LAKE *A* SYST

For

Hauser Lake and Surrounding Watershed

brought to you by

HAUSER LAKE WATERSHED COALITION

"Caring enough to make a difference"

A Property Owner's Guide to Protecting and Improving the Water Quality of Hauser Lake

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Supported by

Hauser Lake Watershed Coalition

and the

Kootenai Shoshone Soil and Water Conservation District

Funding Provided by

City of Hauser, Idaho

May 2008

Modified from Pend Oreille - Lake*A*Syst

Introduction to Lake*A*Syst

Lake*A*Syst or Lakeshore Assessment System, is a voluntary educational program to assist property owners to make well informed decisions in the management of their property throughout the Hauser Lake watershed. Although the information in the Lake*A*Syst booklet was written primarily for Hauser Lake shoreline home and business owners, much of the information is applicable to anyone in the Hauser watershed concerned with protecting surface and groundwater quality and their drinking water supply.

The booklet consists of nine sections, each addressing a specific topic. They include: 1) Stormwater Runoff Management, 2) Lawn and Garden Management, 3) Ensuring a Safe Drinking Water Supply, 4) Household Wastewater Treatment, 5) Household Hazardous Waste and Petroleum Products Management, 6) Landscape and New Construction, 7) Access Roads and Driveway Runoff, 8) Forest Lot and Riparian Management, and 9) Pasture and Riparian Management. Also included is a brief section on Eurasian Watermilfoil. Each section is divided into two parts: an information section and a self assessment to be completed by the property owner. Not all sections are appropriate for every landowner, but taken individually they contain a great deal of information to assist the landowner in becoming an informed steward of the land and water.

A Resource Directory is located at the end of the booklet to put landowners in contact with appropriate local, state and federal resources as well as non-profit organizations concerned with water quality. Most of these agencies exist to provide assistance to private landowners and some can provide detailed on-site assistance. A section recommending further reading is provided, as well as a glossary that defines <u>underlined</u> words throughout the text. Please consider the enclosed material as a *reference manual* to be kept by the property owner and to be shared with friends and neighbors.

Thank you for your interest and efforts in protecting our (your) natural and recreational resources in the Hauser Lake watershed.

Acknowledgements

This document is the culmination of a great deal of work and input by a knowledgeable and diverse group of individuals. The initial Lake*A*Syst project for Priest Lake was completed by Glen Rothrock of the Idaho Department of Environmental Quality and Lance Holloway of the Idaho Association of Soil Conservation Districts who now works for the Idaho Soil Conservation Commission.

Also of great assistance were the staff at Bonner Soil and Water Conservation District who compiled the Pend Oreille Lake*A*Syst book from which this material was completely derived, although modified to fit within the geographic and regulatory constraints of the Hauser Watershed. Also providing guidance were Hauser Lake*A*Syst Steering Committee members: Jamie Davis, Water Quality Resource Conservationist for the Idaho Association of Soil Conservation Districts; Kim Golden, Natural Resources Conservation Service; Bob Flagor, Kootenai Shoshone Soil and Water Conservation District; and, Glen Pettit and Tom Herron of the Idaho Department of Environmental Quality.

Additional advice was provided by Nat Church and Justin Rader of the Panhandle Health District; Gary Stevens of the Idaho Department of Environmental Quality; Scott Clark and Darrel Haarr of the Kootenai County Building and Planning Dept., and Tina McCoy, former City of Hauser Code Administrator.

A significant amount of effort was also provided by volunteers of the Hauser Lake Watershed Coalition (HLWC) who provided the energy, enthusiasm, and vision to make this corner of the world a little better for everyone who lives at or visits Hauser Lake.

The Hauser Lake*A*Syst program would not be possible if not for the foresight and wisdom of the City of Hauser officials who in 2007 agreed to support and fund this effort to protect the City's biggest asset - Hauser Lake. City Officials, past and present, have consistently supported community projects the HLWC has presented to them, and for that we are truly greatful.

Special thanks to Brian Plonka for sharing his beautiful photograph of Hauser Lake with us for our front cover, Jaquith Travis for her creative Hauser Lake Watershed Coalition logo design, and to Dave Nall for allowing us to use his picturesque image of sunset at Hauser Lake on our back cover.

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*Access the Hauser Lake*A*Syst program through Kootenai Shoshone Soil and Water Conservation District at (208) 762-4939 Ext. 101*

Cover Photograph by Brian Plonka
Hauser Watershed Coalition Logo Design by Jaquith Travis
Back Cover Photograph by David Nall

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Website Site Resources:
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Conservation District www.icehouse.net/ksswcd/kootenai-shoshone/index.htm

City of Hauser www.cityofhauser.org/

SECTION 1

Storm Water Runoff Management

Keeping Hauser Lake Clean

If you live in the Hauser Lake Watershed you have a special responsibility to prevent pollutants from entering the lake, its surrounding groundwater and its tributary streams. Unlike the better known destination lakes in the area, Hauser Lake is a small lake used heavily by local and regional residents for recreation. It is surrounded by timber and agricultural areas as well as year around residences. Hauser Lake is a designated impaired water body (per U.S. EPA, IDEQ) due to excessive nutrient loading from the watershed. Because of continued water quality degradation, the Hauser Lake Watershed Coalition (HLWC) has decided to adopt and implement the Lake*A*Syst program in the Hauser watershed in an effort to improve the water quality of the lake and the tributaries that flow into it.

What is Lake*A*Syst?

It is a **Lakeshore Assessment System**; a voluntary program designed to help protect Hauser Lake by providing residents with information and recommendations on how to reduce their impacts on the lake.

Lake*A*Syst is a 3-step process:

1) Read each section and complete the **Home-Owners Risk Assessment Sheet**.
2) Complete the **Action Checklist Worksheet** to inventory your stormwater sources.
3) Take action to protect water quality by implementing the Best Management Practices (BMP) described in each section of this book.

A management plan was developed for Hauser Lake in 1994 which recommends action items for water quality protection. One such action item is to to minimize the input of nutrients, sediments, and toxic materials into Hauser Lake by reducing the amount of Storm Water Runoff.

Why is Runoff a Problem?

Storm water runoff is the flow of water from rain or melting snow that does not soak into the ground. Under natural forested conditions, when soils are not frozen, much of the water soaks into the ground. But as an area becomes developed or altered with roads, driveways, or impervious surfaces (rooftops, decks, walkways, compacted soil areas, and parking lots), less water can seep into the soil, so runoff increases. This increased runoff is generally channeled into streams, ditches, drainage ways, storm sewers, or road gullies and often ends up in Hauser Lake.

High flows of water can cause flooding or erosion, as well as increase the amount of sediment and pollutants, such as petroleum products, pesticides, fertilizers, bacteria, and metals that enter Hauser Lake.

The movement of phosphorus and nitrogen from the land to surface water accelerates eutrophication or premature aging of the lake. This can cause excessive plant and algae growth. Ultimately this can result in a low dissolved oxygen condition harming fish and other wildlife.

Your property alone probably is not a significant source of pollution, but the cumulative effect of all the properties in the Hauser Lake watershed has a considerable impact on water quality.

Identifying Problems Caused by Runoff

PROBLEM	POSSIBLE CAUSE
• Is the water near shore cloudy?	• Excess sediment reaching the 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

Responsibility

Many people are not aware of the concept of storm water runoff and how it can contribute to both surface and ground water quality degradation. Homeowners around Hauser Lake are principally responsible for storm water retention or discharge from their property.

Traditionally, the objective of storm water management has been to transport runoff as quickly as possible through the drainage system in order to prevent flooding and protect lives and property. This is referred to as quantity control. Although public health and safety are still the most important goals, other objectives must now be met as well, such as preservation of water quality for beneficial uses, and natural habitat. Today it is necessary to balance both quantity and quality goals. This balance can be achieved through the voluntary implementation of **Lake*A*Syst**.

Impact of Urbanization

The quantity or volume of storm water runoff from the residential area around Hauser Lake depends on several factors including: (1) the intensity of a given storm event, (2) the duration of the event, (3) the amount of impervious area such as pavement, buildings and compacted soils, (4) soil type, and (5) land slope.

Urbanization around the lake and within its watershed can have an adverse affect on both the quantity and quality of runoff, which can have a serious impact on the lake. As shown in the figure below, in a developed area where there are impervious surfaces (compacted soils, decks, rooftops, paved areas) more water runs off compared to an area of natural vegetation where rain-water soaks into the ground and returns to the air through evapotranspiration.

Best Management Practices (BMPs) are actions you can take to reduce your impact on the environment. **The ultimate goal of this information is to prevent the pollution of Hauser Lake so that it may continue to support a healthy fish and waterfowl population and provide recreational opportunities for its residents.**

Two areas are covered:

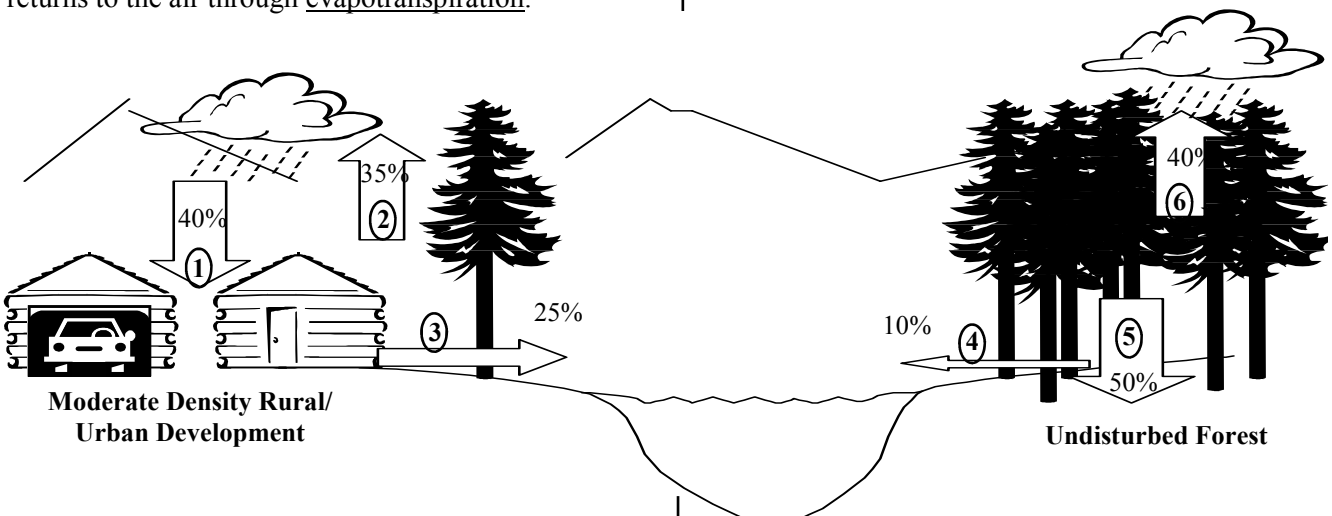
Reducing Pollutants in Runoff. Pollutants can include bare soil, pesticides, fertilizers, petroleum, lawn clippings, pet and animal waste.

Preventing and Minimizing Runoff Impact. This section describes BMPs you can adopt on your property to help protect and preserve water quality.

Reducing Pollutants in Runoff

Storm water is unavoidable, but its effects can be reduced by keeping harmful chemicals and materials out of runoff. Runoff usually consists of surface runoff from pollutant sources such as roads, driveways, and yards. Storm water and/or snowmelt can transport the following pollutants to surface and ground water:

- *Nutrients* such as phosphorus and nitrogen from fertilizers
- *Bacteria and viruses* from human and animal wastes
- *Organic chemicals* such as pesticides and petroleum products



During a storm event in a **developed site,** impervious areas will: 1) **decrease** the amount of water allowed to soak into the ground; 2) **decrease** the amount of water returned to the atmosphere through evapotranspiration; 3) **increase** the amount of water running off the property.

In a **non-developed site**: 4) The velocity of water flowing over the surface is kept in check by vegetation and the organic duff of the forest floor; 5) allowing more water to soak into the ground; 6) more water is available to evapotranspire into the air.

- *Heavy metals* such as lead, copper, zinc and cadmium that are associated with garages, maintenance shops, and parking lots.

- *Sediment,* which can be a composite of fine particulate matter such as silt and clay with chemically bound phosphorus, forest duff organic material, stones, sand, gravel, seed, glass, plastics, metals, and other fine residues. Sediment can smother fish eggs and degrade water quality.

- *Phosphorus* often receives a good deal of attention when considering lake water quality. Phosphorus in lakes is often the "limiting nutrient" to plants. That is, phosphorous is an essential nutrient in short supply which limits the amount (biomass) of floating and attached algae. Any additions of phosphorus above background levels can accelerate plant growth. Overall, concentrations of phosphorus in Hauser Lake are artificially high due to human caused disturbances within the watershed. Lower phosphorus means less biomass of floating algae and other aquatic plants in the lake, which in turn relates to high water clarity and increased oxygen levels for the cold water fishery at Hauser. Increased growth of these unwanted aquatic plants and negative impacts on the fishery will be the result if there are increased sediment/nutrients entering the lake from storm water runoff. Measurements of nutrient levels have shown that sediment and phosphorus concentrations in residential storm water runoff are ten times higher than measurements in stream tributaries during high spring flow.

Pollution Prevention

Source control BMPs are practices designed to prevent pollutants from entering storm water. BMPs can reduce or even eliminate the source of pollution from entering any water body.

The first and most important source control practice is good stewardship. Your role as a good steward is essential in protecting and maintaining the water quality of Hauser Lake.

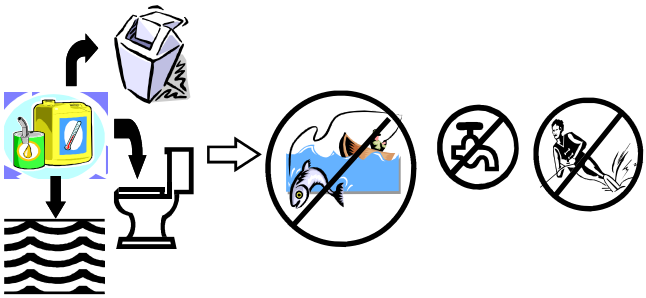
One of the easiest and most efficient ways to keep Hauser Lake safe, clean, and inviting for fishing and recreational opportunities is to **prevent** erosion and pollution from happening. It is much easier to prevent a problem than it is to solve one. As the old saying goes "An ounce of prevention is worth a pound of cure."

Hazardous Household Products

This BMP promotes efficient and safe housekeeping practices such as storage, use, and cleanup, when handling potentially harmful materials such as fertilizers, pesticides, cleaning solutions, paint products, automotive products, and swimming pool/hot tub chemicals. For more information please refer to Section #5, *Household Hazardous and Petroleum Waste Management*.

- Always use caution when handling any hazardous products. These products may contain toxic chemicals that can cause severe injury or death. When possible use alternative products that are less toxic.

- **Do not** dispose of household hazardous waste:
  - → In trash
  - → Down storm drains or into streams
  - → Down sink or toilet



- Unused household hazardous wastes can be disposed of properly at Recycling/Transfer stations in Kootenai and Spokane Counties.
- Change buying habits to purchase fewer products that might become hazardous household waste, and buy in quantities that can be used up.
- Store household hazardous products securely and away from children, pets, and sources of heat, sparks, and flames.
- Store products above flood levels of basements and storage sheds.
- Read and follow use instructions and product labels.
- Store products in their original containers and keep them well labeled. Do not store chemicals in food containers.

- Do not apply pesticides and chemicals if rain is expected within twenty-four hours.
- Use all of the product before disposing, or give extra to friends, neighbors or community groups.

Lawn and Garden Care

Lawn and gardens near the shore must be carefully planned and maintained to prevent possible contamination of storm water runoff. Grass clippings, excess fertilizer, and other yard wastes will wash away during storm events. Fertilizers for example may add nitrogen and phosphorus to the lake promoting algae and aquatic weed growth. (Please refer to Section #2, *Lawn and Garden Management* for more information).

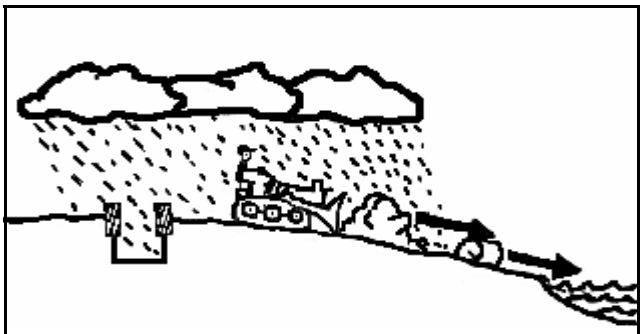
- Maximize the effectiveness of lawn fertilizers and thus minimize the quantity applied. Consider alternatives to chemical fertilizers such as organic mulch.
- The application of fertilizers and pesticides should be avoided within 25 feet of the lakeshore, creeks, streams, and sloughs.
- Native vegetation 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.
- Keep yard wastes out of nearby streams and lakes to protect water quality.
- Burning yard waste is not an environmentally friendly alternative. Hydrocarbons and nutrients that are released contribute to water pollution as well as air pollution.
- Sweep clippings back onto the grass, and compost leaves and garden wastes on your property to recycle nutrients.

Animal Wastes

Animal droppings can be troublesome in two ways. First, pet and stock wastes contain nutrients that can promote the growth of algae in streams and lakes. Second, wastes are a source of disease. The risk of storm water contamination increases if pet wastes are allowed to accumulate in animal pen areas or left on roads or driveways where runoff can carry them to drainage ways.

- Reduce the chance for manure associated with dogs, cats, cattle, horses, or ducks to be washed into the nearest water body.

- If animal manure is stacked, it should be applied to the land. For best results manure should be broken up with a harrow to increase the filtering capacity of vegetation and the uptake of nutrients by plants.



Building Construction Impacts: sedimentation and wastes enter surface waters.

Erosion Prevention

If you are adding on or building a new house, landscaping, or putting in a new driveway or road, consider the effects of construction and other activities that remove vegetation when clearing an area and exposing bare soil. Bare soil can be easily washed into nearby water bodies.

Excessive soil, in suspension, which washes into nearby streams, buries coarse-sized channel sediment that is necessary for fish spawning. Sediment also carries excess phosphorus into Hauser Lake. Here are more tips on protecting water quality:

- Prevent unforeseen impacts, cover bare earth with a layer of straw or other type of material. This covering will help keep the soil in place. A good rule of thumb for hay or straw is one 50 pound bale per 500 square feet. Also, be sure to replant the areas that were dug up as a result of the activity.
- If you have rainspouts and gutters, check the flow to ensure that the rainwater is spread evenly at the point of surface discharge. Direct the discharge to a grassy area, garden, or forest floor depression, where it can soak into the ground.
- Stabilize exposed soil immediately after land disturbance for private road and driveway construction. Once vegetation is removed and soil exposed, the rate of erosion is greatly increased. Refer to the next section on preventing runoff for some simple, cost-effective measures which can be used to minimize a potential erosion impact.

Protecting the Riparian Zone of Streams and Hauser Lake

The riparian zone is the moist soil area next to water bodies able to maintain plants. The width of the zone varies, from a few feet for small creeks to hundreds of feet wide along lowland areas of streams, rivers or lakes. Because the riparian zone is home to many plants and animals, it is the most important area of a lake or stream environment. The thick vegetation works to reduce erosion and filter out pollutants. Overhanging branches provide shade and a source of insects and seeds. As more of the riparian zone disappears, more wildlife is affected and the stream channel becomes unstable. An unstable stream channel causes further erosion and loss of stream habitat and structure. A riparian zone at the shoreline of Hauser Lake can serve as a filter strip for pollutants in storm water runoff.

Here are some practices for protecting the riparian zone. (Please refer to Section #8, *Forest Lot and Riparian Area Management* for more information).

- Keep cattle and horses out of riparian zones. Large animals trample riparian vegetation and stream banks, which results in erosion.
- For new home and lot construction, retain a high percentage of native shrubs and trees along the shoreline or along stream banks. As a guideline for Hauser Lake, remove no more than 20% of the native vegetation for a walkway, beach access, and home safety.
- For existing residential and business development, minimize disturbance in riparian vegetation along the lakeshore and streambanks. Leave native plants where possible and choose species that require little maintenance. The Hauser Lake Development Code lists the required **minimum buffers** needed which vary depending upon the slope of your land. Contact the City of Hauser and Kootenai County Building and Planning Department for more information.

Preventing and Minimizing Runoff Impact

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 imagine the path of a raindrop. In looking at the landscape or any impervious surfaces, which route would it travel? Obviously, it would take the easiest path downhill. Walk your property during a heavy rain storm to inspect drainage patterns and areas of erosion.

Site Planning

Site planning is an essential tool in preventing pollutants from being transported off-site. A general step-by-step process is recommended for those developing or redeveloping near water bodies, on steep slopes, gradients, or highly erodible soils. Please check with the Hauser Planning and Zoning, Kootenai County Building & Planning Department and/or the Stormwater and Erosion Education Program (SEEP) for more detailed information regarding these steps or modifications. The purpose of site planning is to reduce site runoff and erosion through planning considerations based on the conditions of your site. (Please refer to Section #6, *Landscaping & New Construction Activities*, for more information on planning considerations to protect water quality).

Long-Term BMPs

- Limit paved areas, compacted soil, and covered areas that prevent water from seeping into the ground.
- Invest in permanent stabilization practices for long-term protection of your 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%.
- 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 since water does not stop flowing at your property line.

Drainage Ways

- Use existing natural drainage systems such as a gulch or any low areas instead of digging new ditches.
- Design culverts and drainage structures to handle excessive amounts of runoff; assistance is available from the Natural Resources Conservation Service, Kootenai County, the US Forest Service, and Idaho Department of Lands.
- Protect drainage ways from sedimentation so they are able to carry storm water as intended.

Roads, Driveways, and Walkways

BMPs for control and management of storm water runoff from existing public and private roads and driveways are essential for the prevention of water quality degradation of Hauser Lake. Additional information can be found in Sections #2, #6, and #7.

- Minimize semi-impervious and impervious surfaces.
- Incorporate a good gravel base into your private roads and driveways instead of only compacted soil.
- Do not compact or pave wasted space such as corners near buildings that are not large enough for parking or driving.
- Maintain a good drainage and erosion control system for private roads and driveways. Keep culverts unplugged, keep drainage ditches deep and vegetated, keep cut banks (above slope) and fill banks (below slope) from eroding by establishing vegetation.
- Locate driveways and all walkways 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 water ways and cross at a right angle to the stream if possible.
- Sweep paved parking areas and walkways instead of washing them down with a hose to prevent sediment, salt, and petroleum products from flowing as runoff; cover stockpiles of salt and sand with a tarp.
- Use roadside areas covered with grass for runoff and storage of snow instead of impervious and semi-impervious surfaces.
- Install water bars on sloping roadways to slow and divert runoff.
- Use "pervious pavers" 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 that one area is stabilized before another area is disturbed.
- Avoid construction in areas with:
  - little vegetative cover; preserve existing cover
  - erodible soils (sands, or soils that appear fluffy when dry)
  - mainly bedrock with a thin covering of soil
  - steep slopes of greater than 10% (see figure 1)

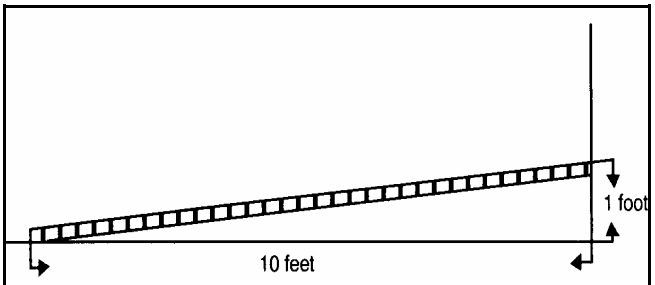


Figure 1. *A 10% slope is represented by leaning a board against the wall with the top at 1 foot and the base set 10 feet away from the wall.*

- 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 straw bales to trap sediments before they enter the water; a combination of methods may be the best solution (see Figures 2 and 3 on page 7).
- Use only clean fill (free from debris and soil) such as rock, sand, or gravel near lakes and streams.
- In landscaping, use only solid concrete forms such as interlocking blocks or slabs; reduce your use of liquid concrete and avoid creosote 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 drainage ways are in proper working order.

1-6

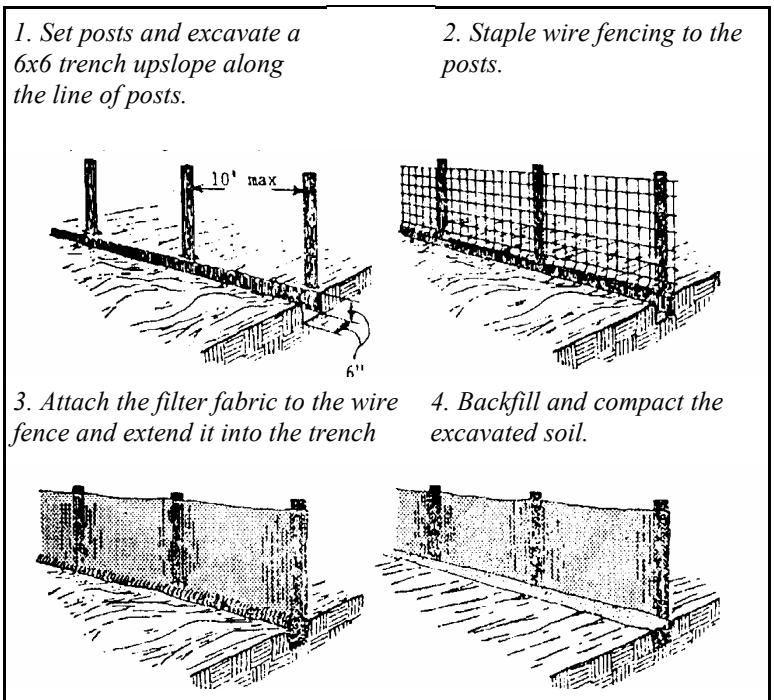


Figure 2. *Construct a silt fence to slow runoff and prevent erosion. Use at top and bottom of slopes to let water seep through slowly.*

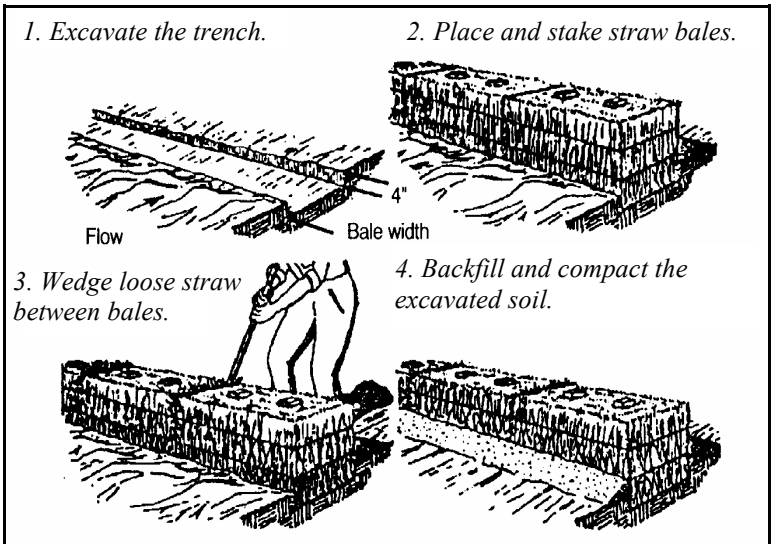


Figure 3. *Constructing a straw bale barrier to slow runoff and prevent erosion.*

Buildings and Runoff

- Install rain gutters along the edge of rooftops to help carry water off the roof and away from the building to areas where soil will not be eroded; make sure there is erosion protection where the gutters outlet onto the soil.
- Keep gutters free from debris and draining properly.
- Install a rainwater catchment system to collect and reuse rainwater in your garden. **A 2000 square foot roof will generate over 41,000 gallons of storm water runoff a year in Kootenai County.**
- Pave patios with flagstones, pervious pavers, or decay-resistant wood blocks instead of solid material to permit some water to seep around the stones or blocks.
- If you are building a new house or garage, and design considerations are flexible, position rooftops so they are perpendicular to the slope, instead of parallel, to slow down runoff as shown below.

Roofline perpendicular to slope slows down runoff

Roofline parallel to slope increases potential for runoff damage

Vehicle Use and Engine Maintenance

Vehicle use is a major source of pollutants to surface waters via storm water runoff. Cars and boats contribute pollutants such as heavy metals, oil and grease and other hydrocarbons through exhaust, leaks, spills, corrosion, and wear and tear of parts. These pollutants are deposited on roadways and carried into receiving waters by runoff.

- For guidelines and tips on minimizing petroleum pollution from boating, refer to the pamphlet, *Kootenai County Boater's Guide* available from Parks and Waterways.
- Purchase only those items you need in amounts you can use, and recycle fluids when possible.
- Clean up oil stains and avoid outdoor spills of antifreeze, brake fluid, and other engine fluids.
- Used oil, antifreeze, and cleaners can be taken to county recycling/transfer stations. Please check with the Kootenai County Solid Waste Department for more information on disposal.

- **Never dump used oil, antifreeze, or gasoline down a storm drain, in a ditch, or on the ground.** These wastes contain toxic compounds which can end up in Hauser Lake, or in local wells (your and your neighbors' drinking water).
- Routine maintenance of your vehicle/boat assures efficient fuel consumption, clean exhaust, and economic operation.

Try to wash vehicles on the lawn or at a commercial car wash. Do not use cleaners that contain ammonia, chlorinated solvents, petroleum distillates, or lye. Buy and use only nontoxic, phosphate free, biodegradable cleaners.

Recommended Reading:

Local industry professionals or anyone can obtain training or become certified through the Panhandle SEEP Program (**Stormwater and Erosion Education Program**) provided by the Panhandle Area Council (PAC).
For more information visit
http://www.plrcd.org/SEEP/index.htm

For details contact:
Panhandle Area Council
11100 N. Airport Drive
Hayden, ID 83835
208-772-0584

Additional information on structural Best Management Practices can be found in the comprehensive ***State of Idaho Catalog of Storm Water Best Management Practices for Idaho Cities and Counties.*** Please consult this catalog when developing and implementing a storm water management plan. You may examine this catalog at Dept. of Lands in Coeur d'Alene or the Kootenai County Building and Planning office, or on the internet at Idaho Department of Environmental Quality.

Kootenai County Building & Planning Dept.
451 Government Way
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Idaho Department of Environmental Quality
2110 Ironwood Parkway
Coeur d'Alene, ID 83814
(208) 769-1422

Idaho Department of Water Resources
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Coeur d'Alene, ID 83815
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Panhandle Health District
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City of Hauser
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Hauser, ID 83854
(208) 777-9315

See Resource Directory (Appendix B) for additional agency contacts.

Notes:

Lake*A*Syst

Assessing and preventing the risk of lake water contamination

Storm Water Runoff Management

Home-Owner Risk Assessment Sheet

Keeping Hauser Lake Clean

WORKSHEET 1

ASSESSMENT 1 – ***Reducing Pollutants in Runoff*** – The assessment table below will help you identify potential environmental risks related to Hauser Lake and the storm water runoff from your property. For each question indicate your risk level in the right-hand column. Your goal is to lower your risks. Some choices may not correspond exactly to your situation. Choose the response that best fits. When finished turn to the **Action Checklist** on page 1-12 and record your medium and high-risk practices. Use the BMP recommendations in Section #1 *Storm Water Runoff Management* to help you decide how to best reduce pollutants in runoff.

