that will be placed on it. Also, be sure to preserve enough undeveloped space on your property for future expansion of the drainfield.

How to Keep Your System in Shape

Here are several BMPs you can follow to keep your septic system in good working order to protect your lake or river.

Household habits

- **Conserve water.** Excessive water use is the most common cause of septic failure, so reduce water used for bathing, laundry, and flushing the toilet.
- **Identify and repair** leaking pipes, sticking float valves in toilets, and dripping faucets to reduce water waste. A dripping faucet can waste 15-20 gallons per day.
- **Shorten shower times and choose showers over baths** to minimize wasted water. A full bath uses 50-60 gallons, while a shower uses only about 5 gallons per minute. Of course, a 20-minute shower is not a savings over a bath.
- **Install low-volume toilets and low-flow showerheads.** Typical toilets use 5-6 gallons per flush, providing nearly half the wastewater from a house. Flush toilets using 11/2 gallons of water are available.
- **Keep a container of drinking water in the refrigerator.** This saves having to run water until it's cold.
- **Use toilet tissue that breaks up easily when wet** to help prevent clogging. To test tissue quality, place a piece in a jar half full of water and shake. If the tissue breaks up easily, it is suitable. The color of tissue has no effect on septic system action.
- **Do not use the toilet as a wastebasket.** Don't flush facial tissue, diapers, tampons, or any kind of plastic down the drain.
- **Eliminate the use of garbage disposals.** Ground-up garbage does not decompose easily, causes rapid buildup of solids in the tank, and may move out of the tank into the drainfield, clogging distribution pipes and soil pores. If you have a disposal--don't use it. When building or remodeling--don't install one.
- **Never put coffee grounds down your drain.**
- **Dispose of household hazardous waste properly.** See fact sheet #14 for additional tips on reducing household hazardous waste.

For cleaning and laundry

- **Wash only full loads in the dishwasher.** Typical dishwashers use about 13 gallons for each wash. Newer models use 8-9 gallons.
- **Use low-phosphate dishwasher detergent.** In Minnesota, detergents may contain up to 11% phosphorus by weight; but some brands may exceed this level, so check the labels.
- **Wash only full loads of clothes and use front-loading washers and suds-savers to save water.** To avoid overloading your system, spread washing over the week instead of washing several loads on one day. A single load takes about 40 gallons.
- **Use liquid laundry detergent** because it's less likely to have fillers or carriers that may damage the septic system. Try to use

the minimum amount because detergents can cause problems with the system.

- **Minimize use of household chemicals and cleaners.** Normal amounts of household detergents, bleaches, drain cleaners, toilet bowl deodorizers, and other cleaners won't harm bacterial action in the septic tank.

Maintain the septic tank

- **Discharge all sewage waste from the house into the septic tank.** Don't run wastewater from laundry or saunas directly into the drainfield as the detergent or soap scum will quickly clog soil pores and cause failure.
- **Do not add "starters" to your septic system.** Enough bacteria are available in the wastes flushed into the septic tank. Even after the tank has been pumped, enough bacteria will be provided when you use the system again.
- **Do not use additives in your system.** They are of no benefit and may harm the system. Additives that cause the accumulated sludge to increase in volume or float will result in sludge being flushed into the drainfield, plugging soil pores. Also, some additives, particularly degreasers, may be carcinogens that will flow into ground water with treated wastewater.
- **Pump the septic tank every year to remove solids and scum.** Although tanks away from lakes or rivers may not need it every year, annual pumping is excellent insurance near shorelines.
- **Remove the manhole cover when having the tank pumped** to make sure that all solids have been removed. The sludge in the tank should be mixed during pumping. A tank cannot be adequately cleaned through a 4-inch inspection pipe. Pumping through the inspection port may clog the outlet baffle with scum and grease.

Your Investment and Costs

It will cost $75 to $150 each time you have a septic tank pumped, but replacing the entire system and drainfield may cost from $2,000 to $7,000. Threats to human health and water quality increase if your septic system is not properly maintained.

If water quality in the lake deteriorates, property values are likely to decrease. In addition, if your on-site treatment system fails, you'll have the inconvenience of being unable to use household plumbing until the system is replaced.

For property transactions, a septic inspection is required and the financial institution generally requires proof that the septic system conforms to standards. Minnesota's shoreland regulations require that septic systems within shoreland areas are in compliance with state standards before building permits for additions or new construction are issued.

Overall, your investment to properly maintain a septic tank and drainfield is minimal compared with the cost involved in repairing or replacing the system.

Regulations that Apply

Regulations may vary somewhat in different counties. The state of Minnesota has minimum requirements that apply to shoreland areas, but some counties may have more restrictive ordinances. Check with your county Zoning and Planning, Health, or Shoreland offices for the setback requirements and permits needed in your county.

Setback is the distance away from the shore and is usually measured from the ordinary high water level. In some cases, the setback may be measured from a bluff face or where vegetation begins. The setback for septic systems depends on the type of lake or river. Required setbacks range from 50 feet for general development lakes to 150 feet for remote river segments or natural environment lakes.

The Minnesota Rules for on-site wastewater treatment systems are governed by the Department of Health and the Pollution Control Agency in Chapter 7080. When upgrading or building a new system, be sure to use a licensed contractor who has been trained to comply with these standards.

For More Information. . .

call
county offices:

- Planning and Zoning Department
- Health Department or Sanitarian

- University of Minnesota Extension Service

regional offices of MN State agencies:

- MN Pollution Control Agency (PCA)

read:

Septic System Owner's Guide. Bulletin, PC-6583-S, 1997. Available from county offices of the University of Minnesota Extension Service or Distribution Center.

Get to Know Your Septic Tank. Bulletin, MI-0639, revised 1997. Available at no charge from county offices of the University of Minnesota Extension Service or Distribution Center.

FARM-A-SYST worksheet and fact sheet #6, Reducing the Risk of Groundwater Contamination by Improving Household Wastewater Treatment. Contact your county extension office.

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Water Plan Coordinators of the Arrowhead counties
Minnesota Board of Water and Soil Resources
Minnesota Department of Health
Minnesota Department of Natural Resources, Division of Fish and Wildlife,
Division of Waters, Division of Forestry

Minnesota Pollution Control Agency
Minnesota Sea Grant Extension Program
Mississippi Headwaters Board
St. Louis County Health Department, Environmental Services Division
Soil and Water Conservation Districts of the Arrowhead counties
Natural Resources Conservation Services
Environmental Protection Agency
Western Lake Superior Sanitary District

You may add information about contact persons or regulations specific to your county, region, or lake association.

University of Minnesota Extension Service, Distribution Center 20 Coffey Hall 1420 Eckles Ave St Paul, MN 55108-6069
612-625-8173

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Next Section: #3 Installing a Shoreland Septic System
Home

Installing a Shoreland Septic System

Shoreland Best Management Practices

Number 3 of 18 in the Series

What Are Shoreland BMPs?

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Why Are Septic Systems a Problem?

In shoreland areas, it is particularly important to install your septic system correctly because soil and water conditions near shore may make the system less efficient in treating wastewater. Location and construction are especially critical in shoreland areas to ensure that the system is effective. Incomplete treatment can result in health risks for humans and water quality problems. For more information on how septic systems work and on proper maintenance, review fact sheet #2 in this series.

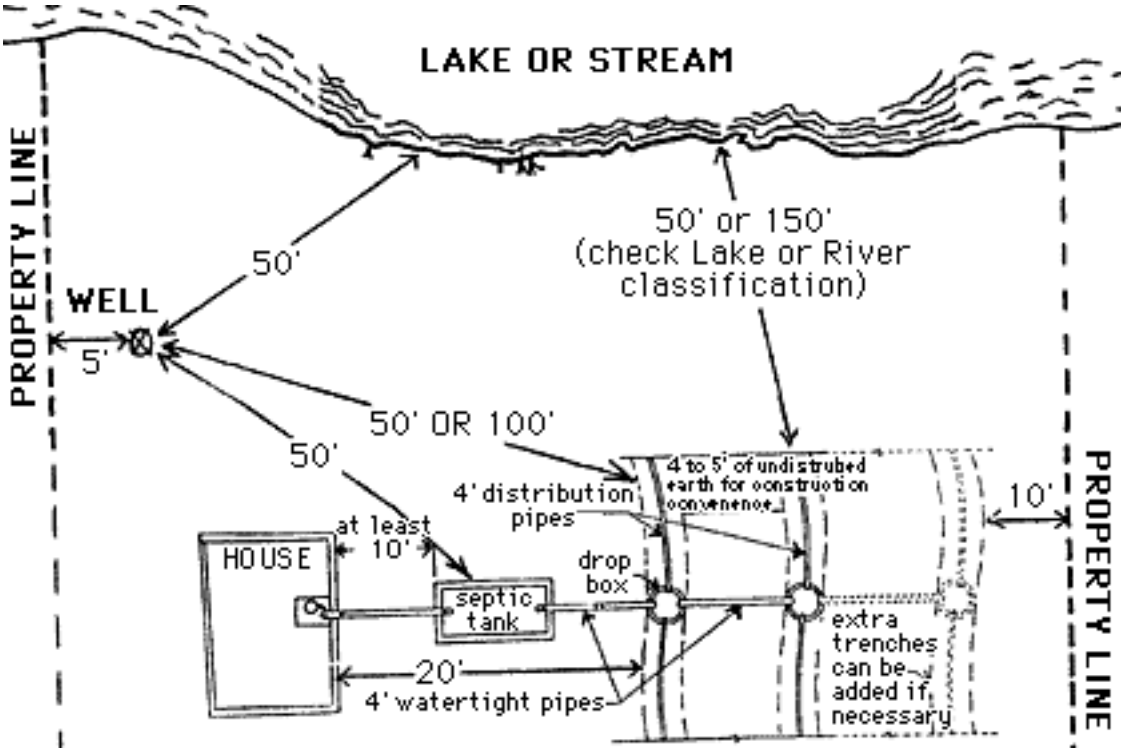

Figure 1: Sewage treatment system with minimal separation distances.

Before You Begin. . .

BEFORE purchasing undeveloped property, evaluate whether it has a suitable area for construction of a septic system. BEFORE installing the septic system, identify the best possible site for it. Determine the site for your septic system and well BEFORE laying out the design for your buildings or compacting soil by using heavy equipment.

To identify where the septic system should be installed, determine:

- depth to the highest known ground water table or to bedrock
- soil types and conditions
- slope
- setback requirements from wells, waterfront, buildings, and property lines
- exact property boundaries

Also, be sure to identify areas for future expansion or replacement of the septic system. This expansion area must be kept available and no buildings, driveways, or other development should take place on this area.

The homeowner should be able to determine information about soil, ground water, and other pertinent conditions through test holes and soil percolation tests. For assistance or information about soils, contact the Soil and Water Conservation District (SWCD) or University of Minnesota Extension Service in your county.

Consult property descriptions on deeds or abstracts for information about boundaries. Your county zoning or health departments can provide information about setback requirements.

A contractor may be hired to locate the proper site for a septic system and to apply for the necessary permits. The contractor you select must be licensed and bonded to comply with Minnesota Rules, Chapter 7080.

Once a suitable site has been identified, draw a sketch of the proposed construction giving as much detailed information as possible about location and construction. The plan should then be submitted to your local or county health or zoning department for approval or modification. Any change in location, size, or design of the system from the accepted plan must also be approved by the health or

zoning official before proceeding with construction. Unforeseen problems such as a high water table, ledge rock, or a change in soil conditions might require some changes.

Be sure to give a copy of the permit and sketch to your contractor. The contractor is responsible for constructing the system in accordance with all conditions set forth in the permit. As a homeowner, you should check to make sure the contractor is meeting setback requirements and other standards to prevent water quality problems because you are ultimately responsible.

Your Investment and Costs

A new septic system may cost between $2,000 and $7,000 depending on type, size, and construction. New or replacement systems must be installed correctly to meet all local codes and setbacks. If the system fails to meet legal requirements, it may need to be replaced. Moreover, if your system is improperly located, designed, or constructed, contaminants may reach your well, lake, or stream.

Regulations that Apply

The Minnesota Rules for construction of on-site wastewater treatment systems are governed by the Department of Health and the Pollution Control Agency in Chapter 7080.

The MN Department of Natural Resources has minimum setback requirements that apply to all shoreland areas, but some counties may have more restrictive ordinances. Check with your local or county Zoning and Planning, Health, or Shoreland offices for the setback requirements and permits needed in your county.

Setback is the distance away from the shore and is usually measured from the ordinary high water level. In some cases, the setback may be measured from the top of a bluff or where vegetation begins. The setback for septic systems depends on the type of lake or river. Required setbacks range from 50 feet for general development lakes to 150 feet for remote river segments or natural environment lakes (see Figure 1).

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- MN Department of Natural Resources (DNR)

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Next Section: #4 Ensuring a Safe Water Supply
Home

UNIVERSITY OF MINNESOTA Extension SERVICE

Ensuring a Safe Water Supply

Shoreland Best Management Practices

Number 4 of 18 in the Series

What Are Shoreland BMPs?

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A Safe Supply?

Most people take a safe water supply for granted. When clear, good-tasting water comes out of the faucet, we assume it is safe to drink. Unfortunately this assumption is not always correct. Most shoreland properties have a private water supply that needs to be tested regularly to confirm safe water.

At seasonal or vacation homes that are used infrequently, the water supply may go untested for years. It is important to test water every year if the well is not used continuously. Residences near lakes and rivers often have wells that use shallow ground water. Seasonal homes or cottages may have older wells that need repair or replacement, but are a lower priority than the primary residence. Older, shallow wells are at the most risk from ground water contamination, so the water from these needs to be tested annually.

Many vacation dwellings use surface water for the household water supply. Surface water presents a different set of risks and problems; information about special consideration and testing for surface water is available from the MN Department of Health (MDH).

The most obvious concern about an unsafe water supply is the health risk to family or guests. Wastewater contamination serves as a source of bacteria, viruses, and parasites that can cause gastrointestinal problems or transmit contagious diseases. High levels of nitrate from fertilizer or wastewater can present a serious health risk to infants, and poisons resulting from improper use or disposal of chemicals can cause long-term or chronic health problems for humans or animals.

Another reason to make sure your shoreland property has a safe water supply relates to property value and transfer. A safe water supply is an essential component of a valuable piece of shoreland property. Also, at the time of property transfer, most lending institutions will not provide financing for the purchase of a property without a safe supply. They generally require a water test on a sample collected by a third party within 60 days of closing.

Is There a Problem?

The following may indicate there is a problem with the quality of your water, and that you should have the water tested to ensure that it is safe:

- if there is a sudden or gradual change in taste, odor, or color
- if family members frequently get upset stomachs, nausea, or diarrhea
- if visitors get sick even when family members don't; those who use the water regularly may have become accustomed to it
- if an oily sheen appears when the water stands for a while (this might also result from dissolved iron, which is not a health risk)
- if you smell petroleum or a chemical odor

Problem Wells

Sandpoint or drivepoint wells are common near shorelines, taking advantage of the high water table that may occur near lakes or rivers. They consist of a screen on the end of a pointed pipe that is pounded, or driven, down to the water table. Because surface and ground water are directly connected in shoreland areas, shallow wells may be essentially drawing water from the lake itself.

Many shallow hand-dug wells still exist in rural areas. Dug wells may be cased with tile or culvert and are especially susceptible to contamination.

Water wells that are no longer in use must be properly sealed to prevent contamination from seeping into ground water. Any unused or abandoned well can present a serious safety hazard for children or pets, as well as a direct route for contaminants to reach ground water.

Using Surface Water

The MDH does not recommend using surface water as a drinking water supply. If you decide to use surface water for drinking at your shoreland property, contact MDH or your county health department for guidelines on how to treat it to ensure a safe supply.

Because water from lakes and rivers contains bacteria and other living organisms, it must be disinfected before being used as drinking water. Water can be disinfected with chemicals (chlorine, bromine, iodine), by boiling, or with ultraviolet light. Filtration alone will not provide safe drinking water because it does not kill the bacteria, viruses, or parasites that can cause disease.

Giardia parasites are present in most of Minnesota's surface water today and can cause giardiasis, an intestinal disorder. The parasites are very small and will pass through filter membranes unless they are extremely fine.

When to Test

Private water supplies should be tested regularly. The MDH requires a well test immediately after construction. After that, recommended test frequency depends on well location, construction, and on previous test results. Testing every two to three years may be sufficient for wells that have no history of contamination, are isolated from pollution sources, and have 50 feet of watertight casing.

Shallow wells, wells that have shown contamination, or wells without a watertight casing (such as dug wells) should be tested at least once a year. Testing should be done when the well is most susceptible to contamination, usually immediately after spring thaw or heavy rainfall.

The water should also be tested:

- when a well is newly constructed or repaired
- before using a well that has not been used for a long time
- when a new baby is expected, arrives, or visits; don't forget visiting grandchildren

- when the water is used by an expectant or nursing mother
- when there is a change in odor, taste, or color
- when a neighbor's well is found to be unsafe
- when family or guests experience recurring stomach illness
- when there is a chemical spill or accident nearby
- when high water or flooding covers the top of the well
- when there has been a significant change in landuse in the area

What to Test for

Water quality may be affected by two types of contaminants:
primary contaminants--Chemicals and organisms that may cause acute disease or long-term health effects; coliform bacteria and nitrate are examples of primary contaminants.
secondary contaminants--Cause objectionable odors, tastes, staining, corrosion, or other aesthetic problems that do not generally pose a health risk; secondary contaminants are usually naturally occurring minerals (such as iron) or organisms (such as soil bacteria).

Municipal water supplies must be tested for over 80 primary drinking water standards. It would be prohibitively expensive to do all these tests on private wells, so they are usually tested for coliform bacteria and nitrate. Coliform bacteria and nitrate are used as indicators of water contamination. Bacteria may come from septic systems or animal feedlots and nitrate may indicate contamination from wastewater or fertilizer.

Be sure to have your water tested at a certified lab. For accurate results, water samples should be tested within 24 hours of collection. For more information on how to collect a water sample or on drinking water standards, contact a regional office of the MDH, your community health service, or your county office of the University of Minnesota Extension Service.

BMPs for Safe Water Supplies

To maintain a safe water supply, follow these guidelines:
Short-term BMPs

- Test the water annually for nitrate and coliform bacteria.
- Disinfect the well and plumbing system following maintenance on the well or pump and after appliances or plumbing fixtures are repaired or replaced.
- Maintain septic systems properly and pump septic tanks regularly; see fact sheet #2.
- Avoid diverting surface drainage to low areas where it may seep into ground water; see fact sheet #8.
- Minimize the use of fertilizer and pesticides, particularly in sandy soils or with shallow wells; see fact sheet #9.
- Dispose of hazardous household products properly; see fact sheet #14 for additional tips.

Long-term BMPs

- Use a licensed well contractor for installing new wells or sealing unused wells.
- When installing or replacing a well, follow the required isolation distances (see Figure 1).
- When planning development on your lot, leave enough room for future expansion to avoid crowding the well.
- Immediately replace or repair wells in which the casing is no longer watertight because of damage or corrosion.
- Properly seal unused wells to prevent direct contamination of ground water.

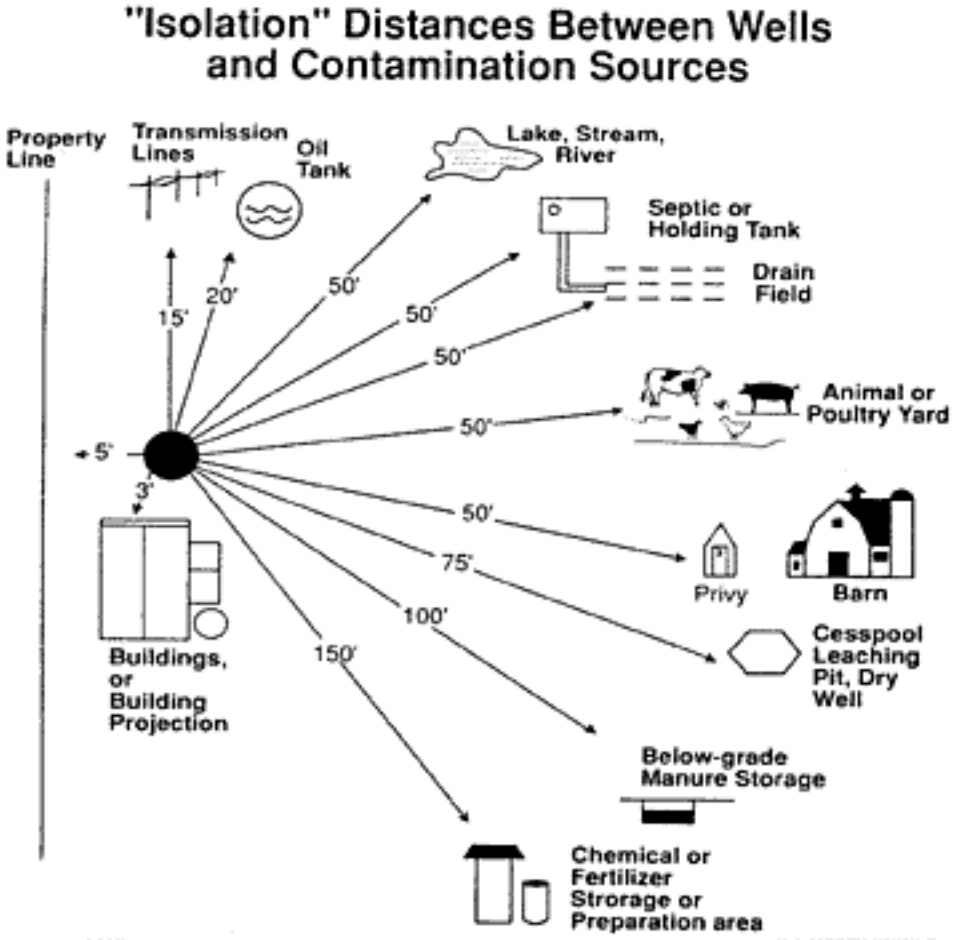

Figure 1: Minimum isolation distances required by Minnesota Department of Health between wells and possible sources of contamination. Wells with less than 50 feet of watertight casing must be located at least twice as far from contamination sources.

Regulations that Apply

In Minnesota, there are certain regulations and recommendations to guarantee a safe water supply:

- New wells should be installed by a licensed well contractor.
- New wells may no longer be constructed within a dwelling.
- A property owner may install a well, but the installation must meet all state requirements and the MDH must be notified.
- Wells that are no longer used must be properly sealed by a licensed well contractor and reported to the MDH.
- New wells must be tested at a certified lab for coliform bacteria and nitrate before they may be placed into service.
- Although it is required **by law** in only a few counties in Minnesota, a water test confirming a safe water supply is required by many financial institutions at the time of property transfer.

Costs

Testing for nitrate and coliform bacteria usually costs less than $15 per test. Some communities offer free water testing or low-cost screening for residents.

Drilling a new well can be expensive, costing $10-20 per foot. However, constructing a new well will increase property value and may be necessary for future property transfer if water from the existing well is unsafe. The health and safety of family and guests should outweigh the financial costs of ensuring a safe water supply.

For More Information. . .

call
Minnesota Water Line 1-800-455-4526
county offices:

- Health Department or Sanitarian
- University of Minnesota Extension Service

regional offices of MN State agencies:

- MN Department of Health

read:

Safe Drinking Water for Minnesotans. Bulletin, FO-0814. Contact county offices of the University of Minnesota Extension Service.

Nitrate in Drinking Water. Fact sheet, PS-01. Available from county offices of the University of Minnesota Extension Service.

Bacteria in Drinking Water. Fact sheet, PS-02. Available from county offices of the University of Minnesota Extension Service.

Giardia in Drinking Water. Fact sheet, PS-07. Available from county offices of the University of Minnesota Extension Service.

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Next Section: #5 Limiting Impact of Recreation on Water Quality
Home

Limiting Impact of Recreation on Water Quality

Shoreland Best Management Practices

Number 5 of 18 in the Series

What Are Shoreland BMPs?

Best Management Practices (BMPs) are actions you can take to reduce your impact on the environment. BMPs have been described for agriculture, forest management, and construction. This fact sheet describes BMPs you can adopt on your shoreland property to help protect and preserve water quality. In many cases, the best management for shorelands may be retaining the natural characteristics of your property.

Keeping Your Lake or River Healthy

Recreational activities can adversely affect both water quality and the shoreline, particularly when they focus on the waterfront. You can minimize these adverse impacts by developing and practicing a stewardship attitude as you enjoy your shoreland property and participate in outdoor activities.

Recreational opportunities are a primary reason people choose to live by or visit Minnesota lakes and rivers, and the demand on our water resources is always increasing. That increasing demand also increases the potential for damage to water quality and shorelines.

Assessing and improving leisure-time activities will help preserve water quality for fish and wildlife habitat as well as for our own recreational purposes. Poor water quality can affect recreation in and on the water, degrade fish and wildlife habitat, pose a health risk for water-contact recreation, and threaten the safety of your drinking water supply.

Over time, the waterfront environment has developed a natural balance based on linkages between water, land, vegetation, and wildlife. This delicate equilibrium can be easily disrupted when humans move in and rearrange the shoreland area or when any of the components are destroyed.

BMPs for Waterfronts

When using the waterfront for recreation, make sure your activities do not cause lasting damage to the shoreline or water. As a property owner, you should consider existing characteristics of the property to determine whether development is suitable. If you decide to alter your waterfront, develop a site plan that uses existing natural features of your shoreline instead of requiring major alteration.

Plan for both passive enjoyment of water resources and active pastimes. If a view of the water is important, consider strategic removal of vegetation to create a line-of-sight rather than clear-cutting and establishing an open lawn. Before removing vegetation in the shore impact zone, check with local zoning officials for guidelines. Remember to include appropriate aquatic and terrestrial wildlife habitat in your plans to enhance your shoreland enjoyment.

If you landscape your lot, plan to preserve or re-establish vegetation, install appropriate erosion control methods, and reduce runoff to protect your shoreland property and water quality (see fact sheets #6, 7, and 8).

The BMPs described below focus on specific recreational activities and are appropriate for property owners and visitors to Minnesota waters.

Managing Vegetation

Soil and rock in the shoreland area have characteristics that influence the type and amount of natural aquatic and upland vegetation and ground water in your area. Vegetation physically slows runoff, enhances infiltration of runoff, and takes up nutrients dissolved in runoff and ground water. Fish, ducks, and other life depend on vegetation for food, spawning, and shelter. In addition, aquatic vegetation protects your shoreline by damping wave action (see Figure 1). Remember to:

- follow your site plan when developing your property, which includes the installation of beaches, docks, accesses, and buildings
- minimize disturbance of aquatic vegetation; BEFORE altering or removing any aquatic vegetation, contact the MN Department of Natural Resources (DNR) Area Fisheries Supervisor to determine whether a permit is needed
- remove aquatic plants only where they seriously interfere with recreational use of water and then clear only the smallest possible area
- never use chemicals for controlling aquatic plants without first obtaining a permit from the DNR; although aquatic herbicides may be purchased without a permit, it is illegal to use them without a permit

Beaches and Swimming

If a swimming beach is a priority, try to purchase a lake or river lot that already has an established beach or sandy shoreline. If you choose to develop a beach, select a site that requires minimal alteration of your shoreline.

FIRST contact your DNR Area Hydrol-ogist for information and appropriate permits for beach development. A good beach site should:

- have a gentle slope of less than 10:1, or 10 feet horizontal distance per each foot of vertical drop
- be located where the bottom is firm, with less than 6 inches of muck or silt, and no springs or flowing water
- be located in an area with minimal wave action; established aquatic vegetation dampens wave action on the shoreline
- be located away from areas of significant fish or wildlife habitat, such as wild rice, bulrush, and other protected vegetation

If you decide to develop a beach, consider the impact of alteration on the shore: you may be "gaining" a beach, but you will be losing habitat, runoff control, and erosion control. For additional information obtain a copy of the *Beach Sand Blankets* brochure from the DNR Division of Waters.

A beach sand blanket may consist of washed sand ranging in grain size from very fine sand to "pea-gravel." If you add sand, use the largest available grain size, e.g., pea-gravel, to provide a more stable beach. Use of a swimming raft may be a good alternative to the

development of a sand beach. Due to boating safety concerns, the county sheriff's department requires an easily obtainable permit for floating rafts.

When swimming:

- do not use soap or shampoo in the water
- insist that swimmers leave the water to use the bathroom

Boating and Fishing

Many recreational activities involve the use of motorized watercraft, including personal watercraft, inboard and outboard motor boats for fishing or water-skiing, and houseboats. The following BMPs will help minimize potential damage to lakes and rivers:

- Avoid spilling gas, oil, paint, varnish, or stripper; never pour over the water during fueling or boat maintenance; do not "top-off" fuel tanks; fuel the boat on the trailer whenever possible.
- Install fuel storage tanks far away from the waterfront.
- Properly store and dispose of all wastewater, both greywater (from sinks) and human waste, while boating or fishing, especially on houseboats.
- Adjust your speed to reduce the wake and consequent wave action that can damage the shoreline; observe surface water use guidelines, including "no-wake" and low speed zones.
- Fish responsibly; it is illegal to deposit fish entrails or parts into public waters or onto lake or stream shores.
- Inspect boats and trailers to avoid moving non-native plants or animals from one water body to another; in Minnesota, it is illegal to transport exotic species; see fact sheet #15.
- Store and then properly dispose of wastewater when ice fishing; human waste from several ice houses can have a significant impact on the water quality in your lake or river.

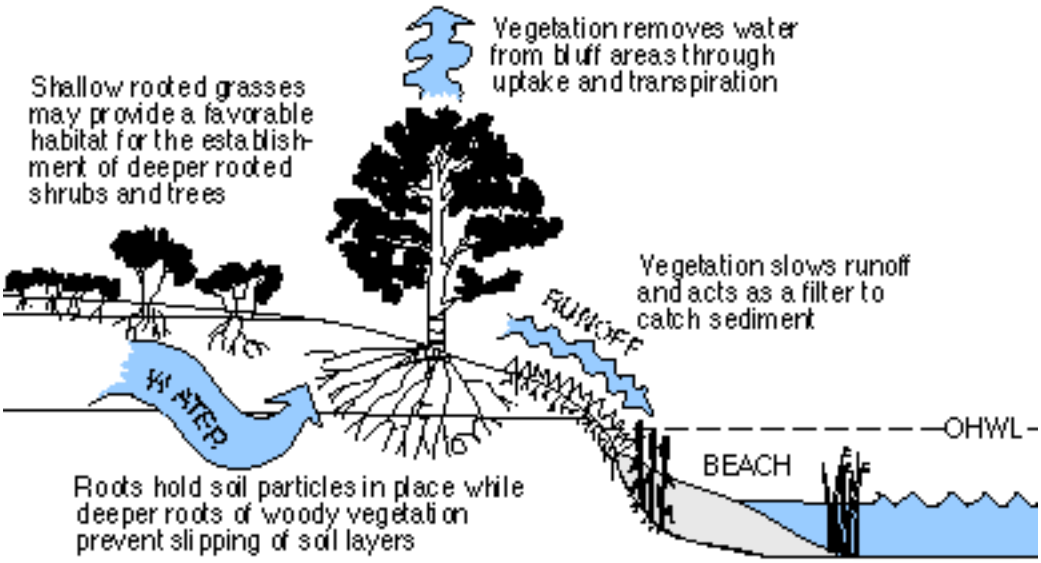

Figure 1: Terrestrial vegetation minimizes runoff that can impair water quality and aquatic vegetation dampens wave action to help reduce shoreline erosion.

Camping

Camping is a recreational activity that takes us away from regular habits for cleanup, washing, and waste disposal. Some practices that will help minimize impact on the environment are listed below:

- Use the latrine whenever one is provided; if none is available, bury human waste a minimum of 100 feet from water's edge; bacteria and viruses in human waste transmit disease.
- Properly dispose of all garbage, including litter you find.
- Never dispose of fish guts or other waste in the water, even if it is "biodegradable"; it attracts pests and can add nutrients to the water.
- Never wash in the lake or river; wash dishes, hair, clothes, and yourself at least 150 feet from the water's edge; always use biodegradable soap.
- If using surface water for drinking, collect it from below the surface near the center of the lake, not from near-shore; running water is more likely to carry giardia parasites, so avoid using river water for drinking; purify the water before drinking by boiling for 5 minutes; filters and chemicals are not always effective in removing giardia; for more information contact the U.S. Forest Service or MN Department of Health.

Remember to always follow the specific rules or guidelines established for the areas in which you are camping (e.g., wilderness areas, state parks, or private campgrounds).

Buildings Near the Shore

Local units of government have established standards that are based on statewide shoreland regulations for nearshore structures, such as boat houses, saunas, and gazebos. In developing a site plan or planning a waterfront structure, property owners should:

- **first** contact the local zoning official to determine if the structure is permitted and what standards are required
- minimize shoreland alteration and use adequate erosion control methods
- design the structure to reduce its visibility from the water and adjacent property
- locate boat houses where the water depth is sufficient to launch the boat and where aquatic plants need not be removed
- store gasoline, oil, and other potentially hazardous materials away from the water in a building with a solid floor; store emergency clean-up materials with the chemicals
- drain greywater from saunas through the septic system or connect with sewer lines to avoid adding soaps, oils, and bacteria to your water
- contact the DNR Area Hydrologist to obtain permit information **BEFORE** repairing any existing structures built over the water

Docks, Decks, and Accesses

Docks, boat ramps, and decks offer ways to reach and enjoy the waterfront. If not properly constructed and maintained, they may cause water quality problems. For more information contact the DNR Area Hydrol-ogist or county zoning office and follow these BMPs:

- Follow your site plan when installing a docking facility; permanent docks, if allowed in your area, and seasonal docks must follow DNR guidelines.
- Use naturally resistant wood (cedar, tamarack, redwood), metal, or plastic instead of treated wood because the chemicals used to treat the wood may cause water quality problems.

- Construct all docks to allow free flow of water beneath them to prevent erosion and sedimentation along the shore.
- Construct the smallest possible dock to meet your needs.
- Never apply wood preservatives or paint to decks or docks while they are in or over the water.
- Follow shoreland ordinances when building decks near the shoreline; some setback requirements apply to decks to help protect water quality and minimize visual impact to other water users.
- Minimize the amount of ground surface covered with decks and patios to avoid increasing runoff and erosion.
- Eliminate paths to the waterfront that cut directly up and down slopes or over bluffs because they decrease stability of the shoreline and increase erosion; replace with stairways when necessary.
- Consider using the public access instead of developing your own boat ramp to minimize waterfront disturbance.

Off-Road Vehicles

The use of off-road vehicles, such as all-terrain vehicles (ATVs), mountain bikes, and snowmobiles, can have a severe effect on lakes and rivers by increasing erosion, turbidity, and sedimentation. Follow these BMPs to minimize the impact of your off-road recreation on water quality:

- Stay on well-maintained trails.
- Construct crossings over streams and wetlands to avoid damaging the bottom and banks (contact the DNR Area Hydrologist for appropriate permits).
- When entering or leaving an ice-covered lake or river, avoid wet or muddy areas and do not break down bluffs or banks.
- Stay away from sensitive areas during spring melt when the ground is thawing and very susceptible to rutting and erosion.
- Observe dates and time periods designed to regulate off-road recreation during muddy seasons.
- Stay off thin ice; not only is it potentially fatal to riders, but when motorized vehicles break through, petroleum products and battery acid can contaminate water.

Your Investment and Costs

Planning and maintaining a healthy waterfront is far less costly than trying to fix a disturbed system and benefits are far greater. Repairing shoreline damage is rarely successful and often impossible. For some shoreline modification projects, you will need a permit. Fees for permits vary; contact the DNR Area Hydrologist for more information.

Fees for many recreational licenses help enhance Minnesota's water-based recreation through educational programs, research, fish stocking, trails and access development, and habitat protection.

Your investment in Minnesota's water resources will pay off in returns to you and future generations through enhanced recreation and improved wildlife habitat.

Regulations that Apply

Any alteration of the lake/river bottom below the Ordinary High Water Level (OHWL) is subject to the regulatory jurisdiction of the DNR. Any alteration of the shoreland above the OHWL is subject to the regulations of the local unit of government (county, township, or municipality).

The OHWL is the highest water level that a lake has maintained for enough time to leave evidence on the landscape. It is often identified as where natural vegetation changes from aquatic to upland species. For streams, the OHWL is generally the top of the bank of the channel.

You should determine the location of the OHWL on your waterfront property (Figure 2). Contact your DNR Area Hydrologist or county zoning officials for assistance. Your DNR Area Fisheries Supervisor can assist you with questions regarding aquatic plant management methods and permits.

In some areas, concerned citizens or lake associations have informally established restrictions for recreational use of surface waters. Some of these, such as "no-wake" zones, are intended to help protect water quality. Others are more social and are designed to enhance community enjoyment, such as noise reduction and curfews. In some cases, county boards have enacted ordinances to formalize these guidelines into regulations. Check with your zoning officials or property owners association about whether any apply in your area.

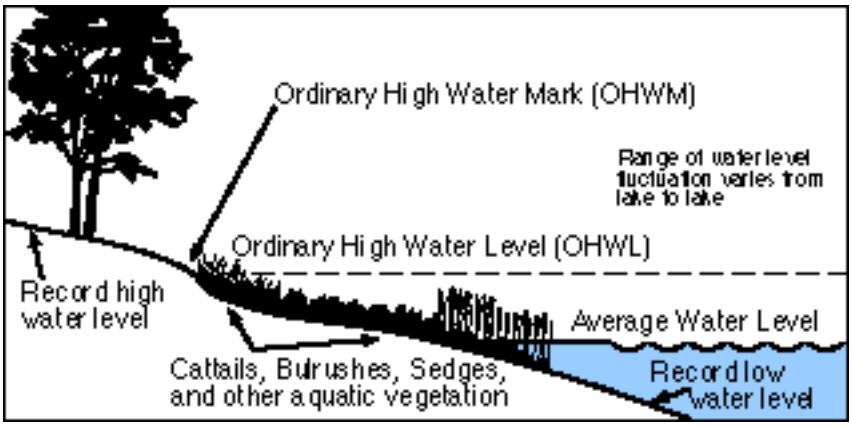

Figure 2: Cross section showing the ordinary high water level (OHWL) which is the legal boundary of the lakebed; in some cases, the OHWL is located many yards away from the open water.

For More Information. . .

call
county offices:

- Soil and Water Conservation District (SWCD)
- Planning and Zoning Department
- University of Minnesota Extension Service

regional offices of MN State agencies:

- MN Department of Natural Resources, (DNR, Division of Fish and Wildlife, Division of Forestry
- Area Hydrologist
- Area Fisheries Supervisor
- Area Wildlife Supervisor

federal agencies

- Natural Resources Conservation Services (NRCS)
- U.S. Army Corps of Engineers (USACoE)
- U.S. Forest Service

read(all available from the DNR

- **Beach Sand Blankets**
- **Boat Launching Ramps**
- **Rip-rap and streambank protection**
- **leafleats on algae and aquatic vegetation**

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Next Section: #6 Developing Shoreland Landscapes and Construction Activities
Home

Developing Shoreland Landscapes and Construction Activities

Shoreland Best Management Practices

Number 6 of 18 in the Series

What Are Shoreland BMPs?

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Why Is a Landscape Plan Necessary?

Whether you are landscaping your property, building a cabin, or designing a large resort, each land parcel has limitations for development. Limitations may include the type of soil, steep slopes, native vegetation, and other landscape features.

Plants and trees help to hold the soil and prevent erosion, especially on steep slopes. Removing them to establish a lawn increases the chance for soil erosion. Soil erosion can lead to structural damage, reduce soil fertility, and fill in road ditches. It harms your river or lake by causing excess sedimentation, killing aquatic bottom life, and disrupting spawning. The sediment, with accompanying nutrients, may lead to algal blooms, decreased lake depth, and reduced aesthetic appeal. All of these potential problems are expensive to correct and, more importantly, can be avoided by proper water and landuse practices.

> *Use existing features of your landscape in creating your plan. You can prevent problems by working "with the land" rather than against it.*

Getting Started

The most important steps in getting started are to draw a detailed map of your property (see Figure 1 as an example) **and** to check with your planning and zoning office for local requirements. On the map, take care to accurately note these important features:

- hills and sloping areas
- location of roads and driveways
- potential building sites
- drainage patterns
- sewage treatment systems
- existing vegetation
- wildlife habitat
- land features such as wetlands and rock outcrops
- water wells

Next consider your long-term objectives for the property:

- How long do you plan on owning the property?
- What space do you require for your outdoor recreation activities?
- Do you want to create additional wildlife habitat?
- How compatible are your ideas with the expected long-term development objectives of the area?
- Do you plan on expanding or remodeling in the future?
- Does the "lay of the land" suit your ideas?

These and many more questions should be explored, including considering the potential uses for your property.

Developing Your Site Plan

The site plan should be based on your long-term objectives and the suitability of the land for these uses, with precautions taken to prevent soil erosion and water pollution. With these considerations in mind, your site plan will optimize the natural beauty and attributes of your property. The site plan can be a one year, ten year, or a twenty-five year plan, depending on your resources and time. But remember, the longer you wait, the more difficult and costly it will become to fix erosion problems.

Layout of Your Grounds

If you have the freedom to arrange your buildings and grounds, you can reduce water runoff problems in several ways. Locate driveways, walks, and yard and garden edges to follow level contours and gentle slopes. Do not lead water directly downhill. This gives it maximum speed and cutting power for erosion. Long, steep slopes have the greatest erosion potential. Consider putting small dams at intervals in ditches to slow runoff water and trap sediment. Cross-slope designs are better than up-and-down-hill ones.

The site plan you develop is critical. Site your septic system and water well in suitable areas before you finalize building locations and landscaping plans.

General Guidelines for Landscaping

- **Keep the site covered.** Any disturbance of ground cover (grass or shrubs) will expose soil. This leads to erosion and slope failure. Use hay or straw as a mulch to cover disturbed areas after reseeding. A good rule of thumb is one 50-pound bale per 500 square feet. Consider working only in a small area and stabilizing that site before disturbing another.

- **Minimize disturbance to plants and trees.** Select and save trees to gain time in landscaping later. Protect trees from heavy equipment by encasing them with heavy planks tied vertically around the trunks. Large trees, especially birch, can be killed by heavy traffic that compacts the soil. Putting fill material too deeply over the root area can also kill trees.

- **Maintain a filter strip of natural vegetation along the banks of lakes and streams.** The best filter strip is mature woodland with undisturbed grass and shrub layers.

- **Establish permanent cover.** After your grounds have been graded to minimize and control runoff, the next step is to plant a permanent cover on all areas that have been disturbed. Trees and shrubs are excellent at protecting soil from rain and are practical erosion-control measures. Use native types of trees and shrubs wherever possible. They are well adapted to our climate, insects, and diseases. Native trees and shrubs also create a landscape that needs minimal maintenance and is more natural.

- **Plant trees and shrubs** to help buffer harsh winter winds and provide shade during hot summer days. Plants also serve as a living "fence" to provide privacy and excellent habitat for birds and other wildlife.

- **Use pesticides and fertilizers carefully.** Use only approved pesticides and follow label directions. See fact sheet #9 for more information.

- **Plan streets and roads.** Roads that follow general contours and moderate slopes offer less obstruction to natural drainage. They are also easier to stabilize and maintain. Plan driveway grades of 10% or less. Where steep slopes cannot be avoided, consider putting in "water bars." These small, raised ridges on the road surface help to route runoff water to road ditches, rather than allowing it to run the entire length of the slope. Properly sized culverts are also important for a well-drained road bed. See fact sheet #8 for more information.

- **Control runoff.** Rainfall and snow melt runoff should be directed to safe drainageways so that water will not scour and wash away soil. Curbs of dirt, timber, or other materials can be placed at the crests of steep hills or cuts to divert runoff away from unprotected slopes. Diversions can also be constructed to control runoff. They collect runoff and lead it downhill to a safe outlet.

  Don't forget that "hard" surfaces are impermeable to water and increase runoff. These impermeable surfaces include building roofs, roads, driveways, and patios. Minimize the amount of hard surfaces to help control excess runoff.

  To prevent runoff damage by water:

- keep it **spread out,** moving slowly

- **divert** it away from sensitive areas

- direct it to **flow over erosion-resistant materials** such as dense sod, rocks, plastic sheeting, or concrete

- **protect natural drainageways from** filling with sediment

Check these off as you draw them on the plan:

_____contour elevations of your property (OR note steep slopes and flat areas)

_____areas where you will be excavating and filling soil types (e.g., clay, sandy loam)

_____property boundaries

_____setback distances between shoreline and structures

_____elevations of important features such as buildings, drainage outlets, or wetlands

_____drainage patterns (streams or drainageways)

_____location of electric, gas, water, or sewer utilities

_____areas needing protection to prevent erosion such as unstable slopes and steep embankments

_____vegetation (to be removed, added, or left as is)

_____ordinary high water level of lake or river

_____scale (usually number of feet per inch)

_____north directional arrow

Big, old dead trees, brushpiles, and unmowed grass are "home" for a wide variety of wildlife. Save these whenever possible.

Use vegetation to help direct people away from sensitive areas, such as steep slopes.