	LOW RISK	MEDIUM RISK	HIGH RISK	YOUR RISK
Automotive wastes:	Oil drips and fluid spills are cleaned up. Dirty car parts and other vehicle wastes are kept out of runoff.	Drips and spills are not cleaned up. Car parts and other vehicle wastes are left on unpaved areas outside.	Used oil, antifreeze, and other wastes are dumped in ditch or onto the ground.	❒ Low ❒ Medium ❒ High
Vehicle washing:	Vehicles washed on a lawn or gravel drive. Runoff diverted to vegetated areas. Phosphate free soap used.		Vehicles are washed on an impervious surface and runoff runs directly into lake or stream. Soap type unknown.	❒ Low ❒ Medium ❒ High
Storage of pesticides and other chemicals:	Chemicals are stored in waterproof containers in a garage, shed, or basement that is protected from storm water.	Chemicals are stored in waterproof containers but within reach of storm water.	Chemicals are stored in non-waterproof containers outdoors or within reach of storm water.	❒ Low ❒ Medium ❒ High
Handling and use of pesticides, fertilizers, and other chemicals:	Any spills are cleaned up immediately. Alternatives to chemicals used when possible. Chemicals are applied according to the label.	Chemical applications used. Spills are not cleaned up.	Spills are not cleaned up. Products are used in higher amounts than what the label recommends.	❒ Low ❒ Medium ❒ High
Pet and animal wastes:	Buried away from gardens, wells, or ditches, wrapped and placed in the garbage for disposal.	Animal wastes are left to decompose on grass or soil. Wastes are scattered over a wide area.	Animal wastes are left on paved surfaces, concentrated in pen or yard areas, or dumped in a ditch.	❒ Low ❒ Medium ❒ High

ASSESSMENT 1 CONTINUED – ***Reducing Pollutants in Runoff***

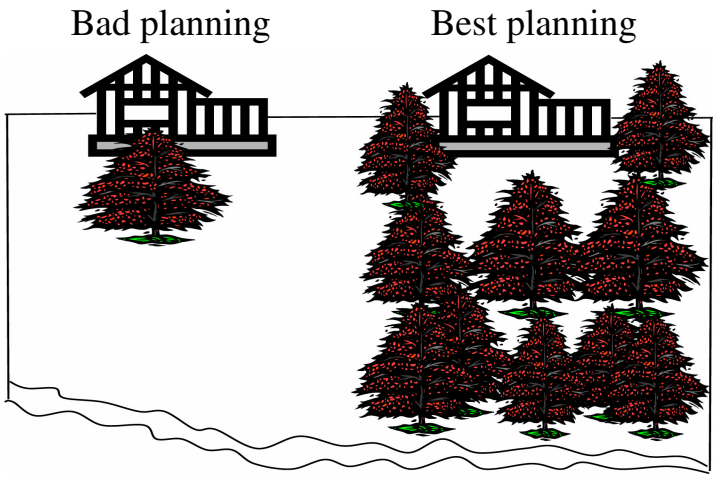
	LOW RISK	MEDIUM RISK	HIGH RISK	YOUR RISK
Grass clippings, leaves, and other yard waste:	Grass clippings, leaves and other yard wastes are swept off paved surfaces and onto lawns away from water flow routes. Leaves and other wastes are composted.		Leaves and other yard wastes are raked into piles near the lake and burned on-site.	❒ Low ❒ Medium ❒ High

ASSESSMENT 2 – ***Landscaping and Site Management to Control Runoff -*** for each question in the assessment table below indicate your risk level in the right-hand column. Select the answer that best matches your situation. Afterward record your medium and high-risk practices in the **Action Checklist** on page 1-12.

	LOW RISK	MEDIUM RISK	HIGH RISK	YOUR RISK
Bare soil, gardens, and construction projects:	Areas of bare soil are seeded and topped with a layer of mulch or straw. Sediment retention barriers (straw bales, soil fence) are used especially on steeper slopes until grass is established.	Soil is left bare during a construction project, but natural features and vegetation slow most runoff.	Soil is left bare and no natural features or sediment retention barriers are used.	❒ Low ❒ Medium ❒ High
Proximity to surface water:	>500 feet to surface water.	300-500 feet to surface water.	10-300 feet to surface water.	❒ Low ❒ Medium ❒ High
Impervious areas (rooftops, paved, and concrete surfaces):	Paved surfaces are minimized; pavers used instead. Runoff from impervious areas diverted into vegetated buffer to prevent drainage directly to the lake or stream.	Some small areas are paved for patios.	A lot of surfaces on property are impervious to water. These areas also drain water directly into the lake or a stream.	❒ Low ❒ Medium ❒ High
Ratio of total lot that is impervious:	0-19%	20-40%	>40%	❒ Low ❒ Medium ❒ High
Roof drainage:	Downspouts and drip lines direct roof drainage onto lawn, garden, or vegetated area where water soaks into the ground.	Some downspouts and drip lines discharge water onto paved surfaces or grassy areas where water runs off.	Most or all drip lines or downspouts discharge onto paved or bare soil surfaces, or downspouts run directly to a stream entering the lake.	❒ Low ❒ Medium ❒ High

ASSESSMENT 2 CONTINUED – ***Preventing and Minimizing Runoff Impacts***

	LOW RISK	MEDIUM RISK	HIGH RISK	YOUR RISK
Landscaping and buffer strips:	Yard is landscaped to slow the flow of storm water and provide areas where water soaks into the ground. Buffer strips of thick vegetation are left along streams or lakeshores.	No areas are landscaped to encourage water to soak in, but yard is relatively flat and little runoff occurs. Mowed grass or spotty vegetation exists adjacent to a stream or lake.	There is no landscaping to slow the flow of storm water, especially on steep slopes, erodible properties. Stream banks or lakeshores are eroding.	❒ Low ❒ Medium ❒ High
Sediment basin, sediment trap, or buffer strips will be used:	In problem areas (problem areas are defined as areas adjacent to waterways, areas of highly erodible soils and/or steep slopes, and wellheads) storm water detention ponds, buffer strips or other devices installed to slow water flow.		No landscape changes made to slow the flow of storm water, especially on steep erodible slopes.	❒ Low ❒ Medium ❒ High
Distance from septic system:	Stormwater runoff diverted away from drain field.		Stormwater runoff runs toward septic drain field and is allowed to saturate the ground.	❒ Low ❒ Medium ❒ High



To help prevent erosion, leave existing vegetation or establish a buffer strip of thick vegetation along streambanks and the lakeshore.

ACTION CHECKLIST

Storm Water Management

Write all high and medium risks below.	**What can you do to reduce the risks?**	**Set a target date for action.**
Sample: Runoff from driveway runs directly into a stream or the lake.	Slow movement of water running down the driveway with culvert boxes that divert storm water into heavily vegetated areas.	One week from today:

You Can Make a Difference

An essential part of storm water management is keeping water from leaving your property, or at least slowing its flow as much as possible. Many home sites slope toward Hauser Lake and its tributaries. You can help make a difference by landscaping your property with native shrubs and grasses to encourage water to soak into the ground.

SECTION 2

Lawn and Garden Management

Keeping Hauser Lake Clean

Why are Lawns and Gardens a Potential Problem?

Homeowners commonly over-apply fertilizer, adding much more nitrogen and phosphorus to a lawn than it will use. Although Hauser Lake has few lawns that go right down to the lakeshore with no buffer strips, excess nutrients or pesticides can still be washed, or carried by shallow ground water, into the lake by rain or heavy irrigating.

Lawns, gardens and pastures near Hauser Lake or any of its tributaries 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. Eventually, most landscapes will revert to a native state if no maintenance is performed and planting native vegetation certainly will hasten the process.

Water Quality Concerns

- **Fertilizers –** Supply excess nutrients, especially nitrates and phosphorus, increasing aquatic plant and algae growth which can lead to reduced dissolved oxygen in bottom of lakes.
- **Pesticides –** Kill beneficial aquatic insects resulting in lowered fish productivity and contaminated spawning beds. Cause chronic health problems in humans.
- **Irrigation –** Too much water forces fertilizers and pesticides into ground water, or may combine with sediment and runoff into surface water.

Best Management Practices

Best Managements Practices (BMPs) are actions you can take to reduce your impact on the environment. This fact sheet describes BMPs you can adopt on your property to prevent water contamination, improve water quality, and enhance your lot's aesthetics and value.

Best Management Practices discourage the use of pesticides and fertilizers within 25 feet of surface waters. This ensures that overspray or the spread of granules will not fall directly into the lake or streams.

Improving Lawn and Garden Management

Before beginning any task, stop and think about potential risks to water quality. Homeowners 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—flowerbeds, 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. If you utilize a professional lawn care service, familiarize yourself with the type of pesticides and fertilizers they may be using and where.
- Try to avoid or minimize the use of chemical fertilizers and pesticides.

Why should homeowners be concerned about pesticide use on their lawns and gardens?

Pesticide over use or misapplication will:

- Harm or kill beneficial insects and earthworms associated with your lawn or garden.
- Harm wildlife and pets that come into contact with your lawn or garden.
- Result in chemical runoff, during rainfall or irrigation, into streams, rivers, lakes and storm water drains which may contaminate the ground water.
- Leach through the soil directly into ground water which is used for drinking water.
- Accumulate in the soil and become toxic to the plants you are growing.
- Create pest resistance to the applied chemicals so that they will be very difficult to control in the future.

Why should homeowners be concerned about fertilizer use on lawns and gardens?

Fertilizer over use or misapplication will:

- Contaminate surface water with nitrates through surface runoff or storm water drains.
- Contaminate drinking water from ground water wells with nitrates, which is hazardous especially to pregnant woman, infants, and small children.
- Cause diseases, such as necrotic ring spot in lawns.
- Make some weeds more competitive with the plants you are trying to grow.

BMPs for Protecting Surface Waters

The most efficient BMP for protecting surface water from lawn and garden activities is to add or enhance a **vegetative filter strip** (see figure 1, page 2-3) between the lake and your activities. This alone will help preserve water quality by filtering rain and irrigation runoff, and by absorbing nutrients from shallow ground water. Other BMPs include:

- Rake dead leaves and brush away from the water; compost vegetation in a sturdy structure away from the shoreline. *(Note: The Hauser Lake Watershed Coalition, HLWC, sponsors an annual Rake-A-Lake event to assist local Eastside lake residents with leaf clean-up; contact the HLWC for more details).*
- Never dump leaves and vegetative debris into the lake or a stream because this releases nutrients and organic acids into the water and uses up valuable oxygen needed by fish and other aquatic life.
- 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.
- When treating diseases or insect pests, use chemicals responsibly and use only the required amount**.** Use of certain pesticides, insecticides or fertilizers within 25 feet of Hauser Lake and its contributory streams is discouraged.

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 harmful 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.
- Reseed disturbed areas as soon as possible to prevent soil erosion. This has the added benefit of choking out invasive weed species.

Best Management Practices for Lawns

Your lawn can be a source of pride. It is an attractive part of your landscape. In fact, a well maintained lawn adds value to your property and helps to tie together your home and other landscape plants.

A healthy good-looking lawn actually improves your living environment. On a hot day, your lawn reduces the glare of the sun, keeps surrounding areas cooler, and will attract birds and other wildlife. Landscapes will revert to a native state if no maintenance is preformed; planting native vegetation will hasten the process.

Pest Management for Lawns

If possible, avoid the use of chemical pesticides. Consult a professional from the University of Idaho Extension Office (see Page 2 - 6) to determine if the use of a pesticide is justified. The following practices will minimize the potential of contamination from pesticides:

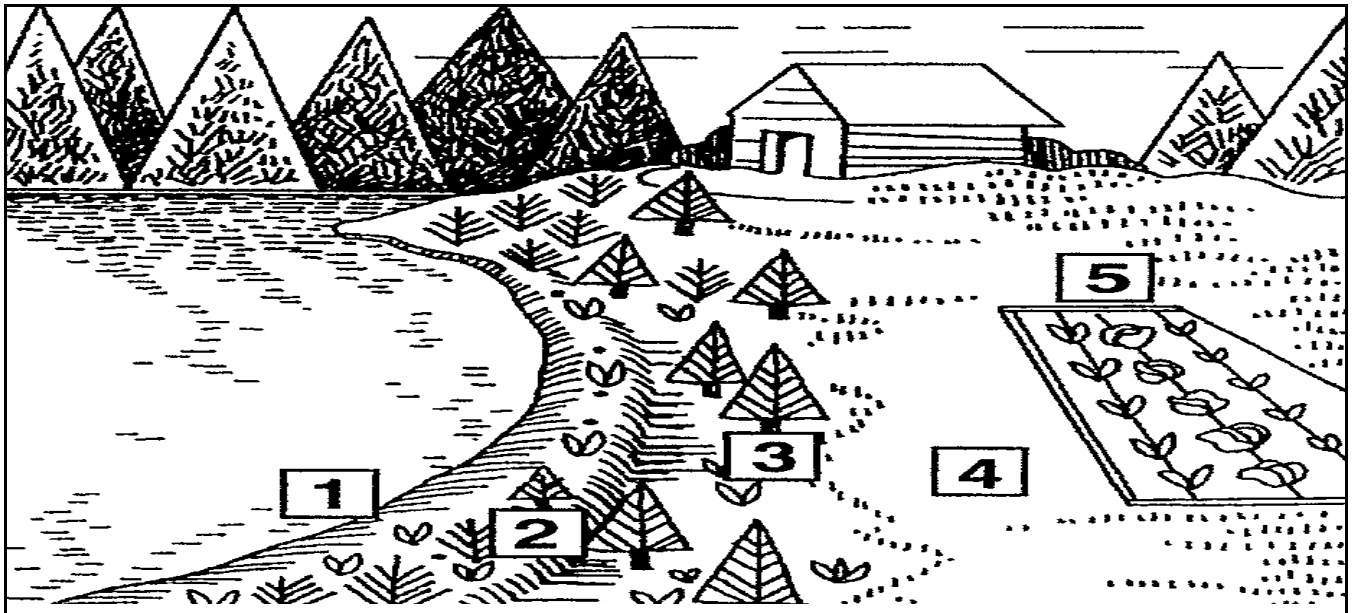


Figure 1. *A well designed landscape plan includes 1) and 2) natural vegetation along the water's edge; 3) a natural vegetation filter strip; 4) well-established grass or ground cover; 5) a level flower or vegetable garden set back from the water*

- 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.
- Properly identify whether the pest is an insect, disease, or other problem.
- 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. For empty pesticide containers, triple rinse the containers and reapply the rinse water to the areas already treated.
- Properly dispose of unused pesticides and containers. Never pour excess pesticides on the ground, into surface waters, or into sanitary treatment systems. Contact Kootenai County Extension office for the next Idaho State Department of Agriculture pesticide container recycling event.

Fertilizer Management

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 Kootenai County University of Idaho Extension Service.
- Use alternative forms of fertilizer. Grass clippings provide (a years worth) 2 pounds annual nitrogen; Compost provides 1 pound annual nitrogen; and Corn Glutin (20 pounds per 1000 square feet) provides 2 pounds annual nitrogen. These are preferable to chemical fertilizer. However, natural amendments still have the potential to damage water quality if used in excessive amounts.
- If chemical fertilizers are used, select slow-release (water insoluble) forms.
- 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 and reapply to the grass. Never wash it off.
- Never apply fertilizers to frozen ground or snow.
- Leave a natural filter strip of grass, trees, and/or shrubs next to the shoreline.

- Use extra caution when applying fertilizer near surface waters; do not spread fertilizer within **25 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.

Irrigation Management

Use water wisely on lawns. Over-watering may cause pesticides, fertilizers, and sediment to either runoff to surface waters, or leach and contaminate the ground water you or your neighbors' use for drinking water.

- Established lawns only need 1 to 2 inches of water per week.
- Water deeply in the early morning and evening to avoid evaporation.
- Avoid over watering at all times, but especially after applying fertilizers and pesticides.
- Leave grass clippings on the lawn, this will:
  -shade the soil surface, reducing moisture loss
  -provide nitrogen, potassium and phosphorus, thus reducing the need for fertilizer
  - help decompose thatch
  - save time and energy by not bagging clippings

Establishing New Turf

Retaining native vegetation is the recommended best management practice, but if having a lush green lawn is what you want, then the following practices will help you prevent pollutants from entering Hauser Lake and the streams that flow into it.

- For maximum pollution prevention, a 25 foot riparian vegetation buffer strip should be maintained between any management activities associated with lawn care and surface waters.

Natural vegetation cannot be excessively removed from the riparian zone, generally a distance of 50 to 100 feet from the surface water is recommended. Removal of vegetation from slopes should be minimal. Do not remove more than 25% of vegetation.

- **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 seedbed 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. An excellent mixture for around Hauser Lake is Bluegrass, Creeping Red Fescue, and Perennial Rye.

MAINTAINING ESTABLISHED TURF

Soil Fertility Management

Adequate soil nitrogen is necessary for a healthy lawn. Many property owners in Hauser Lake watershed use nitrogen fertilizer to enhance the nitrogen levels in their soil. In most cases, adding nitrogen fertilizer produces greener, and faster-growing lawns and garden plants. However, 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 3 lbs. of actual nitrogen per 1,000 square feet of lawn per year. If soils are sandy or grass is sparse, you will want to test your soil for best results.
- For best results split your fertilizer by dividing your total need by 4. Then apply once in April (not on frozen ground or snow), once on Memorial Day, once on Labor day, and then again in October.
- 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.
- 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.

- Use extreme caution when applying fertilizers near water. **Fertilizer application should be avoided within 25 feet of Hauser Lake and its tributaries.** Never allow any fertilizer to enter surface water or wetlands.

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

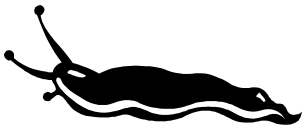
Best Management Practices for Gardens

Your garden is a complex ecosystem of plants, animals, insects, birds, fungi, worms, and microorganisms such as bacteria. All ecosystems have three basic interacting categories of organisms:

- Producers, are green plants that convert sunlight, carbon dioxide, and water into energy for plant growth.
- Consumers, are organisms that feed on live plant or animal material.
- Decomposers, use dead plant and animal material for energy.

A healthy garden ecosystem will have a balance between producers, consumers, and decomposers. If there is an imbalance, symptoms such as plant disease or an increase in damaging pests may result.

An imbalance in the ecosystem can be caused by improper applications of pesticides, fertilizers, and water, or by removing organic matter such as leaves from the garden. By using gardening BMPs, you will reduce the potential for gardening problems and thus the need for chemical controls. By reducing the use of chemicals, the risk of contaminating Hauser Lake and local wells is also reduced.



Pest Management for Gardens

It is best to avoid using pesticides as both beneficial insects (ladybugs, honey bees) and pests (weeds, insects, and disease) may be killed. The following pest management BMPs will help keep your garden ecosystem healthier.

- Create a garden with diversity. Plant a combination of different types of plants to create a balanced ecosystem and in general, rotate plants each year to outsmart potential pests and minimize the threat of soil borne diseases.
- Maximize conditions for healthy plant growth. Choose plants that are suited for your climate and are resistant to diseases in the area. Group plants according to water and light requirements and space them to allow ample root and top growth at maturity.
- Use the least toxic solution for your problems. Some low toxic methods to solve problems include biological controls, insect traps, or mechanical means to remove pests. Also, learn to live with a low level of plant damage.
- If you do use herbicides or pesticides, use them carefully. Identify the insect and weed pests and select the appropriate chemical. Also, buy only what you need and be sure to follow label directions.
- Store and dispose of herbicides and pesticides properly. Store any extra in a secured area, and if you need to dispose of these chemicals, take them to your locally organized household hazardous waste collection program or go through the Idaho State Department of Agriculture Pesticide Disposal Program.

Fertilizer Management for Gardens

Fertilizer should be added only in the amounts needed, at the appropriate time, and in a form that makes the nutrients available to plants. Nutrient management BMPs to implement in your garden include:

- Test your soil. Test your soil for nitrogen (N), phosphorus (P), potassium (K), sulfur (S), pH, and organic matter. Soil samples should be taken to a depth of 12 inches. Consider a soil survey.
- Build a healthy soil. Add organic matter, such as compost to enhance the structure, aeration, and nutrient and water holding capacity of the soil. Organic matter can also be added by growing cover crops. Also, try to supply needed nutrients using organic fertilizers, such as composted manure, cottonseed meal, bone meal, blood meal, and greensand. Most gardening shops have these types of fertilizers. If not, you can order from gardening retailers that specialize in providing organic fertilizers and pesticides.
- Apply fertilizers properly. Based on your soil test and plant needs, apply the proper rate of nutrients and apply it at the correct growth stage of the plant. Overfeeding plants can be as detrimental as underfeeding, but this risk can be reduced if organic fertilizers are used, because the nutrients are released slowly. Synthetic fertilizers are also useful, as they can provide readily needed nutrients. Be sure not to over apply. Remember, 85% to 95% of terrestrial plant growth is dependent on the atmosphere and sunshine rather than added fertilizer.

Irrigation Water Management for Gardens

- Reduce the need for watering by mulching. Mulches not only slow the evaporation of water from the soil surface but also can improve a soil's water holding capacity, keep the soil cooler on hot summer days, reduce weed growth, and help prevent soil erosion. Examples of organic mulches include grass clippings, leaves, barks, and straw. Inorganic mulches may also be used and examples are permeable sheeting and/or rock. Keep in mind that rocks can form undesirable heat sinks.
- Reduce the need for watering by improving soil structure. Each year be sure to add organic matter such as compost, grass clippings, tilled in cover crops, and other dead plant materials.
- Irrigate only when the plants need water. Check whether the soil is dry several inches below the surface. If it is dry, then water, but water slow enough so that it soaks into the root zone and does not run off the soil surface. The depth of the root zone depends on the plant, but in general this is 6 to 8 inches deep. If possible, use a drip irrigation system to conserve water.

Location of Gardens

Flower and vegetable gardens can add to the quality of life of property owners living around Hauser Lake. However, certain precautions must be taken to prevent the possibility of surface water contamination.

- Gardens should **not** be located on slopes because they can promote accelerated soil erosion and runoff. An alternative on sloping ground is to install a terraced garden. Dense turf or other vegetation should be established on slopes.
- Gardens should **not** be located on septic system drain fields or mounds. Exposed soil increases the possibility of septic systems freezing. Drain fields and mounds should be covered with dense turf.
- To minimize the area of exposed soil, use intensive growing techniques such as intercropping, succession planting, and raised beds.

Recommended Reading:

Northern Idaho Lawns
Northern Idaho Fertilizer Guide. U of I Extension publication No. 911.

Herbicides For Lawn Weed Control
U of I Extension publication No.608

For More Information

Call, write or visit...

Kootenai County Extension Office
1808 N. 3rd St.
Coeur d'Alene, ID 83814-3407
208-446-1680

Kootenai County Noxious Weed Control
10905 N. Ramsey Rd
Hayden, ID 83835
(208) 446-1290

See Resource Directory (Appendix B) for additional agency contacts.

Notes:

Lake*A*Syst

Keeping Hauser Lake Clean

Assessing and preventing the risk of lake water contamination

Lawn and Garden Management

Home-Owner Risk Assessment sheet

WORKSHEET 2

ASSESSMENT 1 – ***Lawn and Garden*** – The assessment table below will help you identify potential environmental risks related to Hauser Lake and your lawn and garden maintenance practices. For each question indicate your risk level in the right-hand column. Your goal is to lower your risks. Some choices may not correspond exactly to your situation. Choose the response that best fits. When finished turn to the **Action Checklist** on page 2-10 and record your medium and high-risk practices. Use the BMP recommendations in *Section* #2 *Lawn and Garden Management* to help you decide how to best reduce fertilizer and pesticide/herbicide pollution.

	LOW RISK	MEDIUM RISK	HIGH RISK	YOUR RISK
Fertilizers:	Soil is tested for nutrients. Fertilizer rate is used at label recommendations and applied more than 100 ft from any surface water source.	Soil is not tested. Fertilizer is used at an unknown rate, 50 to 100 feet from any surface water.	Soil is not tested. Fertilizer is applied at a higher rate than label recommendation. Fertilizer is applied 10-20 feet from the lake or its tributaries.	❒ Low ❒ Medium ❒ High
Pesticides:	Do not use chemicals to control weeds, insects, or diseases. Encourage natural defenses (lady bugs and wasps). Use non-toxic solutions (pull weeds).	Limited use of chemicals, spot spray mostly.	Rely on chemical control for control of pests.	❒ Low ❒ Medium ❒ High
Storage of pesticides, fertilizers, herbicides and other chemicals:	Chemicals are stored in waterproof containers in a secure area protected from stormwater and over 100 feet away from the lake or its tributaries.	Chemicals are stored in waterproof containers but not in a secured area.	Chemicals are stored in non-waterproof containers outdoors or within reach of stormwater or in a wellhouse.	❒ Low ❒ Medium ❒ High
Handling and disposal of pesticides, herbicides, fertilizers, and other chemicals:	Any spills are cleaned up immediately. Disposal through a local household hazardous waste collection event or approved landfill.		Spills are not cleaned up. Disposal of chemicals consists of burning, or dumping at an unapproved landfill or on the property.	❒ Low ❒ Medium ❒ High

ASSESSMENT 1 CONTINUED – *Lawn and Garden Care*. When finished turn to the **Action Checklist** on page 2-10 and record your medium and high-risk practices.

	LOW RISK	MEDIUM RISK	HIGH RISK	YOUR RISK
Grass clippings, leaves, and other yard waste:	Grass clippings, leaves and other yard wastes are swept off paved surfaces and onto lawns away from water flow routes. Leaves and other wastes are composted.		Leaves and other yard wastes are raked into piles near the lake and burned on-site.	❒ Low ❒ Medium ❒ High
Bare soil, gardens, and landscaping projects:	Areas of bare soil are seeded and topped with a layer of mulch or straw. Sediment retention barriers (straw bales, silt fence) are used especially on steeper slopes until grass is established.	Soil is left bare during a construction project, but natural features slow and treat most runoff.	Soil is left bare and no natural features or sediment retention barriers are used.	❒ Low ❒ Medium ❒ High
Proximity to surface water:	>500 feet to surface water.	300-500 feet to surface water.	10-300 feet to surface water.	❒ Low ❒ Medium ❒ High
Lawn type and maintenance:	Turf-grass is suited to soil type, available sunlight, and climate. Grass is pest resistant and mowed high (a mixture of bluegrass, fescue, and rye is recommended).	Turf-grass is suited to the site, and is mowed short.	Grass type is not suited to available light, soil type, or climate. Grass is mowed as short as possible and growth is encouraged right up to shoreline.	❒ Low ❒ Medium ❒ High
Irrigation management:	Application of water based on the requirement of plants. Watering is done in the morning or evening. Plants are suitable to climate and do not need extra water.	Watering is excessive or not measured.	Heavy application of water. There is excessive water runoff. Time of watering is not adjusted according to pesticide and fertilizer applications.	❒ Low ❒ Medium ❒ High
Composting:	The compost pile is well-maintained. It is aerated regularly and contains yard waste, vegetable food scraps, and other nitrogen sources (manure).	The compost pile is poorly maintained. It is not aerated or lacks the proper mix of materials. Pet wastes are added to the pile. Is located within 50-100 feet of surface waters.	The compost pile is poorly maintained. It contains excessive high-nitrogen material and is not turned regularly. The pile is less than 50 feet from the lake or a tributary.	❒ Low ❒ Medium ❒ High

ASSESSMENT 2 – *Location of Application in Relation to Water Resources*. When finished turn to the **Action Checklist** on page 2-10 and record your medium and high-risk practices.

	LOW RISK	MEDIUM RISK	HIGH RISK	YOUR RISK
Location of fertilizer application in relation to surface waters:	Fertilizer is applied at the recommended rate more than 50 feet away from surface waters and surface runoff from post application watering does not drain into surface waters.		Fertilizer is applied 10 to 50 feet from the lake or its tributaries and the drainage of post application watering is not considered.	❒ Low ❒ Medium ❒ High
Location of well in relation to application area:	Application area is down gradient and over 25 ft from the well. No post application surface water reaches well area.	Application area is up gradient and over 25 feet from the well. Post application water drainage does not reach the wellhead.	Application is applied to the lawn area around the well. Post application surface water moves across wellhead area.	❒ Low ❒ Medium ❒ High
Solubility of fertilizer: (to dissolve in water)	Low solubility. 2-3lbs of a non-synthetic fertilizer is split applied (4x/ year). Or, use organic fertilizer or mulch.	Moderately-high solubility. Synthetic fertilizer used. Applied at full rate each time.	High solubility. Applied at full rate or higher 3 to 4 times a year.	❒ Low ❒ Medium ❒ High
Amount of fertilizer applied:	Application rate is based on soil tests. Recommended amount is measured out when applied.	No soil test. Fertilizer applied according to directions on bag.	No soil tests. Fertilizer is applied at an unknown rate.	❒ Low ❒ Medium ❒ High
Pesticide or herbicide application location in relation to Hauser Lake and its contributing streams:	No pesticides are applied or spot application is used to control noxious weeds more than 10 feet away from surface water.	Weed and feed is used on the lawn, but more than 10 feet away from surface waters.	Pesticides are used within 10 feet of the lake. Homeowner treats aquatic weeds with herbicides.	❒ Low ❒ Medium ❒ High
Relative leaching ability of pesticide: (ability to move to the ground water)	Low	Medium	High	❒ Low ❒ Medium ❒ High
Vegetation buffer:	Shrubs, ground cover, and trees are planted between the lake and the lawn and garden to reduce soil erosion and uptake excess nutrients and pesticides.	A natural buffer is present along the shoreline, but the lawn is manicured as close as possible to the lake.	No natural or planted vegetation buffer is present between the lake and the lawn and garden.	❒ Low ❒ Medium ❒ High

ACTION CHECKLIST

Lawn and Garden Management

Write all high and medium risks below.	**What can you do to reduce the risks?**	**Set a target date for action.**
Sample: Fertilizers applied without regard to soil test.	Contact Extension Service for information on soil testing to determine application rate.	One week from today:

SECTION 3

Ensuring a Safe Drinking Water Supply

Keeping Hauser Lake Clean

A Safe Supply?

Most people take a safe water supply for granted. We assume the water coming out of the faucet is safe to drink. Unfortunately, this assumption is not always correct. Households around the lake need to have any private water supply tested regularly to confirm it is safe to drink. At infrequently used vacation homes, the water supply should be tested every year, if the well is not used continuously. Drinking water wells near the lake and its tributaries may draw from shallow ground water and are at the most risk from contamination and need to be tested annually.

A majority of Hauser Lake residents obtain their water through the Hauser Lake Water Association which tests its water on a regular basis.

Some vacation dwellings may use surface water for household water supply which presents a different set of risks and problems. Information about special consideration and testing for surface water is available from the Panhandle Health District (PHD).

The most obvious concern about an unsafe water supply is the health risk to your family and guests. Contamination from wastewater (whether from septic system, outhouse or livestock) is a potential source of bacteria, viruses, and parasites that can cause gastrointestinal problems or transmit contagious diseases. Wastewater also contains high levels of nitrate which can present a serious health risk to infants as well as adults. If poisons, fertilizers or other chemicals are improperly used or disposed of they can get into your drinking water supply and may cause long-term, chronic health problems for humans or animals.

Property value and resale is another reason to make sure your water supply is clean. A safe water supply is an essential component of a valuable piece of property. At the time of property transfer, most lenders will not provide financing for purchasing property without a well test that meets the EPA's Primary Drinking Water Standards for several contaminants.

Is There a Problem?

Be sure to have your water tested:

- if there are unexplained illnesses in the family.
- if there is a sudden or gradual change in taste, odor, or color.
- if visitors become sick shortly after arriving as family members may have developed a resistance to water contaminants.
- if there is a spill of chemicals or petroleum products near your well or into the surface water that services your drinking water supply.
- if an oily sheen appears when the water stands for a while.

What is Groundwater?

Groundwater is the underground water found in the cracks of bedrock and in the porous spaces between gravel and sand particles. Ground water can occur just a few feet from the surface or may be buried several hundred feet down.

Groundwater and the Hydrologic Cycle

The hydrologic cycle explains the movement of water through its various phases from vapor in clouds to liquid water on the land surface, in the ground, and in the oceans. Once rain or snow reaches the ground, it either evaporates, is taken up by plants, or it moves below or across the ground surface. If water stays on the surface it flows into lakes and streams. If it moves downward through the soil and rock it becomes groundwater (Figure 1, page 3-2).

As groundwater moves downward, it passes through the spaces and cracks of rock parent material. Near the surface, where the spaces in the ground consist of both air and water, groundwater is referred to as the unsaturated zone. Below this zone, the "saturated zone" is where water fills all spaces, and is considered the top of the water table.

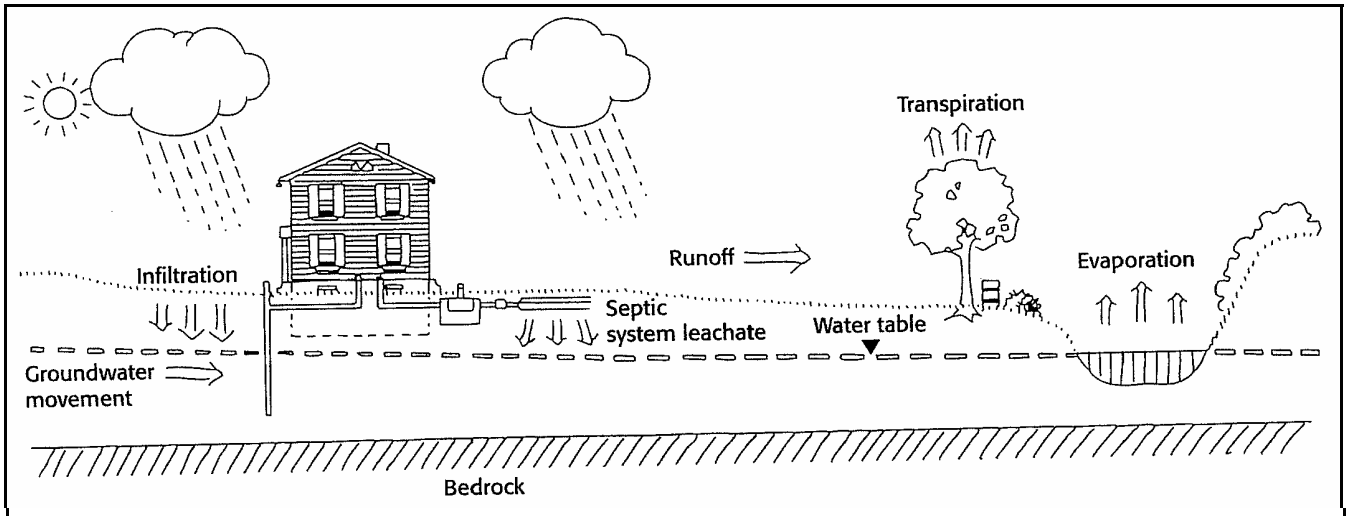


Figure 1. *In the hydrologic cycle, water falls to the earth as rainfall and snow and returns to the atmosphere through transpiration and evaporation.*

Like surface water, ground water moves horizontally, but it moves at a much slower rate, usually only a few inches per day. Its rate of movement depends upon the porosity and permeability of the soil, sand, gravel and /or bedrock.

Water also infiltrates the ground where it renews the water supply. First it moves through a zone of aeration, where air fills most of the pores (spaces) in the soil and rock. Much of the remaining water in the soil is available for plants to use.

Eventually, the water reaches a zone of saturation, where the pores between the rock and sediment are filled with water. The top of this zone is called the water table, and the water here is called ground water. Aquifers are areas in the zone of saturation which contain large quantities of water, generally enough to supply wells or springs. Ground water usually moves slowly through an aquifer. The water eventually leaves the aquifer. Ground water can flow naturally from springs, canyon walls, or as a seep; supplying water to rivers; or be pulled into wells. Once on the surface, the water may evaporate or again infiltrate the earth's surface - starting the cycle over.

What is an Aquifer?

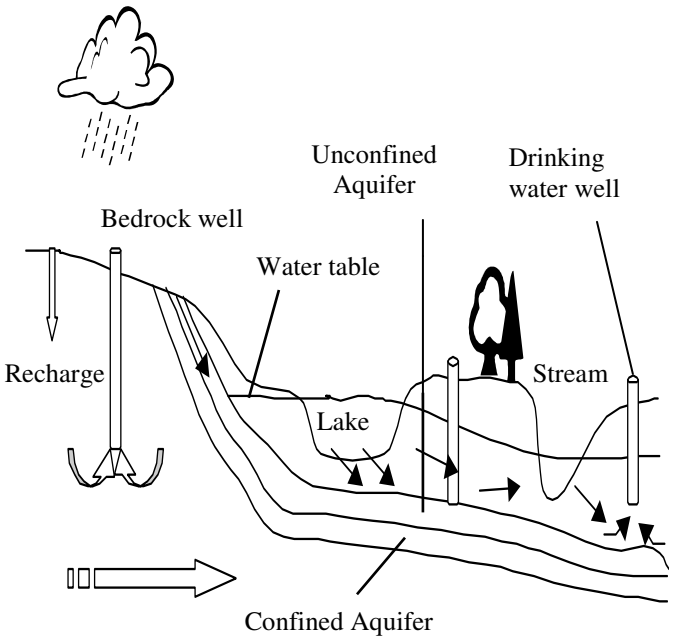
Aquifers are areas where large quantities of water fill the pore space between rocks and sediment.

As groundwater moves downward, it passes through the spaces and cracks of rock parent material. Near the surface, where the spaces in the ground consist of both air and water, groundwater is referred to as the unsaturated zone. Below this zone, the "saturated zone" is where water fills all spaces, and is considered the top of the water table.

Aquifers are defined as either confined or unconfined with confined aquifers overlain by one or more layers of impermeable rock or soil which restrict water to within the aquifer. Thus, water is confined under pressure much the same as the air in a balloon. Drilling a well into a confined aquifer causes the water to rise in the well. If the water comes to the top of the well, these wells are called artesian wells.

Unconfined aquifers are those which are not overlain by a layer of impermeable rock or soil. Water in a well will naturally stay at the level of the water table. As water is removed from the well, the water table is lowered, causing the surrounding ground water to flow toward the well.

The Rathdrum Prairie aquifer is unconfined and Hauser Lake is a Critical Recharge Area for the aquifer. If pollutants are allowed into Hauser Lake then that pollution could eventually reach the aquifer and contaminate community water sources.



Protecting Your Drinking Water is Important!

Preventing contamination of both ground water and surface water in the Hauser Lake area is very important due to the dynamic interaction between the two drinking water sources called hydraulic continuity. Hydraulic continuity is the movement of water in a saturated environment between ground and surface water. Once either water source becomes contaminated both become contaminated making it very difficult to contain or clean up. Both ground and surface water then play an important role in supplying drinking water to the households around Hauser Lake.

Drinking Water Sources:

- Community Public Water System. This public system serves homes/cabins, trailer parks, taverns, restaurants and other businesses around the lake. At Hauser Lake the community owned water association extracts water from wells drilled into the Rathdrum Aquifer along Cloverleaf Road.
- Drilled wells which service individual home sites or a small development of homes. Drilled wells have been developed within sand/gravel upper layer aquifers, developed in sand/gravel aquifers below confining clay layers, or in some cases developed within fractured bedrock.
- Sand-point or drive-point wells developed in sandy soils which may be as shallow as 12 feet.
- Surface water extracted from the lake or streams. This water is not recommended for drinking unless treated.

It is the homeowners sole responsibility to protect their individual drinking water supply. Only public systems, which serve more than 15 connections or at least 25 individuals daily for at least 60 days of the year are regulated to meet State and Federal Drinking Water Regulations. If your home is served by other than a public system, either by an individual well or extraction from surface waters, then it is your responsibility to provide a safe drinking water supply. Contaminated drinking water sources can be extremely difficult and expensive to clean up.

BMPs for Protecting Drinking Water

The following information addresses the management of your wellhead and surface water sources of drinking water and the location of contamination sources in relation to those sources.

Well Location

Whether a well taps water just below the ground surface or hundreds of feet deep, its location at the ground surface is a crucial safety factor. Locating a well in a safe place takes careful planning and consideration of factors such as where the well is located in relation to surface drainage and ground water flow. A well down-slope, from a leaking fuel tank or a failing septic system runs a greater risk of contamination than a well on the uphill side of these pollution sources. The general rule for protecting the water supply is to *keep a well up-slope and as far as possible from potential sources of contamination.*

Separation Distances

Many states encourage good well location by requiring minimum separation distances from sources of potential pollution, thus using the natural protection provided by soil. Idaho Department of Water Resources (IDWR) Well Construction Standard Rules requires that constructed wells must meet all site and distance requirements set forth by Panhandle Health District and Department of Environmental Quality. For example, Idaho Rules require a minimum distance of 100 feet from a septic drain field to a well (see Figure 2 for distance requirements).

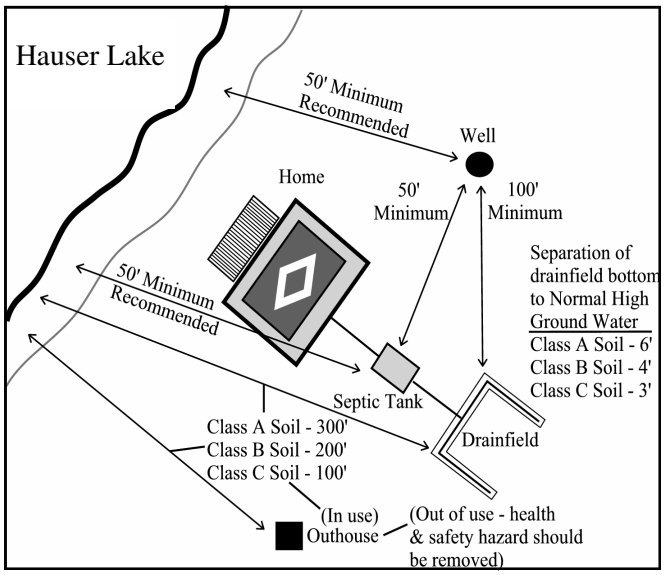


Figure 2. *Panhandle Health District minimum separation distance requirements between the drinking water well and some possible sources of contamination.*

Changing the location of contamination sources in relation to your well may protect your water supply, but not the ground water itself. Any condition likely to cause groundwater contamination should be improved, even if your well is far away from the potential source. Whether or not drinking water is affected, **groundwater and surface water contamination is a violation of Idaho law.**

There is no specific distance that will guarantee that the well will not be affected. Make every effort, however, to always provide as much separation as possible between your well and any potential contamination source(s).

Both soil type and slope can make well location a tricky business. Keep in mind that separation distances listed by the state are minimums. You may want to chose greater separation distances in some cases, depending on factors at your well site. All surface runoff should be diverted away from the well. Be sure to consider possible contamination sources on adjacent properties as well.

Well Construction

Proper well design reduces the risk of contamination by sealing the well from anything that might enter it from the surface (Figure 3). Poor design can allow a well to become contaminated by letting rain or snowmelt reach ground water without filtering through the soil. Wells located in pits, or constructed without grout or a sanitary well seal, can allow surface water to carry bacteria, pesticides, fertilizer, or petroleum into your drinking water supply.

Several items concerning well construction that should be checked are described in the following sections. Well construction information may be available from the person who drilled your well, the previous owner, or the well construction report. The IDWR has copies of well construction reports (well logs) on file and available on-line. You may contact any IDWR office in the state to request a copy. The location of your well, reported by township, range, section (1/4 of a 1/4 section or 40 acres) and the name of the person for whom the well was drilled will be needed to locate your well log. Well construction reports, for wells drilled prior to 1987, were not required to be filed with IDWR and therefore may not be readily available.

Casing, Grout, Pitless Adapter, and Well Seal

The well driller installs a steel pipe (casing) during construction to prevent collapse of the borehole. All openings in the casing should be sealed, and if water pipes exit through the side of the casing, they must do so through an approved fitting called a pitless adapter.

The space between the casing and the sides of the borehole provides a direct channel for surface water and contaminants to reach ground water. To seal off that channel, the driller fills the space with grout (cement or a type of clay called bentonite). The grout seal should extend at least 18 feet in depth from the ground surface with the ground surface sloping away from the well in all directions. This will cause surface water to flow away from the well.

You can visually inspect the condition of your well casing for holes or cracks at the surface, or look down inside the casing with a light or mirror. If you can move the casing by pushing against it, you have a problem with your well casing's ability to keep out contaminants. Check on the condition of your well casing by listening for water draining down into the well (pump should not be running). If you hear water, there could be a crack or hole in the casing, or your casing does not extend down to the water level in the well. Either situation puts your drinking water source at risk.

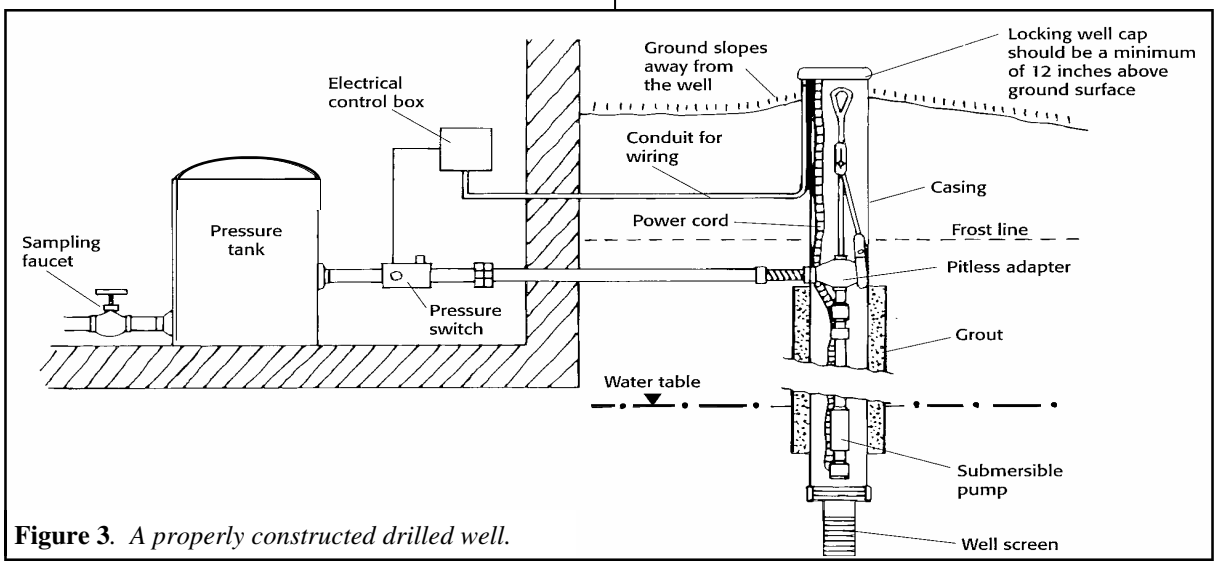


Figure 3. *A properly constructed drilled well.*

To prevent contaminants from getting down inside the well casing, the driller installs a tight fitting, vermin-proof well cap to prevent easy removal by children or entry of insects or surface water. Well regulations require a vermin-proof seal for all private wells (not all wells have caps; some may have pumping equipment attached at the surface). The cap should be firmly installed, with a screened vent incorporated into it so that air can enter the well. If your well has a vent, be sure that it faces the ground, is tightly connected to the well cap, and is properly screened to keep insects out. Check the well cap to see that it's in place and tightly secured. Electrical wires entering the well should be in an approved conduit.

Casing Depth and Height

As stated in Idaho Well Construction Standards, all wells are required to have a durable, watertight casing that extends to a minimum depth of 18 feet below ground level. This ensures that water is filtered through soil and geologic materials before entering the well. Since most contamination comes from the surface, grouting along with casing the well deeper can provide greater protection, so you may want to consider exceeding the minimum casing depth.

Typically, the casing extends one to two feet above surrounding land to prevent surface water from running down the casing or on top of the seal and into the well. Idaho well regulations require that at least 12 inches of casing pipe extend above the final grade of the land. The drilling of wells in areas that are subject to flooding is strongly discouraged. Check with IDWR for regulations concerning casing construction and minimum specifications.

Well Depths

Shallow wells which draw from the ground water nearest the land surface are generally more quickly affected by surface activities such as pesticide usage. Local geologic conditions determine how long it takes for this effect to happen. In some places, this process happens quickly—in weeks, days, or even hours. Areas with thin soils over fractured bedrock or sand and gravel aquifers are particularly vulnerable to contamination. On the other hand, thick clay soils can prevent contaminants from reaching the water table.

Well Age

If you have an older well, you should have it inspected by a licensed well driller. Older well pumps are more likely to leak lubricating oils, which can contaminate the ground water. In addition, older wells are also more likely to have a thinner casing that has corroded through. Even 30 to 40 year old wells with modern casings are subject to corrosion.

Backflow Prevention and Cross Connections

Anti-backflow devices can be placed on all faucets with hose connections, and air gaps should be maintained between hoses or faucets and the water level during all activities. Otherwise, you risk having contaminated water from laundry tubs, sinks, washing machines, pressure washers, outside hydrants, livestock tanks, and hot tubs flowing back through the plumbing to contaminate your water supply. Water supplies that have cross-connections between them (connections between two otherwise separate pipe systems, such as potable and non-potable) also put your drinking water at risk.

BMPs for Maintaining Existing Wells

You wouldn't let a car or tractor run too long without an oil change, and likewise your well deserves the same attention. Good maintenance means testing the water every year, keeping the well area clean and accessible, keeping potential contaminants as far away as possible, and periodically having a qualified well driller check the well mechanics.

To maintain a safe water supply, follow these guidelines.

Short-Term BMP's

- Test the water annually for nitrate and at least annually for 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 Section #4.
- Avoid diverting surface drainage to well areas where it may seep into your drinking water.
- Minimize the use of fertilizers and pesticides, particularly in sandy soils or with shallow wells; see Section #2.
- Properly dispose of hazardous household products; see Section #5.

Long-Term BMP's

- Use a licensed well contractor for installing new wells or sealing unused wells.
- When installing or replacing a well, follow the required isolation distances.
- 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.

BMPs for New Wells

New wells are expensive, but they are a good investment for the future. Getting the most from such an investment means locating the well away from contamination sources and working to maintain the quality of the well. Some simple principles are:

- Prior to drilling a new well make sure groundwater is not already contaminated.
- Follow at least the required minimum distances from potential contamination sources that are set by your local public health district, as well as any other local ordinances when locating your new well.
- Locate your well on ground higher than contamination sources such as fuel tanks, livestock lots, septic systems, or pesticide mixing areas. Where practical, locate the well as far as possible from contamination sources. There is no specific distance from potential contamination source that will guarantee the well will not be affected.
- Build soil up around the well so that all surface water drains away from it, but maintain the minimum 12 inches of casing above the soil surface.
- Avoid areas that are prone to flooding.
- Make the well accessible for pump repair, cleaning, testing, and inspections.
- Hire a competent, licensed well driller. Make sure the driller disinfects the well with chlorine after construction, tests the water for bacteria after drilling, and provides a copy of the water well record, which includes detailed information about the well depth and construction.

Unused Wells

Many rural homesteads have unused wells. It is not uncommon to visit a homestead and find several wells, with only one currently in use. No one knows how many of these wells are in Idaho, although estimates range in the thousands.

If not properly filled and sealed, these wells can provide a direct conduit for surface water carrying contaminants to enter ground water without filtering through soil or can allow contaminant movement from one water source to another.

In addition to these wells being a threat to ground water, large open wells pose safety hazards for people and animals. The landowner, under Idaho law, is responsible for properly abandoning wells and test holes.

You may perform proper well abandonment work on your own land or an Idaho licensed well driller can also be hired to close these wells. Regardless of who does the work, the minimum regulatory requirements must be met. A local well driller can be helpful because they will have experience with well construction materials and methods as well as a working knowledge of the geology of the well site.

Knowledge of the geology of the well site and special equipment is often required to remove old pumps and piping and to properly install sealing material inside the well. Use of inappropriate materials and methods can lead to well settling, collapse, and continued ground-water contamination.

Locating Unused Wells

Pipes sticking out of the ground around the home or under an old windmill are the most obvious places for finding unused wells. You may not know the history of your property, however, and old well locations may not be obvious. A depression in the ground may indicate an old well. Also, wells were often drilled in basements of houses, under front steps, or near old cisterns.

Proper Well Abandonment

The IDWR administers the laws regulating the abandonment of wells. Well drillers and landowners are required to follow these laws so that the potential for aquifer contamination can be reduced.

Proper well closing takes time and money. Costs will vary with the well depth, diameter, and geology of the area. However, spending a few hundred dollars to properly abandon an old well near your home may prevent contamination of your drinking water. Please contact the IDWR in your area for additional information.

Water Testing

Keep an eye on water quality in existing wells by testing them regularly. Wells should be tested immediately after construction, and then at least once annually for coliform bacteria. Well testing is particularly important for shallow wells, dug wells and sand-point wells, and wells that have shown contamination.

The water should also be tested:

- before using a well that has not been used for a long time.
- when family or guests experience recurring or unexplained stomach illness.
- if there are individuals who may be at increased risk like infants and pregnant or nursing women.
- if your neighbors find a particular contaminant in their water.
- if you note a change in water taste, odor, color, or clarity.
- if you have a spill or back siphon of chemicals or petroleum products near your well or on your homestead.
- when there has been a significant change in land use in the area.
- if the presence of an old landfill has been discovered nearby.

What To Test Wells For

A good initial set of tests for a private well includes hardness, pH, conductivity, corrosivity, chloride, nitrate, coliform bacteria, and perhaps lead.

Annually test for total coliform bacteria which is the standard bacteriological test conducted on drinking water supplies. The presence of total coliforms is an indicator of system vulnerability. Total coliform bacteria are a group of closely related bacteria genera, where some species are found in fecal matter, and some species are found in soil and plant material. If your drinking water sample shows the presence of total coliforms, many laboratories will automatically test for the presence of fecal coliforms. Presence of fecal coliforms indicates fecal contamination of the water source, either through an animal source or from septic systems. **If fecal coliforms are present, the water does not meet drinking water standards**. Certain bacteria and viruses from fecal sources are pathogens, that when ingested can cause intestinal disorders and diseases (hepatitis for example). A short term fix for coliform contamination is boiling water, a long term solution is disinfection of the supply (chlorination or the use of ultra-violet light).

Another primary contaminant is nitrate-nitrogen. Nitrate occurs naturally in waters, but levels above 10 mg/L (the Federal Drinking Water Limit) should not be consumed by infants under one year of age or pregnant women. High nitrates in ground water often stem from agricultural activities such as fertilizing and manure from animal feed lots.

Lead in drinking water can be a health concern particularly for children and fetuses. The lead level should not exceed five parts per billion. Sample for lead if you have lead pipes or copper joints with lead solder. Soft or acidic water can accelerate leaching of lead from the plumbing system.

Laboratory tests for other possible contaminants can be quite expensive so you will probably not have them done unless you suspect a specific problem. For example, you may want to test for volatile organic chemicals (VOCs) if there has been a nearby use, spill or deposit (in dump or landfill) of oil, petroleum, or solvent. The same circumstances can be stated for pesticides.

A high concentration of iron in groundwater sources will cause stained porcelain and may be unpleasant to taste, but it is not a harmful compound.

Drinking waters may be tested at commercial laboratories, or in Kootenai County they may be tested through the Panhandle Health District in Coeur d'Alene. Follow the lab's instructions for water sampling to assure accuracy of the results. Use only the container provided and return the samples promptly. Bacteria sample bottles are sterile and must be returned to the lab within a short specified time limit. Request that drinking water methods be used to test your water**.** You may also want assistance in interpreting test results. Contact your local public health district or Idaho Department of Environmental Quality (see contact list on page 3-8).

Using Surface Water

The Idaho DEQ does not recommend using surface water as a drinking water supply unless it is treated. A few older homes/cabins in this area may extract water from either Hauser Lake or nearby streams for household use. Besides bacteria, surface waters can also contain single cell protozoan, *Giardia* and *Cryptosporidium*, whose cysts are intestinal parasites and considered as a waterborne disease. The cysts reside in the digestive tract of mammals, and are transmitted through the fecal-water-oral route. Ingestion of the cysts by humans can lead to severe intestinal disorders.

Use of surface water for drinking should go through a two-step treatment process. The water should be filtered to 1 micron to remove most of *Giardia* and *Cryptosporidium* cysts. Water should then be disinfected to kill bacteria and viruses. Water can be disinfected by boiling, using chlorine, or with ultraviolet light.

BMPs for Surface Water

Protecting a surface drinking water source is difficult because of the many different environmental factors that can adversely impact the surface waters in the Hauser Lake watershed. Your first defense and only sound practice for safe drinking water is a filtration system. Beyond that anything you can do to prevent contamination of Hauser Lake and its tributaries is a bonus. Implementing the best management practices found in the Lake*A*Syst materials will help protect both ground and surface waters in the Hauser Lake watershed.

Home Water-Treatment Systems

If you do not receive your water from the community water association and need to treat it, please be cautious about the multitude of available Home Water-Treatment Systems. First, make sure any treatment unit is certified by the National Sanitation Foundation (NSF). Home systems can be quite expensive, and you may get sold a system that is treating water for a whole host of compounds that are not a concern around Hauser Lake, and conversely does not treat for a compound that may be of specific concern. If you are drinking Hauser Lake water, you would want a system NSF certified for cyst reduction. There have been excellent articles in Consumer Reports on safe water and home treatment systems.

For home use, two types of filters are generally considered:

Granular Activated Carbon. This filter addresses taste, odor, removes chlorine and volatile organic chemicals (VOCs), and some inorganic chemicals (IOC) like lead. They are not as effective against microorganisms. This filter is higher maintenance than other types of filtration devices.

Membrane Filtration. Membrane filters (Microfiltration, Ultrafiltration, Nanofiltration, and Reverse Osmosis) remove particles by forcing water through very small openings.

- Microfiltration - removes particles down to micron and submicron sizes. These units typically do not remove dissolved material.
- Ultrafiltration – passes nearly all ions, but removes nearly all organisms and suspended particles.
- Nanofiltration – generally removes ions larger than one nanometer.
- Reverse Osmosis– removes virtually all particles and many ions. Higher maintenance due to cleaning.

For More Information

call, write or visit…

Panhandle Health District
8500 N. Atlas Rd.
Hayden, ID 83835
(208) 415-5200

Idaho Department of Environmental Quality
2110 Ironwood Parkway
Coeur d'Alene, ID 83814
(208) 769-1422

Idaho Department of Water Resources
7600 Mineral Dr. Ste 100
Coeur d'Alene, ID 83815
(208) 762-2800.

See Resource Directory (Appendix B) for additional agency contacts.

Notes:

Lake*A*Syst

Keeping Hauser Lake Clean

Assessing and preventing the risk of drinking water contamination by

Ensuring a Safe Drinking Water Supply

Home-Owner Risk Assessment Sheet

WORKSHEET 3

ASSESSMENT 1 – ***Drinking Water Well Location***– The assessment table below will help you identify potential environmental risks related to Hauser Lake and your drinking water, if from a private well. For each question indicate your risk level in the right-hand column. Your goal is to lower your risks. Some choices may not correspond exactly to your situation. Choose the response that best fits. When finished turn to the **Action Checklist** on page 3-12 and record your medium and high-risk practices. Use the BMP recommendations in Section #3 *Ensuring a Safe Drinking Water Supply* to help you decide how to best reduce pollution.

	LOW RISK	MEDIUM RISK	HIGH RISK	YOUR RISK
Position of well in relation to contamination sources:	Up slope from all potential sources of contamination. No surface water runoff reaches well. Surface water diverted from well area.	Well is level to downslope from potential sources of contamination. Some surface water runoff may reach well.	Well is downhill from pollution sources or in a depression. Surface water runoff reaches well.	❒ Low ❒ Medium ❒ High
Separation distances between well and pollution sources (suggested minimum separation distance is 100 feet):	Distances from potential pollution sources meet or exceed all state minimum requirements.	Some but not all distances from potential pollution sources meet state minimum requirements.	Distances from most or all potential pollution sources do not meet state minimum requirements.	❒ Low ❒ Medium ❒ High
Soil type:	Soil is fine-textured like clay loams or silty clay.	Soil is medium-textured like silt or loam.	Soil is coarse-textured like sand, sandy loam, or gravel.	❒ Low ❒ Medium ❒ High
Subsurface conditions:	The water table or fractured bedrock are deeper than 20 feet.		The water table or fractured bedrock are shallower than 20 feet.	❒ Low ❒ Medium ❒ High

ASSESSMENT 2 – ***Well Construction and Maintenance*** – Use the table below to rate your risks related to well construction and maintenance. When finished turn to the **Action Checklist** on page 3-12 and record your medium and high-risk practices.

	LOW RISK	MEDIUM RISK	HIGH RISK	YOUR RISK
Well age:	Constructed since Idaho well guidelines were enacted in 1987.	Well meets Idaho requirements, but constructed prior to 1987.	Not constructed according to Idaho regulations.	❒ Low ❒ Medium ❒ High
Well type:	Drilled well.	Driven-point well.	Dug well.	❒ Low ❒ Medium ❒ High
Casing height above land surface:	Casing extends 12 or more inches above the surface, if the area floods, casing is above flood levels.	Casing is at the surface or up to 12 inches above the surface.	No casing present. Hand dug well. Pump at or below ground surface.	❒ Low ❒ Medium ❒ High
Condition of casing and well cap:	No holes or cracks are visible. Cap is tightly attached. A screened vent faces the ground. No space around the pitless adapter.	Casing showing visible stress fractures. Cap is loose and no screen present.	Holes or cracks are visible. Cap is loose or missing. Running water can be heard or seen. Ground around casing is sunken.	❒ Low ❒ Medium ❒ High
Casing depth and surface seal (see well log for this information):	Casing extends below water level in well and is more than 18 feet below surface. At least 18 feet of surface seal is in place, or into the confining layer above the aquifer in which the well is completed.	Surface seal missing or less than required depth (an 18 foot surface seal is required for all new well installations. Placement of a surface seal in all wells is required)	No surface seal.	❒ Low ❒ Medium ❒ High
Backflow protection:	Anti-backflow devices (such as check valves) installed. No cross-connections between water supplies.		No anti-backflow devices. Air gap not maintained. Cross-connections between water supplies.	❒ Low ❒ Medium ❒ High
Water testing:	Regular annual testing. Records indicate consistent, satisfactory water quality. Bacteria, nitrate, and other tests meet standards.	Regular testing. Bacteria, nitrate, and other tests do not meet standards some of the time but are closely monitored.	No water testing. Water taste, clarity, and smell change throughout the seasons.	❒ Low ❒ Medium ❒ High
Unused Wells:	There are no unused wells, or there are unused wells that are properly sealed.	There are old wells partially used, but are maintained to keep out contaminants.	Unused, unsealed wells, near the lake or drinking water well.	❒ Low ❒ Medium ❒ High

ASSESSMENT 3 – ***Drinking Water Source and Conveyance System*** – Use the table below to rate your risks related to drinking from Hauser Lake or any of its tributaries. Note: DEQ does not recommend drinking from Hauser Lake or any other surface water source without an approved treatment process. Please review Section #3 *Ensuring a Safe Drinking Water Supply* for more information. When finished turn to the **Action Checklist** on page 3-12 and record your medium and high-risk practices.