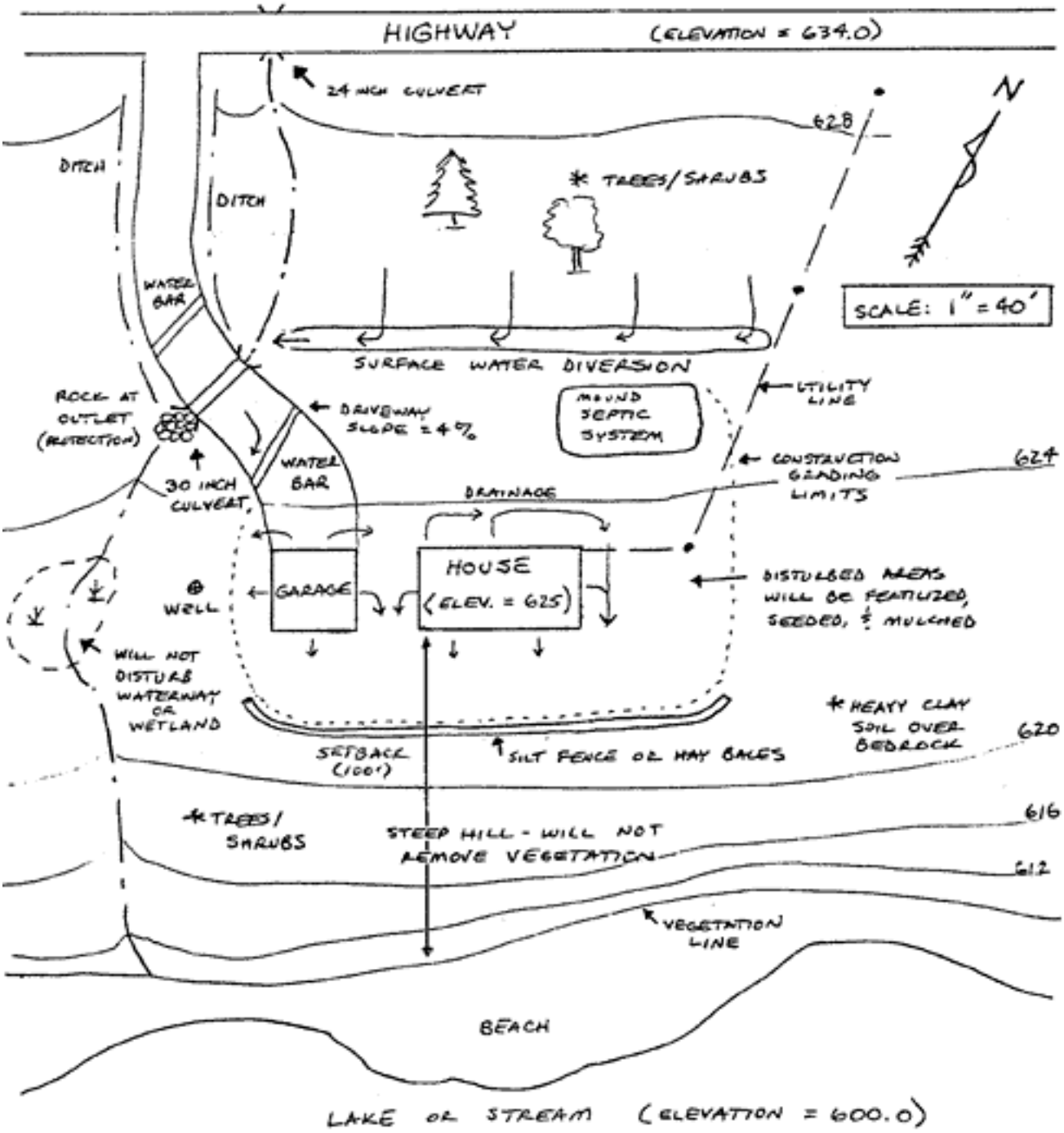

Figure 1: A landscaping plan should include roads, buildings, topography and slope, shoreline, and vegetation.

Remember to maintain an adequate turnaround area near your home for emergency vehicle access.

Regulations that Apply

Before beginning any landscaping or construction, check with your local zoning department for information on shoreland requirements including setbacks, permits, and building codes. Most ordinances restrict the total surface area that may be covered with impermeable materials. These include driveways, roofs, and patios.

For More Information. . .

call
local contractors:

- information on building conditions

county offices

- University of Minnesota Extension Service
  --information on native or adapted plant species, soil testing, or landscape planning

- Soil and Water Conservation District (SWCD)
  --information on conservation planning, soils, erosion control, wetlands

- Planning and Zoning Department
  --information on zoning regulations, wetlands

regional offices of MN State agencies

- MN Department of Natural Resources (DNR)
  --information on wildlife or fish habitat, shoreline erosion, permits

Part of a series. . .

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Water Plan Coordinators of the Arrowhead counties
Minnesota Board of Water and Soil Resources
Minnesota Department of Health
Minnesota Department of Natural Resources, Division of Fish and Wildlife,
Division of Waters, Division of Forestry
Minnesota Pollution Control Agency
Minnesota Sea Grant Extension Program
Mississippi Headwaters Board
St. Louis County Health Department, Environmental Services Division
Soil and Water Conservation Districts of the Arrowhead counties
Natural Resources Conservation Services
Environmental Protection Agency
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University of Minnesota Extension Service, Distribution Center 20 Coffey Hall 1420 Eckles Ave St Paul, MN 55108-6069
612-625-8173

Produced by the Arrowhead Water Quality Team, a cooperative effort of Carlton, Cook, Itasca, Koochiching, Lake, and St. Louis counties and state and federal agencies. All publicly funded agencies involved are committed to equal opportunity education, service, and employment.

Next Section: #7 Stabilizing Your Shoreline to Prevent Erosion
Home

Stabilizing Your Shoreline to Prevent Erosion

Shoreland Best Management Practices

Number 7 of 18 in the Series

What Are Shoreland BMPs?

Best Management Practices (BMPs) are actions you can take to reduce your impact on the environment. BMPs have been described for agriculture, forest management, and construction. This fact sheet describes BMPs you can adopt on your shoreland property to help protect and preserve water quality. In many cases, the best management for shorelands may be retaining the natural characteristics of your property.

Recognizing Erosion Problems

With more shoreline than California, Florida, and Hawaii combined, Minnesota is bound to have areas where shoreland erosion is a problem. It is obvious that wave-pounded properties lose soil and ultimately their value. What is not as obvious is that this erosion process can be accelerated or slowed by the practices you adopt, and that sediment going into the lake or river is a pollutant.

Erosion is a natural process and, therefore, some sediment does end up in surface water. Clearing shoreland vegetation and beach rocks, and increasing runoff to the shore will accelerate shoreland erosion.

Bluff Stabilization

Increased runoff is especially detrimental to high bluffs (Figure 1). Slumping of waterfront bluffs results from unstable soil, usually because surface or ground water is reaching the bluff. On lakes, waves can erode supporting soil at the bottom of the bluff and cause slumping. Along river bluffs, river currents may erode the supporting soil.

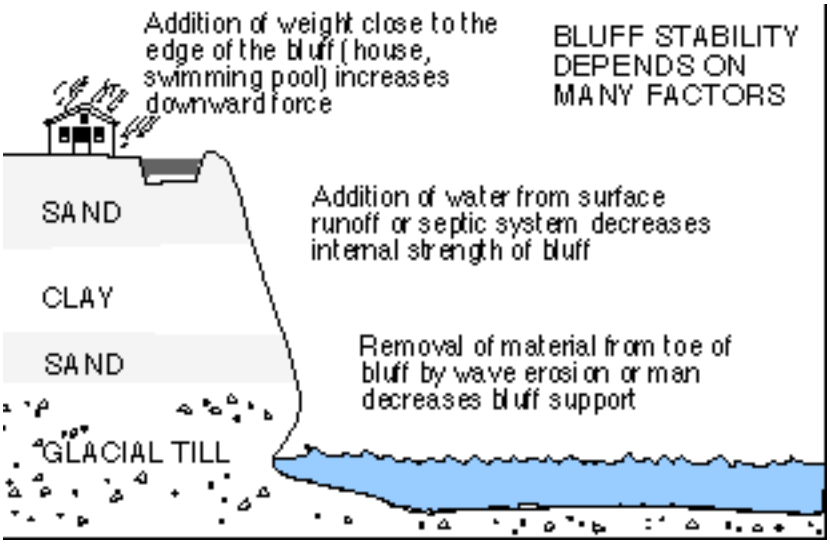

Figure 1: Factors that can make bluffs unstable.

Erosion of higher shoreline bluff areas can be prevented by:

- retaining moisture-absorbing vegetation on the bluff
- outletting rain gutters and diverting surface runoff away from the bluff
- reducing runoff rate toward the bluff
- minimizing paved areas that increase runoff
- limiting ground water flow toward the bluff
- installing septic systems and drainfields away from the bluff
- avoiding additional weight on the bluff edge, such as pools, buildings, or storage sheds

On property with steep slopes or bluffs, reducing the amount of water reaching the bluff will help with stabilization. If diverting water away from the bluff is impractical, it should be routed through a nonperforated plastic drain pipe that outlets at the very bottom of the bluff. Rock should be placed around the outlet to prevent erosion at the bottom of the drain. Surface water and some ground water can be intercepted before it reaches the bluff by installing a "French drain" (Figure 2).

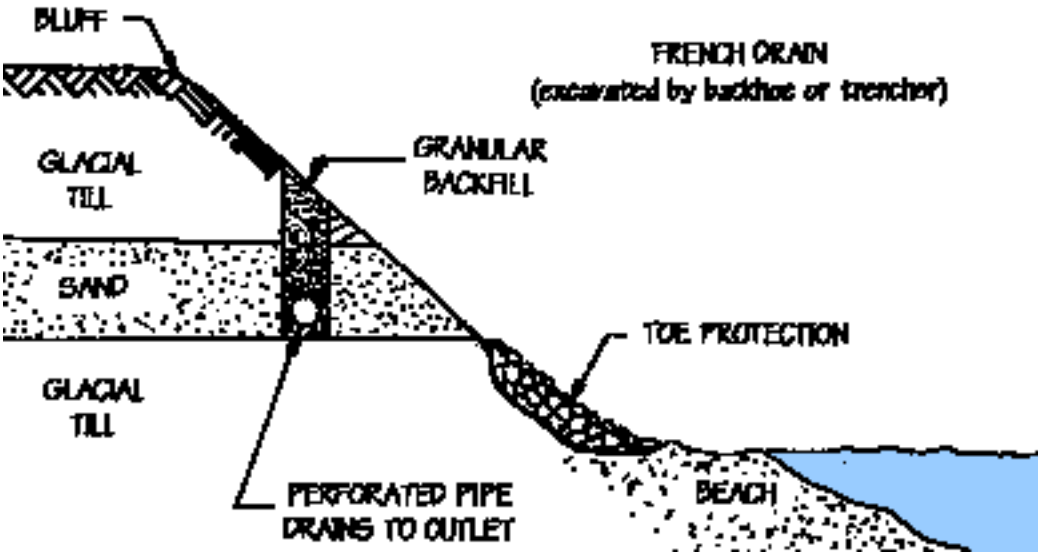

Figure 2: French drains intercept surface water and increase soil stability. Deeper drains will intercept more ground water, but

shallower drains are effective also and may cause less disturbance on the bluff. The maximum depth for French drains is 15 to 20 feet.

A French drain is a narrow trench set back from, but parallel to, the top of the bluff and filled with free-draining sand or gravel. A perforated, corrugated plastic pipe at the bottom collects water and should drain away from the bluff. The entire perforated length of pipe must be wrapped with fabric or a filter sock. Installing deeper drains will intercept more ground water and provide better protection for the bluff.

No additional weight such as a building, garage slab, or vehicle should be placed near the top of the bluff. Septic systems and swimming pools are especially inappropriate near the top of a bluff because they add weight and water.

For most property that slopes toward water, leaving the natural shoreland undisturbed is often the best and least expensive protection against erosion. A filter strip of thriving vegetation on and near the shore binds the soil and minimizes soil loss from surface runoff and waves, and from use by people (Figure 3). Existing vegetation can be enhanced by planting woody or aquatic plants.

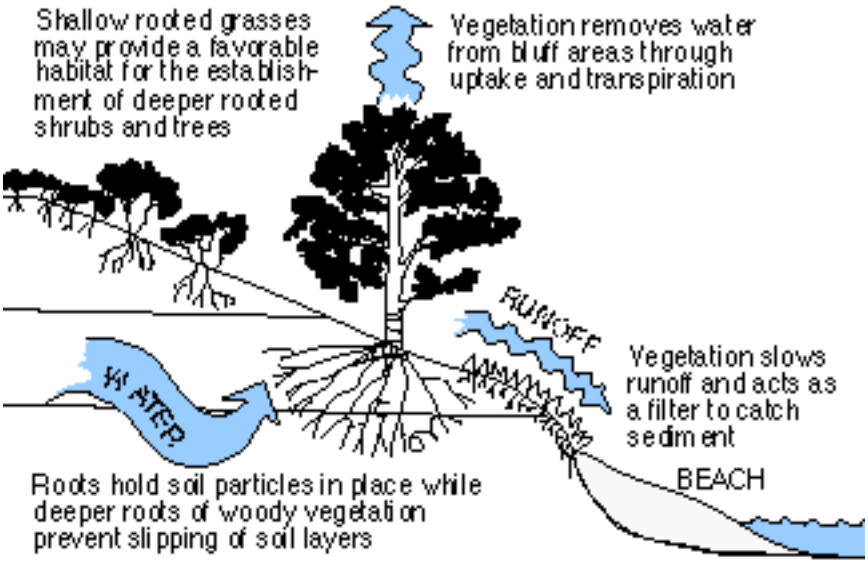

Figure 3: Well-established vegetation on the shore stabilizes the soil and helps remove water.

Natural shoreline features provide natural protection. While swimmers may not enjoy walking on cobblestones, and an ice-pushed ridge may block some of the view from your lawn chair, these features help "nourish" your beach by reducing erosion and trapping sand. Even driftwood absorbs a certain amount of wave energy that otherwise erodes soil.

Shore Protection

Regardless of the natural protection on your shore, the right combination of conditions (such as high lake level and wind direction) can result in a severe wave pounding, and shoreland soil may need additional protection.

Placement of large rock, usually referred to as rip-rap, is the preferred and most common form of shore protection (see Figure 4). Technical methods are available to determine rock size, placement geometry, and elevations to ensure the best protection. Your county Soil and Water Conservation District (SWCD), the MN Board of Water and Soil Resources (BWSR), and the federal Natural Resources Conservation Service (NRCS) can provide technical assistance.

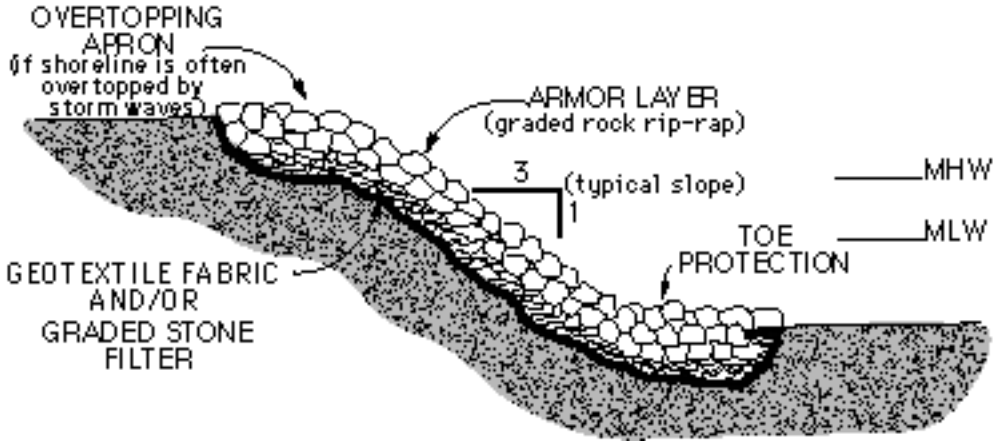

Figure 4: Proper rip-rap placement (MHW=mean high water, MLW=mean low water).

The above agencies will also have information on other types or remedies that may be appropriate for your particular situation. Potential shore protection alternatives include:

- bulkheads (retaining walls)
- gabions (rock-filled wire baskets)
- articulating blocks (cable-connected concrete blocks)
- Geoweb matrix (thick, open-cell plastic grid)

A few of the alternatives can be placed by hand. Some other alternatives, such as railroad ties, are often tried but rarely work. If you have your own idea for a solution, you should seek technical advice first.

If rip-rap is used, crushed or blasted rock locks together better than rounded boulders, but can be very expensive unless it is readily available.

Geotextile fabric is usually placed beneath the rock rip-rap to prevent soil loss through the rip-rap openings. It is easy to place and provides an excellent filter barrier (Figure 4). In order to prevent punctures, plenty of slack should be provided over protruding objects that cannot be removed. A layer of sand or fine gravel can be placed on the fabric for extra protection against puncture. Enough fabric should be laid out so that the rip-rap periphery can be "wrapped" by bringing the fabric up and back down into the rip-rap. This will help hold the rip-rap together as one structural unit. Keep in mind that sunlight will degrade exposed fabric. As an alternative to the fabric, a graded filter layer can be used beneath rip-rap to prevent soil loss through the rip-rap openings.

Sufficient rock must be placed at the base of the rip-rap for toe protection. Excavated toe material must be removed from the lakebed and placed in a non-wetland area.

Costs

The price of rip-rap placement depends on local contractors, distance to the nearest rock source, and access to the project site. It also depends on how much other work, such as clearing or earthwork, is required.

If you are planning to start a project in the mid- to late-1990s, you should expect to pay $40-75 per shoreline foot for inland lake shorelines and $100-175, or more, per foot for Lake Superior shoreline protection. Inquire at the county SWCD office about cost-share assistance.

A project cost can also be estimated by calling earthwork contractors in your area. A big savings can be realized if you can install these items yourself.

If you want to stabilize a slumping bluff, find out about soil types and ground water level. The record from when your well was drilled may be a good information source and can be obtained from the state or county health department or from your well driller. Contact your county SWCD for information on soils.

Effective bluff stabilization will require technical assistance. Request an engineer from the BWSR, SWCD, or NRCS to inspect your

site, or consider hiring a geotechnical engineering firm to take soil borings, analyze soil properties, and recommend a remedy. Most private consulting firms can drill 100 feet a day and charge $1,000 a day. For a small site, drilling, analysis, and a recommendation will cost about $2,000 (1996).

Regulations that Apply

All erosion protection projects that alter the lake- or riverbed require a protected waters permit from the Department of Natural Resources (DNR). Contact the DNR Area Hydrologist for permit guidelines, which other agencies might require a permit, and for assistance in planning your erosion prevention project. Some rip-rap projects may not need a permit. For those projects requiring a permit, the fee is $75 (1996). Permit fees for projects other than rip-rap are a minimum of $75 (1996).

For More Information...

call
county offices:

- University of Minnesota Extension Service
- Soil and Water Conservation District (SWCD)
- Planning and Zoning Department

regional offices of MN State agencies:

- MN Board of Water and Soil Resources (BWSR)
- MN Department of Natural Resources (DNR)(Area Hydrologist)

federal agencies:

- Natural Resources Conservation Service (NRCS)
- U.S. Army Corps of Engineers (USACoE)

read
Streambank Erosion...Gainin a Greater understanding.
Available from DNR.
Rip-Rap Shore and Streambank Erosion Brochure. Available from DNR.
Low Cost Shore Protection...a Property Owner's Guide. U.S. Army Corps of Engineers

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Next Section: #8 Minimizing Runoff from Shoreland Property
Home

UNIVERSITY OF MINNESOTA Extension SERVICE

Minimizing Runoff from Shoreland Property

Shoreland Best Management Practices

Number 8 of 18 in the Series

What Are Shoreland BMPs?

Best Management Practices (BMPs) are actions you can take to reduce your impact on the environment. BMPs have been described for agriculture, forest management, and construction. This fact sheet describes BMPs you can adopt on your shoreland property to help protect and preserve water quality. In many cases, the best management for shorelands may be retaining the natural characteristics of your property.

Why Is Runoff a Problem?

When an area is developed or altered, the way water flows is also changed. As land surfaces are covered with roads, driveways, or impervious surfaces (rooftops, decks, sidewalks, and parking lots), less water can seep into the soil, so runoff increases. This increased runoff is usually channeled into ditches, drainageways, storm sewers, or road gutters and often ends up in nearby lakes and streams.

High flows of water can cause flooding or erosion, as well as increasing sediment in streams and lakes. Fine sediment can also transport nutrients such as nitrate or phosphorus, and pollutants such as sands or salts from icy roads. All of these processes have an adverse effect on water quality.

Preventing Runoff

Planning ahead is the first and most important step in preventing or minimizing erosion due to runoff. An easy way to do this is to pretend that you are a raindrop. In looking at the landscape or any impervious surfaces, which route would you travel? Obviously, you would want to take the easiest path downhill. Keeping that in mind, note any areas that runoff would choose to travel.

Evaluate your property before you begin your landscape design. Consider slope, soil type, and existing vegetation as you plan your development. Fact sheet #6 offers additional tips for landscape planning.

Identifying Problems Caused by Runoff	
Problem	**Possible Cause**
• Is the water near shore cloudy?	• excess sediment reaching water
• Is there an oily rainbow film on the water	• possible petroleum contamination
• Are there algal blooms, green scum, or abundant plant growth in the water?	• excess nutrients such as nitrate or phosphorus reaching the water
• Are washouts, trenches, small piles of sediment, leaves, or debris found at the bottom of slopes?	• excessive runoff across the property

Long-term BMPs

Follow these long-term BMPs to minimize runoff and prevent erosion:

- Limit paved and covered areas that prevent water from seeping into the ground.
- Invest in permanent stabilization practices for long-term protection of your shoreland property by planting new vegetation, installing erosion control structures, and diverting drainage.
- Retain trees and shrubs; trees provide a natural umbrella by shedding water and can reduce runoff by as much as 50%; fact sheets #6, 9, and 11 offer landscaping tips.
- Plan and complete an annual maintenance schedule to make sure that your runoff and erosion control plan is working to protect your property.
- Limit clearing and grading on slopes and minimize cutting and filling for roads, sidewalks, and footpaths to reduce erosion and still provide access.
- Avoid damaging adjacent property with temporary erosion control methods, because water does not stop flowing at your property line.

Drainageways

- Use existing natural drainage systems such as valleys or low areas instead of digging new ditches.
- Design culverts and drainage structures to handle excessive amounts of runoff; assistance is available from your county Soil and Water Conservation District (SWCD) or the Natural Resources Conservation Service (NRCS).
- Protect storm sewers from sedimentation so they are able to carry storm water as intended.