	LOW RISK	MEDIUM RISK	HIGH RISK	YOUR RISK
Drinking water source:	Deep groundwater. Over 20 feet deep.	Shallow ground water. Under 20 feet.	Hauser Lake or any other surface water source (streams, creeks, ponds).	❒ Low ❒ Medium ❒ High
Conveyance system:	Properly constructed drilled well.	Hand dug, or driven point well.	Pump and a pipe that extends into the water.	❒ Low ❒ Medium ❒ High
Separation distances between surface water and pollution sources (suggested minimum separation distance is 100 feet):	Distances from potential pollution sources meet or exceed all state minimum requirements. Septic Tank to surface water over 50 feet. Drain Field to surface water– 100 to 300 feet depending on soil type (see Section #3).	Some but not all distances from potential pollution sources meet state minimum requirements.	Distances from most or all potential pollution sources do not meet state minimum requirements.	❒ Low ❒ Medium ❒ High
Home water-treatment system for surface water:	A two-step treatment system. Water is fine filtered through a membrane filter certified by the National Sanitation Foundation for Giardia and Cryptosporidium Cysts. Then water is disinfected by boiling, using chlorine, or by ultraviolet light.	Granular Activated Carbon filter (generally a good filter, but are not as effective against microorganisms and bacteria). Water should also be disinfected.	No treatment or a screen or a t-shirt wrapped around the end of the pipe.	❒ Low ❒ Medium ❒ High
Water testing:	Regular annual testing. Records indicate consistent, satisfactory water quality. Bacteria, nitrate, and other tests meet standards.	Tested once in the last 5 years. Bacteria, nitrate, and other tests do not meet standards some of the time but are closely monitored.	No water testing. Water taste, clarity, and smell change throughout the seasons.	❒ Low ❒ Medium ❒ High

ACTION CHECKLIST

Ensuring A Safe Drinking Water Supply

Write all high and medium risks below.	**What can you do to reduce the risks?**	**Set a target date for action.**
Sample: Water hasn't been tested for 5 years. Does not taste like it used to.	Contact DEQ or the Panhandle Health District for information on water testing.	One week from today:

Lake*A*Syst

Assessing and preventing the risk of lake water contamination

SECTION 4

Household Wastewater Treatment

Keeping Hauser Lake Clean

Why can Septic Systems be a Problem?

If your home is near the shoreline of Hauser Lake or one of its tributaries it is particularly important to maintain your septic system properly because soil and water conditions near shorelines 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. Bacteria, viruses, and parasites in wastewater may spread hepatitis, dysentery, and other diseases. 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 also reach the ground surface or end up in the water if discharged into your household drains. These hazardous chemicals may neutralize the good bacteria that are breaking your sewage down. Before dumping any chemical into your septic system, consult the labeling instructions for proper disposal practices.

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 or over fertilization.

Inadequate treatment can also allow excess nutrients to reach a nearby lake or stream, promoting algae or weed growth. Algal blooms and excessive weeds not only make the lake unpleasant for swimming and boating, but they may 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.

Existing Systems

The following are the three most common types of wastewater treatment systems found in the North Idaho area.

Sewage Lagoon – Land Application Systems: In a sewage lagoon system, the wastewater either flows by gravity or is pumped to lined lagoons where it is stored and treated. The wastewater can be either whole sewage straight from the residences or the clarified wastewater from a septic tank called "effluent." During the growing season, the lagoon water is disinfected and is applied to open areas where nutrients are utilized by the soil and plants. These systems require considerable acreage for setback requirements and management by a licensed operator. These systems are cost-effective for areas where there is a sufficient population and density to keep user charges affordable.

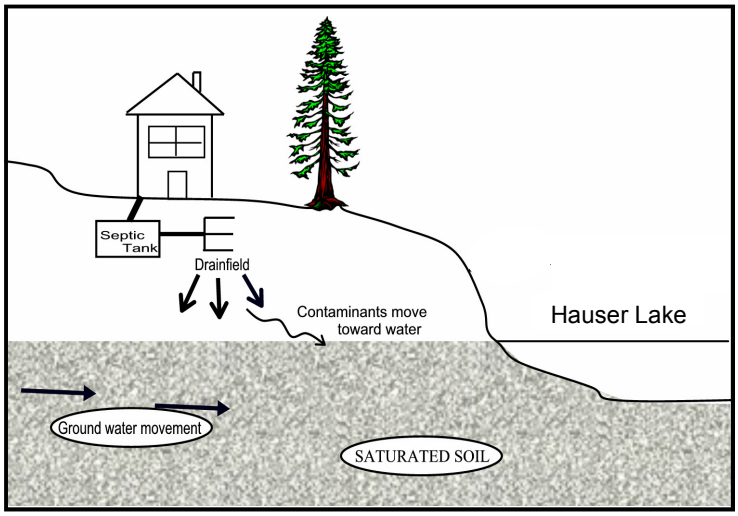


Figure 1*: Avoid contaminating Hauser Lake from inadequate wastewater treatment! If your system is improperly designed or located too close to the water, contaminants may eventually reach Hauser Lake. This figure shows how contaminants move from the septic system to the lake in saturated soil.*

Septic Tank & Drainfield: Most of the residences around Hauser Lake are serviced by individual septic tanks and drainfields, which are the main focus of this section. If your system was installed prior to August 1, 1971, you have a system prior to Panhandle Health District (PHD) records. Please review the PHD Vested Right Policy, 8/30/2006, for which scenario your lot is vested for at this time. Older septic systems may be as close as 25-50 ft. from the lake, a steel tank that has deteriorated, or simply have a cesspool or drywell. All of these offer minimal wastewater treatment and would require an upgrade prior to building permit signature by PHD.

"If you have a steel septic tank over 20 years old, it may be in poor condition, and could be leaking."
Steel tanks commonly used in the area have a high probability of failure due to rust and should be replaced with a modern design.

Septic Tanks & Common Drainfield: Some neighborhood groups around Hauser Lake have developed systems where wastewater is collected in septic tanks and pumped uphill to a common drainfield that meets PHD setbacks from the lake. The distance the effluent needs to travel from the drainfield to the lake allows the soil to treat the wastewater to a level that minimizes water quality impacts.

Purpose and Design of a Septic Tank/Soil Absorption System

The purpose of an on-site sub-surface sewage disposal system, commonly known as a septic system, is to treat sewage from your household. A septic system has two parts: the septic tank and the soil treatment system. A septic tank receives all wastewater from the household and discharges effluent that drains into the soil through a drainfield. Three layers form in the tank: solids settle to the bottom (sludge), a layer of scum or grease floats on the surface, and the liquid layer in the middle, is effluent (Figure 2). As raw sewage is added to the tank, an equal amount of liquid effluent flows out into the soil treatment system, or drainfield.

Wastewater treatment is finished in the soil absorption area. There are three basic methods of soil absorption. **Drainfield trenches** have buried inch perforated flat pipes in 3 foot wide trenches surrounded by "drainfield rock" covered by soil. **Absorption**

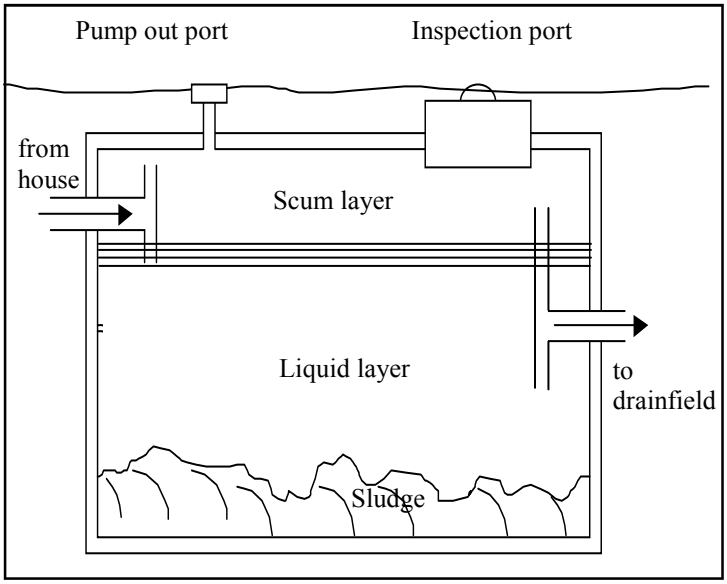


Figure 2*: Typical septic tank.*

beds are flat bottomed rectangular excavations with a distribution network of perforated piping, drainfield rock and soil cover. **Mounds** are elevated systems that may use pressure to distribute sewage effluent. Mounds are alternatives that may be permitted where high ground water and permeable soils coexist.

Dry wells and cesspools are a combination of septic tank and drainfield in one spot. These are not permitted and should not be installed due to the extreme health risks to ground and surface water. Old on-site systems with drywells or cesspools 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 feed on organic matter and 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 dry soils where oxygen can treat the effluent. 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 and possibly into surface water (Figure 1, page 4-1).

Installing a Septic System

Before purchasing undeveloped property, one should evaluate whether it has a suitable area for construction of a septic system. BEFORE **any construction**, identify the best possible site for it. Determine the site for your septic system and water well BEFORE laying out the design for your buildings or compacting soil by using heavy equipment. A Panhandle Health District (PHD) Environmental Health Specialist (EHS) must evaluate the site and soils prior to installation of a system and issue a permit.

To identify where the septic system should be installed, determine with a PHD EHS the following:

- 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 - no buildings, driveways, or other development should take place there.* PHD will require this in the permitting process.

The EHS will be able to determine information about soil, ground water, and other pertinent conditions through test holes and soil analysis that will determine suitability for the septic permit. For a site evaluation contact PHD at (208) 415-5200.

Assistance with failing systems or new designs

If your household wastewater treatment system is backing up or is clogged, contact your plumber or treatment system installer. It may be time to pump the sludge from your septic tank because solids have escaped and plugged the drainfield. If your sewage is surfacing or otherwise failing, contact your local public health district. A permit to repair or replace your wastewater treatment system may be required from the PHD. A licensed septic installer is required to repair failed systems.

If you have a septic tank-soil absorption system, do not wait for the system to fail before pumping the septic tank. Once a system fails, it may be too late to pump the tank and salvage the absorption field. Also avoid using septic tank additives, they provide no benefit. If wastewater is surfacing near or above your soil absorption field, don't cover it with more soil, contact the PHD. This covering does not fix the problem and wastewater will soon surface again.

If your wastewater treatment system is leaking or showing signs of failure, seek help to correct the problem through PHD and licensed septic installers. Do not pipe the sewage to the ground surface or stream for this pollutes the water, creates a public health hazard, and is illegal (Idaho Individual Subsurface Sewage Disposal Rules (IDAPA 58.01.03). The health department will require you to get a repair permit and alleviate the hazard. Also, do not run the sewage into a sinkhole or drainage well because it can potentially pollute ground and well water.

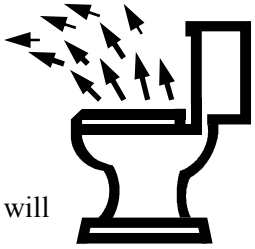
How to Tell If There Is a Problem

These conditions indicate that 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 growths 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 drinking 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 nearby surface waters.

If your household wastewater treatment system is showing any of these signs of failure **call your treatment system installer or Panhandle Health District immediately.**

If Your System Fails



IMMEDIATE ACTIONS

- **Call the Panhandle Health District**. (208) 415-5200. They will help you 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, and wildlife).
- **Don't use additives.** Additives are no benefit and may harm the system.

A properly designed, constructed, and maintained system can effectively treat wastewater for many years. For more information on septic systems and wastewater lagoons, or for advice on alternative wastewater systems, contact Panhandle Health District at (208) 415-5200 or visit their website, environmental section at http://www.phd1.idaho.gov/

These actions may help if the system fails:

- **Increase the absorption field size of the existing system or utilize the replacement area.** This will help if the original field was sized too small for the household or if water doesn't percolate well through the soil.
- **Investigate forming a community drainfield system.** There have been a few cases where adjoining homes have constructed a community drainfield system at a location with acceptable soil conditions. This was done because of failing or poor performance of individual septic systems.

Long-Term Best Management Practice

The only practical long-term solution may be to upgrade your septic system by redesigning and replacing part or all of it. **A licensed installer** must design and install individual sewage treatment systems. **A permit is required from the Panhandle Health District 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. Review the PHD Vested Right Policy for criteria on remodeling, additions, and/or replacements of homes as it pertains to the septic systems. Also, be sure to preserve enough undeveloped space on your property for future expansion of the drainfield and replacement area. All drainfields have a limited life expectancy based on site and use. Typically a drainfield can last from 20 to 40 years.

Conventional fixture	Gallons/ flush	**Water-saving Fixture/device**	Gallons/ flush
Toilet	4-6	Low-volume toilet	**1.6**
Shower head	4-6/ min.	Low-flow shower head	**2.5/ min.**
Faucets: Bathroom and Kitchen	4-6/ min.	Faucet-flow-Control aerators: Bathroom and Kitchen	**2.5/ min.**

Table 1. Conventional vs. water-saving fixtures.

BMPs for Improving Wastewater Treatment

Satisfactory treatment and disposal of residential wastewater can be accomplished by on-site systems. For these systems to function over a long period of time, they need to be properly designed, installed, and maintained. When these systems are properly designed, installed, and used, there will be minimal impact by the system on surface or ground water.

Here are several BMPs you can follow to keep your septic system in good working order to protect the lake and its tributaries.

Quantity and Collection of Wastewater

Reducing the volume of wastewater entering the treatment system is important because less flow (volume) means better treatment, longer system life, and less chance of overflow. Excess flow is a principal reason for system failure (wastewater surfacing or backing up in house). However, all wastewater needing treatment should be sent to the system to avoid contamination of surface or ground water.

Less flow entering the system improves treatment by increasing the time waste spends in the septic tank, thus providing more time for solids' separation, settling, and decomposition. Less flow also means improved aeration and increased soil contact, providing better treatment in a soil absorption field.

Consider the following ways to **conserve water:**

- **Excessive water use** is the most common cause of septic failure, so reduce water used for bathing, laundry, and flushing the toilet (see Table 1).
- **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 flow showerheads.**
- **Install low gallon per flush toilets.**
- **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.

- **Keep a container of drinking water in the refrigerator.** This saves having to run water until it's cold.
- **Do not use the toilet as a wastebasket.** Don't flush facial tissue, diapers, tampons, or any kind of plastic down the drain. These items will clog septic pipes/drainfield and fail the system.
- **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.
- **Dispose of household hazardous waste properly.** See Section #5 for additional tips on reducing household hazardous waste.

Cleaning and Laundry BMPs

- **Wash only full loads in the dishwasher**. Typical dishwashers use about 13 gallons for each wash. Newer models use 8-9 gallons.
- **Use phosphate-free detergents**.
- **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 is 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.

Quality of Wastewater

Contaminants found in wastewater include:

- **Bacteria and viruses.** Some can cause disease in humans. These microorganisms are usually removed by settling or through filtration in the soil. Many will die from aging or the adverse conditions in the soil absorption system.
- **Suspended solids.** These are composed of particles which are more dense (sludge) or less dense (scum) than water. Most can be separated from liquid waste by allowing enough time in a relatively calm septic tank. Grease and fats are also considered suspended solids. Soil absorption fields can quickly become clogged or fail due to wastewater high in suspended solids.
- **Organic chemicals.** These include cleaning solvents, paints, pesticides, and fuels which usually are not degraded or removed through treatment and can pass along with the wastewater into the water supply and inactivate the treatment of your domestic wastewater in the tank and soil.
- **Inorganic chemicals**. These include lead from corroded piping, pesticides (herbicides, insecticides, fungicides, and rodenticides), and preservatives that may seriously compromise your on-site treatment system. Household on-site systems are generally designed to degrade only biological contaminants. Inorganic chemicals introduced into your on-site system may even harm the microorganisms that break down wastes.
- **Nutrients.** Nitrogen from human wastes and phosphorus from detergents and some chemical water conditioners are the most notable nutrient sources. Nitrate-nitrogen is a common groundwater contaminant. In addition, phosphorus can contaminate surface water.
- **Pharmaceuticals**. Do not dispose of any medicine in the septic system or sewer. Dispose of these items as solid waste garbage.

Oxygen demand is used as an indicator of wastewater strength. The microorganisms that decompose organic contaminants in wastewater use oxygen. The amount of oxygen required to break down wastewater is measured as biochemical and chemical oxygen demand, commonly known as BOD and COD, respectively. Organic wastes or contaminants such as blood, milk residues, and garbage grindings have high oxygen demand. Aerobic processes (in the presence of oxygen) produce stable, low-odor effluent when given enough time. Wastewater with excess oxygen demand can cause problems for soil absorption fields, ground water, streams, and lake water by reducing levels of oxygen.

Common sense is your best BMP to minimize the amount of contaminants in wastewater. If you have to think twice about flushing or pouring something down the drain, *then don't do it.* Remember, what goes down the drain doesn't just disappear, it eventually gets recycled back into the environment and can end up in Hauser Lake or your drinking water.

Improving Wastewater Quality

Do not put items in your disposal system, such as fats, grease, coffee grounds, paper towels, sanitary napkins, tampons, or disposable diapers. Dispose of these as solid wastes. These items have a high

potential to cause a failure to your septic system and lead to costly repairs.

- **Toxic substances,** such as solvents, degreasers, acids, oils, paints, disinfectants, and pesticides, should not be put down the drain since they may end up in ground water. This does not include bleach used to disinfect laundry or to wash clothing worn for pesticide applications. Follow label instructions.
- **Discharge all sewage waste from the house into the septic tank.** Do not bypass the septic tank and run wastewater from laundry or grey water directly onto 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 solid wastes that are 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 three to five years to remove solids and scum.** Have tank inspected bi-annually to determine when to pump. Use of garbage disposal, tank size, number of days septic system is used, and the number of people using it greatly affect when to pump the tank. When the sludge depth reaches 40% of the liquid depth, the tank sludge needs to be removed. Call a septic pumper.

Treatment and Disposal of Wastewater

There are a number of wastewater treatment systems. A licensed Environmental Health Specialist (EHS) must evaluate the site to determine the system that is best suited to your site and needs.

In Idaho, the DEQ sets minimum standards and the (PHD) administers rules for on-site household wastewater systems. These standards are detailed in Individual/Subsurface Sewage Disposal Rules (IDAPA 58.01.03). The rules are a minimum, so consider whether the minimum requirement is sufficient for your site.

The conventional septic system is the most common form of on-site wastewater treatment and, where soil conditions are suitable, it is the most desirable on-site system to use. Since the septic tank and drain field are completely covered with soil, the system is not visible and odor is nonexistent as long as wastewater does not surface.

Septic Tank/Soil Absorption System—the most common system

In the septic tank/soil absorption system, wastewater flows from the household into an underground septic tank and is then introduced to the soil through a piped distribution system (see figure 2, page 4-2). In the septic tank the waste components separate—the heavier solids (sludge) settle to the bottom, and the grease and fatty solids (scum) float to the top. Up to 50 percent of the solids retained in the tank are decomposed by bacteria in the anaerobic digestion process. Most of the pathogens are treated in this anaerobic environment. The partially treated water effluent moves on to additional treatment and disposal in the soil absorption system.

Septic tanks and other chambers must be designed and constructed to be watertight. Among the most important components of a septic tank are the baffles. Baffles are placed in the tank to provide maximum retention of solids, prevent inlet and outlet plugging, and prevent short-circuiting of wastewater through the tank.

Septic tanks remove solids by holding wastewater in the tank. This allows the solids to settle and the scum to rise to the top. Septic tank size is based on the wastewater flows in gallons per day (gpd) for each household or business. For up to 300 gpd (generally up to a four bedroom/2500 square foot house), the minimum septic tank capacity is 1000 gallons. As the number of bedrooms and wastewater flows increase, the septic tank and drainfield increases in capacity. Properly selected tanks have enough space for sludge to accumulate for an average of three years without needing solids removal.

Subsurface treatment and disposal using soil absorption—such as trenches and beds—is the common practice for household wastewater after treatment in a septic tank. The liquid portion (effluent) flows through the septic tank outlet to the soil absorption field, which is usually a series of trenches (laterals), each containing a distribution pipe embedded in drainfield gravel or graveless pipe. The effluent flows out through holes in the pipe/chambers then down through the drainfield rock/chambers walls and into the oxygen rich soil. This aerobic environment filters out remaining solids and pathogens (disease-producing microorganisms), and dissolved substances degrade, as the wastewater slowly percolates through the soil and reaches the ground water.

Soil absorption systems must be maintained properly to operate at peak efficiency and minimize potential health hazards:

- Do not drive or harbor livestock over a drainfield. Compaction from vehicles and animals or equipment will cause settling, shifting, or breakage of lateral lines. The compaction also reduces the oxygen levels in the soil which reduces effluent treatment. This can lead to the surfacing of wastewater, and the creation of a health hazard.
- Do not allow trees to grow over the system. Roots from the trees can plug off lines.
- Keep a grass cover over the absorption field. This will help use some of the nutrients available and aid in evapotranspiration.

Soil absorption systems are not suitable on some sites because of slow soil permeability, shallow depth to restrictive soil layer or bedrock, shallow water table depth, or other factors. Deep, well-drained, well-developed, medium-textured soils (such as silt loam and loam) are more desirable for soil absorption systems. Coarse, sandy soils may allow effluent to flow too quickly downward to ground water and do not provide adequate time for solids and pathogens to filter from the liquid. Clay mixtures with sands and loams are more impermeable and require a larger area to treat effluent. Clay alone is an unsuitable soil for effluent treatment because it has an extremely slow rate of filtration.

Between three and six feet of suitable, aerated soil beneath the bottom of a soil absorption system is needed to renovate wastewater before it reaches a limiting layer. A limiting layer may be bedrock, impervious soil (claypan, hardpan, or fragipan), or extremely permeable material. Unsaturated soils allow movement of air, which helps keep the soil profile aerobic.

Disposal sites that are as far as possible from your well increase the isolation of your drinking water supply from contaminated wastewater. An individual soil absorption system is required to be at least one hundred feet from any drinking water supply, ten feet from the foundation of the house, twenty feet from a basement foundation, one hundred to three hundred feet from surface water depending on soil type, twenty-five to seventy-five feet from scarps, twenty-five feet from waterlines, five feet from property lines, twenty-five to fifty feet from seasonal drainage run-off, and on a slope 20% or less. However, separation distances of greater than 200 feet to water supplies are highly recommended because they provide greater protection to your drinking water supply whether it comes from groundwater or the lake. Figure 3, page 4-8 shows minimum separation distances between a septic system and water supplies according to the Panhandle Health District.

Septic Tank Maintenance

Pumping the tank before it is 40 percent filled with sludge improves functioning of the system and is required. When the tank is filled beyond this point, sewage has less time to settle and solids can pass through to the absorption field plugging soil pores and causing premature failure.

When the tank is pumped, have the baffles checked, check for tank leaks, and make any needed repairs. All other components of the septic system should be checked at this time. Keep a record book on the system and record all maintenance procedures in it. Septic system maintenance is required to be performed by a licensed professional.

The frequency of pumping depends on the capacity of the septic tank, the flow of wastewater (related to number of people in the household and water-use habits), and the volume of solids in the wastewater (more solids if garbage disposal is used).

The importance of safety around septic tanks should not be overlooked. The space within a septic system contains gases, which are toxic when inhaled. Because of this, never go into or lean into a septic tank. Fatalities have occurred from unsafe acts during septic tank maintenance and repair.

Alternative Treatment Systems

The DEQ defines alternative treatment systems as any system other than a conventional septic tank and drainfield. The design and maintenance of such systems should be consistent with the (TGM) *State Technical Guidance Manual for Individual and Subsurface Sewage Disposal* (available at DEQ website).

Drainfield Examples:

Capping fill trench is a standard drainfield trench constructed so that its bottom is at least twelve inches into the natural soil and below the organic layer. A selected fill material caps the trench to provide cover.

Gravelless trench system is a standard trench design except that the drain rock is replaced by either a large diameter, nylon fabric-wrapped plastic pipe, a plastic domed chamber, or polystyrene wrapped pipe. Gravelless domed chamber systems and polystyrene wrapped pipe may be awarded a reduction in size if arranged in trenches.

Gravel trench system is a standard trench design with washed rock and perforated 4 inch pipe in a typical three foot wide trench with straw or geotextile paper layer over the top of the rock.

Absorption bed is a standard washed rock with perforated 4 inch pipe in a box or rectangular area. These are only used if the preferred trench system cannot fit the area for critical repairs or vested right scenarios.

Sand Mound is a complex soil absorption facility consisting of a pressurized system to a mound fill of selected sand with a small diameter pipe distribution system, cap and top soil. This system has stringent criteria to be installed and is less common.

Two Cell Infiltrative System (Lagoon) is an alternative basic system that requires considerable acreage for setback requirements and soils with high clay content and low slope requirements. These are not likely to be used in the Hauser Lake area due to slope, population, and soil types.

Evapotranspiration systems are a sand and gravel bed contained within an impervious lining, which receives septic tank effluent and in which evapotranspiration through the surface of the sand and or plant life is the sole means of effluent removal. These systems only work in areas that have more annual evaporation than precipitation. North Idaho has higher precipitation than evaporation, so these systems are not installed in this area.

Pre-Treatment Systems:

Sand/Gravel filters are enhanced wastewater treatment systems that are characterized by a large container with means for distributing septic systems effluent atop a layer, or layers, of medium sand or gravel. As the wastewater moves downward, it undergoes biochemical degradation. There are many different designs of sand/gravel filters, but they can generally be divided into three types: intermittent sand filters, re-circulating sand filter, re-circulation gravel filter.

Extended Treatment Package Systems (ETPS) are mechanical treatment devices that provide additional biological treatment to sewage producing an effluent of better quality than that of septic tank effluent. Such units may use extended aeration, contact stabilization, rotating biological contact, trickling filters or other methods to achieve treatment.

Further information on guidelines for these and other wastewater treatment systems is available from the TGM (DEQ website) or the PHD website.

Septic disposal

Regular pumping of septic tanks is essential to ensure proper functioning of a septic system (*see page 4-7 on septic tank maintenance*). Wastes pumped from the septic tank are known as septage. Septage should be removed and disposed of only by septage haulers licensed by your local public health district. Homeowners are responsible for the proper disposal of septage, and local ordinances should be followed in all instances. Contact your local public health district for further information and a list of licensed septage haulers.

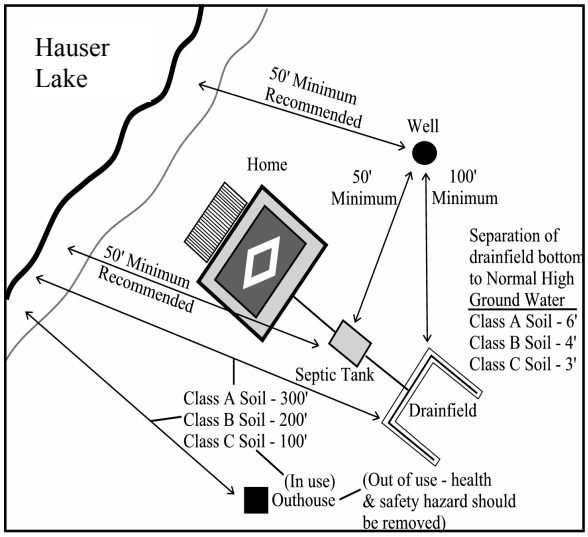


Figure 3: *Sewage Treatment System with minimal separation distances.*

Conclusions

A properly designed, constructed, and maintained system can effectively treat wastewater for many years. For more information on septic systems and wastewater lagoons, or for advice on alternative wastewater systems, contact your local public health district.

If your septic system is discharging to the soil surface or otherwise failing, contact your local public health district for permits to repair or replace your wastewater treatment system.

If you have a septic tank-soil absorption system, do not wait for the system to fail before pumping the tank.

If your household wastewater treatment system is backing up or your distribution system is clogged, contact your plumber or treatment system installer.

For More Information

call, write or visit…

Panhandle Health District
8500 N. Atlas Rd.
Hayden, ID 83835
208-415-5200

Idaho Department of Environmental Quality
2110 Ironwood Parkway
Coeur d'Alene, ID 83814
(208) 769-1422

Lake*A*Syst

Keeping Hauser Lake Clean

Assessing and preventing the risk of lake water contamination

Household Wastewater Treatment

Home-Owner Risk Assessment Sheet

WORKSHEET 4

ASSESSMENT 1 – ***Septic System Design and Location*** - The assessment table below will help you identify potential environmental risks related to Hauser Lake, your drinking water and the treatment of your home's wastewater. For each question indicate your risk level in the right-hand column. Your goal is to lower your risks. Some choices may not correspond exactly to your situation. Choose the response that best fits your situation. When finished turn to the **Action Checklist** on page 4-12 and record your medium and high-risk practices. Use the BMP recommendations in Section #4 *Household Wastewater Treatment* to help you decide how to best reduce pollution.

	LOW RISK	MEDIUM RISK	HIGH RISK	YOUR RISK
Capacity of system:	Tank is designed to handle more wastewater than required, based on the size of the home.	Capacity just meets load requirements, but I watch out for factors indicating system overload. Water conservation measures are taken.	Bathrooms, bedrooms, or water-using appliances are added without reexamining the capacity of the wastewater system.	❒ Low ❒ Medium ❒ High
Separation distances: Drainfield	Drainfield over 100 feet from well. Depending on soil type the drainfield is between 100-300 feet from any surface water source (see Section # 4)	Drainfield is 100 feet away from the well and surface waters.	Drainfield is less than 100 feet from the lake or drinking water well.	❒ Low ❒ Medium ❒ High
Tank	Greater than 50 feet from well and surface waters.		Tank is less than 50 feet from the well or surface waters.	❒ Low ❒ Medium ❒ High
Soil type:	Soil is fine-textured like clay loams or silty clay.	Medium sands to fine sands-loamy sands.	Soil is coarse-textured like sand, sandy loam, or gravel.	❒ Low ❒ Medium ❒ High
Safety devices:	Alarm on the pumping chamber or lift station indicates that the tank is full or power has been cut off to the pump.		There is no alarm to indicate tank overflow or that power has been cut off to the pump.	❒ Low ❒ Medium ❒ High

ASSESSMENT 2 – *On-Site System Maintenance* – Use the table below to rate your risks related to maintaining the septic system. When finished turn to the **Action Checklist** on page 4-12 and record your medium and high-risk prac-

	LOW RISK	MEDIUM RISK	HIGH RISK	YOUR RISK
Age of system or holding tank:	System is five years old or less.	System is between six and twenty years old.	System is more than twenty years old.	❒ Low ❒ Medium ❒ High
Type of tank:	Cement.		Steel or fiberglass.	❒ Low ❒ Medium ❒ High
Condition of tank:	Tank and baffles are inspected for cracks; repairs are made promptly.		The condition of the tank and baffles is unknown.	❒ Low ❒ Medium ❒ High
Tank pumping:	The septic tank is pumped on a regular basis as determined by an annual inspection. Holding tanks are pumped as needed.	Septic tank has been pumped but date is unknown.	Septic tank has never been pumped. The holding tank overflows or leaks between pumpings.	❒ Low ❒ Medium ❒ High
Drainfield protection:	Vehicles and other heavy objects or activities are kept from the drainfield area.	Occasionally, the drainfield is compacted by heavy objects or activities.	Vehicles, livestock, heavy objects, or other disturbances are permitted in the drainfield area.	❒ Low ❒ Medium ❒ High
Diverting surface water:	All surface runoff is diverted away from the drainfield area.	Some surface water flows into the drainfield area.	Runoff from land, rooftops, driveways, etc. flows into the drainfield.	❒ Low ❒ Medium ❒ High
Backflow protection:	A backflow valve is installed to prevent backup.		No anti-backflow devices is installed to prevent backup.	❒ Low ❒ Medium ❒ High
Plantings over the drainfield:	Grass or other shallow rooted plantings are over the drainfield.		Trees and shrubs are growing on or near the drainfield.	❒ Low ❒ Medium ❒ High
Signs of trouble:	Household drains flow freely. There are no sewage odors inside or outside. Soil over the drainfield is firm and dry. Well water tests negative for coliform bacteria.	Household drains run slowly. Soil over the drainfield is sometimes wet.	Household drains back up. Sewage odors can be noticed in the house or yard. Soil is wet or spongy in the drainfield area. Well water tests positive for coliform bacteria.	❒ Low ❒ Medium ❒ High

ASSESSMENT 3 – ***Septic or Sewage System Inputs*** – Use the table below to rate your risks relating to system inputs.

	LOW RISK	MEDIUM RISK	HIGH RISK	YOUR RISK
Settleable solids:	No use of a garbage disposal. No disposal of bulky items (disposable diapers, sanitary napkins) in toilet.	Moderate use of garbage disposal.	Frequent use of garbage disposal unit. Disposal of bulky items very probable.	❒ Low ❒ Medium ❒ High
Dissolved solids (household chemicals):	There is careful use of household chemicals (paints, cleaning products). No solvents, fuels, or other hazardous chemicals are poured down the drain. No water softener.	Moderate disposal of diluted household chemicals.	Extensive disposal of diluted household chemicals.	❒ Low ❒ Medium ❒ High
Floatable solids:	No disposal of cooking grease or oils into septic system. Oil and grease wiped from cooking utensils before washing.	Routine disposal of grease or oils. No attempt to reduce disposal of grease and oil.	Extensive disposal of cooking grease or oils in household septic system.	❒ Low ❒ Medium ❒ High
Water use:	Conservative water use. Good maintenance of water conserving fixtures. No water softner.		Excessive water use. Leaking fixtures. No water conserving fixtures.	❒ Low ❒ Medium ❒ High
Cesspool:			Any cesspool or surface discharge of wastewater violates Idaho Law.	❒ High

ACTION CHECKLIST

Household Wastewater Treatment

Write all high and medium risks below.	**What can you do to reduce the risks?**	**Set a target date for action.**
Sample: Toilets frequently back up.	Have septic system inspected by licensed inspector.	One week from today:

SECTION 5

Household Hazardous Waste and Petroleum Products Management

Why Are Hazardous Household Products A Problem?

Many common household 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 have the potential to contaminate soil, your drinking water supply, and pollute Hauser Lake and surrounding streams. Small (and sometimes large) unusable amounts of hazardous materials are at times spilled, buried, or dumped onto rural properties.

1) Use this Section and the associated worksheets to assess your management of hazardous household wastes and petroleum products;

2) Fill out the **Action Checklist** (in the worksheets) to inventory contamination sources, and to help you;

3) **Take Action** to protect Hauser Lake by using the *Best Management Practices* found in **Lake*A*Syst.**

This Fact Sheet will help you identify potential hazards and minimize risks. We will cover:

- Product selection, purchase, and use
- Safe storage
- Product disposal
- Petroleum use and storage (cans to tanks)
- Controlling road dust

Guide for Managing Home Wastes

- **Do not** dump oil, gasoline, paints, pesticides, or any other hazardous household chemicals on the ground, down drains, down storm sewers, or into a water body. For many products it is illegal to do so.
- **Do not** dispose of partially-filled containers in the garbage.
- **Do not** use pesticides and fertilizers within 25 feet of Hauser Lake and its watershed streams.
- **Do not** burn hazardous household containers in a barrel or outdoors.
- **Do not** bury chemical containers containing residues; or other products such as batteries.

Please:

- Use all products according to label directions.
- Find out if a product can be recycled and where to recycle it in your community (the county transfer stations accepts all types of household waste).

Some Household Products that Could be Hazardous or Harmful to Your Health, or to the Environment if Improperly Managed:

Home cleaning supplies - drain cleaners, oven cleaners, laundry and stain removers, bleach, lye, some bathroom cleaners, floor wax stripper, polishes.

Home maintenance products - oil based paints, lead based paint, paint thinner, wood stains, wood preservatives, paint stripper, some adhesives and glues, degreasers, mothballs, lead solder, fluorescent lights.

Vehicle-related products - antifreeze, oil, gasoline, cleaning solvents, brake fluid, grease, rust removers, oil filters, transmission fluid, old auto parts.

Batteries - lead-acid car batteries, flashlight batteries that contain mercury or cadmium.

Hobby and recreational supplies - photo developer chemicals, marine paints containing pesticides and/or mercury, swimming pool and hot tub chemicals, strong acids/bases, chemistry sets.

Product Selection, Purchase and Use

Your choice of products is the first step. By carefully selecting the product for the job needed, or considering alternatives, you can control the degree of "hazard" you bring to your home or property.

Read The Label!

Reading product labels is the best way to get information about the product. Information on the product label can help you decide whether the product is right for the job you want to do, and if it can be used safely in your situation. Before you purchase or use a product, take time to read the label, even though the print is often tiny.

Labels provide information about product ingredients, how to store and use them 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.

Do you buy only what you need?

If you buy more than you need, household products will accumulate and create storage and disposal problems. If unused for long periods, product containers may become damaged and leak, and products may change chemically and not be effective when you finally try to use them.

Can an alternative product do the job?

There are numerous alternatives to some common hazardous household products and pesticides. For a comprehensive list of alternatives obtain the DEQ booklet *Eliminating Household Hazardous Waste.*

Cleaning Agents -

- Baking soda is a non-abrasive scouring powder.
- Use vinegar and warm water for windows and smooth surfaces.
- Rub toothpaste on wood to remove water stains.
- Avoid aerosol products. Mist particles can enter the blood stream; use pump or spray bottles.
- Open drains with metal snake or plunger. Keep drains clear with rinses of ½ cup baking soda, followed by ½ cup vinegar, let sit, and then 2 quarts boiling water.
- Clean upholstery or carpet stains immediately with cold water or club soda.
- In general choose soap or detergent-based cleaners when possible. Avoid non-water-soluble and corrosive cleaners when others offer an effective substitute.

Paints, Solvents, Strippers, Adhesives

- Use latex or water-based paints whenever possible. These don't require thinners or solvents.
- Use sandpaper, a scraper, or heat gun for small jobs instead of a paint stripper. Avoid strippers and other products containing methylene chlo ride.
- For wood preservatives, use a water-sealing coating. If treated wood is needed, choose pressure treated.

Batteries

- Use rechargeable batteries, and mercury-free or less than .025% mercury batteries when possible.

Pesticides

Before you choose a pesticide, be sure that you have exhausted other options for managing the pest, weed, or fungus problem. There are a whole host of alternatives to insecticides and herbicides to control pests outdoors. Please see Section #2, *Lawn and Garden Management* for suggestions in this area.

Safe Storage

When storing household products, the primary concerns are child safety, indoor air quality, prevention of damage to household equipment, and environmental pollution. If you can smell a household product while it is in storage, the product lid may be loose or ventilation may be inadequate to protect your health.

Be sure to separate corrosives like acids or lye from each other and other hazardous products to prevent dangerous chemical reactions. Reactions occur when corrosives leak from their containers and drip or flow to other products. Corrosive materials are often stored where equipment and appliances are located. Be aware that they can corrode heating systems, hot water heaters, and other equipment and appliances. Routinely check areas where you store household products (under the kitchen sink, in the basement or garage, in an outside shed) to make sure that containers are closed tightly and not leaking, and that the sides of containers are not bulging.

When You Store Hazardous Household Products, Do You?

- Keep them out of reach of children and pets, preferably in a locked, secure area.
- Store them in their original container.
- Clearly label and date any alternative containers.
- Keep containers tightly sealed and dry.

- Keep products in a well-ventilated area and away from sources of ignition.
- Store batteries and flammable chemicals in an area shaded from direct sunlight.
- Store products at least 200 feet from a well or waterway.
- Store chemicals in an outside shed or your basement, on shelves above any flood waters.

Product Disposal

Purchase of household products that are considered potentially hazardous to health and/or the environment eventually pose a disposal dilemma. Disposal should be your last option because it is wasteful, and if not done properly, can be unsafe for you and the environment. Here are some tips on how to avoid some of the disposal dilemmas:

Reduce -

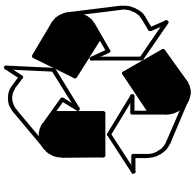
- Use up hazardous products before disposing.
- Don't purchase more products than you really need.
- Give leftovers to a friend who can use them.
- Try non-toxic alternatives.

Reuse -

- Use old paint as a primer.
- Many chemical products have alternative uses
- Allow used paint thinner to sit in a sealed jar until paint particles settle. Pour off clear liquid and use again.
- Don't buy several products if one can do the job. General household cleaners can clean a variety of things. Check product labels.

Recycle -

- We are all familiar with recycling of paper, glass, aluminum cans, and plastic containers.
- Many other products can be recycled such as used motor oil which can be refined, or burned as fuel. Other recyclables include flashlight batteries.



Recover -

- Separate hazardous waste containers from your household garbage.
- Periodically take all hazardous containers to the county transfer station if they accept the hazardous material.

See page 5-7 for facilities that accept household hazardous wastes, petroleum products, antifreeze, car batteries, tires, and other recyclable goods.

Waste Disposal on Your Property

Disposing of hazardous household waste by burning it or burying it on private property can pose threats to your health and the environment. Although these disposal methods have been used in many rural areas for decades, local and state laws are becoming more restrictive.

Some residents use burn barrels to get rid of many household wastes. A noxious mix of chemicals can be released into the air, and can be hazardous to breathe. Eventually, most byproducts from burning are removed from the air by rain or snow and are deposited on land or water.

The ash residue from burning may contain heavy metals and other toxins, and if this ash is dumped on your property it can contaminate soil and water.

By products of Open Burning

Smoke, particles, or ash from burning waste may contain some of the following pollutants:

- ***Arsenic and Cadmium*** from some wood preservatives or pesticides.
- ***Benzene*** and other solvents from paint or varnish strippers.
- ***Cadmium*** from nickel-cadmium batteries and plastics such as PVC.
- ***Chromium*** from some paints.
- ***Dioxin*** from byproducts formed when chlorine containing products such as plastics are burned.
- ***Formaldehyde*** from some particle board and fabric treatments.
- ***Lead*** from some paint on old boards, batteries, and PVC plastics (lead is used as a stabilizer in PVC).
- ***Mercury*** from some batteries, paints, plastics, thermometers, thermostats, fluorescent lights.
- ***Sulfuric acid*** from some chemicals, dyes and pigments, rayon, and film.
- ***Toxic organics*** from burning plastics.

Other Tips Regarding Disposal:

Paints

Many of us buy too much paint. Municipalities that collect leftover hazardous household products report that paints make up about half of the material that people bring in and thus are a costly disposal expense.

- Paints can become unusable if they go through freeze and thaw cycles. Store paints where they won't freeze.
- Use up completely, or give leftover paint to a friend, or a theater or nonprofit group. Air dry empty containers and dispose of cans with lids off in the garbage.
- For leftover water-based paints, take the lid off and let the liquid evaporate in well ventilated area. When dry, the can with its hardened contents can be discarded in the garbage. For leftover paints that are oil based, or contain mercury or lead, the cans should be deposited at a hazardous waste drop off site.

Pesticides

Many people don't pay enough attention to how they manage pesticides. EPA studies provide disturbing information about how pesticides are used, stored, and thrown away. Household practices showed that people fail to recognize the danger that pesticides can pose to child safety, human health, or the environment when managed improperly.

- Before you choose a pesticide, be sure you have exhausted other alternatives. If you do need to use a pesticide, read label information carefully before purchasing a product. Buy only what you need.
- For empty plastic or metal pesticide containers, **triple rinse** the containers and use the rinse water as part of your yard and garden treatment. Triple rinsed containers can then be placed in your household garbage. Better yet, residue-free pesticide containers can be processed through the Idaho Dept. of Agriculture's pesticide container recycling program (see page 5-7).

Used Oil and Antifreeze

- Besides County Transfer Stations, many automobile repair shops will accept used oil and antifreeze. Place these used products in sturdy containers such as milk jugs, or empty oil and antifreeze jugs. Do not mix waste antifreeze with used oil. Clearly label the containers.

Car Batteries

- In Idaho it is illegal to dispose of vehicle batteries in the garbage. Most battery retailers will accept your old battery for recycling.

Spills of Hazardous Wastes

- Soak up the spill with soil, sawdust, or kitty litter. Place absorbent into a sealable container and dispose at a county household hazardous waste drop off site.

Petroleum Product Use and Storage

You may not have thought much about how you store gasoline, heating oil, and other fuels and lubricants on your property. If you are like most people, you own at least one fuel-burning device such as a lawn mower or an outboard marine engine, and probably keep fuel in portable containers that hold 1 to 5 gallons. Some people around the lake have underground or above-ground tanks to store gasoline for their motor boats or heating oil.

Fuels are hazardous and if improperly managed they can pollute the water you drink. It is critical to prevent spills and leaks. Petroleum fuels contain a number of potentially toxic compounds including common solvents such as benzene, toluene and xylene, and additives such as ethylene dibromide. Benzene, considered a human carcinogen, has a ground water standard much like that of many pesticides at five parts per billion. *One gallon of gasoline containing one percent benzene can contaminate about two million gallons of ground water.*

Contamination can come from unexpected sources. Unknown or forgotten underground tanks have come back to haunt property owners. Contaminated soil and water can rob your property of its value, trigger environmental liability and costly cleanups, and drive away lenders and property buyers. Vapors from fuel can ignite fires or collect underground and explode.

Portable Fuel Containers

- Purchase and store minimum amounts of fuel for short periods, buy quantities that you need for a month or so.
- Do you fill your watercraft tank or portable outboard tank with gas cans near or over the water? Be careful not to spill into the lake. Make sure the collar on the gas can nozzle has a washer and is tight so gas doesn't spill from the collar.

- Don't pop the can air vent plug until the nozzle is in the tank filler tube. Don't try the fuel transfer if the boat or dock is bobbing.
- If you do spill, have on hand an oil/gas absorbent pad to quickly soak up the spill.
- Do you have left-over gasoline as the summer season ends? See if your neighbor can use the gasoline. Excess gasoline can be poured into a car's gas tank. If the gasoline is old, strain old gasoline through a paint filter, dilute one part old fuel with five parts new fuel to protect your engine.
- Use only self-venting UL-approved or original containers to store fuel. Storing fuel in an unapproved container, such as a glass jar or plastic jug is dangerous.
- In your garage or shed, store fuel containers so that they cannot become flooded, but not too high on shelves where they get hot. Periodically check for leaks.

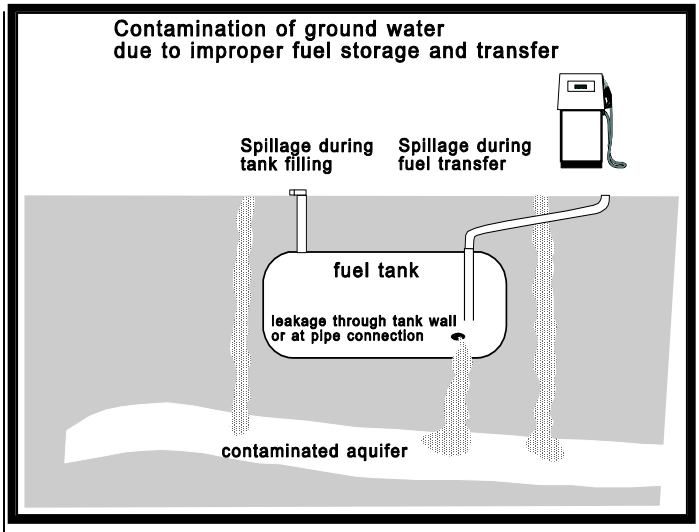
Above-ground, Underground, and Basement Storage Tanks

It is vital to know about fuel storage tanks on your property, including tanks that are currently in use and those that are abandoned. As a tank owner, you may have many responsibilities and must keep up with increasingly strict laws.

This section on tanks is meant only to be a general information guide. When it comes to petroleum storage tanks, seek a professional company, government agency, or Fire Marshall to advise you on safety, installing a new tank, making improvements to an existing tank, removing a tank, and dealing with any spills or contamination.

Federal law regulates underground storage tanks (USTs) of 1,100 gallons capacity or more and used for commercial purposes. Tanks not covered by federal regulations are farm and residential USTs less than 1,100 gallons, any tank less than 110 gallons, and USTs or above-ground tanks storing heating oil burned on the premises.

- Federally regulated USTs must be registered with the Idaho DEQ within 30 days of bringing the tank into use. Federal law requires that existing and new regulated USTs, and all related piping, must have corrosion protection by December 1998, if they are to remain in use.
- Above-ground tanks and their installation are affected by a mosaic of local, state and federal regulations. See page 5-7 for UST contact information.



- Most USTs for petroleum storage by individual lakeshore households and farms are less than 1,100 gallons and are considered non-regulated by Federal law. *Idaho Water Quality Standards* requires that storage and disposal of petroleum in the immediate vicinity of state waters (including groundwater) must have adequate measures and controls to insure that stored materials will not enter public waters.

Tank Location

- Petroleum storage tanks should be located at least 50 feet from a drinking water well according to state regulations, but the greater the distance the better (200 - 400 feet). Tanks are safer when located downslope from wells. The 50-foot minimum also applies to the distance from streams, wetlands, ponds, and other surface water.
- Certain conditions accelerate the corrosion potential of underground tanks and piping. These include high water tables, clay soils, or soils with an acid pH.

Tank Management

- **Is your underground tank old and possibly leaking?** Buried tanks over fifteen years old have a dramatically higher chance of leaking. But even newer tanks and piping can leak if they were incorrectly installed.
- **Does your steel tank have corrosion protection**? Most older tanks do not have this protection. It is expensive to put corrosion protection on existing tanks, and it may be more cost-effective to replace unprotected tanks. Piping should be made of cathodically protected steel, coated to prevent corrosion.

- **Have you checked pipes and hoses?** The pipes, hoses, and fittings connected to a storage tank can be a major source of leaks. Here, too, age is a factor. Piping fails because of corrosion, accidents, and frost heaving.
- **How will you detect leaks?** A first step is inventory control. Measure and record the amount of fuel in the tank each month, and record the gallons of fuel extracted and delivered. Differences in your records may indicate a leak. Leak detection systems or practices include tightness testing under pressure, automatic tank gauging, or soil vapor monitoring. Notify the fire department, police, and the Coeur d'Alene regional DEQ office in case of a leak.
- **What signs of trouble should you look for?** Your senses - sight, smell, and taste are an important part of your leak detection system. Is there an unexplained oil-like substance on streams or wet places near the tank? Is nearby soil stained with petroleum? Have you tasted fuel in your drinking water? Be aware of unusual or changing conditions at the pump. Does fuel flow unevenly or does the suction pump rattle?
- **What spill-protection actions have you taken?** Over-filling is the most common, and most avoidable cause of spills. Never walk away while filling a container or your vehicle. Automatic shutoff devices are available to prevent spills. There are also fill-level indicators. Design a catch basin to contain spills and leaks.
- **Does your above-ground tank incorporate secondary containment**? This containment can be a double-walled tank, or a structure consisting of a concrete curb and pad to contain a leak or spill. Hoses are now on the market which are double walled.
- **Is your above-ground tank well-supported and protected from damage by vehicles and other objects**? Tanks should be on a solid, stable base that resists changes in soil moisture and frost heaving. Protect your tank from vehicles. If the tank is not enclosed in a structure, install posts or other barriers around it.

Controlling Road Dust

Fugitive dust from the numerous gravel and dirt roads around Hauser Lake is considered by some residents to be an aesthetic problem, a nuisance, and for some people a health problem.

A common solution to control road dust is to apply oil onto the surface. The use of Anew@ oil formulated for application as a dust suppressant is legal. However, if dust control oil reaches Hauser Lake or watershed streams, it is considered a hazardous and/or deleterious material according to the *Idaho Water Quality Standards* (page 5-7). If adequate measures and controls are not taken to prevent environmental damage, applicators may face enforcement action. Also, as many of you know, oil can leave a real mess on your car and be difficult to clean off.

Application Guidelines:

- The State of Idaho and the federal government have regulations which **prohibit the use of waste or used oil on road surfaces**. Waste oils have contaminants such as heavy metals.
- Do not oil immediately before forecasted rain events.
- Make sure the applicator does not over-apply the oil, leaving puddles in which the oil can easily be washed away with a rain storm.
- While not always practical from a cost or timing standpoint, the preferred application of oil is after a road grading where the oil can be worked into loosened soil instead of applied over hard compacted dirt.
- Do not apply oil over stream crossings such as culverts and bridges.

Alternatives to Oil:

- The Forest Service now uses Calcium Chloride flakes on some roads. Grading and wetting of the roadbed in conjunction with application improves effectiveness. Results for dust control have been favorable. One concern is the migration of chloride with storm runoff. There is a potential for salt damage to plants, and these products are not recommended near drinking water.
- Another dust control product is Calcium Lignosulfonate, which is more environmentally compatible, but local availability appears limited.
- Live with the dust.

Recommended Reading:

Copies of the following material may be obtained free from the DEQ Coeur d'Alene office.

Eliminating Household Hazardous Waste

To learn more about *Idaho Water Quality Standards* visit the DEQ website www.deq.idaho.gov

County Facilities with Household Hazardous Waste Drop-Off Sites and Recycling Centers

The following sites will accept residential quantities of household hazardous products, used oil, and anti-freeze. No single container greater than **5 gallons** will be accepted. There is no charge for these services for residents of the respective county sites.

All centers accept recyclable materials during regular operating hours. Some centers have restricted days to drop household hazardous wastes.

Kootenai County Transfer Station
N. 3650 Ramsey Rd.
Coeur d'Alene - (208) 769-4402
accepts household hazardous waste products
Wed. & Sat.

Spokane County:
Accepts household waste products every day
Waste-To-Energy Plant
2900 S. Geiger Blvd. - (509) 625-6871
Valley Transfer Station
3941 N. Sullivan Rd. - (509) 625-6885

For More Information

Panhandle Health District
Environmental Health
8500 N. Atlas Road
Coeur d'Alene ID,83835
(208) 415-5200

Department of Environmental Quality
2110 Ironwood Parkway
Coeur d'Alene, ID 83814
(208) 769-1422

For information on Underground Storage Tanks (USTs) contact

Department of Environmental Quality
2110 Ironwood Parkway
Coeur d'Alene, ID 83814
(208) 769-1422

See Resource Directory (Appendix B) for additional agency contacts.

Notes:

Lake*A*Syst

Assessing and preventing the risk of lake water contamination

Household Hazardous Waste and Petroleum Products Management

Home-Owner Risk Assessment Sheet

Keeping Hauser Lake Clean

WORKSHEET 5

ASSESSMENT 1 – ***Product Selection, Purchase, and Use*** – The assessment table below will help you identify potential environmental risks related to Hauser Lake in your use of hazardous products around the house. For each question indicate your risk level in the right-hand column. Your goal is to lower your risks. Some choices may not correspond exactly to your situation. Choose the response that best fits. When finished turn to the **Action Checklist** on page 5-11 and record your medium and high-risk practices. Use the BMP recommendations in the Section #5 *Household Hazardous Waste Management* to help you decide how to best reduce pollution.

	LOW RISK	MEDIUM RISK	HIGH RISK	YOUR RISK
Product selection:	I always read labels; understand signal words; and respect the health or environmental hazards that labels describe. I use less hazardous products when possible.	I don't read labels or don't understand what they mean, but I use a "common sense" approach to safety.	I never read labels. I purchase products without considering what the product is made of or how it will be used.	❒ Low ❒ Medium ❒ High
Quantities purchased:	I buy only what is needed for a specific job. I use up most of the product during the season of purchase. I dispose excess at a county waste drop-off site.	I buy excess product, but provide safe and accessible storage.	I buy more than is needed, then purchase additional product without checking on current supplies.	❒ Low ❒ Medium ❒ High
Safety precautions:	I follow label instructions and take recommended precautions against exposure, like wearing protective clothing (gloves, and safety goggles). I never mix product.	I occasionally read the label. I take precautions based on my knowledge of the product. I occasionally mix products for specific cleaning tasks, but refer to label first.	I never follow label instructions and take no precautions – even when recommended. If one product doesn't work, I add another without checking safety precautions.	❒ Low ❒ Medium ❒ High
Use of less toxic alternatives:	Alternatives to toxic materials are used whenever applicable.		No alternatives are used.	❒ Low ❒ Medium ❒ High

ASSESSMENT 1 CONTINUED – ***Product selection, Purchase, and Use***

	LOW RISK	MEDIUM RISK	HIGH RISK	YOUR RISK
Pesticides:	Non-chemical pest control used. Pest control products are chosen and used according to the label. Stored, handled and disposed of properly.	When solving pest problems, I do not practice much prevention or explore non-chemical options.	I may not always handle pesticides as directed on the label. Pesticides are applied near my well or at the edge of streams and Hauser Lake.	❒ Low ❒ Medium ❒ High

ASSESSMENT 2 - ***Safe Storage*** - When finished turn to the **Action Checklist** on page 5-11 and record your medium and high-risk practices.

	LOW RISK	MEDIUM RISK	HIGH RISK	YOUR RISK
Child safety:	Hazardous products are stored in a locked cabinet or other location inaccessible to children.	Products are kept out of the direct reach of children (on a high shelf, for example) but still accessible.	Products are easily accessible to children (for example, in an unlocked cabinet within a child's reach).	❒ Low ❒ Medium ❒ High
Containers, storage location, and spill protection:	Unused product stored in original container clearly labeled. Dry product stored separately and above liquids. Spill prevention and containment is considered in storage area.	Unused product is stored without regard to location. I don't provide protection against leaks or spills.	Unused products have been transferred to other containers such as used milk jugs or glass jars lacking caps or lids. I don't provide protection against leaks or spills.	❒ Low ❒ Medium ❒ High
Location of storage area in relation to well and the lake:	Hazardous products are safely stored in a protected location; a spill could not reach the lake or my drinking water and well.		Products are stored close to my well, or even in my pump house. A spill in the storage area could reach the lake or well.	❒ Low ❒ Medium ❒ High

ASSESSMENT 3 - ***Product Disposal*** **—** When finished turn to the **Action Checklist** on page 5-11 and record your medium and high-risk practices.

	LOW RISK	MEDIUM RISK	HIGH RISK	YOUR RISK
Antifreeze, used motor oil:	Recycled at county approved drop-off site or automotive shop. Used oil burned for heat in an approved space heater.	Disposed of at unapproved landfill or dump.	Dumped on property or in on-site sewage treatment system.	❒ Low ❒ Medium ❒ High

ASSESSMENT 3 Continued - *Product Disposal*

	LOW RISK	MEDIUM RISK	HIGH RISK	YOUR RISK
Household trash and hazardous product containers:	Non-hazardous plastic bottles and aluminum cans are recycled. I triple rinse empty yard and garden pesticide containers and include rinse water in yard and garden management.	Non-toxic materials are burned on my property. If burning is legal, burning guidelines are strictly followed. Burning barrels are emptied at an approved landfill.	I don't recycle. Hazardous materials are burned, releasing metals, acids, and chlorine compounds. Burning barrel emptied on the property.	❒ Low ❒ Medium ❒ High
Batteries: **May contain mercury, cadmium, lead, or acid.**	I recycle batteries, or take them to a county hazardous waste drop-off site. I trade-in my used car or boat battery at an auto or tire store.	Used batteries are disposed of in a county landfill.	Used batteries are stored or buried on my property near a well or waterway. Small batteries used in flashlights etc. are burned with my trash.	❒ Low ❒ Medium ❒ High
Cleaning and repair products containing hazardous solvents (non-water-soluble), and paint:	I share leftovers. Unused products containing mercury, pesticides, or hazardous solvents are taken to a county waste drop-off site.	Allow liquids to evaporate away. Sludge or leftover products are placed in normal trash flow which goes to a county landfill.	Leftover products are dumped on the ground near a well or waterway.	❒ Low ❒ Medium ❒ High
Drips and spills:	Contained on paved area with absorbent material (kitty litter) then disposed of at county landfill.	Drips and spills not contained, occasional flushing onto property.	Drips and spills not contained. Frequent flushing onto property and infiltration into ground.	❒ Low ❒ Medium ❒ High
Pesticides:	Containers are triple rinsed and disposed of at a recycling event and are used according to label instructions. Leftover pesticides are shared when possible and any used product is returned to the dealer or disposed of at county recycling event.		My disposal practices do not follow these guidelines; leftover pesticides should **never** be burned, buried, mixed together, poured on the ground, dumped in the water, poured down the drain, or put into the garbage.	❒ Low ❒ Medium ❒ High
Strong acids and bases: **Found in hobby and recreation products, building cleaners and repair products.**	I share any leftover products, or I take leftover product containers to a county household hazardous waste drop-off site.	Strong acids and cleaners are poured down the drain. Leftovers are stored or disposed of in trash.	Leftover products are dumped on the ground near a well or waterway.	❒ Low ❒ Medium ❒ High

ACTION CHECKLIST

Household Hazardous Waste

Write all high and medium risks below.	**What can you do to reduce the risks?**	**Set a target date for action.**
Sample: Unknown type, age and amount of chemicals in storage area.	Inventory all hazardous products to determine if some are not needed or expired, and to not over purchase.	One week from today:

Lake*A*Syst

Assessing and preventing the risk of lake water contamination

Keeping Hauser Lake Clean

SECTION 6

Landscape and New Construction

Site Planning

Site planning is an essential tool in preventing pollutants from being transported off-site. A general step-by-step process is recommended for those developing or redeveloping land near Hauser Lake, especially on steep slopes or gradients, or highly erodible soils. The purpose of site planning is to reduce site runoff and erosion through planning considerations based on the conditions of your site.