Roads, Driveways, and Sidewalks

- Minimize pavements and impervious surfaces.
- Use gravel driveways instead of pavement.

- Where paved areas are necessary, locate them as close to the main road as possible to minimize the length of paved driveway.
- Do not pave wasted space such as corners near buildings that are not large enough for parking or driving.
- Locate driveways, sidewalks, stairways, and footpaths away from slopes because steeper slopes have greater erosion potential; if you must cross a hillside, follow the contour of the slope.
- Use steps when a walkway must go directly up and down a slope, particularly near the waterfront.
- Minimize road crossings over waterways and cross at a right angle to the stream if possible.
- Sweep driveways or sidewalks instead of washing them down with a hose, to prevent sediment, salt, and petroleum products from washing into storm sewers; cover stockpiles of salt and sand with a tarp or store them in a building.
- Use shallow grassed areas by roadsides instead of curb and gutter runoff and storage for snow.
- Install water bars on sloping roadways to slow and divert runoff.
- Use paving stones instead of solid concrete for walkways; this allows water to seep around the stones instead of running off.
- Avoid shortcutting down slopes because shortcutting causes erosion; compacted soil on footpaths also promotes excessive runoff.

Landscaping and Construction

- When landscaping, stage construction so one area is stabilized before another area is disturbed.
- Avoid construction in areas with:
  --little vegetative cover; preserve existing cover
  --erodable soils (sands, or soils that appear fluffy when dry)
  --mainly bedrock with a thin covering of soil
  --steep slopes of greater than 10%; to picture a 10% slope, imagine putting the bottom end of a board 10 feet out from the wall and the top end at 1 foot up the wall; this is a 10% slope (see Figure 1)
- Control erosion during construction by using temporary methods such as **diversions** to carry water away from the construction site to where it can be safely dispersed or **silt fences** or **hay bales** to trap sediments before they enter the water; a combination of methods may be the best solution (see Figures 2 and 3).
- Use only clean fill (free from debris and dirt) such as rock, sand, or gravel near lakes and streams.
- Use only solid concrete forms such as interlocking blocks or slabs; do not use liquid concrete and avoid treated timbers or railroad ties.
- Make sure utility trenches are drained of water, backfilled, seeded, and mulched.
- Inspect construction projects immediately after initial installation of erosion control measures, during construction, following any severe rainstorm, before reseeding, and when nearing the completion of construction work; temporary erosion controls should be removed; ensure that stabilization is complete and drainageways are in proper working order.

Figure 1: A 10% slope is represented by leaning a board against the wall with the top at 1 foot and the base set 10 feet away from the wall.

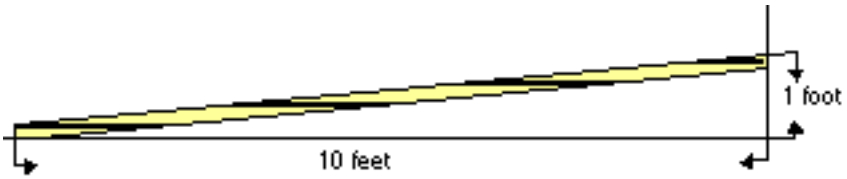
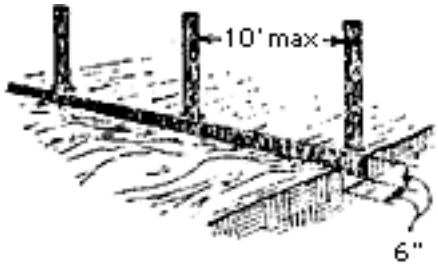
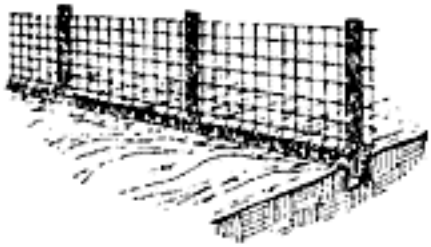


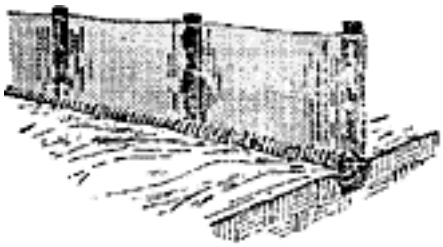
Figure 2: Constructing a silt fence to slow runoff and prevent erosion.



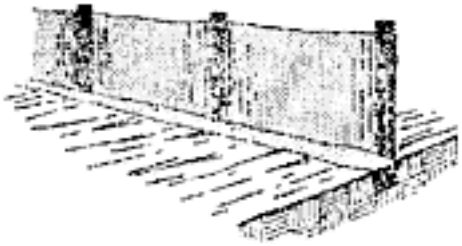
1. Set posts and excavate a 6"x6" trench upslope along the line of posts.



2. Staple wire fencing to the posts.

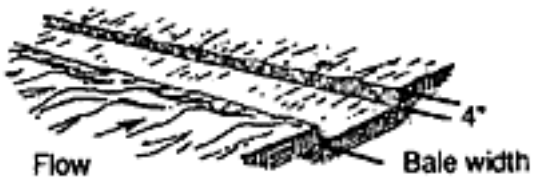


3. Attach the filter fabric to the wire fence and extend it into the trench.



4. Backfill and compact the excavated soil.

Figure 3: Constructing a straw bale barier to slow runoff and prevent erosion.



1. Excate the trench.

2. Place and stake straw bales.

3. Wedge loose straw between bales.

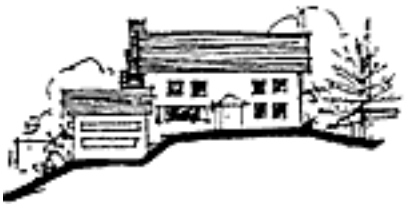
4. Backfill and compact the excavated soil.

As a general rule, the erosion hazard will become critical if slope lengths exceed these values:	
0-6%	*200 feet*
6-12%	*100 feet*
13% and over	*50 feet*

Buildings and Runoff

- Install rain gutters along the edge of rooftops to help carry water off of the roof and away from the building to areas where soil won't be eroded; make sure there is erosion protection where the gutters outlet onto soil.
- Keep gutters free from debris and draining properly.
- Keep rooftops free of snow and ice buildup to help control the magnitude of runoff in the spring and protect your roof from damage.
- Pave patios with flagstones or decay-resistant wood blocks instead of solid material to permit some water to seep around the stones or blocks.
- Position rooftops so they are perpendicular to the slope, instead of parallel, to slow down runoff (Figure 4).

Figure 4: Build rooflines perpendicular to slopes



roofline perpendicular to slope slows down runoff

roofline parallel to slope increases potential for runoff damage

Regulations that Apply

Most zoning ordinances restrict the amount of impermeable surface allowed in the shoreland area; check with your local zoning officials for more information. Alteration or filling of wetlands is strictly regulated; check with your county Soil and Water Conservation District before beginning any projects that impact wetlands. For any development along waterways or lakeshores, contact the Department of Natural Resources, Division of Waters for any necessary permits.

Remember

It is a Minnesota law that you must "call before you dig."
Contact Gopher State one Call 1-800-252-1166

For More Information...

call
county offices:

- Soil and Water Conservation District (SWCD)
- University of Minnesota Extension Service
- Planning and Zoning Department

federal agencies:

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Soil and Water Conservation Districts of the Arrowhead counties
Natural Resources Conservation Services
Environmental Protection Agency
Western Lake Superior Sanitary District

You may add information about contact persons or regulations specific to your county, region, or lake association.

University of Minnesota Extension Service, Distribution Center 20 Coffey Hall 1420 Eckles Ave St Paul, MN 55108-6069
612-625-8173

Produced by the Arrowhead Water Quality Team, a cooperative effort of Carlton, Cook, Itasca, Koochiching, Lake, and St. Louis counties and state and federal agencies. All publicly funded agencies involved are committed to equal opportunity education, service, and employment.

Next Section: #9 Caring for Shoreland Lawns and Gardens
Home

Caring for Shoreland Lawns and Gardens

Shoreland Best Management Practices

Number 9 of 18 in the Series

What Are Shoreland BMPs?

Best Management Practices (BMPs) are actions you can take to reduce your impact on the environment. BMPs have been described for agriculture, forest management, and construction. This fact sheet describes BMPs you can adopt on your shoreland property to help protect and preserve water quality. In many cases, the best management for shorelands may be retaining the natural characteristics of your property.

Why Are Lawns and Gardens a Potential Problem?

Lawns and gardens near shorelands must be carefully planned and maintained to prevent possible contamination of surface waters. Native vegetation should be considered as a quality alternative to cultured lawns and landscapes. Landscapes will revert to a native state if no maintenance is performed; planting native vegetation will hasten the process.

Establishment of new lawns must conform to Shoreland Management Regulations, which prohibit excessive removal of vegetation near the shore and on slopes and bluffs. Check with your local zoning authority for specific regulations governing the body of water in question.

Existing lawns and gardens must be maintained in a manner that prevents the possible contamination of ground and surface waters.

Before beginning any practice, stop and think about potential risks to water quality. Shoreland owners must be aware of potential problems caused by soil erosion, as well as pollution due to chemical amendments and organic yard waste.

Special attention should be paid if the following conditions exist:

- There are areas of exposed soil--flower beds, vegetable gardens, or poorly established vegetation.
- Soils have a coarse texture, such as sands or sandy loams.

- The property slopes toward surface water.
- There are impervious surfaces, such as sidewalks and driveways.
- Lawn or landscape maintenance is being done close to the surface water.
- Fertilizers, pesticides, or soil amendments are being applied.

Avoid or minimize the use of chemical fertilizers and pesticides.

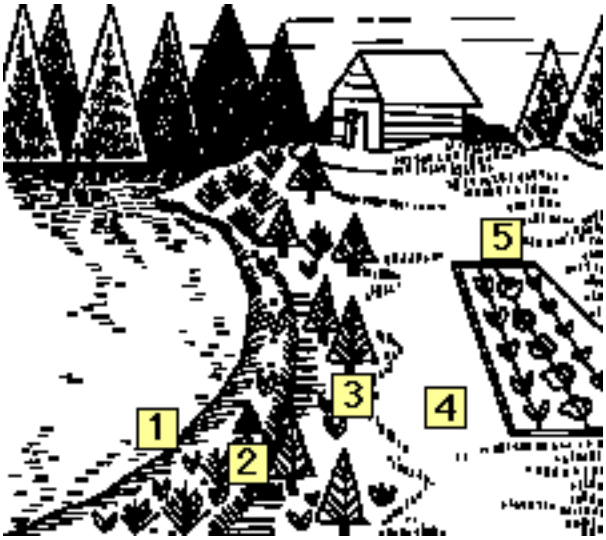

Figure 1: A well-designed landscape plan includes

1. *natural vegetation along the water's edge;*
2. *an intact ice ridge or added berm;*
3. *a natural vegetation filter strip;*
4. *well-established grass or ground cover; and*
5. *a level garden set back from the waterfront.*

Preventing Soil Erosion

Surface waters can be contaminated by soil particles that are washed or blown into the water. In addition to the problem of sediment, soil particles can carry phosphorus, which is a potential pollutant, into the water.

To avoid this problem:

- maintain a vigorously growing filter zone of grass, trees, and shrubs next to surface waters
- minimize areas of exposed soil by maintaining native vegetation or dense turf
- preserve ice ridges or construct an earth berm near the shore to minimize the possibility of runoff; the berm, which is a small mound of earth, should run parallel to the shore to prevent runoff into surface water

Preventing Potential Problems from Fertilizers

If possible avoid the use of chemical fertilizers. Native vegetation does not require the application of additional fertilizer. Use caution if applying fertilizers to lawns and adhere to the following guidelines:

- **Have your soil tested to determine how much fertilizer is needed and minimize the use of chemical fertilizers; soil test sample bags are available through the county offices of the University of Minnesota Extension Service.**

- Use compost or manure; this is preferable to chemical fertilizer. However, these also have the potential to damage water quality if used in excessive amounts.
- If chemical fertilizers are used, select slow-release (water insoluble) forms; see recommendations for fertilizing on next page.
- Water your lawn after fertilizing, but do not allow excess water to run off into surface waters.
- Sweep up any fertilizer spilled on hard surfaces such as walks and driveways, instead of washing it off.
- Use extra caution when applying fertilizer near surface waters; do not spread fertilizer within 75 feet of surface waters or wetlands; use a "drop" spreader and not a "cyclone" spreader to minimize the possibility of getting fertilizer directly into the water.
- Never apply fertilizers to frozen ground.
- Leave a natural vegetation filter strip of grass, trees, and/or shrubs next to the shoreline; another option would be to construct a berm along the shore.

Preventing Potential Problems from Pesticides

If possible avoid the use of chemical pesticides. Consult a professional from the University of Minnesota Extension Service or Soil and Water Conservation District to determine if the use of a pesticide is justified. The following practices will minimize the potential of contamination from pesticides:

- Properly identify whether the pest is an insect, disease, or other problem.
- Determine if there is an economic or aesthetic justification for initiating control of the pest.
- Consider control options other than the use of a chemical pesticide; **biological controls and pest-resistant plant varieties are becoming more available.**
- Use the least toxic and most readily degradable pesticide that will be effective.
- **Read the pesticide label carefully and pay special attention to safety precautions and warnings about use near water.**
- Do not apply pesticides when it is windy to avoid the possibility of drift.
- When purchasing pesticides, buy only what is needed to control the problem during the current season.
- Waste pesticides should be disposed of properly. Never pour excess pesticides on the ground, into surface waters, or into sanitary treatment systems; consult with your county solid waste office, the Minnesota Pollution Control Agency, or your sanitary district for proper methods of collection and disposal.

Best Management Practices for Lawns

The establishment of new lawns must conform to Shoreland Management Regulations. Natural vegetation cannot be excessively removed from the "Shore Impact Zone," generally a distance of 50 to 100 feet from the surface water, depending upon the county, and lake or river classification. Removal of vegetation from slopes and bluffs is also regulated. Check with your local zoning authority for specific regulations.

ESTABLISHING NEW TURF

- If permitted by regulation, a grass lawn can be established with either sod or seed.
- **Sod should always be used if there is a slope and the danger of soil erosion exists.**
- Seeding is effective if runoff is not a problem and if the seedbed can be kept moist. Bluegrass seed requires three weeks to establish, and if the seed bed dries out during this time, the seedlings may die.
- When seeding, preparation of a good seedbed is necessary for success. Seed-soil contact is essential. Select seed varieties that are suitable for full sun or partial shade. For specific recommendations consult *The Home Lawn,* University of Minnesota Extension Service Bulletin MI-0488.

MAINTAINING ESTABLISHED TURF

Fertilizing

For dense growth, grass requires the addition of some form of nitrogen fertilizer. **Nitrogen is a very mobile nutrient and attention must be paid to application rates and timing to eliminate the possibility of water contamination.**

- Do not apply more than 1 lb. of actual nitrogen per 1,000 square feet of lawn per year. If soils are sandy or grass is sparse, 1/2 lb. of nitrogen per 1,000 square feet per application is appropriate. (The analysis of fertilizers is a percentage by weight. For example, a 34-0-0 fertilizer is 34% nitrogen by weight; 3 lb. of fertilizer contains 1 lb. of actual nitrogen.)
- Low-maintenance lawns will grow well with one application of fertilizer per year (1 lb. of actual nitrogen per 1,000 square feet). The best time of year to apply this fertilizer is in the early fall, during the month of September.
- The use of slow-release nitrogen is desirable. This may be some form of organic fertilizer or "synthetic" slow-release form.
- Never apply fertilizer to frozen ground or on snow.
- Use extreme caution when applying fertilizers near water. Never allow any fertilizer to enter surface water or wetlands.
- Always sweep up any fertilizer that is on hard surfaces and reapply to the grass. Never wash it off.
- Apply commercial fertilizers just before moderate rain or irrigate immediately after application.

Watering

- Bluegrass lawns generally do not require watering. They will become dormant during the dry part of the summer, but will revive when it rains.
- If quality growth is desired throughout the season, bluegrass lawns will require additional water during dry summer months.
- Water deeply, but infrequently. Sandy soils require 1 or 2 inches of water per week. Clay soils require 1 inch of water per week.
- Water in the early morning to prevent water loss due to evaporation and to minimize the potential for disease.

Mowing

- Mow regularly and leave the clippings on the grass. By leaving the clippings on the lawn, nutrients are naturally recycled to the grass plants.
- Never allow grass clippings to enter the water. Clippings and other organic material contain nutrients that may contaminate the water.

With proper management, dense turf provides a good ground cover to prevent soil erosion.

BMPs for Gardens

Flower and vegetable gardens can add to the quality of life for shoreland owners. Certain precautions must be taken to prevent the possibility of surface water contamination.

LOCATION

- Gardens should **not** be located on slopes because they can promote accelerated soil erosion and runoff. An alternative on slopes is to install a terraced garden. Dense turf or other vegetation should be established on slopes.

- Gardens should **not** be located on septic system drainfields or mounds. Exposed soil increases the possibility of septic systems freezing. Drainfields and mounds should be covered with dense turf.

- To minimize the area of exposed soil, use intensive growing techniques such as inter-cropping, succession planting, and raised beds.

SOIL FERTILITY MANAGEMENT

Excessive application of fertilizers has the potential for ground and surface water contamination. This can be avoided by the following practices:

- Test the soil to determine nutrient needs; apply only the recommended amounts of nutrient; soil test bags and forms are available at the county offices of the University of Minnesota Extension Service.

- Make split applications of the total amount of nutrient required; this would include "side-dressing" nitrogen-loving crops, such as sweet corn, vine crops, and the cabbage family.

- Use organic fertilizers if available and practical; these include well-rotted manures and compost.

PEST MANAGEMENT

- Use pesticides only if necessary and if there are no other options for pest control. See section on "Preventing Potential Problems from Pesticides," p. 2. **Always read the pesticide label and pay careful attention to warnings on the potential for surface water contamination.**

VEGETABLE WASTES

- Vegetable wastes, such as corn husks, pea pods, or other plant material, should never be deposited in the water. Compost these materials instead and apply to garden soil.

Yard Waste Disposal

Yard waste, including leaves, grass clippings, fruit and vegetable wastes, and woody materials, should never be allowed to enter the water. These materials contain phosphorus and may contribute to degradation of surface water quality.

Collect and compost yard waste. Compost provides an excellent material for amending flower and vegetable gardens. Information on composting is available from your county office of the University of Minnesota Extension Service or the County Solid Waste office.

For More Information...

call
county offices:

- University of Minnesota Extension Service
- Soil and Water Conservation District (SWCD)
- Planning and Zoning Department

regional offices of MN State agencies

- MN Department of Natural Resources (DNR)
- MN Pollution Control Agency (PCA)
- Western Lake Superior Sanitary District

read
Backyard Composting. FS-3899, University of Minnesota Extension Service

Composting and Mulching: A Guide to Managing Organic Yard Wastes. FO-3296, University of Minnesota Extension Service

The Home Lawn. MI-0488, University of Minnesota Extension Service

Lawn Care Practices to Reduce the Need for Fertilizers. FO-5890, University of Minnesota Extension Service

Soil Sample Bags and Information Sheets. University of Minnesota Extension Service, County Offices

Turfgrass Management for Protecting Surface Water Quality. BU-5726, University of Minnesota Extension Service

Part of a series. . .

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2. Maintaining Your Shoreland Septic System
3. Installing a Shoreland Septic System
4. Ensuring a Safe Water Supply
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University of Minnesota Extension Service, University of Minnesota
College of Natural Resources, University of Minnesota
Water Plan Coordinators of the Arrowhead counties
Minnesota Board of Water and Soil Resources
Minnesota Department of Health
Minnesota Department of Natural Resources, Division of Fish and Wildlife,
Division of Waters, Division of Forestry
Minnesota Pollution Control Agency
Minnesota Sea Grant Extension Program
Mississippi Headwaters Board
St. Louis County Health Department, Environmental Services Division
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Next Section: #10 Managing Your Shoreland Woodlot
Home

Managing Your Shoreland Woodlot

Shoreland Best Management Practices

Number 10 of 18 in the Series

What Are Shoreland BMPs?

Best Management Practices (BMPs) are actions you can take to reduce your impact on the environment. BMPs have been described for agriculture, forest management, and construction. This fact sheet describes BMPs you can adopt on your shoreland property to help protect and preserve water quality. In many cases, the best management for shorelands may be retaining the natural characteristics of your property.

Forests and Water Quality

Clean water is one of Minnesota's greatest natural resources. Many of our water resources, such as lakes, rivers, and streams, originate in forested areas. Woodlands assist nature in maintaining water quality by keeping soil in place, storing nutrients, and balancing water flows. They also help moderate stream water temperatures to support healthy fish populations.

Managing Woodlots Can Affect Water Quality

Whether your woodlot is five acres or 100 acres, managing it can require road building, timber harvesting, and mechanical site preparation. Any of these activities can adversely affect the quality of adjacent waters if not properly planned or conducted.

The biggest concern for managing woodlots adjacent to lakes, streams, or wetlands is the erosion and deposition of soil. The amount of soil erosion and sedimentation will depend on soil type, steepness of slopes, rainfall, and the amount of soil that has been disturbed or exposed by management activities.

This fact sheet is directed at the shoreland owner with five or more acres of forest land adjacent to a lake or stream. For more information refer to *Protecting Water Quality and Wetlands in Forest Management--Best Management Practices in Minnesota* (listed on back page). For information on caring for trees and shrubs on less than five acres, see fact sheet #11.

The goal of these BMPs is to minimize soil disturbance.

Filter Strips Are Necessary

A filter strip is a zone of vegetation adjacent to a water body where management activities are kept to a minimum so that less than 5% soil is exposed. A filter strip should be established in the area between the shoreline (the ordinary high water level) and the area to be managed (Figure 1). Management is permitted in the filter strip if it does not result in soil disturbance. Minimizing the exposure of soil and maintaining the residual vegetation will help trap sediment and provide a zone of infiltration before runoff reaches surface water bodies.

The width of the filter strip will vary depending on steepness (percent slope), length of the slope, and soil type. Recommendations for filter strip widths for woodlot management are given in Table 1. (Percent slope is defined in Figure 2.)

In general, the steeper the slope, the wider the filter strip should be. For more erodible soil, the filter strip should be wider.

Figure 1: Areas where filter strips are needed.