Importance of a Landscape Plan

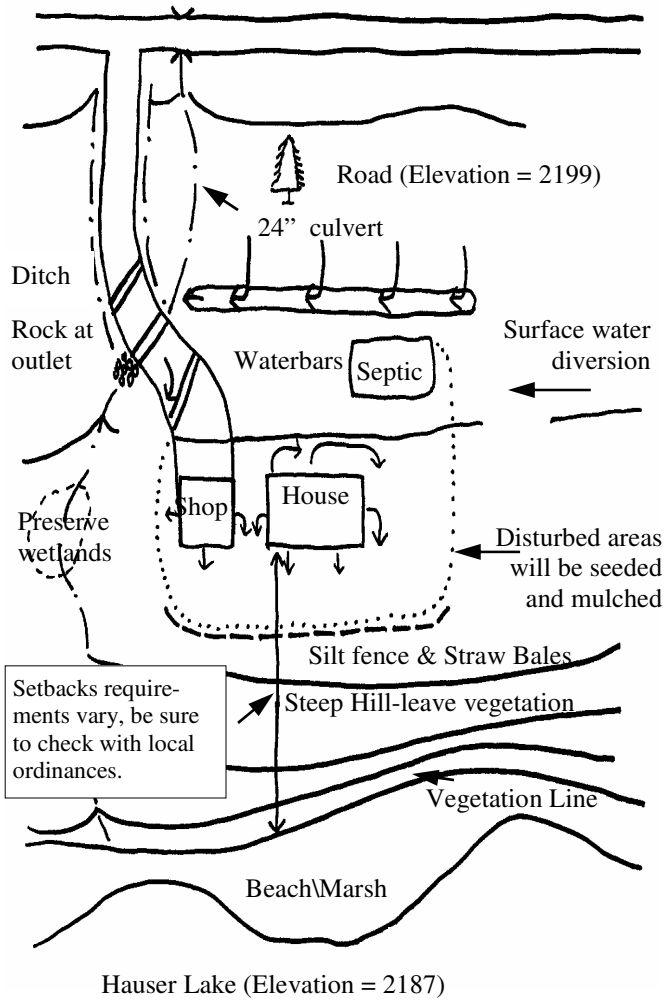
Plants and trees help hold the soil and prevent erosion, especially on steep slopes. Any time existing vegetation is removed the bare soil that is exposed can be easily washed into Hauser Lake. Soil erosion can lead to structural damage, reduce soil fertility, and fill in road ditches. It harms the lake and basin streams by causing excess sedimentation, killing aquatic bottom life, and disrupting spawning. The sediment, with accompanying nutrients, may lead to algal blooms, and reduced aesthetic appeal. All of these potential problems are expensive to correct and more importantly, can be avoided by proper water and land-use practices.

Developing Your Site Plan

Your 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, the 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.

Best Management Practices

Best Management Practices (BMPs) are actions you can take to reduce your impact on the environment. This fact sheet describes BMPs you can adopt on your property to prevent water contamination, improve water quality, and enhance your lot aesthetics and value.



Above is an example of a site plan that includes roads, buildings, topography, shoreline, and plants.

Layout of Your Grounds

You can manage your buildings and grounds to 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 preferred to up-and-down-hill designs.

BMPs for Landscaping

- **Keep the site covered**. Any disturbances of ground cover (grass or shrubs) will expose soil. This leads to erosion and slope failure. Use hay or straw as 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 can be killed by heavy traffic that compacts the soil. Putting fill material too deeply over the root area can also kill trees**.**

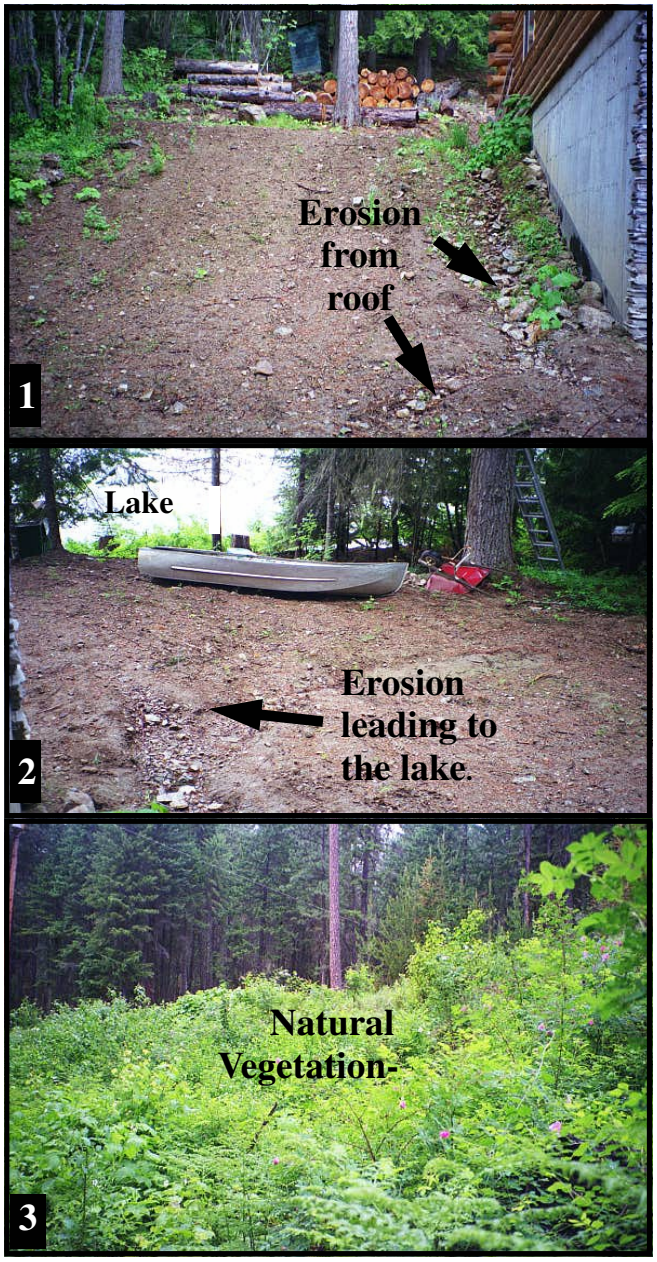
- **Maintain a filter strip of vegetation along the banks of Hauser Lake and its contributing streams**. The best filter strip is mature woodland with undisturbed grass and shrub layers.

- **Establish permanent cover**. After your grounds have been graded to minimize and control runoff, the first step could be to plant a herbaceous cover (grass) to protect the soil until trees and shrubs can become established. It is recommended that you 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, and are resistant to insects, and diseases.

- **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. Native trees and shrubs also create a landscape that needs minimal maintenance and is more natural.

- **Use pesticides and fertilizers carefully**. Use only approved pesticides and follow label directions. See Section #2 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



Keep bare soils to a minimum. *Picture 1, erosion of the soil surface from roof runoff. Picture 2, because of the steep slope water carries sediment into the lake. Picture 3, is a perfect example of what to do by retaining existing vegetation.*

or vegetated infiltration areas rather than allowing it to run the entire length of the slope. Properly sized culverts are also important for a well-drained roadbed. See Section #7 for more information.

- **Control runoff**. Rainfall and snowmelt runoff should be directed to safe drainage-ways so that water will not scour and wash away soil. Curbs of soil, timber or other materials can be placed at the crests of steep hills or cuts to divert runoff. They collect runoff and lead it downhill to a safe outlet. See Section #1 for more information. 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 drainage ways from filling with sediment.

Other Landscaping Considerations

Use Firewise landscaping to protect your home or cabin from forest fire:

When maintaining your landscape keep in mind the following tips to safeguard your home from fire danger.

- Keep trees and shrubs pruned. Prune all trees up to 6' to 10' from the ground depending on tree height. Do not remove more than 1/3 of tree canopy.
- Remove leaf clutter and dead or overhanging branches.
- Dispose of cuttings and debris responsibly.
- Store firewood away from the house.
- Be sure your outdoor water supply is well maintained.
- Use care when handling and storing flammable products.
- Dispose of smoking materials carefully.
- Old and unused lumber either placed in a pile or in a structure is a potential fire hazard.
- Use fire-resistant building and plant materials.

New Construction BMPs

The Environmental Protection Agency (EPA) has identified construction activities as one of the more common sources of non-point source pollution. The removal of site vegetation during construction exposes subsoil to precipitation. When erosion prevention measures are inadequate and sediment control is not used, large volumes of sediment can be transported off-site during storms and snowmelt. The transport of sediment from construction sites can affect storm drains, streams, and lakes and impair the operation of storm water control devices.

Construction site erosion prevention and sediment control are important in protecting existing and future water quality. Construction sites close to water bodies have a greater potential for affecting water quality than those in upland areas. Erosion prevention should be the first choice, using such measures as (1) timing of construction, (2) preserving native vegetation, (3) covering stockpiles, and (4) mulching and matting. Please refer to ***State of Idaho Catalog of Storm Water Best Management Practices for Idaho Cities and Counties.*** Maintaining natural vegetation and stabilizing exposed soil surfaces helps in preventing erosion, however this is not always possible at each construction site.

If construction cannot be postponed until the dry season, sediment control is the preferred alternative for trapping sediment on-site. The following measures are practical and cost-effective: (1) temporary berms, (2) straw bale barriers, and (3) silt fences.

Additional site planning may be necessary to protect water quality in circumstances where the construction site is near a sensitive water resource; such as a creek, stream, or lake; along a steep slope (greater than 30 percent); within an area of porous soil; or a shallow water table. A certified professional can provide direction in developing an erosion and sediment control plan prior to development, if site conditions warrant more attention. An erosion and sediment control plan outlines each construction activity beforehand, accounting for possible impacts to sensitive ecological areas.

Panhandle SEEP (Stormwater and Erosion Education Program) training and certification are available through local agencies such as Panhandle Health District and Panhandle Area Council (see page 6-8 for contact details).

Timing of Construction

Construction work and erosion prevention applications should be scheduled so they occur under optimal conditions. Optimal conditions consist of dry, low runoff periods during the year when erosion is lowest, usually summer. This measure is especially relevant to those who are planning to build a home near a stream, lake, or along a steep, forested slope.

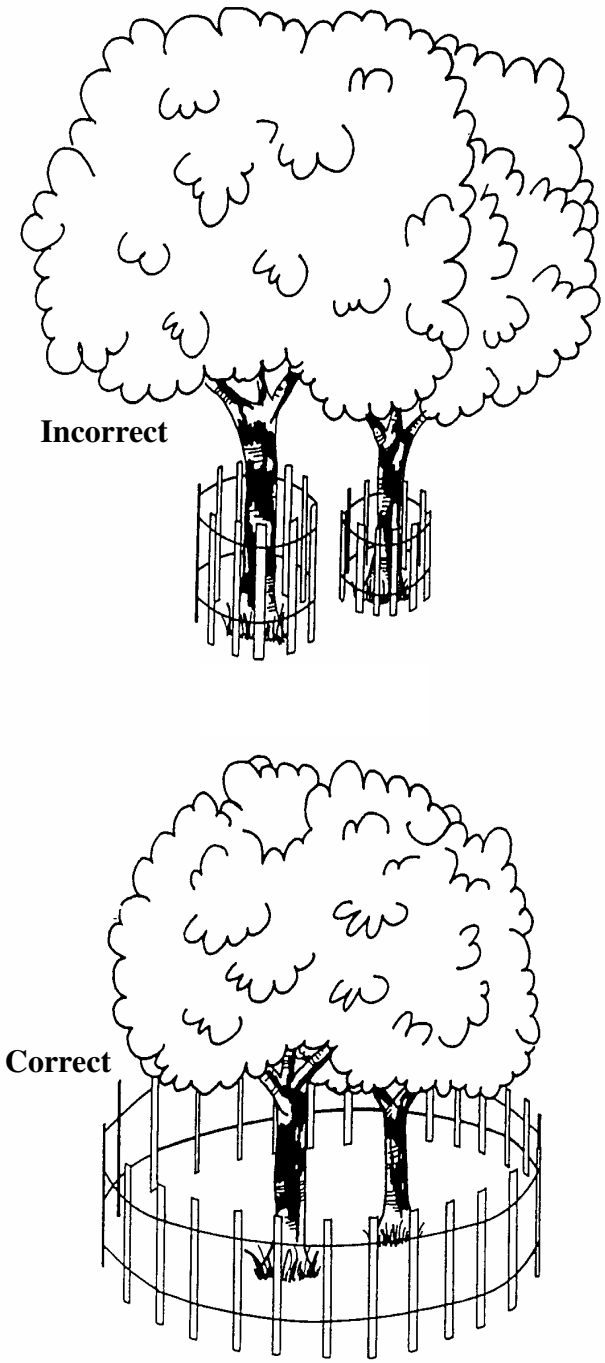
Preserving Native Vegetation

Minimizing disturbance or restricting construction to a specified area on the site or a right-of-way can protect existing vegetation (including trees, grasses, and other plants). By preserving natural vegetation, a natural buffer zone or a stabilized area helps prevent erosion. A desired vegetative buffer strip would be a minimum of 40 feet wide. This measure also minimizes the amount of bare soil exposed to erosive forces. This measure is applicable to all types of sites. Areas where preserving vegetation can be particularly beneficial are floodplains, wetlands, stream banks, steep slopes, and other areas where other structural sediment controls would be difficult to establish, install, or maintain. Preserving natural vegetation has many advantages:

- It does not require time to re-establish vegetation.
- It can handle higher quantities of storm runoff than newly seeded areas.
- It usually requires less maintenance, watering, and chemical application, than newly planted or seeded areas.
- It has greater filtering capacity because the vegetation and root structure are usually denser in preserved natural vegetation than in newly seeded or bare areas.

Successful preservation of vegetation requires good planning and site management to minimize the impact of construction activities. The areas to be preserved should be identified early during the planning stage and be clearly marked in the field before any work on-site begins. Other useful practices are as follows:

- Clearly mark any trees to be preserved, and protect roots against ground disturbance within the dripline of each marked tree. The dripline marks the edge of the tree's foliage where moisture from rainfall would drop. Most of the tree's roots lie within the dripline and are vulnerable to damage.
- Consider the use of design alternatives in order to preserve natural vegetation in certain areas where it typically would be removed and where its preservation would not pose safety problems.
- Perform maintenance activities as needed to ensure that the vegetation remains healthy and aids in erosion prevention and sediment collection. Inspect the preserved vegetated areas at regular intervals to make sure they remain undisturbed and are not overwhelmed by sediment.



Barriers should be installed at the dripline of tree branches.

Covering Soil Piles

Short-term soil piles should be completely covered with a tarp of some kind. If the soil cannot be replaced during the same growing season in which it was stockpiled, soil piles or stockpiled soil should be seeded. The purpose of re-vegetating stockpiled soil is to reduce the potential of soil loss from erosion. Seeding will require greater maintenance during the drier summer months of July, August, and September. It may be necessary to break up the soil surface if it becomes crusted after stockpiling.

A seeding mixture that the Idaho Department of Lands uses is 7% Sodar Streambank Wheatgrass, 20% Reubens Canada Bluegrass, 33% Durar Hard Fescue, 7% Common Sheep Fescue, 13% Bromar Mountain Brome, and 20% White Clover. But, any two or more of these grasses can be used. Please refer to the local county extension office for more information (see page 6-8 for contact information). Cover the seed with one-half to three-quarter inch of soil to improve germination. This can be done with tillage equipment if slopes are not too steep, or by hand raking. It may be necessary to re-seed after one growing season.

Mulching

Mulching temporarily stabilizes soil and acts to control erosion through use of such materials as straw, grass, grass hay, compost, wood chips, or wood fibers. Mulching allows vegetation to re-establish, reduces soil crusting, reduces evaporation, and decreases fluctuations in soil temperature. Other materials can be used for mulching including erosion control fabrics or mats, wood residue, and hydromulch, or a combination of these materials. Mulches can be spread by hand or with machines. Mulching is done after seeding, unless otherwise noted. Mulch should be applied to disturbed areas within riparian zones (approximately 100 feet on each side of a perennial stream or within 100 feet of the lake) and buffer strips.

Cut-and-fill slopes associated with private roads can also be mulched, reducing the chance for erosion and aiding in re-establishing vegetation. These areas should be evaluated on a case-by-case basis to determine the need for mulching. Several types of mulch are described below.

- **Straw or hay mulch** is usually economical and is satisfactory under a variety of conditions. The disadvantages are that straw may absorb soil moisture in very dry conditions, resulting in poorer seed establishment. Use enough mulch to cover all exposed soil. The mulch should be worked into the soil to avoid being blown away.
- **Wood residue -** wood chips, sawdust, and shavings. This type of mulch can usually be purchased through local sources, and it is easy to apply and contains no weed seeds. It is more fire resistant than straw or hay, and chips are resistant to wind movement. The disadvantages include the following: heavy applications may prevent moisture from reaching soil; wood product mulch may be acidic; it may promote nitrogen deficiency; it may float on or be dislodged by running water; and shavings and sawdust may be taken up by the wind. With a chip size of 0.5 inch or less, an application of 1.5 to 2 tons per acre is recommended.
- **Erosion control fabrics**, such as jute, excelsior paper, plastic, or nets, are especially useful on steep slopes or areas with high winds where nets can be anchored in place. They can, however, be expensive, costing as much as 4 or 5 times more than tacked straw. Also, the labor cost of anchoring is high. Nets are less effective on rocky areas and very rough surfaces. Erosion beneath mats may be a problem if they are not properly installed. Costs may limit use to critical areas such as stream banks, channels where runoff concentrates, and generally hot, dry sites.

Temporary berms

A temporary berm is a ridge of compacted soil or sandbags that intercepts and diverts runoff from small construction areas. Temporary berms often are constructed along the top edge of fill slopes but also may be constructed across a roadway at a slight angle to the centerline. Berms are used to prevent runoff onto newly constructed slopes until permanent measures are in place. They intercept flow from the construction area and direct it to temporary slope drains or to outlets where it can be safely discharged. Since temporary berms do not provide filtration, they can only be used for minor flows.

Soil berm

Berms should be high enough to prevent overflow. Berms are normally constructed from embankment materials. Design a berm of soil with an approximate height of 1 foot with a minimum top width of approximately 2 to 2 ½ feet and side slopes of 2:1 (horizontal: vertical) or flatter.

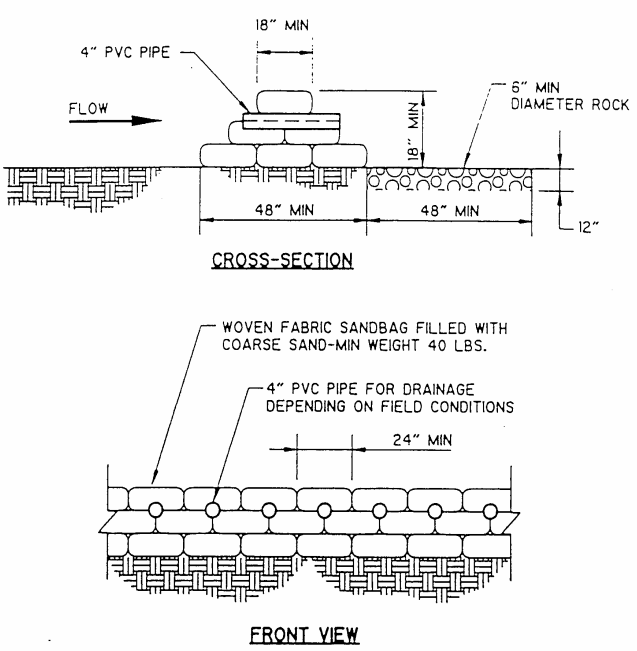
All soil berms should be properly located to effectively divert intercepted runoff. Runoff intercepted from disturbed areas should be diverted to a sediment trapping BMP such as a vegetative buffer strip, a sediment trap, a temporary or permanent grassy swale, straw bale barriers, or a silt fence. The entire width of the berm must be compacted.

Sandbag Berm

The following dimensions are suitable for sandbag berms: height and top width are both slightly more than 1 ½ feet minimum, and bottom width between 4 ¼ to 5 feet. Each sandbag has a general length of 2 to 2 ½ feet, a width of approximately ½ foot, depth or thickness of approximately 1-½ feet, and a weight of 90 –130 lbs.

The sandbags should be installed to prevent flow under or between bags. When the sandbags are stacked in an interlocking fashion, it provides additional strength for resisting the force of the flowing water. However, sandbags should not be stacked more than three high without broadening the foundation (using additional sandbags) or providing additional stability.

The sandbags should be reshaped or replaced as needed during inspection. Inspections should be made daily during wet weather. When silt reaches a depth of ½ foot behind the berm, it should be removed and disposed of at an approved site in a way that does not contribute to additional siltation. The sandbag berm should be left in place until all upstream areas are stabilized and accumulated silt has been removed. The sandbags should be removed by hand.



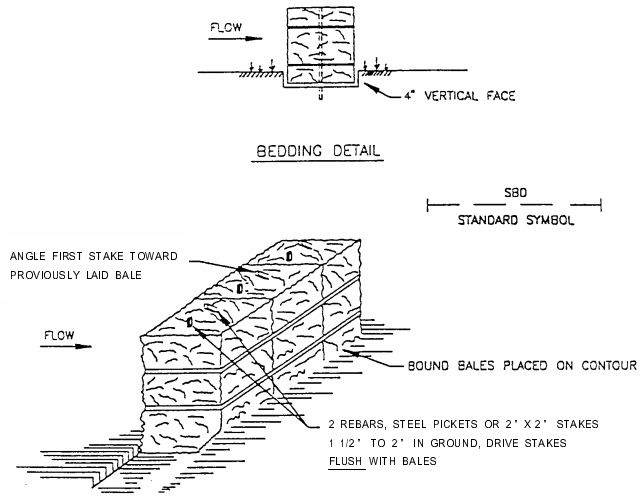
Proper sand bag berm design.

Sediment Collection BMPs

Straw Bale Barriers

Straw bale barriers are primarily used to intercept sediment-laden runoff from small drainage areas of disturbed soil. The purpose of a straw bale dike is to reduce runoff velocity and effect deposition of the transported sediment load. The straw bale barrier is used where there is no concentration of water in a channel or other drainage way above the barrier.

When installed and maintained properly, straw bale barriers remove most of the sediment transported in construction site runoff. This optimum efficiency can be achieved through careful maintenance, with special attention given to replacing rotted or broken bales. Straw bale barriers can be constructed from readily available materials and put in place to control runoff without causing major site disturbances. Installation, however, can be demanding work. Straw bale barriers should be used for no more than two to three months because they tend to rot and fall apart over time.



Construction Specifications:

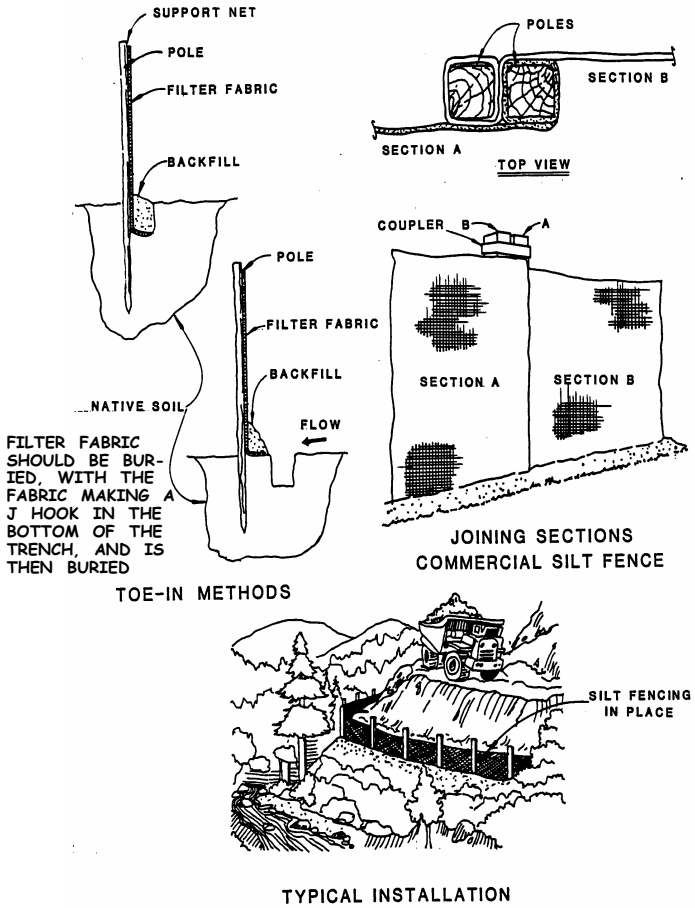
- Bales should be placed at the toe of a slope or on the contour and in a row with ends tightly abutting the adjacent bales.
- Each bale should be embedded in the soil a minimum of 4 inches and placed so the bindings are horizontal.
- Bales shall be securely anchored in place by either two stakes or re-bars driven through the bale. The first stake in each bale shall be driven toward the previously laid bale at an angle to force the bales together. Stakes should be driven flush with the bale.
- Inspection shall be frequent and repair replacement should be made promptly as needed.

Silt Fence

A silt fence is a filter fabric that is entrenched and attached to supporting poles. The purpose of the silt fence is to detain sediment-laden water on-site, releasing it slowly as sediment is filtered out, preventing sedimentation on and off site. A common application of silt fence is along the perimeter of the lot or around a temporary soil pile area. Silt fences are also practical along streams or creek channels. However, they should not be installed within the channel itself or anywhere there is a concentrated flow. The use of a silt fence also is limited to less than an acre lot and has a design life of six months. Installation guidelines include:

- Allow an area behind the fence for the ponding and settling of runoff and sediment, respectively.
- Place the silt fence along a level contour, to prevent the ponding of water that is greater than 1 ½ inches deep at any point.
- Weekly or periodic inspection of the silt fence to repair tears and remove sediment that reaches one-third the height of the fence.

See Section #1 for more information on silt fence design. Silt fence application and design guidelines can be seen in the figures below.



Stormwater Filters

Storm water filters are designed to filter pollutants out from runoff. The primary removal mechanisms employed by these facilities are straining and settling, which allow capture of coarse to fine sediments and the pollutants adhered to them. Vegetated filters such as bioswales also offer limited nutrient uptake in plants as well as absorption in underlying soils. The term biofiltration has been coined to describe the more or less simultaneous process of filtration, infiltration, absorption, and biological uptake of pollutants in storm water that takes place when runoff flows over and through vegetated treatment facilities.

In vegetated systems, the degree to which the above mechanisms operate will vary considerably depending upon many factors, such as the depth and condition of the vegetation, the velocity of the water, the slope of the ground, and the texture of the underlying soil. However, the most important design criterion is the residence time of the storm water in the biofilter, provided there is an adequate stand of vegetation and the underlying soil is of moderate texture. Therefore, to be effective, the biofilter must be designed so that the residence time is sufficient to permit most, if not all, of the particulates and at least some of the dissolved pollutants to be removed from the storm water.

Storm water filters can be used for a variety of land uses. However, they may not be suitable where the runoff contains high sediment loads over long periods, unless the facility is inspected and maintained frequently.

The following storm water filter BMPs should be used when diverting runoff from a construction site. A detailed description for the design and construction of these BMPs can be found in the ***State of Idaho Catalog of Storm Water Best Management Practices for Idaho Cities and Counties.***

- **Vegetated Filter strip**– is designed to provide runoff treatment of conventional pollutants but not nutrients. Very effective at pretreating runoff prior to a filtration BMP.
- **Sand Filter** – filter storm water runoff through a sand layer into an underdrain system which conveys the treated runoff to a detention facility.
- **Compost Stormwater Filter** – mechanical filter to remove fine sediments and metals, and degrade organic compounds such as oil and grease.
- **Catch basin Inserts** – are generally used under a storm drain grate providing water quality treatment through filtration, settling, or absorption.

Recommended Reading:

Forestry for Idaho: BMP's - Forest Stewardship Guidelines for Water Quality.
An excellent color pamphlet with photographs displaying and explaining proper and improper uses of forest practice BMPs, along with forest ecology and water quality concepts.

State of Idaho Catalog of Storm Water Best Management Practices for Idaho Cities and Counties.
A comprehensive landowner and contractors BMP guide for the control and treatment of storm water, erosion, and sedimentation. Available from Kootenai County Building and Planning Department, or the DEQ office in Coeur d'Alene.

Local industry professionals or anyone can obtain training or even become certified through the Panhandle SEEP Program (**Stormwater and Erosion Education Program**) provided by the Panhandle Area Council (PAC).
For more information visit
http://www.plrcd.org/SEEP/index.htm

For SEEP details contact:
Panhandle Area Council
11100 N. Airport Drive
Hayden, ID 83835
208-772-0584

For More Information

Call, write or visit...

Idaho Dept. of Lands
3780 Industrial Ave South
Coeur d'Alene ID 83815
(208)769-1525

Department of Environmental Quality
2110 Ironwood Parkway
Coeur d'Alene, ID 83814
(208) 769-1422

Idaho Department of Water Resources
7600 Mineral Drive. Suite 100
Coeur d'Alene, ID 83815
(208) 762-2800

Kootenai County Building and Planning Dept.
451 Government Way
Coeur d'Alene, ID 83816
(208) 446-1070

City of Hauser
11837 N. Hauser Lake Rd.
Hauser, ID 83854
(208) 777-9315

Kootenai County Extension Office
1808 N. 3rd St
Coeur d'Alene, ID 83814-3407
208-446-1680

Panhandle Health District
8500 N. Atlas Rd.
Hayden, ID 83835
208-415-5200

See Resource Directory (Appendix B) for additional agency contacts.

Notes:

Lake*A*Syst

Assessing and preventing the risk of lake water contamination

Landscape and New Construction

Home-Owner Risk Assessment Sheet

Keeping Hauser Lake Clean

WORKSHEET 6

ASSESSMENT 1 – ***Landscaping and Site Management to Control Runoff -*** The assessment table below will help you identify potential environmental risks related to your landscapes ability to reduce excess water runoff into Hauser Lake and how you manage new construction on the property. For each question indicate your risk level in the right-hand column. Your goal is to lower your risks. Some choices may not correspond exactly to your situation. Choose the response that best fits. When finished turn to the **Action Checklist** on page 6-12 and record your medium and high-risk practices. Use the BMP recommendations in Section #6 *Landscape and New Construction* to help you decide how to best reduce pollution.

	LOW RISK	MEDIUM RISK	HIGH RISK	YOUR RISK
Site plan:	A site plan has been developed for preventing erosion and pollutants from being transported off-site.		No site plan has been developed for making clean water a priority.	❒ Low ❒ Medium ❒ High
Topography, slope of site from potential pollution source toward the lake or a stream:	0-2% slope $\frac{\text{Rise}}{\text{Run}}$ X 100 = % slope	3-4% slope	5% and above	❒ Low ❒ Medium ❒ High
Retention of existing native vegetation:	Plants and trees that help hold soil in place and prevent erosion are protected and preserved whenever landscaping or doing new construction.	Not all trees and plants are retained during construction projects. Areas that are under construction are revegetated when finished.	Preserving vegetation is not taken into consideration when constructing or landscaping.	❒ Low ❒ Medium ❒ High
Landscaping and buffer strips:	Yard is landscaped to slow the flow of stormwater and provide areas where water soaks into the ground. Buffer strips of thick vegetation are left along streams or lakeshores.	No areas are landscaped to encourage water to soak in, but yard is relatively flat and little runoff occurs. Mowed grass or spotty vegetation exists adjacent to a stream or lake.	There is no landscaping to slow the flow of stormwater, especially on steep slopes, erodible properties. Stream banks or lakeshores are eroding.	❒ Low ❒ Medium ❒ High

ASSESSMENT 1 CONTINUED – ***Landscaping and Site Management to Control Runoff***

	LOW RISK	MEDIUM RISK	HIGH RISK	YOUR RISK
Roads, driveways, and openings:	All BMPs required to prevent erosion and protect water quality are identified during the design and construction of roads, trails or driveways, which is done in consultation with an engineer. BMPs are frequently inspected and maintained.		Roads, trails and openings are bare and eroding. No effort is taken to reduce road or skid construction in a riparian area.	❒ Low ❒ Medium ❒ High
Control runoff:	Rainfall and snowmelt runoff is directed into areas appropriate for collecting runoff, so that water will not scour and wash away soil.		No landscape changes made to slow the flow of stormwater, especially on steep erodible slopes.	❒ Low ❒ Medium ❒ High

ASSESSMENT 2 – ***Other Landscaping Considerations*** **-** When finished turn to the **Action Checklist** on page 6-12 and record your medium and high-risk practices.

	LOW RISK	MEDIUM RISK	HIGH RISK	YOUR RISK
Landscaping maintenance to protect property from forest fire:	Leaf clutter, dead trees and branches, firewood, and unused old timber is taken to an approved landfill and/or stored away from the house and other out buildings.		Leaf clutter, dead and down trees, and old unused lumber are not stored away from buildings.	❒ Low ❒ Medium ❒ High

ASSESSMENT 3 – ***Construction site erosion prevention*** – is important in protecting existing and future water quality. Construction sites close to water bodies have a greater potential for affecting water quality. Maintaining natural vegetation and stabilizing exposed soil surfaces helps prevent erosion. When finished turn to the **Action Checklist** on page 6-12 and record your medium and high-risk practices.

	LOW RISK	MEDIUM RISK	HIGH RISK	YOUR RISK
Timing of construction:	Construction work and erosion prevention applications are scheduled for optimal conditions; dry, low runoff periods when erosion is lowest.	Construction work is performed during the wet season, but erosion prevention BMPs are used to help reduce runoff.	Construction work is performed during the wet season and no erosion prevention BMPs are used.	❒ Low ❒ Medium ❒ High
Sediment control:	On construction sites close to water bodies sediment control devices like temporary berms, straw bale barriers, or silt fencing are used. And on steeper slopes (greater than 30%) additional measures are taken with professional assistance.	Construction site is protected by natural vegetation, but no man-made sediment control devices are used.	No sediment control BMPs are used during construction to keep water laden with sediment from running directly into the lake or stream.	❒ Low ❒ Medium ❒ High
Bare soil during construction projects:	Areas of bare soil are seeded and topped with a layer of mulch or straw. Sediment control devices (straw bales, silt fence, or berms) are used especially on steeper slopes until grass is established.	Soil is left bare during a construction project, but natural features slow and treat most runoff.	Soil is left bare and no natural features or sediment control devices are used.	❒ Low ❒ Medium ❒ High
Proximity to surface water:	>500 feet to surface water.	300-500 feet to surface water.	10-300 feet to surface water.	❒ Low ❒ Medium ❒ High

ACTION CHECKLIST

Landscape and New Construction

Write all high and medium risks below.	**What can you do to reduce the risks?**	**Set a target date for action.**
Sample: Runoff from construction activities runs directly into a stream or the lake.	Divert water into a heavily vegetated area and place a silt fence between vegetated area and the nearest waterbody.	One week from today:

SECTION 7

Access Roads and Driveway Runoff

Public and Private Residential Roads

Public and private residential roads are all the roads around Hauser Lake that are not associated with timber harvesting. Some of these roads may have been originally built for agricultural uses or logging access and were not constructed for permanent long term residential or recreation use.

Today, roads around the lake mostly provide access for residential and recreational uses. Maintenance of our public roads is done by the Post Falls Highway District and maintenance is dependent on public funding. Homeowners are responsible for the maintenance of their private roads and driveways.

How does a rut form and where does all the soil go?

Most roads and driveways are constructed of compacted native soils. These dirt roads, if not properly managed, can get rutted after just a single storm. If a road is constructed properly, water from a storm event does not get a chance to pick up speed and create a rut. Water runoff is slowed down by control measures and diverted into vegetated drainage areas where the dirt is captured and the water is filtered back into the ground. On the other hand, if a road does not have any runoff control practices in place water runs freely downhill unchecked where it picks up speed and scours away the soil creating those car eating ruts. The runoff carrying suspended sediment (soil) may then flow into either the lake or one of it's tributaries. The addition of sediment into water bodies increases the loading of phosphorus, which is the limiting factor of algae production (algae blooms and algae on the rocks), and can cover fish spawning beds in streams. Ruts can also form by driving on dirt roads during spring thaw.

The information and intent of this section is only to **provide general guidelines** on proper road construction as it relates to water runoff and erosion control management on private roads and driveways. With driving safety a foremost consideration, as well as proper knowledge on designing and constructing water drainage structures into a road, the expertise of a road design engineer or contractor and an experienced heavy equipment operator are essential. In too many cases we have seen private roads constructed by a property owner who has insufficient knowledge and experience in these areas, and consequently either no ***Best Management Practices*** are installed, or features that are installed fail in the objective of proper water runoff management. The guidelines in this section should help you ensure that contracted road building on your property is done in a proper manner to minimize the impact on the lake, streams, and wildlife. Also offered are several maintenance guidelines which the property owner can undertake for long-term functioning of BMPs.

Developing A 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. Also note that design and permit requirements may vary depending upon your site.

Road Construction BMPs

Many private roads and driveways have significant gullies which form each winter and spring. These gullies can serve as conduits to transport water and sediment directly into streams and Hauser Lake. Normally, plants and trees help hold the soil in place and prevent erosion, especially on steep slopes, but when existing vegetation is removed for road construction the bare soil that is exposed can be easily washed into the lake. Soil erosion can lead to structural damage, reduce soil fertility, and fill in road ditches. It harms the lake by causing excess sedimentation, killing aquatic life, and disrupting spawning. Sediment, with accompanying nutrients, may lead to algae blooms, reduced water clarity and reduced aesthetic appeal. All of these potential

problems are expensive to correct and even more importantly, can be avoided by properly controlling erosion during the construction process.

The following BMPs are used to control erosion during the construction process and for preventing erosion problems in the future.

Construction BMPs:

- Place temporary roads as far as possible away from streams, surface waters or wetlands.
- Construct roads in a manner that prevents debris, overburden, and excess materials from entering streams. Deposit excess materials outside of stream protection zones. See Section #8 *Forest Lot Management* for more information on Stream Protection Zones.
- Construct roads to IFPA plan and design guidelines.
- Provide for drainage, to prevent sediment from entering surface waters.
- Clear drainage ways of all debris, generated during construction or maintenance, that may interfere with drainage or impact water quality.
- When constructing road fills near streams, compact the material to settle it, reduce erosion, and reduce water entry into fill. Minimize snow, ice, frozen soil, and woody debris buried in embankments. Limited slash and debris may be windrowed along the toe of the fill to provide a filter near stream crossings.
- Construct road stream crossings or roads constricting a stream channel in compliance with the **Stream Channel Alteration Law.** Contact the U.S. Army Corps of Engineers for appropriate permits.

Stabilize Road Slopes:

- Where exposed material (excavation, embankment, waste piles, etc.) is erodible and may enter streams, stabilize it before fall or spring runoff by seeding, compacting, riprapping, benching, mulching, or other suitable means.
- Retain *outslope drainage* during or following operations and remove outside edge berms except those protecting road fills.
- Construct *cross drains and relief culverts* to prevent erosion. Minimize construction and installation time. Use riprap, vegetation matter, down spouts, or similar devices to prevent erosion of fills. Install drainage structures on uncompleted roads **before** fall or spring runoff.
- Install a wooden *open-top box culvert* across the road grade to convey surface runoff and roadside ditch flows to the downslope side. This practice is an excellent substitute for pipe culverts on lightly used unpaved roads on steep grades of 6% or more.
- Install *waterbars* for use as a temporary or permanent drainage practice on light-use, low-maintenance, unpaved roads. Waterbars should be placed above grade changes to prevent water from flowing down steeper portions of roads or skid trails.
- Construct the road with shallow, outward-sloping dips or undulations to collect surface runoff and convey it away from the road surface.
- Care should be taken to maintain trees and shrubs growing at the base of fill slopes.
- Mixing tree stumps and other vegetative debris into the road fill should always be avoided.
- Design roads to balance cuts and fills or use full bench construction where stable fill construction is not possible.

Most forest roads are built by excavating a road surface. Road design and layout on-the-ground show machine operators the proper cut slopes and indicate cut slope steepness. The bulldozer starts at the top of the cut slope, excavating and sidecasting material until the desired road grade and width is obtained. Material from cuts is often pushed or "drifted" in front of the blade to areas where fill is needed. Road fill is used to cover culverts and build up flat areas. Since fill must support traffic, it needs to be spread and compacted in layers to develop strength.

While cut-and-fill construction is common for gentle terrain, full-bench roads are usually built on slopes over 6%. In full-bench construction, the entire road surface is excavated into the hill. The excavated material is pushed or hauled to an area needing fill or to a disposal area.

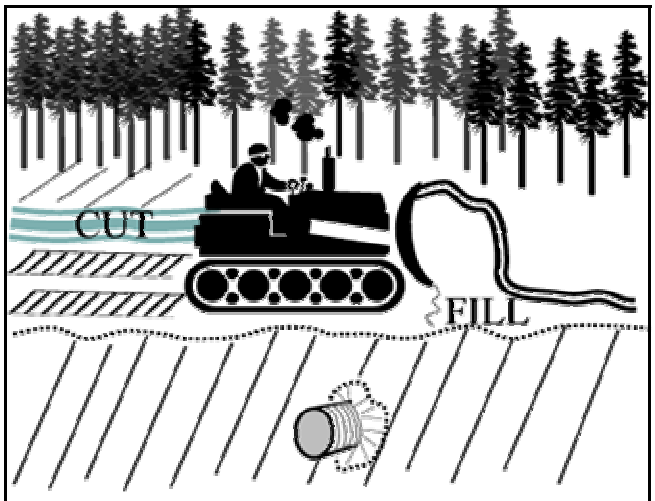
During the process of cut-and-fill, it is critical to avoid letting sidecast or waste material enter streams or placing it on unstable areas where it might erode.

- Minimize sediment production from borrow pits and gravel sources through proper location, development, and reclamation.
- Place debris, overburden, and other waste materials associated with construction and maintenance activities in a location to avoid entry into streams. Include these waste areas in soil stabilization planning for the road.

Please refer to Section #6, *Landscape and New Construction*, for more best management practices on controlling erosion during the construction process.

Table 1. *Road grade and open-top culvert distances.*

Road Grade (percent)	Spacing Between Open-Top Culverts, (feet)
2 to 5	300 to 500
6 to 10	200 to 300
11 to 15	100 to 200
16 to 20	<100



Forest roads are often built by excavating the road surface out of a hillside. A bulldozer starts at the top of the cut slope, excavating and sidecasting material until the desired road width is obtained.

BMP Design and Construction

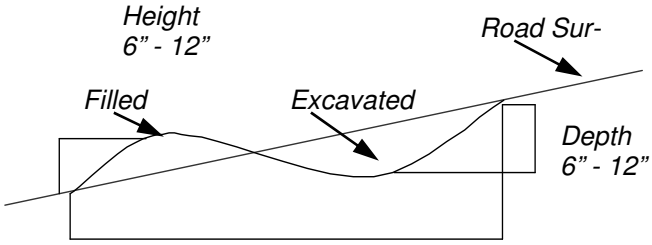
Knowing which BMP to use is half the battle; the other half is designing, constructing and installing the BMP. The following guidelines were taken from the **State of Idaho Catalog of Storm Water Best Management Practices**. A copy is available at the Kootenai County Library, Kootenai County Building & Planning Dept., and DEQ. Please refer to that manual when doing any new construction.

Open-Top Box Culvert: Construct a box-like frame (three-sided, open-topped) of logs; lumber; discarded guardrail; or commercial, corrugated steel. Install it flush with the road surface skewed at an angle downgrade across the roadway. The inflow end should extend 6-12 inches beyond the surface of the roadbed and should be directed onto vegetated ground or riprap or into another erosion control structure such as a sediment trap or catch basin. Install relief open-top box culverts with a minimum cross drainage grade of 2 percent.

Spacing between culverts should be in accordance with recommended cross drainage spacing in Table 1. Where recommended spacing is less than 33 ft, the road should be paved with gravel or crushed rock.

Water bar: A cut and berm built at a downward angle across the roadway, extending from the cutbank to the opposite fill shoulder. Waterbars reduce erosion by diverting storm water runoff from the road surface and directing it to a safe discharge area.

- Construct low enough for traffic to pass over and angle across road to direct runoff flow off the road.
- Berm 6-12 inches high with cut 6-12 inches deep, skewed at angle of 30º to 40º across road.
- Spacing between bars: Use Table 1, for recommended cross drain spacing on low to relatively moderately steep topography.
- Discharge: Runoff should not be directed onto fill material without proper energy dissipation and drainage away from the fill.



6' - 12'
WATERBAR SECTION

Road Sloping: Used as a drainage measure to divert surface water off the entire road surface so that water does not concentrate in any specific location.

- A rounded slope with the high point being the middle of the road with an approximate 1 to 2 percent grade from the middle outward.
- Berms on the outside of the road should be limited or removed to allow water to flow off the road surface.
- Provide sediment collection or erosion control measures at the toe of the fill slope to prevent excessive erosion and sediment transport.

Rolling Dip: Used as a runoff diversion measure to prevent erosion of the road surface. Rolling dips are effective on long inclines to keep storm water from flowing directly down the road where it may cause gullying and other damage to the road surface and grade.

- Rolling dips are not suitable on road grades steeper than 5 percent. Road must be at least 150 feet long.
- The dip should be 1 foot below the road surface. The upgrade approach to the bottom of the dip should be approximately 66 feet long. The down grade approach to the bottom of the dip should be approximately 23 feet long.

Align the dip across the road at nearly a 90-degree angle and slope it outward 5 percent. Rolling dips are built into the road, during construction, following the natural contours of the land. Install erosion and sediment measures at the low point of the dip (drainage outfall to fill slope) before final grading to direct storm water discharge from the dip. Outflows should be kept free of debris to prevent ponding.

BMPs for Ditches

Ditches are constructed to convey water from storm runoff to an adequate outlet without causing erosion or sedimentation. A good ditch needs to be shaped and lined using the appropriate vegetative or structural material.

Ditches are efficient in the removal of runoff from the road, helping preserve the road bed and banks. Well designed ditches provide an opportunity for sediments and other pollutants to be removed from runoff water before it enters surface waters. A ditch achieves this by controlling, slowing and filtering the water through vegetation or structures. In addition, a ditch must be stable so as not to become an erosion problem itself.

Construction Guidelines:

- Locate ditches on the up slope side of the road to prevent water from flowing onto the road from uphill.
- Size ditches so they are large enough to handle runoff from the drainage area.
- Design and grade ditch and bank side slopes at a maximum 2:1 ratio of slope.
- Excavate a ditch deep enough to drain the road base: 1.5 to 2 feet deep.

Machine maintenance in the forest can result in water contamination. Dispose of used oil, filters, and parts responsibly!

- The ditch bottom should be parabolic-shaped or at least flat and a minimum of 2 feet wide to help slow and disperse water.
- Seed ditches which have less than 5% slope with grass in order to filter sediments.
- Line ditches which have a greater than 5% slope with 2-6 inch diameter rock.
- All ditches need outlets; standing water weakens roads.

Cleaning and Maintenance:

- Clean ditches when they become clogged with sediments or debris to prevent overflows and washouts.
- Check ditches after major storm events for obstructions, erosion, or bank collapse.
- Re-grade ditches only when absolutely necessary and line with vegetation or stone as soon as possible.

Culvert BMPs

Use fish friendly culverts at stream crossings. Culvert installation should not change the conditions in the stream that existed prior to the installation. Trout and other species need to move upstream and downstream to spawn and meet other habitat requirements.

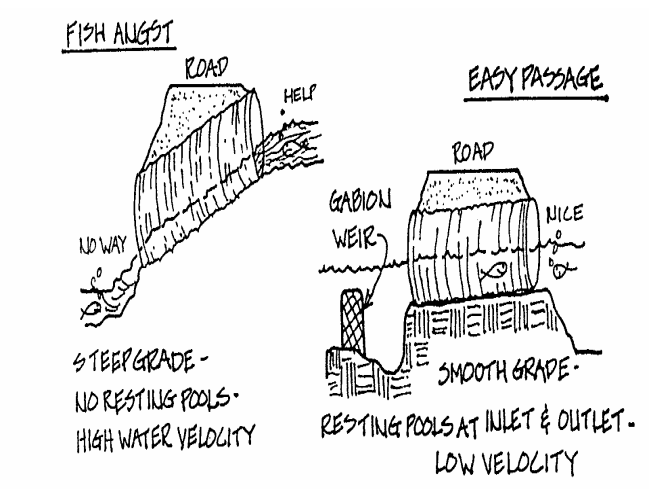
Culverts can impede fish passage by creating the following conditions:

- Excessive water velocities.
- Vertical barrier-fish must jump too high.
- Inadequate water depth.
- Icing and debris problems.
- Culvert design does not accommodate the size and species of fish passing through the structure.

The following BMPs are for a fish friendly culvert:

- When crossing a stream, select the culvert site so that there is no sudden increase or decrease in gradient and there is a 50 foot straight alignment of the stream channel directly above the crossing.
- Use bridges, bottomless arches or partially buried culverts in areas where fish passage is an important consideration.

- Design culverts so that water velocities passing through the pipe are equal to water velocities in the stream.
- Provide resting pools at culvert inlet and outlet for culverts installed in streams with high gradients.
- Place riprap securely at upstream culvert end to avoid dislodging that may result in lower culvert capacity, higher velocity flows and reduced inlet efficiency.



FISH ANGST vs. EASY PASSAGE

BMP Maintenance

The best management practices listed previously must be regularly maintained to control erosion. Periodic inspection and maintenance will extend the life of the BMP and keep road maintenance costs down.

- Mark road culverts to aid in location and clean regularly.
- Clean and repair box culverts on a regular basis. Keep water bars and box culverts free of debris and sediment for optimum performance.
- Avoid using roads during wet periods if such use would likely damage the road drainage features.
- Grade road surfaces only as often as necessary to maintain a stable running surface and to retain the original surface drainage.
- Rolling dips and other outflows should be kept free of debris to prevent ponding.

Place all excess material removed by maintenance operations in safe disposal sites and stabilize these sites to prevent erosion. Avoid locations where erosion will carry materials into a stream.

Culvert Maintenance and Inspection Chart

Problem	Cause	Solution
Ponded/puddled water	Invert is too high. Ditch grade is too flat.	Reset the pipe to match the invert to the channel bottom. Regrade ditch to maintain correct flow.
Dented/crushed ends	Traffic/snow plows are hitting the ends.	Fix pipe ends; use flared inlets and outlets; mark and protect.
Heavy corrosion	Water flowing through the culvert is acidic.	Install a sleeve of PVC in the existing pipe or replace the steel pipe with non-corrosive material (PVC, polyethylene, aluminum, concrete).
Piping around the outlet	Pipe is incorrectly installed, resulting in water flowing outside the pipe.	Reinstall pipe with proper bedding and compaction; install headwall or antiseep diaphragm.
Sediment build-up	Not enough slope.	Reinstall pipe with proper bedding and compaction; install headwall or antiseep diaphragm.
Sediment build-up	Not enough slope.	Reinstall pipe with a slope of at least 1/4 inch per foot.
Objects blocking the pipe	Debris traveling from the ditch to the culvert.	Remove blockage; install check dams upstream of culvert.
Sagging bottom	Foundation material has settled or has low bearing capacity.	Reinstall pipe with suitable and properly compacted foundation material.
Crushed top	Not enough cover. Soil around walls not compacted. Traffic loads are too heavy.	Add cover. Reinstall pipe deeper and/or with suitable and properly compacted bedding material.

Recommended Reading:

Copies of the following material on water quality may be obtained for free from the DEQ or the Idaho Department of Lands Coeur d'Alene offices.

Forestry for Idaho: BMP's - Forest Stewardship Guidelines for Water Quality
An excellent color pamphlet with many photographs displaying and explaining proper and improper uses of forest practice BMPs, along with forest ecology and water quality concepts.

Rules and Regulations Pertaining to the Idaho Forest Practices Act, Title 38, Chapter 13, Idaho Code ("IFPA")

State of Idaho Catalog of Storm Water Best Management Practices for Idaho Cities and Counties
A comprehensive landowner and contractors BMP guide for the control and treatment of storm water, erosion, and sedimentation. You may examine this Catalog at the DEQ office in Coeur d'Alene. Also, it is best to use a professional when designing and installing BMPs.

Local industry professionals or anyone can obtain training or even become certified through the Panhandle SEEP Program (**Stormwater and Erosion Education Program**) provided by Panhandle Area Council (PAC).
For more information visit
http://www.plrcd.org/SEEP/index.htm

For SEEP details contact:
Panhandle Area Council
11100 N. Airport Drive
Hayden, ID 83835
208-772-0584

For More Information

Call, write or visit...

Idaho Dept. of Lands
3780 Industrial Ave South
Coeur d'Alene ID 83815
(208)769-1525

Idaho Department of Environmental Quality
2110 Ironwood Parkway
Coeur d'Alene, ID 83814
(208) 769-1422

City of Hauser
11837 N. Hauser Lake Rd.
Hauser, ID 83854
(208) 777-9315

Kootenai County Building and Planning Dept.
451 Government Way
Coeur d'Alene, ID 83814
(208) 446-1070

Idaho Department of Water Resources
7600 Mineral Drive, Suite 100
Coeur d'Alene, ID 83815
(208) 762-2800

See Resource Directory (Appendix B) for additional agency contacts.

Notes:

Lake*A*Syst

Assessing and preventing the risk of lake water contamination from

Access Roads and Driveway Runoff

Home-Owner Risk Assessment Sheet

Keeping Hauser Lake Clean

WORKSHEET 7

ASSESSMENT 1 – ***Physical Characteristics of Access Roads and Risk of Sediment Delivery to Lake and Streams –*** The assessment table below will help you identify potential environmental risks related to Hauser Lake and the management of your properties access roads and driveways. For each question indicate your risk level in the right-hand column. Your goal is to lower your risks. Some choices may not correspond exactly to your situation. Choose the response that best fits. When finished turn to the **Action Checklist** on page 7-8 and record your medium and high-risk practices. Use the BMP recommendations in Section #7, *Access Roads and Driveway Runoff*, to help you decide how to best reduce pollution associated with water runoff.

	LOW RISK	MEDIUM RISK	HIGH RISK	YOUR RISK
Access road type, and slope of road to home:	Road paved, or road has good gravel base.	Road compacted dirt, and slope is 0-15%.	Road compacted dirt, and slope is >15%.	❒ Low ❒ Medium ❒ High
Condition of unpaved road into home:	Erosion low; no obvious gullies or road wash channels.	Some signs of erosion with loss of soil.	Erosion evident with deep gullies and wash channels.	❒ Low ❒ Medium ❒ High
Condition of road cut bank (above slope) and fill bank (below slope):	Banks are relatively flat and well vegetated, no obvious signs of erosion.	Banks are steep but well protected with vegetation with only some signs of erosion.	Banks are steep, generally bare, erosion evident with gullies and soil slumps.	❒ Low ❒ Medium ❒ High
Existence and condition of structures for water runoff management:	Drainage ditches deep and vegetated, culverts maintained, water bars or rolling dips present on steep slopes to slow runoff velocity.	Evidence that drainage ditches and culverts are not completely effective in runoff management.	Drainage ditches shallow or flat allowing road wash, culverts plugged or no culverts, road needs water bars or rolling dips.	❒ Low ❒ Medium ❒ High
Fate of water and sediment runoff from roads and road banks:	Most water flows over forested land where sediment can drop out before reaching a stream or the lake.	A good deal of water flows directly into the lake or stream; water only slightly turbid (cloudy or brownish in color).	Most runoff water is channelized and flows directly into streams or the lake; water is turbid.	❒ Low ❒ Medium ❒ High

ACTION CHECKLIST

Access Roads and Driveway Runoff

Write all high and medium risks below.	**What can you do to reduce the risks?**	**Set a target date for action.**
Sample: Runoff from driveway runs directly into a stream or the lake.	Slow movement of water running down the driveway with culvert boxes that divert storm water into heavily vegetated areas.	One week from today:

Lake*A*Syst

Assessing and preventing the risk of lake water contamination

Keeping Hauser Lake Clean

SECTION 8

Forest Lot and Riparian Management

Target Audience and Activities

This Section of Best Management Practices (BMPs) is directed at the property owner with forest land in the Hauser Lake watershed. Management of your forested lot may range from timber harvesting to preservation and\or enhancement of vegetation along waterways for wildlife habitat and water quality protection.

Timber Harvesting. If you are planning to harvest trees for commercial sale you are required to adhere to the rules and regulations of the Idaho Forest Practice Act (IFPA), a law intended for protection of water quality, forest productivity and wildlife habitat. Before commencing a forest practice, notification must be given to the Idaho Department of Lands (IDL), the state agency responsible to ensure compliance to the FPA. Six categories of forest practices require notification:

- Timber harvesting and related road construction, or road construction and reconstruction away from the harvesting area.
- Practices associated with reforestation.
- Application of insecticides, herbicides, rodenticides, and fertilizers for forest management purposes.
- Management of slash resulting from harvest, management, or improvement of forest tree species.
- Conversion of harvested forest land to another use.
- The use of prescribed fire.

In forest industry terminology, if you are not a timber company, you are a Family Forest Owner. In Idaho, Family Forest ownership is twice the acreage owned by industrial timber companies. The application of BMPs on these private lands is just as important as on industrial, state and federal ownership land.

State and federal audits are routinely conducted on various harvested lands to determine whether BMPs were being applied and how effective they were at protecting water quality. Audit results indicate that Family Forest landowners generally have more departures from BMPs than found on other ownerships. Common problems include: inadequate Stream Protection Zones (SPZs), inadequately sized stream crossings, inadequate road surface drainage, and ditches and culverts that don't work.

Even in the likelihood that you will be hiring a professional timber operator, this section along with other suggested reference material, (see page 8-8) will allow you to assess whether proper BMPs are being applied on your harvested land to protect the water quality in the Hauser watershed. **As a knowledgeable land steward you should ensure that the conduct of forest practices on your land exceeds the minimum requirements of the IFPA.**

Managing Your Forested Lot is Important!

Why is forested land important to water quality? The forest assists nature in maintaining water quality by keeping soil in place, storing nutrients, and balancing water flows. Forested land also helps to moderate stream water temperatures to support healthy fish populations and other aquatic life.

The biggest concern for managing forested land 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, vegetation cover, pattern of snowmelt, rainfall, and the amount of soil that has been disturbed or exposed by your forest management activities.

A properly managed forest lot can provide a balance of sustainable benefits for both the environment and you.

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 that shows all water bodies, the direction water flows across the property, roads and trails, vegetation, impermeable areas (roofs, driveways, and decks), soil types, and slopes.

You may obtain advice and assistance in preparing a management plan by contacting any of the referenced agencies on page 8-8 of this manual. You can also contract with a private consulting forester. Other fact sheets in this series that are useful in preparing a management plan include Section #1 *Stormwater Runoff*, and Section #6 *Landscaping and Construction Management*.

BMPs for Protecting Nearshore Waters

Adding or enhancing a filter strip will help preserve water quality, and there are other BMPs to follow as you care for vegetation near streams or the lake shore. 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 and vegetative debris into a lake or stream because this releases nutrients and organic acids into the water and uses up valuable oxygen.
- Avoid disturbing wetlands within your forested property.
- Avoid burning near streams or near the lakeshore because the remaining ash is highly alkaline and may change the pH of the lake and promote growth of undesirable plants.
- When treating diseases or insect pests, use chemicals responsibly and use only the required amount. **Note: Use of fertilizers and other chemical applications within 25 feet of the streams or the lake shore is discouraged.**

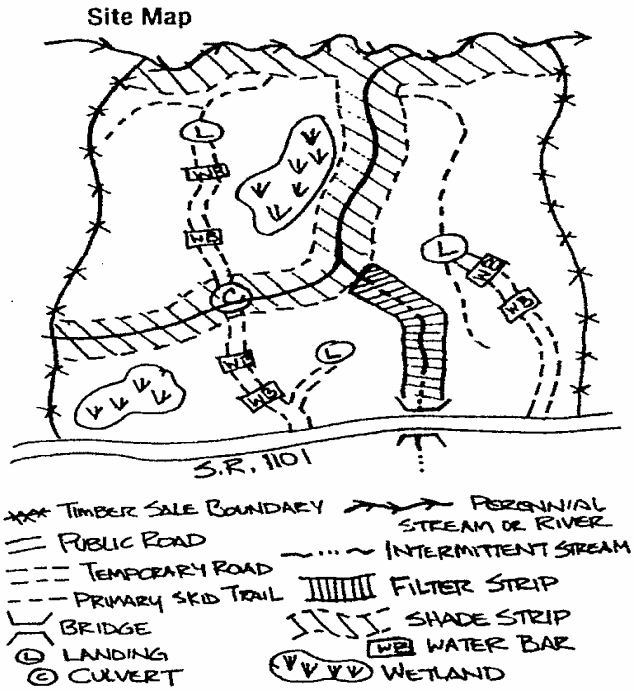


Figure 1: *Map of management area showing roads, harvest areas, filter strips, landings, water bodies, and no-harvest areas.*

BMPs for Upland Timber Harvesting

Timber harvesting is an integral part of wood lot 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 stream bank or lakeshore protection zones.
- Never deposit harvesting slash (treetops, branches) or debris into wetland areas.

- Follow road 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 Site Preparation

Mechanical:

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, compaction or accelerated 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.
- Low slash and small brush should be left to slow surface runoff, return soil nutrients and provide shade for seeding.

Chemical:

- Chemical site preparation is another method of preparing a site. Consult Idaho Dept. of Lands or the County Extension Service for proper herbicide advice and **do not spray near water.**

Manual:

- Hand or individual tree site preparation with hand tools is recommended in small areas and should be considered near water.

BMPs for Forest Roads

Erosion that occurs during forest road construction, and throughout the life of the forest road has a great 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 the impact of road construction, roads should be built to comply with IFPA plan and design guidelines. Always consult a professional for proper road design and construction. Below are some BMPs that should be followed:

- Design roads for minimal disruption of drainage patterns.
- Use barriers, such as silt fencing and hay bales, where siltation and erosion may occur (see Section #1). Mulch and seed exposed soils.
- Where the road must cross a stream, construction of a temporary or permanent stream crossing must be in compliance with the Idaho Stream Channel Protection Act. A Joint Application for permits must be obtained from the Idaho Department of Water Resources, U.S. Army Corps of Engineers or Idaho Dept. of Lands for any alterations within the beds and banks of continuously flowing natural streams in Idaho. **A wrong choice of stream crossing method can result in major damage to both the immediate site and down-stream water uses.**
- Minimize the number of times a road crosses running water or wetlands.
- Driving through open water is not recommended. Skidding through streams is not permitted.
- 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 has been abandoned. Always re-vegetate disturbed soils.
- Design roads for maximum cross drainage using water diversion structures (e.g., water bars) to minimize down road flow.
- Close all temporary roads after use to prevent unwanted use by off-road vehicles that could be detrimental to the site.
- Always route drainage through a vegetative filter strip so sediment can be removed before water reaches a surface water body.

Valuing your Trees

This portion of the fact sheet will cover the importance of maintaining and enhancing your forested lot by retaining existing trees. Trees, shrubs and grasses 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 Hauser Lake and cause algal blooms or excessive plant growth. Trees and shrubs also improve air quality by taking in carbon dioxide and giving off oxygen.

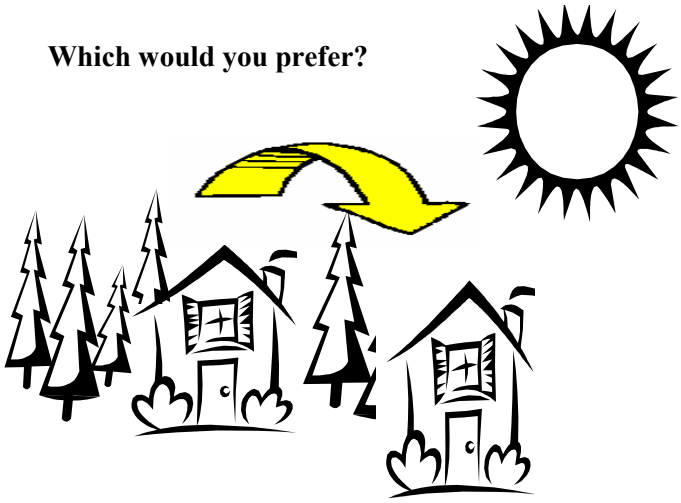
In addition, trees provide shade and help moderate weather extremes such as hot sun or strong winds. Trees and shrubs offer habitat for wildlife and privacy for humans by screening adjacent property.