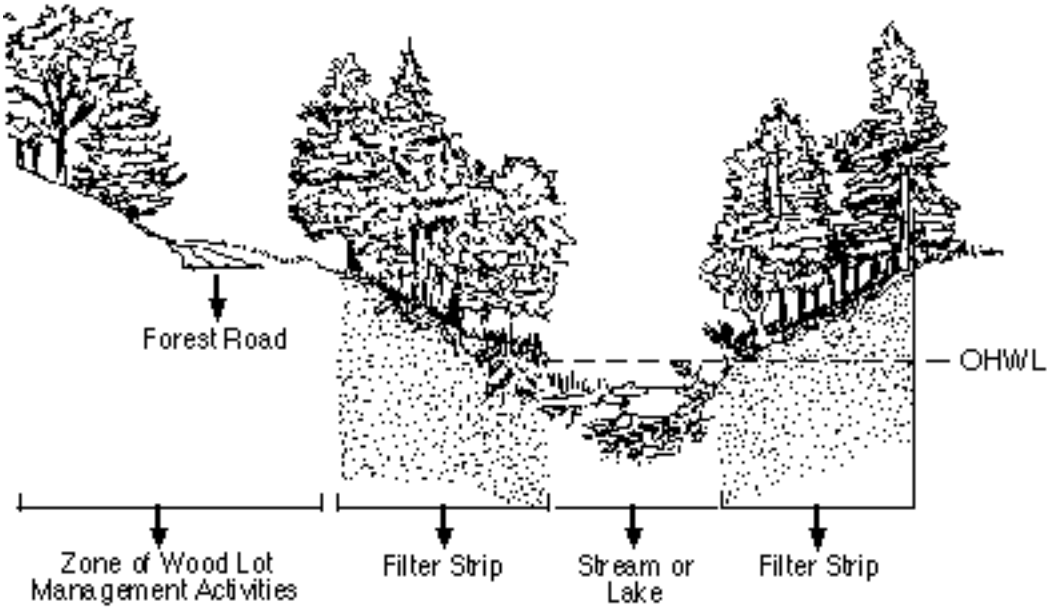


Figure 2: A 10% slope is represented by leaning a board against the wall with the top at 1 foot and the base set 10 feet away from the wall.

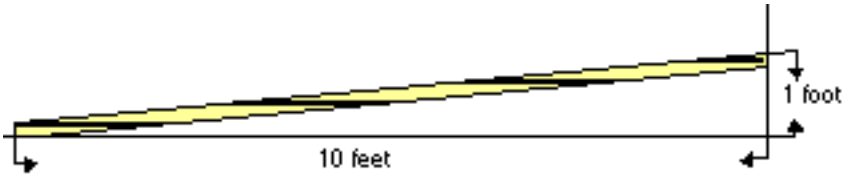


Table 1: Filter strip width guide for woodlot management.

Slope of land between management activity and water body (percent)	Recommended width of filter strip (slope distance in feet)*
0 - 10	50
11 - 20	51 - 70
21 - 40	71 - 110
41 - 70	111 - 150

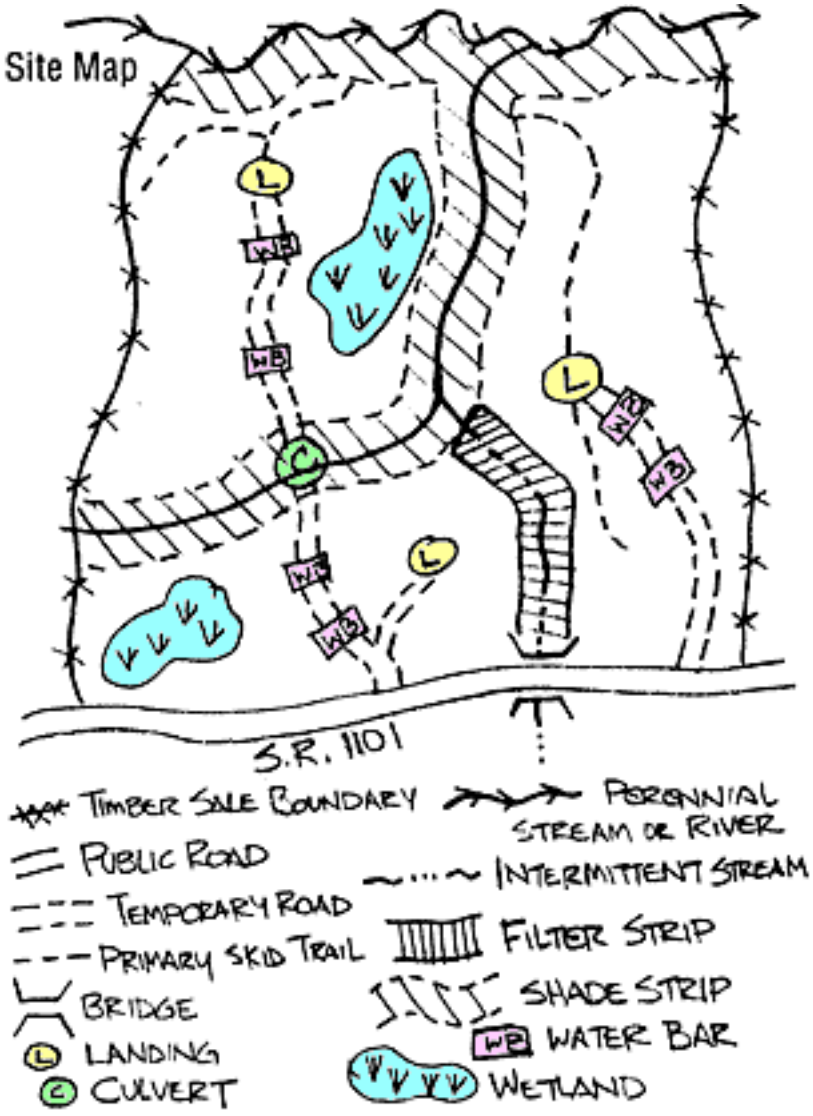
*Distance is measured to the edge of soil disturbance, or in the case of fills, from the bottom of the fill slope.

Have a Management Plan

A landowner should develop a management plan before beginning any forest management activities. This plan should make clean water a priority while meeting the landowner's objectives. An important part of the management plan is a map of the area (Figure 3) that shows all lakes, streams (including all seasonal streams), springs, wetlands, and other sensitive areas. The map should also include existing roads and trails, forest types, soil types, and slopes. Eventually the map will be used to delineate new roads, harvest areas, filter strips, and other protected areas.

A landowner may obtain advice and assistance in preparing a management plan from the regional Department of Natural Resources (DNR) Division of Forestry, local Soil and Water Conservation Districts (SWCD), or local forest industries. Individuals can also contract with a private consulting forester. Cost-sharing programs may be available to assist woodlot owners with some management activities. Resources that are useful in preparing a management plan include soil surveys, soil maps, topographic maps, and aerial photos, as well as a thorough on-site examination of the area.

Figure 3: Map of management area showing roads, harvest areas, filter strips, landings, water bodies, and no-harvest areas.



BMPs for Forest Roads

Erosion that occurs during forest road construction has the greatest potential to degrade lakes, streams, and wetlands. An important first step is to determine how the roads will be used now and in the future. To minimize road construction, roads should be built to the maximum standards needed to meet expected uses:

- Design roads in locations with lowest slope.
- Use barriers, such as silt fencing and hay bales, where siltation and erosion may occur (see fact sheet #8). Mulch and seed exposed soils.
- Where the road must cross a stream, contact the DNR Division of Waters to determine if a protected water permit is needed.
- Minimize the number of times a road crosses open water or wetlands.
- Low water crossings (driving through open water) are not recommended.
- Water crossings using a culvert or bridge should cross a stream at a 90 angle to the stream bed in areas where the stream edge is stable.
- Use properly sized culverts or bridges where necessary. Remove any temporary culverts or bridges after the road is abandoned.
- Design roads for maximum cross drainage using water diversion structures (e.g., water bars) to minimize downroad flow. Refer to *Protecting Water Quality and Wetlands in Forest Management -- Best Management Practices in Minnesota* for additional information.
- Close all temporary roads after use to prevent unwanted use by off-road vehicles that could be detrimental to the site.

BMPs for Upland Timber Harvesting

Timber harvesting is an integral part of woodlot management that involves cutting trees and removing them from the site. Harvesting temporarily disturbs the environment in the immediate area and should therefore follow a plan that incorporates water quality protection in all operations:

- Time the harvest to be compatible with soils, topography, and weather conditions. Soil disturbance is generally greatest under wet conditions and least under frozen conditions.
- Locate landings (areas where harvested trees are brought for processing) away from low, poorly drained areas and outside of filter strips.
- Never deposit harvesting slash (tree tops, branches) or debris into wetland areas.
- Follow road construction BMPs when designing and laying out skid trails.
- Prevent erosion and sedimentation along roads by filling in ruts, seeding disturbed areas, and installing water diversion structures and erosion barriers.

BMPs for Mechanical Site Preparation

The purpose of mechanical site preparation is to enhance conditions for the establishment, survival, and growth of desired tree species. Mechanical site preparation involves clearing the site for planting, seeding or natural regeneration, and providing partial control of other vegetation competing with crop trees. Site preparation is usually done by a contractor with specialized equipment.

- Avoid operation during periods of saturated soil conditions when such operations may cause rutting or accelerate soil erosion.

- Avoid disposing of residues from shearing and raking operations in wetland areas. Deposit residues in stable upland locations.
- Be sure that slash piles do not interfere with natural drainage patterns.
- Consider shearing and raking under frozen conditions to minimize incorporation of soil into slash piles.
- Follow land contours to promote soil stability.
- Use patch or row scarification (clearing) where terrain or soil type calls for minimum soil disturbance.

Regulations that Apply

Permits are required for work in protected waters and wetlands. To determine whether a permit is required for a particular water body, contact the DNR Division of Waters area office. In some instances, further review is required by the U.S. Army Corps of Engineers or local authorities. Also, the Minnesota Wetland Conservation Act of 1991 prohibits the draining and filling of certain wetlands. Contact your local SWCD office for more information on management activities allowed in wetlands.

For More Information...

call
county offices:

- Soil and Water Conservation District (SWCD)
- University of Minnesota Extension Service

regional offices of MN State agencies

- MN Department of Natural Resources (DNR), Divisions of Forestry and Waters
- MN Board of Water and Soil Resources (MWSR)

other:

- local forest industries, private forest management assistant programs

read
Protecting Water Quality and Wetlands in Forest Management--Best Management Practices in Minnesota. MN Department of Natural Resources, Forestry Division and the MN Pollution Control Agency. 140 p.

Water Resources and Timber Harvesting in the Lake States. Lake States Forestry Alliance, E-1311 First National Bank Bldg., St. Paul, MN 55101.

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Next Section: #11 Valuing Your Shoreland Trees
Home

Valuing Your Shoreland Trees

Shoreland Best Management Practices

Number 11 of 18 in the Series

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Why Are Shoreland Trees Important?

Trees and shrubs are an excellent inexpensive and attractive way to control runoff and erosion. Roots hold soil and help stabilize slopes by trapping and using precipitation that would otherwise run off. They also increase soil porosity, allowing water to infiltrate rather than run off. Vegetation helps protect water quality by filtering out nutrients and pesticides that could otherwise reach a lake or stream and cause algal blooms or excessive plant growth. Trees and shrubs also improve air quality by taking in carbon dioxide and giving off oxygen.

In addition, trees provide shade and help moderate weather extremes such as hot sun or strong winds. Trees and shrubs offer habitat for wildlife and privacy for humans by screening adjacent property.

This fact sheet offers guidelines to shoreland property owners who are growing a limited number of trees and shrubs on their recreational property, rather than those who are managing larger forest areas. Fact sheet #10 offers more information for managing shoreland woodlots.

Why Retain Existing Trees and Shrubs?

Natural vegetation is best because it is adapted to the local climate and usually has strong, well-established root systems that provide better erosion control, water-cleaning capacity, and stability for plants. Existing trees and shrubs also offer more typical habitat for wildlife and are more resistant to pests and disease.

Planning your property development in advance to save existing vegetation is very important. If native trees and shrubs were removed in the past, planting and nurturing replacements will help increase your property value and enjoyment while helping to protect water quality.

Establishing Filter Strips

Filter strips are vegetated areas of land adjacent to shorelines that help minimize runoff to a lake or stream. The most effective filter strips include a variety of low plants, shrubs, and trees, preferably native or existing vegetation.

Research on agricultural land adjacent to water bodies has indicated that all nitrate was removed from ground water flowing under 90 feet of woods, and 80% of phosphorus and nitrate was removed from surface runoff. Thus, filter strips are a wise investment to protect your lake or stream, even on property that is not used for intensive agriculture.

In Minnesota, filter strips of 50-150 feet are recommended for most effective water quality protection. For new development, the required width for filter strips depends on how a lake or river is classified. Contact your local zoning official for information on classifications. Re-establishing vegetative strips along the shore on property that has been developed is recommended because a filter strip of even a few feet will help minimize runoff and provide some water quality protection.

BMPs for Existing Trees

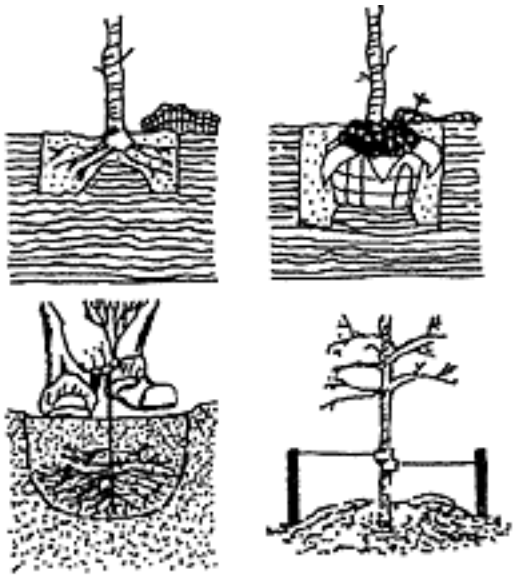
- Protect bark, limbs, and roots during construction; tie planks around trees to protect them from equipment; do not drive or park equipment over the root area.
- Safeguard roots because they are the most important part of a tree; avoid filling, compacting, or removing soil from the root area; root area is at least as large as the area under the crown of a tree.
- Trim dead and dying limbs and remove diseased growth, but never trim oaks between April 15 and July 1 because of risk of oak wilt; properly dispose of diseased limbs and bark to avoid providing an opportunity for the disease to spread.
- Scout for pests and diseases; treat early to avoid widespread damage.
- Water during times of low rainfall; trees should receive 1 inch of water per week
- When trees are too crowded, remove some to allow more light and water to reach other remaining stems.
- Contact your local zoning office for restrictions related to thinning trees in the shoreland area.

Establishing New Trees

- Use native species when available because they are hardier, more resistant to disease and pests, and provide natural habitat for wildlife.
- Include a variety of trees and shrubs; emphasize diversity of species, heights, and ages.
- Plant in the spring or fall.
- When planting, dig a hole 1 to 2 feet wider than the root system and backfill with original soil; water root area thoroughly, add a 3- to 6-inch layer of mulch, and stake only if necessary (see Figure 1).

- Nurture new vegetation (simply planting a tree is not enough to ensure it will survive); water regularly and deeply; avoid short, frequent watering because it promotes shallow root systems; fertilize and prune as necessary; provide winter protection.

Figure 1: When planting a tree, dig a hole 1-2 feet wider than the roots, water well, and add 3-6 inches of mulch. For more specific instructions, refer to Planting and Transplanting Trees and Shrubs bulletin.



Suggested Species for Northeastern Minnesota

HARDWOODS

red maple *(Acer rubrum)* - Needs full sun, well-drained soil with ample moisture; intolerant of poorly aerated soils, high pH, and hot, dry site conditions; gray squirrels eat the buds and seeds in late winter/early spring.

silver maple *(Acer saccharinum)* - Fast-growing, large size; needs full sun; tolerates a wide range of soil types but prefers deep moist soil; large vigorous root systems; seeds prolifically.

sugar maple *(Acer saccharum)* - Needs fertile, well-drained soil with ample moisture; full sun or partial shade; grows poorly in compacted soils.

paper birch *(Betula papyrifera)* - Prefers well-drained soil and cool, moist conditions; full sun; needs irrigation and fertilization to stay vigorous; intolerant of compacted soil, dry conditions, and high temperature.

river birch *(Betula nigra)* - Needs fertile, slightly acidic soil; transplant in spring only; susceptible to birch leaf miner (skeletonizes leaves).

black ash *(Fraxinus nigra)* - Needs full sun and ample soil moisture; tolerates poorly drained areas.

green ash *(Fraxinus pennsylvanica)* - Needs full sun, but well adapted to a variety of soil types; easily established; pruning may be needed to improve form.

swamp white oak *(Quercus bicolor)* - Tolerant of heavy soils with poor drainage; likes acidic soils; drought tolerant; specify swamp white oak if purchasing, because white oak does not do well in northeastern Minnesota.

northern pin oak*(Quercus ellipsoidalis)* - Prefers sandy soil and full sun; drought tolerant.

burr oak *(Quercus macrocarpa)* - Large tree tolerant of a wide range of soil conditions; likes full sun.

northern red oak *(Quercus rubra)* - Tolerant of a wide range of site and soil conditions but needs well-drained soil; faster growing oak; do not prune April through July.

laurel leaf willow *(Salix amygdaloides)* (also known as peach leaf willow) - Tolerant of a wide range of sites, even poorly drained

areas.

black willow *(Salix nigra)* - Likes moist site, otherwise not demanding of site conditions; needs frequent pruning.

weeping willow *(Salix babylonica)* - An introduced species that does well in northern Minnesota.

linden (American basswood) *(Tilia americana)* - Tolerant of a wide range of soils but prefers well-drained soil with ample moisture; will grow on clay soils.

CONIFERS

balsam fir *(Abies balsamea)* - Needs rich, well-drained soil with adequate moisture; intolerant of hot, dry conditions.

larch/tamarack *(Larix laricina)* - Performs well on a variety of sites; tolerant of poorly drained soils and dry sites; loses its foliage each year.

white spruce *(Picea glauca)* - Tolerates a wide range of soil conditions but prefers moist, well-drained soil; likes full sun.

black spruce *(Picea mariana)* - Tolerates a wide range of soil conditions, including wet areas.

Norway nine *(Pinus resinosa)* - Needs full sun; tolerates dry, sandy acidic soils; intolerant of compacted or poorly drained soils.

eastern white pine *(Pinus strobus)* - Fast-growing species, grows well on heavy or sandy acidic soil; must be managed to prevent loss to white pine blister rust which is especially prevalent in shoreland areas; a favorite of deer and red squirrels.

northern white cedar *(Thuja occidentalis)* - Suitable for shorelines and low wet areas; very shade tolerant; a favorite of deer and rabbits.

SHRUBS

alder *(Alnus sp.)* - Likes moist, cool soil; full sun or partial shade; good for wet soil sites.

serviceberry *(juneberry) (Amelanchier sp.)* - Needs well-drained soil; full sun or moderate shade.

gray dogwood *(Cornus racemosa)* - Tolerant of a wide range of soil moisture and fertility conditions; full sun or partial shade.

red-osier dogwood *(Cornus stolonifera)* - Tolerant of a variety of soil types, but does not like hot, droughty conditions; full sun or light shade.

american hazel *(Corylus americana)* - Needs moist fertile soil; full sun or partial shade; intolerant of dry areas; squirrels and bears use the nuts.

winterberry *(Ilex verticillata)* - Needs moist, acidic soil; prefers full sun; grows well in wet soil near ponds or streams.

chokecherry *(Prunus virginiana)* - Prefers well-drained soil with ample moisture.

sumac *(Rhus typhina)* - Tolerates poor, dry soils; prefers full sun.

willow *(Salix sp.)* - Various varieties; smaller types good for stabilizing banks; pussy willows like moist soils and tolerate wet areas; prefers full sun.

viburnum (Cranberry) *(Viburnum sp.)* - Likes rich soils with ample moisture; sun or shade.

BMPs for Maintaining Shoreland Vegetation

Adding a filter strip will help preserve water quality, and there are other BMPs to follow as you care for near-shore vegetation. Follow these guidelines to help protect your lake or stream:

- Rake dead leaves and brush away from the water; compost vegetation in a sturdy structure away from the shoreline.

- Never dump leaves or vegetative debris into a lake or stream because this releases nutrients and organic acids into the water.
- Avoid burning on the beach or near shore because the remaining ash is highly alkaline and may change the pH of the lake and promote growth of undesirable plants.
- Use lake water for irrigating trees, shrubs, and lawns; lake water usually can supply the nutrients your near-shore vegetation needs to promote healthy growth.
- When treating diseases or insect pests, use chemicals responsibly and use only the required amount.

Encouraging Wildlife

Planting certain trees and shrubs will attract wildlife to your property and enhance your enjoyment. Keep in mind the need for shelter and habitat as well as food. Offer a diversity of plants with flowers, fruits, nuts, or cones and include deciduous as well as evergreen species. For more information, contact the MN Department of Natural Resources (DNR) Area Wildlife Manager or your county office of the University of Minnesota Extension Service.

Regulations that Apply

Filter strips are required on all new shoreland property development. The width depends on slope and lake or river classification, but the minimum requirement is 38 feet. Some local zoning ordinances may be more restrictive than the minimum state regulations, so check with your local zoning office for requirements in your area.

For More Information...

call
county offices:

- University of Minnesota Extension Service
- Soil and Water Conservation District (SWCD)

regional offices of MN State agencies:

- MN Department of Natural Resources, Division of Fish and Widlife (DNR)
- MN Board of Water and Soil Resources (BWSR)

federal agencies:

- U.S. Forest Service (USFS)

read
Minnesota Tree Handbook. Minnesota Association of Soil and Water Conservation Districts Forestry Committee. ISBN 0-934860-45-9

The Right Tree Handbook. University of Minnesota, Northern States Power Company, and Minnesota Power.

Fitting Trees and Shrubs Into the Landscape. Bulletin FO-0604. Available at your county offices of the University of Minnesota Extension Service.

Planting and Transplanting Trees and Shrubs. Bulletin FO-3825. Available at your county offices of the University of Minnesota Extension Service.

Tree Owner's Manual. Minnesota Department of Agriculture bulletin.

Landscaping for Wildlife. Carol Henderson, Minnesota DNR Nongame Wildlife Program.

Part of a series. . .

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College of Natural Resources, University of Minnesota
Water Plan Coordinators of the Arrowhead counties
Minnesota Board of Water and Soil Resources
Minnesota Department of Health
Minnesota Department of Natural Resources, Division of Fish and Wildlife,
Division of Waters, Division of Forestry
Minnesota Pollution Control Agency
Minnesota Sea Grant Extension Program
Mississippi Headwaters Board
St. Louis County Health Department, Environmental Services Division
Soil and Water Conservation Districts of the Arrowhead counties
Natural Resources Conservation Services
Environmental Protection Agency
Western Lake Superior Sanitary District

University of Minnesota Extension Service, Distribution Center 20 Coffey Hall 1420 Eckles Ave St Paul, MN 55108-6069
612-625-8173

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Next Section: #12 Preserving Wetlands
Home

Preserving Wetlands

Shoreland Best Management Practices

Number 12 of 18 in the Series

What Are Shoreland BMPs?

Best Management Practices (BMPs) are actions you can take to reduce your impact on the environment. BMPs have been described for agriculture, forest management, and construction. This fact sheet describes BMPs you can adopt on your shoreland property to help protect and preserve water quality. In many cases, the best management for shorelands may be retaining the natural characteristics of your property.

Wetland Values

Why are we even concerned about wetlands? Wetlands have many values, some very evident, others less discernable. Many creatures, such as amphibians and migratory birds, depend on wetland fringes that border lakes and streams for nesting and food.

A not-so-obvious benefit of wetlands is flood control. Flood damage in Minnesota is estimated to be at $130,000,000 per year! Wetlands hold storm water and release it gradually, reducing flood damage and improving water quality by filtering nutrients and some pollutants. Other values of wetlands include aesthetic benefits and ground water recharge and discharge.

What Is a Wetland?

The term *wetland* is used to describe a wide variety of wet environments found in Minnesota. A wetland can range from a slight depression that holds water only after spring runoff to a forested swamp with saturated peat soils.

Most people probably would describe a wetland as a small body of open water with cattails on the fringe. Lakes and streams are generally not wetlands, but may be bordered by wetlands. How then do we know what is and what is not a wetland?

Since there are many laws today protecting wetlands, it is important to identify wetlands and define their boundaries. There are some

clues that are helpful in determining wetland or non-wetland areas.

Water usually determines soil color and influences the vegetation found on a site. Therefore, vegetation, soils, and hydrologic (water) factors must all be present in legal identification of a wetland. In undisturbed sites, vegetation is the most easily identifiable criterion and can be useful in wetland observations. Soils and hydrologic factors are more complex and are only briefly described in this fact sheet.

Wetland Vegetation

Wetland areas are usually dominated by vegetation that competes well or survives in wet conditions. In fact, some plants are almost always found in wetlands! These "obligate" wetland plants are good indicators of the existence of a wetland.

If you see the following obligate wetland plants, you are looking at a wetland:

- bog rosemary
- swamp milkweed
- bog birch
- sundew
- cotton-grass
- sand bar willow
- black willow
- skunk-cabbage
- labrador tea
- sphagnum moss
- bulrush
- wild rice
- cattail

The following plants are usually found in wet areas and are fairly good indicators of the presence of a wetland. If any of these are found in the area of interest, further investigation should be done to determine the presence of a wetland:

- red-osier dogwood
- black spruce
- larch (tamarack)
- speckled alder
- northern white cedar
- black ash

Wetland Soils

Soil development is also affected by water. In Minnesota, two major soil types develop in wet conditions. One is organic soils, or peat. The second is mineral soils that do not drain well because of low land, ground water seepage, or a slowly permeable soil layer (e.g., clay, bedrock, or hardpan). These are both called hydric soils.

Organic soils develop in depressions and consist of plant remains that do not decompose because soil is saturated. Organic soils can range in thickness from 2 to 30 feet. Plant parts are often still discernable in many organic (peat) soils.

Mineral soils that are saturated much of the time become dull-colored or gleyed. Gleyed soils are neutral gray and occasionally greenish or bluish gray.

Mineral soils saturated for short periods develop spots or blotches of different colors. These spots are called mottles and can be an indication of hydric or wetland soils.

Wetland Hydrology

Hydrology is the third criterion used in describing a wetland. Hydrology refers to the presence or flow of water through the site. Some wetlands are relatively dry during drier times of the year (i.e., late summer). Often, aerial photographs, personal interviews with neighbors, and visual evidence are used to determine wetland hydrology.

Wetland Delineation

Wetland areas are identified on site using vegetation, soils, and hydrology. The hardest part of defining a wetland is locating the boundary between the wetland and upland. This is called wetland delineation. When any of the above three criteria are no longer present, legally, you are out of a wetland and into the upland area.

Wetland Regulation

Due to the loss of many wetlands, the Federal government and Minnesota have established regulations to protect remaining wetlands. Some local governments also regulate wetlands. Since wetlands themselves are so very complex, it follows that the laws protecting them are also complex.

The Minnesota Legislature passed the Wetland Conservation Act (WCA) in 1991. The goals of the WCA are to protect wetlands (no net loss) and make the process of wetland regulation more equitable. Responsibility for administering WCA lies with local governmental units (LGU) throughout Minnesota.

If you think you have a wetland, the best plan is to avoid impacting it. If you must consider a drain or fill activity near the wetland, follow these steps:

1. Clearly outline the proposed project by drawing a sketch or writing a narrative.

2. Contact your local zoning office or Soil and Water Conservation District (SWCD) for information on required permits.

3. While at the zoning office or SWCD, request a Local-State-Federal Water Resource Project Notification Application Form. Complete this form by describing your proposed activity.

4. Send copies of the form to these agencies: municipal government or county; MN Department of Natural Resources (DNR) Division of Waters area office; U.S. Army Corps of Engineers; SWCD; and Watershed District, if one exists in your area. These agencies should advise you of their jurisdiction or permit requirements within 45 days.

If it is determined by the regulators that you are impacting a wetland, you will need further permits. In Minnesota, permits are provided by these regulating agencies:

- Small wetlands may be regulated by the U.S. Army Corps of Engineers, regarding drainage or the placement of fill; although the Corps may give you an exemption from its regulations to place fill in a wetland, WCA may require replacement.

- Wetlands listed on the Minnesota Protected Waters Inventory are regulated by the DNR; a permit is required for any alteration.

- Wetland impacts may need a water quality permit from the MN Pollution Control Agency (PCA); if a PCA permit is deemed necessary, your application will be automatically forwarded to them.

- LGUs may also have water quality ordinances regulating wetlands.

- All wetlands are covered by regulation through WCA; by law, WCA delegates implementation to LGUs such as cities and counties; under WCA, if you impact a wetland, it may need to be replaced elsewhere unless it is granted an exemption.

Wetland Replacement

If avoidance is not possible, replacement of an impacted wetland area or paying into a "wetland bank" are two alternatives. Both replacement and banking programs are coordinated with your LGU.

Replacing an impacted wetland area with a wetland elsewhere on the landscape is ordinarily accomplished by restoring a wetland that was previously drained. Plugging an existing tile or building a dike is usually required to restore a wetland. Created wetlands are also generally acceptable for wetland replacement. Created wetlands can be achieved by shaping abandoned gravel pits or excavating upland areas.

Wetland banking allows someone proposing a project to buy credits from a "bank" of wetlands that have been restored or created elsewhere. The bank of wetlands must first be established so that credit will be available for withdrawal. Payment for wetland bank credit acres will depend on many factors, including the cost of land in your area and the cost of creating or restoring wetlands.

BMPs for Wetlands

Avoid, minimize, and replace are the watchwords for wetland protection. Avoid wetlands whenever possible. If you must disturb a wetland area, minimize disruption of the soil, vegetation, and hydrology. A final alternative when a wetland is lost is mitigation by replacing it elsewhere.

Even very small wetland areas can help protect water quality. Following simple practices such as these on your property can help maintain the integrity and effectiveness of wetlands:

- Use docks or boardwalks to cross a wetland rather than filling.
- Lay out access paths along high ground, even if it means a longer walk to the shore.
- Preserve existing drainageways and never divert water to or from wetland areas.

Costs

If you cannot avoid altering a wetland on your property, there will be some financial cost. Costs will be incurred for acquiring permits to work in the wetland; there will also be mitigation costs for restoring wetlands:

- **DNR permits for working on protected wetlands or streams depend on the size and scope of the project. Fees are charged.**
- U.S. Army Corps of Engineers has permit fees for individuals and for commercial applications. These fees relate to nationwide permits. Larger projects may require individual permits with increased costs.
- LGUs may have fees in addition to building permits. Fees may be charged for inspecting erosion control near streams or for wetland replacement.
- The landowner may be responsible for delineating the wetland boundary by paying the LGU or by using a consultant.
- Costs for replacing a wetland will vary greatly across Minnesota. Costs may range from $4,000 to $50,000 per acre to buy credits in the wetland bank depending on land acquisition, earthwork, and seeding costs.

Example Project

Let's say you want to build a new garage and driveway. If you think your property includes a wetland that may be affected by the project, your first step is to ask your LGU to check it out. If it determines that the area is in fact a wetland, you should consider altering your plans so the project doesn't impact the wetland. If there is no alternative, you will need to minimize impact and possibly provide wetland replacement.

After acquiring a building permit for the garage from your LGU, complete a project notification form describing the proposed project. The U.S. Army Corps of Engineers may determine that the fill area is small enough to be exempt from their program.

However, WCA regulations will apply. If your driveway is 50 feet long by 15 feet wide, you will impact 750 square feet. The garage fill will require 20 feet by 18 feet or 360 square feet. Total wetland impact is 1,110 square feet. Your LGU will review and approve or reject your proposed wetland replacement plan.

In this example, you would be required to replace the lost wetland. If replacement elsewhere on your property is impossible, there would be an assessed cost per square foot of filling. That money would be paid into a wetland bank and might range from a couple hundred dollars to $1,000 in this example.

Avoiding wetlands altogether is preferable, considering the potential costs of working near a wetland. But if you must impact a wetland, use protective practices described in the other Shoreland BMP fact sheets.

For More Information...

call
county offices:

- Planning and Zoning Department
- Soil and Water Conservation District (SWCD)

regional offices of MN State agencies:

- MN Department of Natural Resources (DNR)
- MN Board of Water and Soil Resources (BWSR)

federal agencies:

- U.S. Army Corps of Engineers (USACoE)

read
Water Permits in Minnesota: What You Need to Know About Federal, State, and Local Permit Requirements. Brochure available at above-mentioned offices.

Minnesota Wetland Conservation Act. Rules available from MN Board of Water Soil Resources, One West Water Street, St. Paul, MN 55107. (612) 297-3767.

Wetland Types and Definitions. Brochure available from the MN Department of Natural Resources, Division of Waters, 500 Lafayette Road, St. Paul, MN 55155-4001. (612) 296-4800.

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Next Section: #13 Managing Crops and Animals Near Shorelands
Home

Managing Crops and Animals Near Shorelands

Shoreland Best Management Practices

Number 13 of 18 in the Series

What Are Shoreland BMPs?

Best Management Practices (BMPs) are actions you can take to reduce your impact on the environment. BMPs have been described for agriculture, forest management, and construction. This fact sheet describes BMPs you can adopt on your shoreland property to help protect and preserve water quality. In many cases, the best management for shorelands may be retaining the natural characteristics of your property.

Crops and Animals Affect Water Quality

Rainfall and snow melt running off farmland or seeping into the ground can carry pollution into lakes and streams. Pollution carried by runoff is called n**onpoint source pollution.** In the past, nonpoint pollution from one farm or field has been easy to ignore as insignificant, but it cannot be ignored any longer because the sum of the thousands of nonpoint pollution sources is the main cause of today's water quality problems. Raising crops and animals can contribute to nonpoint pollution if runoff is not properly treated.

Nonpoint Pollution in NE Minnesota

Northeastern Minnesota is blessed with an abundance of clean water. Our lakes and streams are important to tourism, recreation, and the residents who live or vacation in our area.

Nonpoint source pollution from crops and animals in northern Minnesota results from operations ranging from dairy and beef farms to sled dog kennels and hobbyhorse farms. These operations have the potential to send nutrients and organic matter into surface water. Pasturing animals along streambanks can also cause erosion that adds sediment to lakes and streams. Sheet and rill erosion strip away topsoil from steep fields that are farmed in continuous row crops. The topsoil that ends up in lakes and streams often carries nutrients and pesticides along with it.

Major Agricultural Pollutants

The major nonpoint source pollutants are sediment, nutrients, pesticides, bacteria, and oxygen-demanding substances.

sediment--Eroded soil particles from fields, ditches, and streambanks make water turbid, damaging fish and plant habitat and reducing water's aesthetic appeal; sediment may carry nutrients and heavy metals with it.

nutrients--Fertilizer or animal waste in runoff water delivers nutrients such as phosphorus and nitrogen to lakes and streams, causing excessive algae and weed growth; high nitrate concentrations in drinking water can present a health threat for infants.

pesticides--Agricultural chemicals such as insecticides or herbicides can wash off crops and fields into lakes and streams where they can be toxic to fish and other aquatic life; some pesticides pose a threat to human health if they reach drinking water supplies.

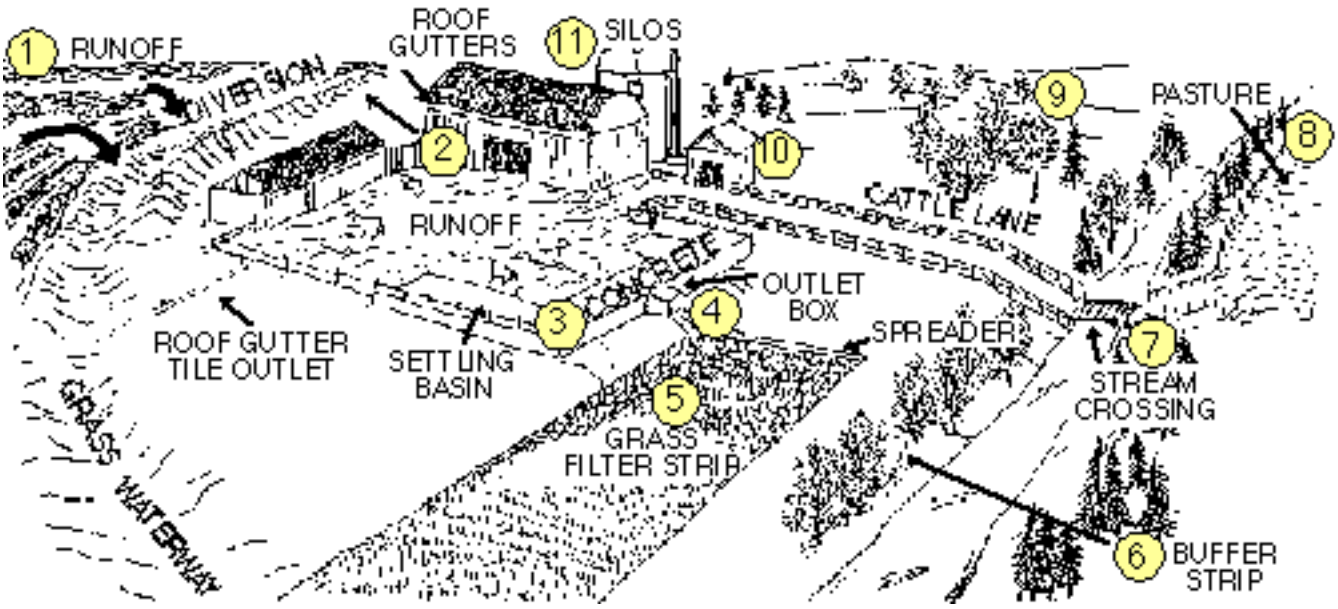
bacteria--Runoff or seepage from feedlots and failing septic systems can carry coliform bacteria into surface and ground water, presenting health risks for drinking or body contact.

oxygen-demanding substances -- Manure, sewage, crop residue, and other decaying organic matter use up oxygen needed by fish.

BMPs to Prevent Nonpoint Source Pollution

Figure 1 illustrates several BMPs designed to minimize the impact of agriculture on nearby lakes and streams.

Figure 1: Several BMPs work together to control agricultural runoff.



(1) CROPPED LAND EROSION CONTROL

Careful management of your tillage practice can lead to a more profitable farm operation, reduce erosion, and improve water quality. These management choices added to your tillage options can enhance your operation. Some tillage options to consider are:

- mulch tillage
- no-till and ridge-till systems
- contouring and grass field borders
- strip cropping

Many operations still use the moldboard plow in a conventional tillage system. Fall plowing heavy soils is the best option, but the ground should be left rough and cloddy. Winter conditions can help improve your soil structure by reducing the clump size. Leaving a rough surface also helps cut down surface erosion. Never disc a fall plowing unless it is early enough to establish a fall cover crop. Discing or making seedbeds in the fall will create the opportunity for significant soil and nutrient loss. Spring plowing is your best option in lighter soils and can reduce overall soil erosion.

Some basic BMP practices such as soil management, crop rotation, nutrient management, and seeding fragile and drainage areas with grass for sediment control can greatly increase the profitability of your long-term farming operations. At the same time, negative impacts to water quality will be lessened.

(2) DIVERSIONS AND ROOF GUTTERS

A diversion is a permanently vegetated ridge constructed at the base of a slope to safely divert the runoff. Gutters simply redirect significant amounts of water away from building foundations or, in this case, an animal barnyard.

(3) & (4) MANURE CATCHMENT

This structure allows for the buildup of manure and channels liquid manure to a single outlet. Liquid manure can be either stored and used to fertilize fields or treated by a grass filter strip. Solid manure within the catchment can be removed during the growing season and applied to the field, adding organic matter and nutrients. There are many designs and methods of storage for managing both solids and liquids.

(5) GRASS FILTER STRIP

This is permanent grass sod that filters potentially harmful nutrients from the manure catchment area. In the growing months, excess nutrients can be utilized by the grasses. This method is enhanced by the addition of a buffer strip between the grass filter strip and the stream.

(6) BUFFER STRIPS

Along lakes and streams, removal of excess nutrients can be enhanced by the use of buffer strips. These consist of natural or planted woody vegetation along the edge of the stream or lake. In this case, red pine and spruce trees were planted. The buffer strip acts to:

- stabilize soil
- trap nutrients by filtering runoff
- shade and cool the water to improve aquatic habitat

The wider the buffer strip, the greater its effectiveness. Planting high value tree species could increase your farm's future value.

(7) STREAM CROSSING

The least expensive method is to make a low-flow gravel crossing allowing livestock access to pasture on the other side of the stream. Fencing can be installed on either side of the crossing as gates to prevent them from walking along the stream.

Culverts and bridges are more costly but might be necessary in sensitive areas. These also can be built to allow machinery to cross.

Fencing animals out of lakes or streams will prevent water pollution. Watering your animals can be done with electric pumps, solar-powered pumps, mechanical nose-pumps, and stock watering ponds. Permits may be needed for work done along streams or lakeshores.

(8) PASTURING LIVESTOCK

Intensive rotational grazing provides better forage for your animals while improving sod and soil coverage between grazing cycles and can reduce overall erosion. Fencing animals from sensitive areas is also important.

(9) UNUSABLE LAND CONVERSION

Highly erodable and marginal fields can be converted to various uses depending on your objectives. Changing marginal cropland or pastures can provide long-term benefits both financially and environmentally. Some conversion possibilities are:

- intercropping trees and pasture
- planting nut trees or high quality timber
- planting Christmas trees
- using native and imported species for wildlife habitat

(10) FUEL, FERTILIZER, & PESTICIDE STORAGE

A small amount of fuel oil, gasoline, diesel, fertilizer, or other chemicals can contaminate a large volume of water. Here are som suggestions:

Fuel Oil, Gasoline, and Diesel

- Locate tanks away from other buildings and water.
- Dike the area around above-ground tanks to contain spills.
- Follow maintenance, safety, and disposal precautions.

Fertilizer and Other Chemicals

- Store only small amounts for short periods.
- Clearly mark containers and check their condition.
- Cover and store on a sealed surface to contain any spills.
- Properly dispose of outdated unused chemicals; contact your county solid waste officer who may accept unused chemicals free of charge.

(11) SILAGE/HAYLAGE

Improperly contained silage can contaminate ground and surface water. Using basic BMPs minimizes risk from these operations:

- Store silage away from any water source.
- Provide impermeable surface soil around the storage.
- Install a seepage collection system.
- Divert clean water away from area.
- Adequately cover silage.

Regulations That Apply

Owners of feedlots with more than ten animal units are required to have a feedlot permit available from the MN Pollution Control Agency (PCA). Check with local zoning authorities for assistance.

Program Assistance for Agricultural BMPs

Programs are available to help individuals cover up to 75% of the cost of applying BMPs. Many animal owners have used this assistance to apply systems such as the ones shown in Figure 1. They find these practices save time and money. Valuable organic fertilizer is stored for use on fields rather than flowing downstream.

The Soil and Water Conservation Districts (SWCD), the MN Board of Water and Soil Resources (BWSR), the University of Minnesota Extension Service, and the U.S. Department of Agriculture (USDA) agencies of the Natural Resources Conservation Service (NRCS) and the Farm Services Administration (FSA) all offer programs to help people plan and adopt BMPs. Through the SWCD, state and federal cost-share programs are available to help people apply these practices. Planning and design assistance is offered at no cost and up to 75% of the installation cost can be covered by cost-share dollars.

For More Information...

call
county offices:

- Soil and Water Conservation District (SWCD)
- University of Minnesota Extension Service

regional offices of MN State agencies:

- MN Pollution Control Agency (PCA)
- MN Department of Agriculture (MDA)

federal agencies:

- Natural Resources Conservation Services (NRCS)

read
Agriculture and Water Quality--Best Management Practices for Minnesota. MN Pollution Control Agency

Running your Feedlot for Farm Economy and Water Resource Protection. MN Pollution Control Agency

Nitrogen Management for Livestock Producers. Beltrami Soil and Water Conservation District.

Protecting Minnesota's Water Resources--Best Management Practices for Atrazine and Nitrogen. MN Department of Agriculture.

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19. Property Management System form
20. Septic System Information form

This series of fact sheets is a cooperative effort of the following agencies:

University of Minnesota Extension Service, University of Minnesota
College of Natural Resources, University of Minnesota
Water Plan Coordinators of the Arrowhead counties
Minnesota Board of Water and Soil Resources
Minnesota Department of Health
Minnesota Department of Natural Resources, Division of Fish and Wildlife,
Division of Waters, Division of Forestry
Minnesota Pollution Control Agency
Minnesota Sea Grant Extension Program
Mississippi Headwaters Board
St. Louis County Health Department, Environmental Services Division
Soil and Water Conservation Districts of the Arrowhead counties
Natural Resources Conservation Services
Environmental Protection Agency
Western Lake Superior Sanitary District

University of Minnesota Extension Service, Distribution Center 20 Coffey Hall 1420 Eckles Ave St Paul, MN 55108-6069
612-625-8173

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Next Section: #14 Reducing the Use of Hazardous Household Products
Home

Reducing the Use of Hazardous Household Products

Shoreland Best Management Practices

Number 14 of 18 in the Series

What Are Shoreland BMPs?

Best Management Practices (BMPs) are actions you can take to reduce your impact on the environment. BMPs have been described for agriculture, forest management, and construction. This fact sheet describes BMPs you can adopt on your shoreland property to help protect and preserve water quality. In many cases, the best management for shorelands may be retaining the natural characteristics of your property.

Minimizing the use of hazardous products and properly handling those that are used can preserve water quality.

Why Are Hazardous Household Products a Problem?

Many common household cleaners and home improvement products contain ingredients that are corrosive, toxic, or flammable. When used improperly or disposed of improperly, these products can become personal health and safety concerns and can also cause problems in the environment, contaminating ground water and soil and eventually reaching surface waters.

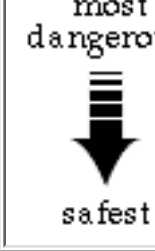
Smart Shopping

Think twice before buying household cleaning and maintenance products. General purpose products may work just as well as products developed for a specific surface or appliance. Some products may contain hazardous ingredients, such as degreasers, which contain petroleum distillates. Purchase nontoxic or less toxic products whenever possible (like water-based rather than solvent-based paints and cleaners). Alternatives to hazardous cleaning products are cheaper and some are equally effective. Do not use pesticides unless you have tried all other alternatives without success. The Western Lake Superior Sanitary District (WLSSD), the MN Pollution Control Agency (PCA), and the University of Minnesota Extension Service can provide information on alternatives to pesticides, cleaning products, and other hazardous products.

If you must use a hazardous product, read the label carefully before purchasing. Make sure the product will do what you want it to. Buy only the amount you need, and use it up. If you can't use it up, give it to someone who can.

Read the Label!

Reading product labels is the best way to get information about that product. Labels contain information about product ingredients, how to store and use safely, and hazards associated with the product. Labels on hazardous products contain **SIGNAL WORDS**, which tell how hazardous the product is to humans. This can give some indication of the potential problems to the environment.

Signal words: what they mean	
	**POISON = highly toxic** **DANGER = extremely flammable, corrosive, or highly toxic** **WARNING = moderate hazard** **CAUTION = mild/moderate hazard** **NO SIGNAL= the product is not hazardous WORD**

Remember, signal words are found on labels of new products. Older products in your home may not contain signal words

The label will also include more specific information about the kind of hazard associated with the product, whether it is flammable, corrosive, reactive, or toxic.

Look for signal words on labels and buy products with no signal words, or with the lowest hazardous level signal word (caution or warning). Some products will indicate whether they are safe for septic systems.

Safe Storage and Disposal

Follow label instructions for use and storage of all household products. Do not store paints and pesticides in unheated buildings where they will freeze and become waste.

Dispose of banned or unusable products properly. Do not pour leftovers down the drain, on the ground, or into a storm sewer. Empty containers, including paint cans (lids should be left off) and aerosol cans, should be placed in the trash. Pesticide containers must be triple-rinsed before disposal. The rinse water should be used for the same purpose the pesticide was used for. The clean, empty containers can then be placed in the trash. In some areas, pesticide containers can be collected to be recycled into new pesticide containers. Hazardous product containers should not be recycled through community recycling programs.

Call your county solid waste office for information about household hazardous waste collections in your area.

Special Concerns About Mercury

Mercury in the environment is a serious public health issue in northern Minnesota. Many household products, including paints, batteries, thermometers, and fluorescent tubes, contain small amounts of mercury. When these products are not disposed of properly, mercury can be released into the environment. Mercury in lakes and rivers can accumulate in fish and be passed on to humans who eat them. Fish consumption advisories have been established by the MN Department of Health. Advisories have been set for certain lakes and fish species.

Product manufacturers are aware of the problems with mercury and many are modifying their products to reduce or remove it. Alkaline batteries sold in Minnesota after January 1, 1996, have no added mercury and can safely be discarded in the trash.

Here are some things you can do to reduce mercury waste:

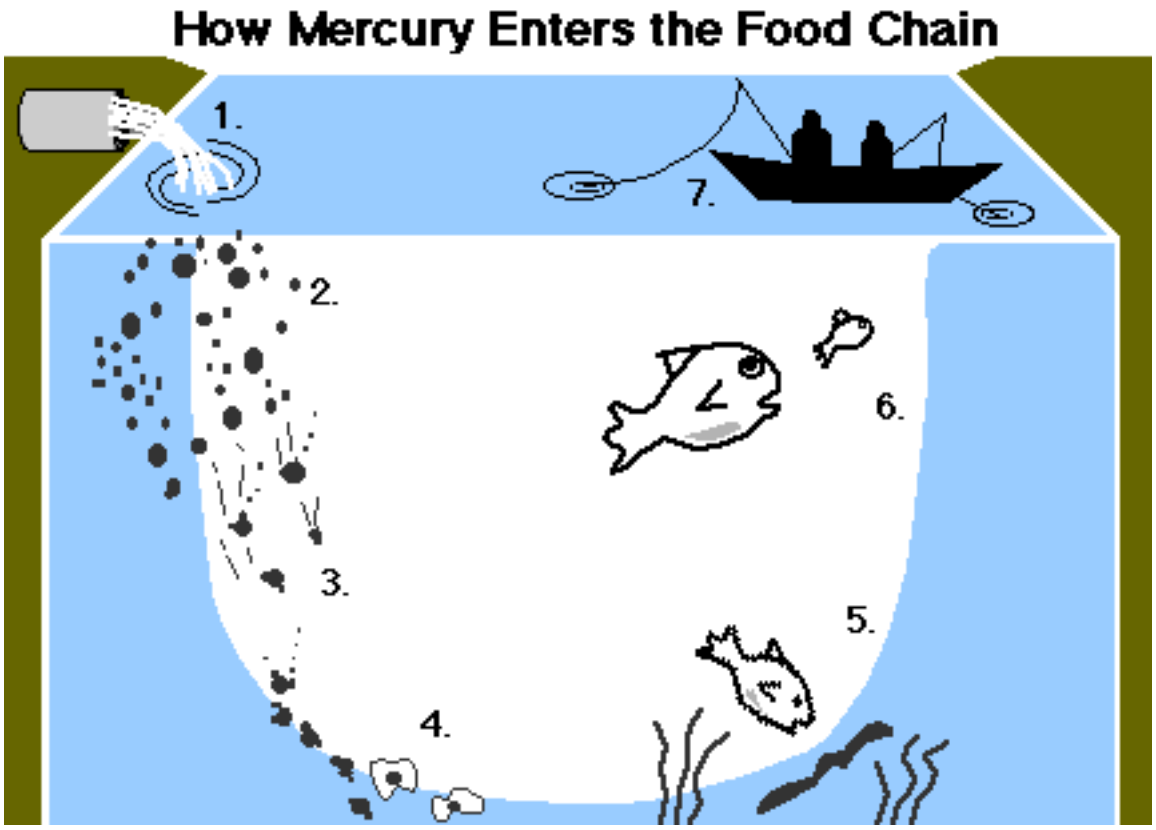
- Look for alternatives; many mercury-free products are available and can replace mercury-containing products.
- Purchase alkaline batteries with no added mercury.
- Use rechargeable nickel-cadmium batteries to reduce overall battery waste by 90%; nickel-cadmium batteries should be saved for a collection and recycling program.
- Button batteries, used in watches, cameras, and calculators, are recyclable. Return these to a retail outlet that collects them, or to a household hazardous waste collection program.
- Fluorescent tubes--contact your county solid waste officer for disposal or handling advice.
- Take paints, thermostats, mercury switches, thermometers, blood pressure cuffs, and other items containing mercury to a household hazardous waste collection program for recycling; do not throw these in the trash.
- Look before you buy items to see if they contain mercury; many products you might not suspect contain mercury (e.g., some red-light tennis shoes).

Regulations That Apply

The Minnesota Legislature prohibits the placement of the following items in municipal solid waste:

- lead-acid batteries (vehicle batteries)
- waste motor oil and oil filters
- rechargeable batteries
- thermostats, thermometers, or electric switches containing mercury

Don't dump antifreeze down your drain. Contact your county solid waste office for information on proper disposal of anti-freeze.



Here's what can happen when mercury is improperly disposed of and mercury compounds enter a river or lake food chain:

1. Mercury enters the river or lake.
2. Mercury attaches to particles of organic material or sediment and falls to the river or lake bottom.
3. Bacteria and other microorganisms consume the mercury and convert it to a fat-soluble form.
4. Bacteria that contain mercury are eaten by small animals on the riverbed and the mercury enters their fatty tissues.
5. Small fish eat the small animals.
6. Larger fish eat the smaller fish and the mercury builds up in their tissues. The older the fish, the more mercury it contains.
7. If a contaminated fish is eaten by a human, the mercury in the fish is absorbed into human fatty tissues. Although mercury will be eliminated from our bodies over time, frequent meals of contaminated fish will cause accumulation of mercury in human tissue to potentially unsafe levels. No method of cleaning or cooking fish will reduce the amount of mercury in its flesh.

For More Information...

call
county offices:

- University of Minnesota Extension Service
- Solid waste office

regional offices of MN State agencies:

- MN Pollution Control Agency (PCA)
- Western Lake Superior Sanitary District
  Garbage Hotline - (218) 722-0761

read

Easy Recipes for Alternatives to Hazardous Household Products. Brochure available from Western Lake Superior Sanitary District.

Household Hazardous Waste Fact Sheets. Available from MN Pollution Control Agency and Western Lake Superior Sanitary District.

Household Hazardous Disposal Guide. Available from MN Pollution Control Agency and Western Lake Superior Sanitary District.

Household Cleaning Products - What About Substitutes. Available from county offices of the University of Minnesota Extension Service. **Mercury: Get Mad Now, Not Later.** A guide to mercury in common household products, proper disposal, and available alternatives. Western Lake Superior Sanitary District.

Household Battery Basics. A guide to battery disposal. Western Lake Superior Sanitary District.

Part of a series. . .

This fact sheet is one of a series designed to assist shoreland property owners in protecting and preserving water quality. The series includes:

1. Understanding Shoreland BMPs
2. Maintaining Your Shoreland Septic System
3. Installing a Shoreland Septic System
4. Ensuring a Safe Water Supply
5. Limiting Impact of Recreation on Water Quality
6. Developing Shoreland Landscapes and Construction Activities
7. Stabilizing Your Shoreline to Prevent Erosion
8. Minimizing Runoff from Shoreland Property
9. Caring for Shoreland Lawns and Gardens
10. Managing Your Shoreland Woodlot
11. Valuing Your Shoreland Trees
12. Preserving Wetlands
13. Managing Crops and Animals Near Shorelands
14. **Reducing the Use of Hazardous Household Products**
15. Preventing the Introduction of Exotic Species
16. Accessing Information to Protect Water Quality
17. Shoreland Stewardship Scorecard
18. Conserving Water
19. Property Management System form
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Division of Waters, Division of Forestry
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Next Section: #15 Preventing the Introduction of Exotic Species
Home

Preventing the Introduction of Exotic Species

Shoreland Best Management Practices

Number 15 of 18 in the Series

What Are Shoreland BMPs?

Best Management Practices (BMPs) are actions you can take to reduce your impact on the environment. BMPs have been described for agriculture, forest management, and construction. This fact sheet describes BMPs you can adopt on your shoreland property to help protect and preserve water quality. In many cases, the best management for shorelands may be retaining the natural characteristics of your property.

Why Are Exotic Species a Problem?

Today, "exotics"-the term for organisms that have been introduced into areas where they are not native-are considered to be among the most severe, worldwide agents of habitat alteration and degradation. They are a major cause in the continuing loss of biological diversity throughout the world. They have caused extinction of some native species. Exotic species can be thought of as "biological pollutants."

Moving plants or animals, accidentally or intentionally, from one habitat into another where they have never been before is risky business. In the absence of predators, parasites, pathogens, and competitors from their native habitat, species introduced under favorable conditions will often overrun their new home and crowd out important native species. Once established, exotics can rarely be eliminated.

To Protect Your Lake from Exotics

There are many BMPs you can adopt as an individual to minimize the spread of aquatic exotic plants and animals:

- **Learn** what these organisms look like and monitor for their presence. If you suspect a new infestation of an exotic plant or animal, report it to Minnesota Sea Grant Extension in Duluth, (218) 726-8712, or the MN Department of Natural Resources (DNR) Exotic Species Program in St. Paul, 1-800-766-6000 or (612) 296-2835, or a local DNR fishery office.

- **Consult** the DNR for recommendations and permits before you try to control or eradicate an exotic pest. Remember, exotic species thrive on disturbance. Do-it-yourself control treatments often make matters worse and can harm native species.
- **Organize** educational campaigns and committees. Contact Sea Grant if you would like to become a volunteer zebra mussel monitor. Your lake association or civic group could also undertake an educational campaign in your area.
- **Conduct** public awareness events at water accesses (at DNR accesses, notify the DNR before planning an activity).
- **Don't transport water, animals, or plants from one lake or river to another.** In Minnesota, it is illegal to transport surface water, aquatic plants, or exotic species.
- **Remove** plants and animals from your boat, trailer, and accessory equipment (anchors, centerboards, trailer hitch, wheels, rollers, cables, and axles) before leaving the water access area.
- **Drain** your livewell, bait bucket, and bilge water before leaving the water access area.
- **Empty** your bait bucket on land, never into the water. Never dip your bait bucket into one lake if it has water in it from another. And, never dump live bait from one water body into another.
- **Wash** your boat, tackle, downrigger cables, and trailer with hot water. Flush hot water (at least 104 F) through your motor's cooling system and other boat parts that normally get wet. If possible, spray your boat, trailer, and accessories with hot, high pressure water. Let everything dry for five days before transporting your boat to another body of water (both hot water and drying will kill zebra mussels).

Species of Concern

Aquatic exotic species that are causing particular concern in Minnesota today are shown below. Other exotics of concern are the common carp, sea lamprey, rusty crayfish, white perch, flowering rush, and curly leaf pondweed. Species are not drawn in correct proportion to each other.

Don Luce
Bell Museaum of Natural History

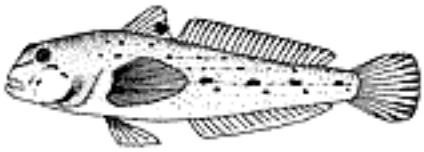
Zebra Mussel *(Dreissena polymorpha)*
Size: 1/4 to 2 inches

Eurasian Water Milfoil
(Myriophyllum spicatum)
Leaflet: 1/2 life size

MN DNR

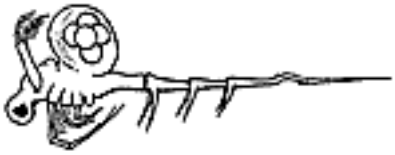
M. Baradlai

Eurasian Ruffe *(Gymnocephalus cernuus)*
Size: 2 to 5 inches



Donna Francis

Round Goby *(Neogobius melanostomus)*
SizeL 2 to 12 inches



Don Luce
Bell Museum of Natural History

Spiny Water Flea *(Bythotrephes cederstroemi)*
Size: 3/8 inch

Purple Loosestrife
(Lythrum salicaria)
Size: 2 to 7 feet

MN DNR

For More Information...

call
regional offices of MN State agencies:

- Minnesota Sea Grant's Exotic Species Information Center,
  2305 East 5th Street, Duluth, MN 55812-1445; (218) 726-8712
- MN Department of Natural Resources (DNR), Exotic Species Program

read

Zebra Mussel WATCH Citizen Network Guide. Early Detection of Adult Zebra Mussels. Available from Sea Grant.

A Field Guide to Aquatic Exotic Plants and Animals. Available from DNR or Sea Grant.

Exotic Species Information. A resource list of publications and videos. Available from Sea Grant.

Mussel Menace! Zebra Mussels and You. Leader training manual, videotape, and slide-audiotape set. Available from Sea Grant.

Clean Boats, Clean Waters: Exotic Species Handbook. Available from DNR.

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Next Section: #16 Accessing Information to Protect Water Quality
Home

Accessing Information to Protect Water Quality

Shoreland Best Management Practices

Number 16 of 18 in the Series

What Are Shoreland BMPs?

Best Management Practices (BMPs) are actions you can take to reduce your impact on the environment. BMPs have been described for agriculture, forest management, and construction. This fact sheet describes BMPs you can adopt on your shoreland property to help protect and preserve water quality. In many cases, the best management for shorelands may be retaining the natural characteristics of your property.

Information and Assistance Available

Information and assistance are available from many public agencies and organizations that work in partnership with shoreland property owners, lake associations, public officials, and private enterprises to protect water quality. This fact sheet is intended to direct you to the appropriate source of information as you undertake protection strategies or adopt BMPs on your shoreland property.

Assistance may be in the form of:

- information and education on water quality issues
- technical and planning consultation for your parcel of property
- issuing permits, requirements, guidelines for developing your property
- enforcement of regulations affecting the water quality of lakes and rivers
- cost-share assistance and project funding for individual projects
- testing and monitoring of water

What to Expect When Contacting an Agency

- The agency may have office hours between 8:00 a.m. and 4:30 p.m., Monday through Friday.
- Some may require fee-for-service; others may be available at no direct cost to the user.
- The person you want to speak with may be out of the office, as that is the nature of his or her work - to be out meeting with people or conducting site visits or inspections. It is best to call ahead for an appointment if you want to meet with the person. If you don't reach him or her by phone, leave your name, phone number, and a specific message.
- On some issues you may be given several alternatives to help you make a decision. You may also need to be referred to a more appropriate agency.

Questions You May Have

Listed below are some common questions people have and which agency would be the most appropriate to contact. Locations, addresses, and telephone numbers are listed later in this fact sheet.

Is my water supply safe for an infant to drink?

MN Department of Health or County Health Department

How do we keep exotic species out of our lake?

MN Sea Grant Extension Program or MN Department of Natural Resources - Exotic Species Program

Do I need a permit to install a new dock?

MN Department of Natural Resources - Division of Waters

How can I keep the lake from washing away my yard?

Soil and Water Conservation District or MN Board of Water and Soil Resources or county planning and zoning department

How many fish can my family eat without getting mercury poisoning?

MN Department of Health or MN Sea Grant Extension Program

How do I know if I have a wetland on my property?

Soil and Water Conservation District or MN Board of Water and Soil Resources

How can I get rid of weeds in my swimming area?

MN Department of Natural Resources - Section of Fisheries

Where can I buy 100 trees to plant on my property?

Soil and Water Conservation District

Where can I get information on building a compost heap?

University of Minnesota Extension Service or Western Lake Superior Sanitary District

What can I do about the beaver dams flooding my property?

MN Department of Natural Resources - Section of Wildlife

How can I make sure my septic system keeps working?

County Health Department or University of Minnesota Extension Service

Who controls the water levels in our reservoir lake or river?

MN Department of Natural Resources - Division of Waters or local power utility

What are the guidelines and regulations for paving my driveway?

Soil and Water Conservation District or county Planning and Zoning department

To whom do I report a violation such as dumping into a lake or river?

MN Pollution Control Agency

The following list is categorized by the level at which you might best access information and assistance - local, state, or federal. A brief description of services is given, as well as how to access either by telephone or in writing.

Local Resources

Water Plan Coordinators

Your county water plan coordinator is a good place to start because she or he has knowledge of, and access to, many other resources. The Water Management Act of 1986 (Minnesota Statutes, Chapter 110B) encouraged counties to develop and implement comprehensive local water management plans. In Minnesota, all non-metro counties have completed and adopted water plans, and are now in the process of implementation. The responsibility for implementation varies by county. In some counties, the Soil and Water Conservation District (SWCD) has the primary responsibility, and in others it is the responsibility of the county planning, zoning, or environmental services.

Access: Call your county SWCD or University of Minnesota Extension Service office for help identifying your county water plan coordinator.

Soil and Water Conservation Districts

SWCDs were formed nationwide to conserve soil and water resources, and are local units of government within each county. Their objective is the control and prevention of soil erosion and water pollution. This is carried out through:

- technical and planning assistance to landowners on conservation practices
- cost-share assistance (50 to 75%) to landowners to install erosion control practices, such as on roadsides and shorelines, or control barnyard runoff
- printed information and presentations to landowners and groups
- forest stewardship assistance to landowners and communities (this may vary by county)
- service of selling trees (this may vary by county)

Access: Look in the phone book under county office listings.

University of Minnesota Extension Service

University of Minnesota Extension Service provides education on protecting our water resources with an emphasis on reaching people with practical, understandable methods. These include:

- displays, publications, demonstrations, AV materials
- workshops, presentations to groups (may vary by county)
- coordination with other agencies to address water quality issues

- training on organizational and group process skills to assist groups in reaching their goals

INFO-U is a 24-hour service that gives you telephone access to University of Minnesota research-based information. Recorded information is available on environmental issues, safe drinking water, yard waste disposal, lawns, shrubs, and trees. Contact your county extension office to receive a brochure listing the topics and how to use this system. Web address: http://www.extension.umn.edu/info-u

The Minnesota Waterline, a toll free number with knowledgeable staff to answer your questions, is 1-800-455-4526.

Minnesota Sea Grant Extension Program, University of Minnesota

Lake Superior and Minnesota water resources are the focus of research and educational programs of the Minnesota Sea Grant Extension Program located on the Duluth and St. Paul campuses of the University of Minnesota. Presentations, workshops, publications, and audiovisual materials are available on research findings and expertise in these areas:

- fisheries
- aquaculture
- recreation and tourism
- water quality
- economic development
- coastal management
- aquatic exotic species

Access: Minnesota Sea Grant Extension Program
208 Washburn Hall
University of Minnesota Duluth
2305 East Fifth Street
Duluth, MN 55812-1445
(218) 726-8106
www.d.umn.edu/seagr/

Exotic Species Information Center
(address same as above)
(218) 726-8712

County Health, Zoning, Planning, and Solid Waste Departments

Health/environmental services departments enforce public health regulations and assist in areas that affect water resources and shoreland property owners. Many functions deal with individual septic systems. The county health department:

- issues permits and inspects the installation of septic systems
- inspects septic systems for observable failure during point-of-sale inspections
- licenses and monitors septic system contractors
- licenses and inspects septic tank pumpers and on-land septic disposal sites
- tests water from private wells for safety and at the time of property transactions
- tests surface water at public beaches for fecal contamination

The zoning department regulates landuse to encourage the most appropriate use of land, while preserving economic and environmental values. It also administers and enforces the zoning ordinances, except in incorporated cities and townships that have their own zoning administration.

County governments carry out solid waste programs including management of landfills and transfer stations, collection of household hazardous waste, and coordination of recycling activities. Access: Look in your phone book under county office listings for health,

zoning, planning, or solid waste departments.

Lake Associations

Lake property owner associations have been formed for many lakes in Minnesota. The purpose of a lake association can vary. They may be organized mainly for social and security reasons, around a specific issue such as weed control, for political purposes, or to encourage activities such as water quality testing or placement of navigational buoys. Individual lake associations may join together to form county Coalitions of Lake Associations (COLAs).

Access: Contact your county water plan coordinator to find out about lake associations in your area. For assistance in organizing a lake association, contact your county water plan coordinator, county office of the University of Minnesota Extension Service, or the Minnesota Lakes Association at:

Minnesota Lakes Association

P.O. Box 321

Brainerd, MN 56401-0321

1-800-515-5253

(218) 825-1909

www.mnlakesassn.org

State Resources

MN Board of Water and Soil Resources (BWSR)

The BWSR works with local units of government to help them develop local resource management capabilities. Some of the areas it is involved in are wetlands, shoreland erosion, water quality education, feedlots, nonpoint source pollution and local water planning. Publications, slide presentations, and technical assistance are available. BWSR has regional offices in Bemidji, Brainerd, Duluth, Marshall, New Ulm, Rochester, and St. Paul.

Access: Look under the state government offices in your phone book or contact:

Board of Water and Soil Resources

One West Water Street, Suite 200

St. Paul, MN 55107

(612) 296-3767

MN Department of Health (MDH)

Within the MDH, the Division of Environmental Health has these responsibilities related to water resources and shoreland property owners:

- regulating the construction, repair, and sealing of wells and borings
- licensing well contractors and well pump installers
- requiring well disclosure prior to property transfer
- licensing and regulating plumbers
- establishing health risk limits for contaminants in water
- establishing fish consumption advisories based on health risk limits

MDH issues permits for well construction and well sealing notification; a well may not be constructed or sealed until after it has received the appropriate notification. Publications and videos are available on well construction and abandonment, well disinfection, water quality, ground water contamination, water treatment devices, and well disclosure.

MN Department of Natural Resources (DNR)

Within the DNR, three divisions deal most directly with water resources Waters, Fish and Wildlife, and Forestry. The DNR has regional offices in Bemidji, Brainerd, Grand Rapids, New Ulm, Rochester, and St. Paul. The DNR has a Minnesota toll-free number to provide you with information on materials available and DNR facilities, services, and regulations: 1-800-766-6000 (TTD 1-800-657-3929).

DNR - Division of Waters:

The Division of Waters is a regulatory division that provides technical and educational assistance to local government units and citizens. It has regulatory jurisdiction over the alteration of protected lakes, rivers, and wetlands, and water use. Shoreland property owners need to contact the division prior to altering lakes, rivers, or wetlands below the ordinary high water level to obtain information and to determine if a permit is needed. Programs include:

- alteration of lakes, rivers, and wetlands
- water use, withdrawal of surface and ground water
- dam safety, water level control structures
- landuse management programs such as shoreland, floodplain, and wild and scenic rivers
- information on streamflow, lake levels, precipitation, and ground water levels
- publications, slide presentations, and displays
- advice on local landuse ordinances
- hydrologic data to provide information for decision making
- grant programs

Access: Contact Area Hydrologists in regional or area offices.

DNR - Division of Fish and Wildlife - Section of Fisheries/Section of Wildlife:

The Section of Fisheries works in the area of fish management and water quality as it relates to fish and other aquatic life. It issues permits on aquatic plant management and fish stocking and transportation. Publications are also available.

Access: Contact the nearest regional office.

The Section of Wildlife can provide information on how to improve your wetlands for wildlife and the value of wetlands for wildlife. It can also give alternatives on the control of beavers and exotic species.

Access: Contact the nearest regional office.

DNR - Division of Forestry:

The Division of Forestry provides service to landowners on tree planting and care. Although it usually deals with large stands of trees on an ecosystem basis, staff can give advice about shade tree management on smaller land parcels. This division issues burning and timber harvest permits.

Access: Contact the nearest regional office.

MN Pollution Control Agency (PCA)

The PCA regulates what goes into our water and conducts water quality studies through its three divisions of Air Quality, Water Quality, and Ground Water/Solid Waste. PCA issues permits that deal with the discharge of pollutants into the air, water, or land. It also carries out the enforcement of local, state, and federal regulations that deal with pollution control.

The PCA has regional offices in Brainerd, Detroit Lakes, Duluth, Marshall, Rochester, and St. Paul.

Printed materials are available, as well as speakers on specific topics.

Access: Contact the nearest regional office or the PCA state information office at (612) 296-6300.

Federal Resources

Natural Resources Conservation Service (NRCS), U.S. Department of Agriculture

The NRCS is a conservation-oriented natural resource federal agency. NRCS offices are often co-located with SWCD offices and the two work together closely. They can:

- help property owners prepare conservation plans to manage soils, water, plant, and animal resources
- conduct soil surveys
- assist local groups in planning and installing small watershed projects, such as watershed protection, erosion and sediment control, agricultural water management
- collect data to be used by organizations and individuals to make landuse decisions
- provide technical assistance to implement the Conservation Reserve Program, Sodbuster, Swampbuster, and conservation compliance provisions

Access: Contact the field office in most counties, listed in the phone book under U.S. Govern-ment, USDA.

U.S. Environmental Protection Agency (EPA) - Environmental Research Laboratory

Minnesota is home to EPA s only Federal Freshwater Research Laboratory, located on Lake Superior in Duluth. This laboratory is the nationwide resource center of expertise on freshwater (lakes and streams) aquatic ecology and toxicology. Scientific publications on water pollution are available.

Access:

EPA Environmental
Research Laboratory
6201 Congdon Boulevard
Duluth, MN 55804

(218) 720-5733

Part of a series. . .

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16. **Accessing Information to Protect Water Quality**
17. Shoreland Stewardship Scorecard
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Next Section: #17 Shoreland Stewardship Scorecard
Home

UNIVERSITY OF MINNESOTA Extension SERVICE

Shoreland Stewardship Scorecard

Shoreland Best Management Practices

Number 17 of 18 in the Series

What Are Shoreland BMPs?

Best Management Practices (BMPs) are actions you can take to reduce your impact on the environment. BMPs have been described for agriculture, forest management, and construction. This fact sheet describes BMPs you can adopt on your shoreland property to help protect and preserve water quality. In many cases, the best management for shorelands may be retaining the natural characteristics of your property.

This fact sheet summarizes BMPs from the entire series. Check off practices as YOU adopt them and measure your success as a shoreland steward.

Practices to Adopt

Maintaining Your Septic System/Conserving Water

_____ Repair leaking pipes and dripping faucets

_____ Install low-flow showerheads/low-flush toilets

_____ Eliminate use of garbage disposal

_____ Wash only full loads-dishes and laundry

_____ Switch to liquid laundry detergent

_____ Pump septic tank through manhole instead of inspection port

_____ Pump septic tank annually

_____ Other, what?_____

Ensure Safe Drinking Water Supply

_____ Test water every two years

_____ Disinfect well and plumbing after maintenance

_____ Identify location, type, and depth of well

_____ Properly seal well that is no longer used

_____ Evaluate the condition of wellhead and improve if needed

_____ Other, what?_____

Limiting Recreational Impact on Water Quality

_____ Stop washing dishes, laundry, self in lake while camping

_____ Move fuel from nearshore location to secure site away from shore

_____ Properly dispose of wastewater when boating and ice fishing

_____ Eliminate greywater lines from sauna to lake or river

_____ Realign dock to permit better water flow; minimize shoreline alteration when installing new dock

_____ Observe dates regulating off-road traffic in the spring

_____ Make a conscious effort to avoid erosion problems from off-road recreation

_____ Contact DNR before trying to remove aquatic vegetation

_____ Quit using soap or shampoo in the water

_____ Inspect boats and equipment before taking them to another water body

_____ Preserve aquatic vegetation in developing new property

_____ Develop a beach site with minimal shoreline alteration

_____ Adjust speed to reduce wake and minimize wave damage to shore

_____ Consider existing natural characteristics of property before designing shoreland development

_____ Other, what?_____

Developing Shoreland Landscapes/Construction

_____ Develop a site plan before beginning construction or landscaping

_____ Develop a site plan to improve the landscape

_____ Re-establish or preserve a filter strip along the shore

_____ Minimize disturbance of plants and trees during construction

_____ Plant native trees and shrubs

_____ Carefully plan new roads and accesses

_____ Install "water bars" to slow runoff along roads and paths

_____ Protect trees during construction

_____ Plan construction in stages to minimize runoff and erosion of uncovered soil

_____ Other, what?_____

Stabilizing Shoreline to Prevent Erosion

_____ Retain moisture-absorbing vegetation along bluffs

_____ Move heavy loads back away from bluffs

_____ Retain ice ridges along the shore

_____ Install erosion control structure; improve shoreline protection

_____ Divert water away from top of bluff

_____ Other, what?_____

Minimizing Runoff from Shoreland Property

_____ Reduce paved or covered areas

_____ Use gravel instead of paving driveways

_____ Limit clearing and grading on slopes

_____ Locate new driveways, walks, and footpaths away from slopes

_____ Relocate footpaths and walkways to less steep areas; install steps on paths cutting up and down hillsides

_____ Use erosion control structures during construction and landscaping

_____ Install rain gutters along edge of rooftops and keep them free of debris to drain properly

_____ Keep rooftops free of snow and ice buildup

_____ Replace solid concrete patios with wood or paving stones to minimize runoff

_____ Sweep driveways and walks instead of washing them down with water

_____ Other, what?_____

Caring for Lawns and Gardens

_____ Test soil to determine plant nutrients needed before applying fertilizer to lawn and garden

_____ Use compost or manure in recommended amounts instead of chemical fertilizer

_____ Use extra caution when spreading fertilizer near surface water; do not spread within 75 feet of water or wetland

_____ Retain a natural vegetation filter strip of grass, trees, and shrubs next to shoreline

_____ Obtain proper identification of pest before applying any pesticide (for weeds, insects, mold, etc.)

_____ Follow recommendations for low-maintenance guidelines in fertilizing grass

_____ Use slow-release form of nitrogen in fertilizing

_____ Locate new garden or relocate old garden on level site, and avoid planting in septic drainfield

_____ Prevent yard waste from reaching the water

_____ Other, what?_____

Managing Your Shoreland Woodlot

_____ Establish filter strip between shoreline and area being managed

_____ Develop a plan, including a detailed map, before beginning management activity

_____ Install roads in locations with lowest slope

_____ Use barriers to prevent erosion during road building; mulch and seed exposed soil

_____ Contact DNR Division of Waters to see if a protected water permit is needed

_____ Use properly sized culverts or bridges to cross stream at 90° angle

_____ Design roads for maximum cross drainage to minimize downroad flow

_____ Close all temporary roads to prevent unwanted use

_____ Locate landings outside filter strips and away from low, poorly drained areas

_____ Time harvest appropriately

_____ Properly dispose of slash away from wetland areas

_____ Do not conduct mechanical site preparation during periods of saturated soil conditions

_____ Deposit residue from mechanical site preparation in upland areas

_____ Create slash piles that do not interfere with natural drainage

_____ Other, what?_____

Valuing Your Shoreland Trees

_____ Plan development of property to save existing vegetation

_____ Use filter strips adjacent to shoreline to minimize runoff to water

_____ Contact local zoning office for filter strip requirements before developing new area

_____ Contact local zoning office for information on thinning trees in shoreland area

_____ Protect existing trees during site development

_____ Check for and treat pests and diseases on trees and shrubs

_____ Water trees during times of low rainfall or after planting

_____ Use a variety of native species in new plantings

_____ Rake leaves and vegetative debris away from the water

_____ Use lake water to water trees, shrubs, and lawn

_____ Other, what?_____

Preserving Wetlands

_____ Preserve existing drainageways during land alterations

_____ Avoid filling or draining any wetlands during land alteration

_____ Avoid diverting storm water to any wetland

_____ Do not use wetland as a dumping ground

_____ Establish boardwalks to avoid compacting wetland areas

_____ Preserve unique wetland vegetation for habitat

_____ Correctly identify a wetland area before beginning land alteration

_____ Contact the SWCD for assistance in determining wetland boundaries

_____ Other, what?_____

Managing Crops and Animals Near Shorelands

_____ Follow pesticide labels when used

_____ Prevent runoff from feedlots or manure storage from entering surface waters

_____ Divert water from manure storage or feedlot away from shoreland

_____ Control soil erosion by adopting crop rotation or seeding critical areas to grass

Reducing the Use of Hazardous Household Products

_____ Change buying habits to purchase fewer products that might become hazardous household waste

_____ Learn what the safety information and signal words on product labels mean

_____ Carefully follow label instructions for use and storage of all household products

_____ Properly dispose of banned or unusable pesticides

_____ Move paints and pesticides from unheated buildings to an area where they will not freeze and become waste

_____ Recycle used motor oil and dispose of antifreeze and other automotive fluids properly

_____ Recycle button batteries

_____ Purchase alkaline or rechargeable batteries

_____ Take hazardous household products such as paint, solvents, thermometers, and other mercury-containing products to a designated collection site

Preventing Introduction of Exotics

_____ Learn to identify exotic species

_____ Learn whom to contact if exotic species are found or suspected

_____ Help educate other people about preventing the spread of exotics

_____ Always drain livewells, bilge water, and transom wells before leaving a boat landing

_____ Always empty bait buckets on land, never in the water

_____ Never dip bait buckets into a lake when they contain water from another lake

_____ Never dump live fish from one water body into another

_____ Wash boat, tackle, downriggers, and trailer with hot water between uses on different water bodies

_____ Flush hot water through motor's cooling system and other boat parts that come in contact with lake water between uses

_____ Let boat and equipment dry for five days before transporting boat to another body of water

_____ Other, what?_____

Accessing Water Quality Information

_____ Call a state agency's regional office for technical assistance

_____ Contact a local agency to get questions answered or to apply for a permit

How good a shoreland steward are YOU?

If you checked off	You're...
More than 80 BMPs	Awesome
60-80 BMPs	Doing a great job
40-59 BMPs	Well on your way
25-39 BMPs	Starting off right
11-24 BMPs	Behind the times
1-10 BMPs	Get Started Today!

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Next Section: #18 Conserving Water
Home

Conserving Water

Shoreland Best Management Practices

Number 18 of 18 in the Series

What Are Shoreland BMPs?

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Why Is Conserving Water Important?

Reducing our use of water will decrease water pollution, increase energy savings, and create more efficient use of our water resources. Too much water in an on-site sewage treatment system can flush untreated material through before organisms have a chance to break it down. If untreated material gets to the drainfield, the material can plug up the soil within the drainfield and shorten the life of the septic system. Sending too much water down the drain can also cause systems to "blow out," allowing untreated material to flow out onto the ground. If this occurs, the system needs to be dug up and repaired. Failing septic systems can:

- contaminate drinking wells
- cause health risks such as hepatitis or dysentery
- cause chemical pollution from household cleaning products
- contribute excess nutrients to ground water, lakes, or streams

Conserving water in rural areas will increase the life of existing septic systems. Conserving water within a municipal water system will reduce household expenses, increase treatment plant efficiency, and reduce the amount of electricity and chemicals needed to treat

wastewater. In both situations, conserving water protects water quality through improved wastewater treatment.

How Much Water Do We Use?

A typical household of four uses 260 gallons of water each day. Much of this water is used in the bathroom. Toilets use 40% of the total, showers/baths and faucets use 35%. By contrast, 15% is used in the kitchen, and 10% for washing clothes.

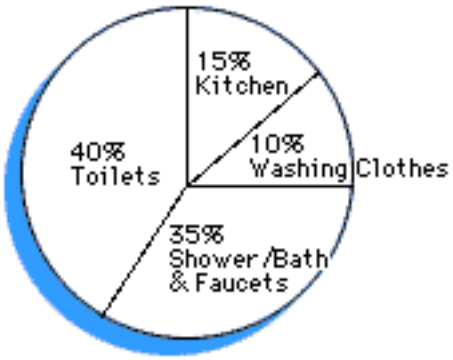

Table 1: Typical water use (in gallons). Calculate how much your family typically uses in one week.

ACTION	TYPICAL USE	CONSERVATIVE USE	ULTRA-CONS. USE	? YOUR USE ?
Toilet-flushing	6 (old standard)	1.5-3 (low-flow)	Composting toilet	
Tub bath	30 (1/2 filled)	15 (1/4 filled)	Sponge bath	
Shower	10 min: 50 (5 gal/min) 3 min: 15 (5 gal/min)	25 (2.5 gal/min) 7.5 (2.5 gal/min)	Camper style (3 gal)	
Laundry - full load	Top loading: 50-60 (older models) Front loading: 33 (older models) ***(Suds-saver reuses most of the "wash fill" for the 2nd load)***	40 (newer models) 17-28 (newer models)	Laundromat	
Dishwashing	Machine: 12-15 (old-reg cycle) ***(Pre-rinsing before loading adds 3-5 gal)*** Hand: 16 (faucet rinse)	6-9 (new-reg cycle) 6 (basin rinse)		
Teeth-brushing	2 (faucet running)	1/8 (wet brush, brief rinse)		
Hand-washing	2 (faucet running)	1 (basin; brief rinse)		
Shaving	3-5 (faucet running)	1 (basin; brief rinse)		

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Use less water by using common sense, making lifestyle choices, and installing new low-flow products!

Bathroom

the toilet

To significantly reduce water use, replace your old 5 gallon per flush toilet with a new 1.5 or 1.6 gallon per flush toilet. This is the most effective way to decrease the amount of water used in the bathroom.

As an alternative to installing a new toilet, retrofit your old one with a water-saving device. Displacing volume in the tank means that less water is used for each flush. A clean, sealed plastic container filled with sand will work.

- Don't use a brick-pieces of decaying brick can get under the rubber flapper and cause leaks.
- Leaky toilets can waste a lot of water. Replace the rubber flapper in the tank every two to three years. If black coloring comes off on your hand when you touch the flapper, it's time to replace it!
- Be careful that your displacement device still allows a complete flush. With old tanks, less volume may mean less than a total flush.
- Flushing twice doesn't save water!

Bathroom

the tub/shower

To save water while showering, install a low-flow showerhead. New designs range from 1.5 to 2.5 gallons per minute and still provide a powerful stream of water. Some models allow you to temporarily turn off the water without changing the water temperature.

To install a new showerhead, simply unscrew the old one and screw on the new one using Teflon tape to seal the threads. Be careful not to unscrew plumbing fixtures inside the wall!

Other lifestyle choices will help save water while bathing:

- Take short showers instead of baths.
- Take shorter showers or shower less often.
- Don't run the water full force when showering.
- Turn the shower off while soaping or shaving.
- Keep the water shallow when using the tub.

Baths can sometimes actually save water compared with long showers. A showerhead that delivers 5 gallons per minute means that a shower longer than 8 minutes uses more water than a typical full bathtub (40 gallons).

Kitchen

Saving water in the kitchen is easy with a low-flow faucet aerator and a few new habits. When selecting a low-flow faucet, keep in mind that flows less than 2.5 gallons per minute are inconvenient at a kitchen sink when you are trying to fill pots or wash dishes. A dual flow faucet is the best choice for kitchens.

Other BMPs can save water in the kitchen:

- Repair leaky faucets.
- Wash only FULL loads in the dishwasher and select a low-water-use model.
- Hand-wash dishes in a basin instead of under running water.
- Store a container of water in the refrigerator to avoid running water each time you want a cold drink.

Utility Room-*laundry*

Front-loading washing machines use 40% less water than top loaders. However, front loaders are not common; they may be more expensive than top loaders and may be difficult to find.

Another option is to purchase a top loader with a suds-saver. Suds-savers reuse most of the sudsy wash water for a second load. By beginning with the cleanest clothes and reusing wash water for at least one load, suds-savers can cut water use by 30-50%.

Even when using a standard top-loading machine, there are habits that will save water:

- Wash only FULL loads.
- When smaller loads are necessary, use partial load settings.

water treatment devices

If your water softener backflush line is connected to the septic system, recharge your softener as infrequently as possible to reduce water use and avoid overloading the septic system. If you want automatic recharge on your conditioner, select a model that recharges after a certain amount of water passes through rather than one that recharges at regular time intervals. That way if you're away or your water usage drops, the frequency of recharge will also drop.

If you have a point-of-use water treatment device, be sure it has a shut-off valve so the system doesn't run continuously when the reservoir is already full. Reverse osmosis systems sometimes reject 8 gallons for every 1 gallon filtered. This

rejected water can put too much water into your septic system and chemically destroy the bacterial action.

Saving Water Saves Energy and Money

By conserving water, you will save money. Using a low-flow showerhead will annually save you an estimated $10 per person in waterheating savings alone. Savings can be realized from water and wastewater service fees, electric city bills, and longevity of your pumps and switches. The largest savings in the rural setting is your septic system performance and longevity.

Regulations That Apply

The 1992 Federal Energy Policy Act established standards for water-efficient plumbing fixtures including toilets, urinals, showerheads, and faucets manufactured after January 1994. This includes installing 1.5 or 1.6 gallon flush toilets, low-flow showerheads, and other watersaving devices in new constructions and remodeling projects.

Minnesota law requires municipalities with public water supplies serving more than 1,000 people to develop conservation plans. By January 1, 1996, municipalities must have developed a water emergency and conservation plan. Before requesting approvals to construct new wells or increase their annual appropriation, communities must implement demand reduction measures designed to decrease water use.

For More Information...

- The Minnesota Water Line is available to answer your questions on water issues.
  1-800-455-4526
- Small Flows Clearing House, West Virginia
  1-800-624-8301
- Water Wiser for water efficiency, Colorado Internet Web Site: http://www.waterwiser.org or e-mail: bewiser@waterwiser.org
  1-800-559-9855

read

Septic System Owner's Guide. PC-6583 - at your University of Minnesota Extension Service Office

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Next Section: Property Management System Form
Home

PROPERTY MANAGEMENT SYSTEM FORM

Name of lake or river:

Property address:

Fire number (if different):

Legal description of property (township, range, section):

Well Information:

Year well was constructed:

Depth in feet:	Diameter in inches:			
Casing Depth in feet:	Type of casing:	____steel	____concrete	____none
Pump location:	____in well	____in basement	____in pumphouse	

Name of contractor who installed well:

Dates water was tested:
(Insert water test records in this folder)

Location of any wells on this property:

Next Section: Septic System Information:
Home

Septic System Information Form:

Year septic system was installed:

Size of septic tank in gallons: OR holding tank in gallons:

Type of soil treatment:
___mound ___pressure mound ___drainfield trenches
___seepage bed ___cesspool ___none

Name of contractor who installed system:

Dates septic tank was pumped:
(Entire tank should be pumped empty)

Name and phone of septage hauler:

Sketch the location of well and septic system in relation to house, and roads.
Include sketch in this folder.

This folder and its contents should be passed on to new owner when this property is sold.

Home