Retain Existing Trees and Shrubs!

Native 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.

When developing a management plan for property development keep in mind to save existing vegetation. If native trees and shrubs were removed in the past, planting and nurturing replacements will help increase your property value and your enjoyment while helping to protect water quality.

Which would you prefer?



Suggested Species for North Idaho

DECIDUOUS TREES

Quaking aspen (Populus tremuloides)

Black cottonwood (Populus trichocarpa)

Western paper birch (Betula papyrifera)

Rocky Mountain Maple (Acer glabrum)

CONIFERS

White Pine (Pinus monticola)

Lodgepole Pine (Pinus contorta)

Ponderosa Pine (Pinus ponderosa)

Whitebark Pine (Pinus albicaulis)

Grand Fir (Abies grandis)

Douglas Fir (Pseudotsuga menziesii)

Subalpine Fir (Abies lasiocarpa)

Englemann Spruce (Picea engelmannii)

Western Larch (Larix occidentalis)

Pacific Yew (Taxus brevifolia)

Western Red Cedar (Thuja plicata)

Western Hemlock (Tsuga heterophylla)

SHRUBS

Alder (Alnus sp.)

Elderberry (Sambucus cerulea)

Huckleberry (Vaccinium membraneceum)

Serviceberry (Amelanchier alnafolia)

Red-osier dogwood (Cornus stolonifera)

Chokecherry (Prunus virginiana)

Willow (Salix sp.)

Wild Rose (Rosa gymnocarpa)

Shiny Leaf Spiraea (Spiraea betulaforia)

Mountain Ash (Sorbus sitchensis)

Snowberry (Symphoricarpos albus)

Thimbleberry (Rubus Parviflorus)

Buckbrush (Ceanothus velutinous)

Twin Flower (Linnaea borealis)

Mountain Lover (Pachistima myrsinites)

Ocean Spray (Holodiscus discolor)

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 the tree.
- Trim dead and dying limbs and remove diseased growth. Properly dispose of diseased limbs and bark to avoid providing an opportunity for the disease to spread.

- 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 a lakeshore area.

Establishing New Plants

- 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, (see Figure 2.) 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. Remove stakes within one year, if used.
- 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 roots systems; fertilize and prune as necessary; provide protection from deer, rodents and other pests.

BMPs for Maintaining Stream Bank or Shoreland Vegetation

Adding a filter strip will help preserve water quality, and there are other BMPs to follow as you care for stream bank or 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 and vegetative debris into a lake or stream because this releases nutrients and organic acids into the water.
- Avoid burning on the beach, near shore or along a stream bank because the remaining ash is highly alkaline and may change the pH of the stream or lake and promote growth of undesirable plants.
- Use lake water for irrigating trees, shrubs, and lawns; lake water usually can supply nutrients your near-shore vegetation needs to promote healthy growth. Screen irrigation intakes to protect aquatic life and prevent clogging.
- When treating diseases or insect pests, use chemicals responsibly and use only the required amount.
- Scout for pests and diseases; treat early to avoid widespread damage. Contact County Extension Agent or Idaho Dept. of Lands for help.
- Water during times of low rainfall; trees should receive 1 inch of water per week under the crown canopy.
- If trees are too crowded, remove some to allow more light and water to reach remaining stems.
- Minimize the thinning of trees within the streamside or lakeside filter buffer strip.
- 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.
- 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; prune as necessary; and provide winter protection.
- 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- 6 inch layer of mulch, and stake only if necessary. Remove stakes, if used, within one year.

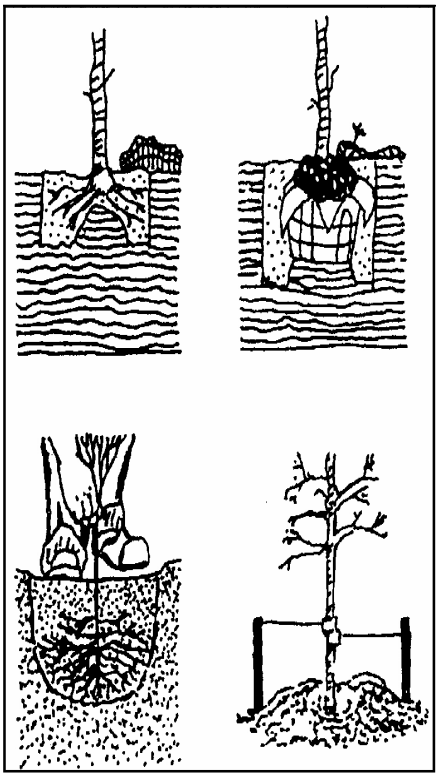


Figure 2: *When planting a tree, dig a hole 1-2 feet wider than the roots, plant so that tree base is at grade, water well, and add 3-6 inches of mulch. Don't forget to care for the tree after planting. Even native species may need watering for the first year or two to establish.*

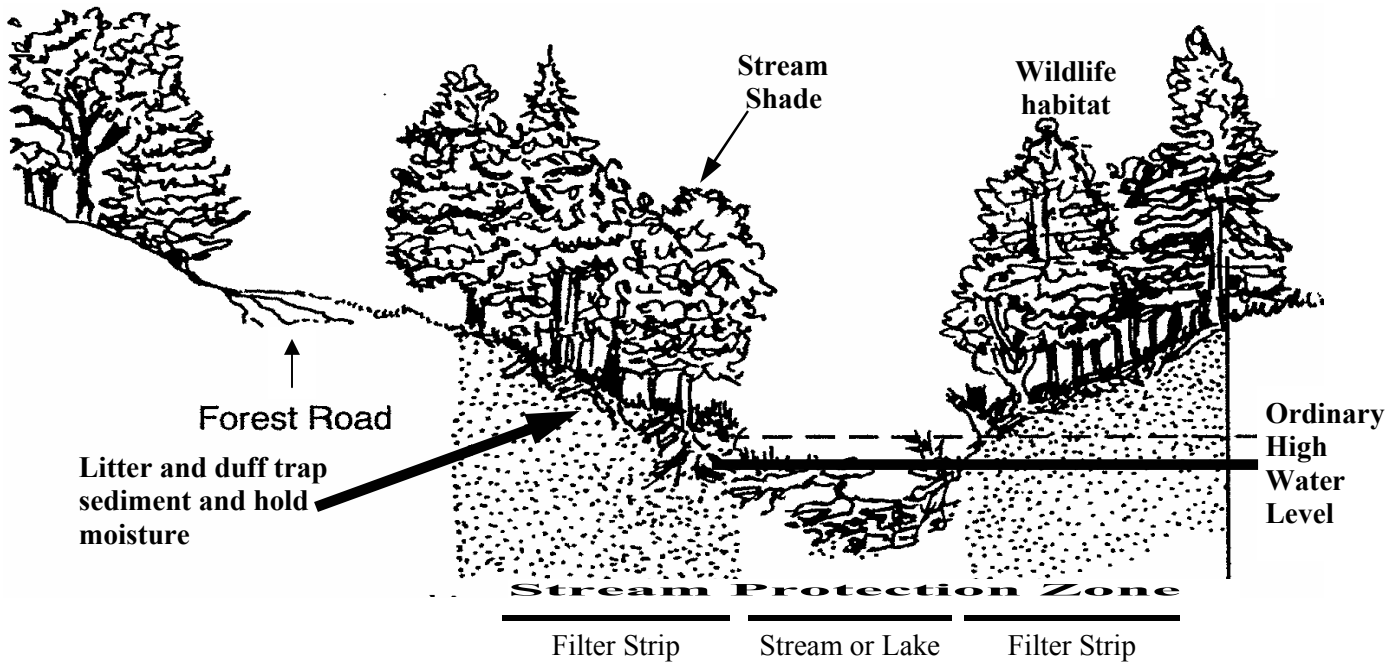


Figure 3: *Function of Stream Protection Zones, Riparian areas, and Vegetative Filter Strips.*

Stream Protection Zone

Stream Protection Zone (SPZ) is a term used in the Idaho Forest Practices Act (IFPA) that mandates a 75-foot minimum distance from a Class I (used by fish or for domestic water supply) stream, lake, or other water body that must be protected because of its importance to wildlife habitat, water quality and fish habitat (Figure 3). Even though the IFPA SPZ only refers to lot owners who harvest timber commercially, everyone harvesting timber near a water body should allow for a Stream Protection Zone. *Why*? First, by maintaining stream shade, water temperatures are kept in check even through the heat of the summer, which helps fish spawning and rearing. Bordering vegetation also provides 90 percent of the food found in streams. Second, wildlife depend on riparian areas for habitat. Research has shown that 59% of land birds use SPZ's for breeding. SPZ's also provide food and shelter for deer, elk, bears, and small animals. Third, vegetative litter and duff retard rain drop impact reducing erosion. The overall function of an SPZ is to protect water quality along streams, lakes and other water bodies.

Riparian Areas

Riparian areas are those areas adjacent to creeks, streams, rivers, and lakes where vegetation is strongly influenced by the presence of water. Riparian vegetation filters out sediment which builds stream banks, forms productive wet meadows and floodplains, and reduces sedimentation of lakes. Riparian areas in good condition slowly release water to stream channels, thus improving seasonal water quantity and quality. They also stabilize the water table as well as water to be recharged, and assist in the beneficial recycling process of accumulated nutrients. Therefore, any alteration, degradation or destruction of riparian habitat can have significant environmental and economic consequences on the watershed.

Riparian areas are critical components of watershed health. Sediment, bacteria, nutrients, and temperature are water quality parameters that are influenced by riparian area management. Improper management practices can lead to poor water quality and habitat in the tributary streams that empty into Hauser Lake.

Excess sediment can cover spawning and resident fish sanctuaries making them unusable. Sediment carries nutrients which can lead to the eutrophication of lakes (algae blooms and excessive aquatic plant growth).

Decreased plant cover leaves more soil exposed to rain impact and soil compaction, further reducing infiltration rates. A slower infiltration rate means that more water will run off and less water will be available for plant growth, subsurface percolation, and ground-water recharge.

The BMPs on the following pages will help you enhance your forested lot for both water quality protection and its resale value.

A healthy riparian area is the key to a healthy stream system. Lush riparian and wetland vegetation along the waters edge will:

- **Slow** flood flows and reduce erosion and property loss.
- **Secure** food and cover for fish, birds and other wildlife.
- **Keep** water cooler in the summer and prevent ice damage in winter.
- **Reduce** water pollution by filtering out sediment, chemicals, and nutrients from runoff.
- **Provide** important breeding habitat for birds.
- **Shelter** animals when brooding or fawning.
- **Hold** more water in the soil, slowly releasing it for longer season stream flows and groundwater re-charge.

Best Management Practices

Vegetation Filter Strip

A vegetation filter strip is an area of trees and shrub vegetation adjacent to streams, lakes, ponds, and wetlands. Filter strips in the Hauser Lake basin occur mostly as a natural riparian area that intercepts sediment, nutrients, pesticides, and other materials in surface runoff which in turn reduce nutrients and other pollutants in shallow subsurface water flow. A filter strip is also an effective storm water management tool that minimizes the exposure of soil, and maintains the residual vegetation. The filter strip traps sediment and provides a zone of infiltration before runoff reaches surface water bodies. Filter strips should be established between developed areas and surface water bodies or adjacent property whenever possible. A minimum amount of management is permitted in the filter strip if it does not result in soil disturbance. Clearing vegetation down to the lake or stream for a walkway, for home safety, and for beach and dock development are environmentally acceptable amounts of disturbance as long as precautions are taken to reduce excess surface water runoff.

When developing a filter strip the width of the strip will vary depending on steepness (percent slope), length of the slope, and soil type. Recommendations for filter strip widths for forest lot management are given in Table 1 (percent slope is defined in Section #1, *Stormwater Management*, page 1-6).

Table 1: Filter strip width guide for forest lot management.

Slope of land between management activity and water body (percent)	Recommended width of filter strip (slope distance in feet)
0 – 10	75
11 – 20	76 – 85
21 – 40	86 – 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.

FYI: Research on farm land adjacent to water bodies has shown significant reductions in surface water nutrient levels where filter strips are used. (University of Minnesota Extension Service, Shoreland Best Management Practices).

- **Channel vegetation**. Establishing and maintaining adequate plants on stream banks, berms, bare soil, and associated areas is an excellent way to improve riparian condition.
- **Wetland development\restoration**. Construction or restoration of a wetland facility to provide the hydrological and biological benefits of a wetland. Establishing or improving wetlands is an excellent way to improve riparian areas.
- **Critical Area Planting**. Planting vegetation, such as trees, shrubs, vines, and grasses or legumes, on highly erodible or critically eroding areas. This practice is an excellent way to reduce sediment runoff from any problem area.
- **Livestock exclusion**. Excluding animals from a riparian area not intended for grazing.
- **Nutrient Management**. Managing the amount, form, placement, and timing of fertilizer applications adjacent to water bodies. Increase efficiency, reduces loss.
- **Planting to reduce erosion**. Using adapted plant species and double seeding techniques to reduce the formation of gullies eroded by storm water runoff. When used in combination with small rock structures, this can be very effective and aesthetically pleasing.
- **Ponds**. Embankment or excavated ponds that are used to water animals. Small constructed ponds are valuable as sources of water when stream access is prevented to provide riparian area protection.

- **Slash.** Keep stream free of green slash and debris created by logging and clearing. Rotting debris can use up oxygen that is needed to sustain fish and other aquatic organisms. Don't burn slash in SPZ.
- **Stream bank and shoreline protection.** Using vegetation or structures to stabilize and protect stream banks against scour and erosion (may require a stream channel alteration permit).
- **Wildlife habitat.** Leave tall trees such as cottonwoods for eagle and osprey nesting habitat. Leave snags (large dead trees) and forage producing trees for homes and food and protect the forest from wildfire hazards.

Recommended Reading:

Copies of the following material on water quality may be obtained for free from the Idaho Department of Environmental Quality ("DEQ") Coeur d'Alene.

Forestry for Idaho: BMP's - Forest Stewardship Guidelines for Water Quality
An excellent color pamphlet with photographs displaying and explaining proper and improper uses of forest practice BMPs, along with forest ecology and water quality concepts.

Rules and Regulations Pertaining to the Idaho Forest Practices Act, Title 38, Chapter 13, Idaho Code

State of Idaho Catalog of Storm Water Best Management Practices for Idaho Cities and Counties
A comprehensive landowner and contractors BMP guide for the control and treatment of storm water, erosion, and sedimentation. You may examine this Catalog at Dept. of Lands, Kootenai County Building and Planning Dept. or the DEQ office in Coeur d'Alene. Also, it is best to use a professional when designing and installing commercial grade BMPs.

Visit the Idaho Department of Water Resources on line at www.idwr.idaho.gov for more information on the **Stream Channel Protection Act**.

For More Information

Call, write or visit...

Idaho Dept. of Lands
3780 Industrial Ave South
Coeur d'Alene ID 83815
(208)769-1525

Natural Resources Conservation Service
7830 Meadowlark Way, Suite C-1
Coeur d'Alene, ID 83815
(208) 762-4939

Kootenai Shoshone Soil & Water
Conservation District
7830 Meadowlark Way, Suite C-1
Coeur d'Alene, ID 83815
(208) 762-4939 Ext 101

Idaho Department of Environmental Quality
Coeur d'Alene Regional Office
2110 Ironwood Parkway
Coeur d'Alene, ID 83814
(208) 769-1422

See Resource Directory (Appendix B) for additional agency contacts.

Notes:

Lake*A*Syst

Keeping Hauser Lake Clean

Assessing and preventing the risk of lake water contamination

Forest Lot and Riparian Management

Home-Owner Risk Assessment Sheet

WORKSHEET 8

ASSESSMENT 1 – ***Forest Management*** – The assessment table below will help you identify potential environmental risks related to Hauser Lake and the way you manage your forested lot. For each question indicate your risk level in the right-hand column. Your goal is to lower your risks. Some choices may not correspond exactly to your situation. Choose the response that best fits. When finished turn to the **Action Checklist** on page 8-12 and record your medium and high-risk practices. Use the BMP recommendations in Section #8, *Forest Lot and Riparian Management* to help you decide how to best reduce pollution.

	LOW RISK	MEDIUM RISK	HIGH RISK	YOUR RISK
Management plan:	A written management plan has been developed for timber harvesting, site preparation, stream protection, road maintenance, and forest management BMPs, and a time has been scheduled for forest management plan review.	A written plan has been created, but has not been updated in the last 5 years.	No management plan has been developed for making clean water a priority.	❒ Low ❒ Medium ❒ High
Timber harvesting:	Timber harvests are planned and conducted using BMPs to protect water quality; meet sunlight and site requirements of tree species; are monitored by a professional forester.	Timber harvests are planned and conducted using BMPs without the assistance of a professional forester or other natural resources professional.	BMPs are not used. Timber buyer or logger plans and implements the harvest with no landowner or natural resources professional oversight.	❒ Low ❒ Medium ❒ High
Using BMPs:	Forestry Best Management Practices (BMPs) are carefully selected to protect water quality during all forest management activities. BMPs are included in the written forest management plan.	BMPs are included on an as-needed basis where believed necessary, but not included in the written plan.	BMPs are not considered during forest management activities.	❒ Low ❒ Medium ❒ High

ASSESSMENT 1 CONTINUED – ***Forest Management*** – Use the table below to rate your risks related to managing your forested lot.

	LOW RISK	MEDIUM RISK	HIGH RISK	YOUR RISK
Forest health:	Recommended forest management activities produce a healthy, vigorous forest which meets goals for timber production, while enhancing wildlife, water quality, recreational and aesthetic goals.	The forest is not being managed for timber production, but meets goals for forest health, wildlife, water quality, recreation and aesthetics.	The forest is not being managed. As a result, forest health is declining and other goals are not being accomplished.	❒ Low ❒ Medium ❒ High
Tree species:	Planned and implemented forest establishment practices result in adequate populations of forest trees suited to the area. Selected tree species meets goals for timber, wildlife, water quality, recreation and aesthetics.	Forest is adequately populated/stocked, but the species mix is not ideal to meet all forest management goals.	Forest is inadequately populated/stocked with species that match soil conditions. Species do not meet management objectives.	❒ Low ❒ Medium ❒ High
Tree population/ stocking:	Appropriate intermediate stand management practices (weeding, release, thinning, timber stand improvement, pruning, controlled burning, fertilization) manipulate the stocking, species composition and competition levels within management goals.	Established forest meets less than all management goals and needs some intermediate stand forest management practices.	Forest is overstocked or under-stocked, lacks vigor, is not of ideal species composition, does not contribute to forest management goals or sustain a healthy forest.	❒ Low ❒ Medium ❒ High
Stream Protection Zone (SPZ):	Stream Protection Zones are identified and marked. SPZ's adhere to the Idaho Forest Practices Act of a 75 foot width for a Class 1 water body, provide water quality protection, and adequate stream shade. Minimal harvesting in SPZ. No roads or trails in SPZ.		No Stream Protection Zone has been delineated. No efforts are made to reduce harvesting impact on streams.	❒ Low ❒ Medium ❒ High

ASSESSMENT 2 – *Riparian Management* – Use the table below to rate your risks relating to riparian health. When finished turn to the **Action Checklist** on page 8-12 and record your medium and high-risk practices.

	LOW RISK	MEDIUM RISK	HIGH RISK	YOUR RISK
Streambank condition:	More than 90% of the streambanks are stable with plant cover or large rocks. Little or no active erosion.	70-90% of the streambanks are stable with plant cover or large rocks. Some active erosion.	Less than 70% of the streambanks are stable with plant cover or large rocks. Active erosion very evident.	❒ Low ❒ Medium ❒ High
Roads, driveways, and openings:	All BMPs required to prevent erosion and protect water quality are identified during the design and construction of roads, trails or driveways, which is done in consultation with an engineer. BMPs are frequently inspected and maintained.		Roads, trails and openings are bare and eroding. No effort is taken to reduce road or skid construction in a riparian area.	❒ Low ❒ Medium ❒ High
Streamside vegetation (riparian):	Stream well shaded with trees and/or shrubs. Perennial plants dominate with few or no annual plants.	Trees and/or shrubs providing some shade. Perennial plants dominate with some annual plants.	Little or no shade provided by trees and/or shrubs. Perennial or annual plants may dominate.	❒ Low ❒ Medium ❒ High
Streamside vegetation trend:	Streamside tree and/or shrub seedlings present and growing well.	Streamside tree and/or shrub seedlings present but not growing well.	Streamside tree and/or shrub seedlings not present.	❒ Low ❒ Medium ❒ High
Stream crossings:	Stream crossings are avoided unless absolutely necessary. BMPs are installed for all temporary and permanent culverts, bridges, and fords. Engineering services used in design of water friendly stream crossings.		BMPs are not used. Stream crossings are eroding or bare. Culverts, bridges, and fords are not maintained.	❒ Low ❒ Medium ❒ High

ACTION CHECKLIST

Forest Lot and Riparian Management

Write all high and medium risks below.	**What can you do to reduce the risks?**	**Set a target date for action.**
Sample: Don't have any type of plan to manage forested lot.	Contact a natural resources professional for on-site consultation to develop a plan.	One week from today:

SECTION 9

Pasture and Riparian Management

Keeping Hauser Lake Clean

Over the past several years, there has been a migration from city residential areas to more rural housing developments as well as homes on small acreages. This section will address conservation and pollution prevention measures which can be implemented to protect pastures and riparian areas on lots up to twenty acres in size. The need for this type of information has been clearly demonstrated in watersheds throughout the state.

Most owners of these small farms are concerned about what they can do to help with the restoration of the watershed. Improper grazing management of pasture and riparian areas by small farms can lead to pollutants such as sediment, nutrients, and bacteria entering streams and ground water. Individually, their contribution may seem small, but as the numbers of small farms increase, the potential for more pollutant input on a watershed scale increases. This section will provide information these landowners should consider to become a part of the solution to improve water quality.

Pastures

Pastures in good condition provide adequate protection from erosion by wind or water. Proper grazing systems help to prevent erosion and sediment or nutrients delivery from pasturelands. Soil compaction and increases in water runoff can occur when pastures are grazed when wet or overgrazed. This can occur on pasturelands used as winter and spring feeding areas, on pastures grazed in early spring while soils are still wet, and on pastures grazed during or too soon after irrigation. Overgrazing can leave pastures vulnerable to erosion by water and lead to excessive nutrient leaching or runoff.

For a successful grazing program, the following management tips should be considered:

- Eliminate continuous grazing; allow 30 day rest periods or use a high-intensity, short-duration grazing system to rejuvenate poor condition pasture.
- Subdivide large pastures into smaller sections, and develop a pasture-rotation system.
- Corral livestock and feed them hay until your pasture grasses are 6" to 8" high. Move livestock when 50% of the grass plant has been eaten (3" to 4" height remains). Do not re-graze until grasses are at least 6" high (will take up to one month).
- During winter months, continue your rotation and feed in dry pastures to distribute manure. Feed evenly across your pastures or hold animals in a corral.
- Horses do not need 24-hour access to feed or forage. Their nutritional needs can be met with only a few hours of grazing on good pasture each day. Corral animals for a period each day to prevent overgrazing of plants and extend usage of available forage.
- Provide a water source for each pasture.
- Irrigate each pasture (if irrigation is available) immediately after grazing to get plants growing again. Do not graze on wet soils.
- Restrict or end grazing early enough in the Fall to maintain 3 inches of stubble going into Winter.

What Is A Riparian Area?

Riparian areas are areas adjacent to creeks, streams, wetlands, lakes and rivers where vegetation is strongly influenced by the presence of water.

Riparian vegetation filters out sediment which builds streambanks, forms productive wet meadows and floodplains, and reduces sedimentation of lakes and reservoirs. Riparian areas in good condition slowly release water to stream channels, thus improving seasonal water quantity and quality. They also stabilize the water table, add to aquifer recharge, and assist in the beneficial recycling process of accumulated nutrients. Therefore, any alteration, degradation or destruction of riparian habitat can have significant environmental and economic consequences on the watershed.

How Does Grazing Affect Riparian Areas?

Management of animal grazing on riparian areas for small plots of land should follow the same basic strategy as that for larger plots of public or private land. Improper animal grazing can affect the amount, timing, and quality of water in riparian areas. Improper animal grazing affects on riparian areas include loss or reduction of streamside vegetation and trampling of streambanks and channels. Channel stability can be reduced and become more susceptible to erosion by high flows. Stream downcutting or channelization of riparian areas will result in additional erosion and lowering of the water table. Streambank compaction can also occur and contribute to poor plant root development and decrease the soil's infiltration rate. Improper grazing can eliminate woody vegetation which would result in decreased shade and a potential increase in stream temperatures. This increase in stream temperature can have a negative impact on the life cycles of Hauser's cold water fishery and the organisms on which they depend for food.

Degraded Riparian Areas Have:

- Little vegetation to protect and stabilize stream banks and shade stream.
- Lowered water table and saturated zone, reduced subsurface water storage.
- Reduction or elimination of summer stream flows.
- Warmer water in summer and increased icing in winter.
- Poor habitat for wildlife, fish and other aquatic organisms.

Healthy Riparian Areas Have:

- Diverse vegetation and root systems protect and stabilize stream banks; stream shaded.
- Elevated water table and saturated zone increase subsurface water storage.
- Sustained summer stream flows.
- Cooler water in summer, reduced icing in winter.
- Good habitat for wildlife, fish and other aquatic organisms.
- Increased potential for nutrient recycling.

Potential Groundwater Impacts

Poor grazing management practices often lead to slower soil infiltration rates. Decreased plant cover leaves more soil exposed to raindrop impact and soil compaction, further reducing infiltration rates. A slower infiltration rate means that more water will run off and less water will be available for plant growth, subsurface percolation, and groundwater recharge.

The potential impact on the quantity and quality of deep groundwater aquifers is low. However, grazing can impact the quality, amount, and timing of shallow groundwater. In many cases, the flow of perennial and intermittent springs and streams is sustained by shallow groundwater flow. Groundwater is cooler than surface water and helps maintain lower stream and lake temperatures to support aquatic life during hot dry times of the year when snow melt is no longer contributing to streamflows. Decreased soil infiltration will cause increased overland and reduced groundwater flow and can also cause a shift in plant species and increased evapotranspiration.

Potential Surface Water Impacts

Research indicates that impacts on surface water from poor grazing management practices includes increased bacteria, nutrient concentrations, and increased sediment production in downstream portions of the watershed. It appears that coliform bacteria in streams are a function of animal density and their direct access to streams. Bacteria are not nutrients and do not lead to the increased eutrophication of Hauser Lake. They do however, pose a human health risk to anyone ingesting water that is contaminated.

Of the nutrients that could impact streams, nitrogen and phosphorus are of the most concern. Phosphorus binds to soil organic and mineral particles and is a potential pollutant any time soil erosion rates are high. On pastures receiving fertilizer, there is the potential for nutrient loss to streams, especially in areas with poor drainage, poor grazing management, or soils that have a high leaching potential.

Riparian Grazing Solutions

Best: Use fencing to exclude livestock from riparian areas. Livestock exclusion allows riparian plants the greatest opportunity for recovery in the shortest period of time. Significant improvement is often seen in only two to three growing seasons. Use watering troughs away from surface water wherever possible.

Good: If riparian grazing is necessary, use fencing to allow *controlled* grazing of the riparian area. Avoid grazing the riparian area until stream banks are stable and well vegetated, then graze only in the late spring for short periods. Avoid early spring grazing because stream banks are saturated and vulnerable to trampling. Avoid summer and fall grazing because this is when livestock tend to overgraze shrubs, especially willows. In just a few days, livestock can remove an entire year's shrub growth. Avoid grazing riparian plants shorter than three inches.

Best Management Practices (BMPs)

BMPs are practices or combinations of practices found to be the most effective and practical means of preventing or reducing the amount of pollution generated by non-point sources. For any BMP to be practical, it must be technically feasible, economically feasible, and socially acceptable.

Best Management Practices that could be useful to the small farm type operation for grazing of both pasture and riparian areas are:

- **Fencing** is the enclosing or dividing of an area of land with suitable permanent structures that act as a barrier to animals, wildlife, or people. Rotational grazing can be used with properly fenced pastures. Temporary fencing can enhance grazing systems.
- **Livestock exclusion** is the exclusion of animals from an area not intended for grazing. Fencing is an excellent way to exclude animals from riparian areas. The width of area fenced should be carefully planned.
- **Nutrient management** is managing the amount, form, placement, and timing of applications of plant nutrients. Performed properly, nutrient inputs to streams from fertilizer applications can be substantially reduced. Soils should be tested regularly to determine proper fertilizer needs and prevent over fertilization.
- **Pasture management** is the proper treatment and use of pasture. Planning and maintaining the proper use and fertilization, minimum forage height and pest control of pastures helps focus other practices towards water quality goals.
- **Planned grazing system** is a practice where two or more grazing units are alternately grazed. This could be useful where separation of pastures will continue to improve forage.
- **Excavated ponds** may be used to water animals. Small constructed ponds are valuable as sources of water when stream access is prevented to provide riparian area protection.
- **Proper grazing** is using correct timing, duration, and animal numbers that will maintain enough cover to protect soil and maintain or improve vegetation quality and quantity. This can be used in conjunction with a planned grazing system.
- **Water development** is improving springs and seeps by excavating, cleaning, capping, or providing collection and storage facilities. Also includes wells and pipelines in order to place water where desired. When springs are located on the property, they can become an excellent source of stock water. This can be part of a riparian protection plan.
- **Critical area planting** is planting native vegetation (trees, shrubs, vines, grasses or legumes) on erodible areas. This practice is an excellent way to reduce sediment runoff from any problem area. It should be used with other measures, such as animal exclusion or rest.
- **Ephemeral watercourse planting** is using adapted plant species and double seeding techniques to reduce the formation of seasonal gullies. When used in combination with mulching and small rock structures, this can be very effective at reducing erosion.
- **Fish stream improvement** is improving a stream to create fish habitat or enhance existing habitat. This practice will require a stream alteration permit from the U.S. Army Corps of Engineers and other appropriate agencies. When used with other riparian area protection methods, a small farm can have both grazing and an improved in-stream fishery.
- **Heavy use area protection** is protecting heavily used areas by establishing plant cover, surfacing, or structures. This is an excellent way to prevent erosion from high traffic areas.
- **Stream bank and shoreline protection** is using native vegetation or structures to stabilize and protect stream banks against scour and erosion (may require a stream channel alteration permit). When suitable riparian protection is initiated, stream bank improvements are very effective.
- **Wetland development and restoration** is the construction or restoration of a wetland facility to provide the hydrological and biological benefits of a wetland. Establishing or improving wetlands is an excellent way to improve riparian areas and raise water tables to be utilized by forage plants.

- **Salting** Salt blocks are useful for controlling animal distribution. Placing salt away from watering locations will help reduce time spent near water.

Summary

Utilizing proper grazing management strategies and improving pasture and riparian areas is beneficial not only for human health concerns, but to the landowner as well as water quality, fish and wildlife. Virtually all of the practices mentioned above result in some type of improvement in forage or water table levels which translates into improved productivity over the long term. Small farm owners concerned with water quality as well as increased productivity should seek the proper technical assistance for the implementation of a plan to improve forage production, riparian areas, and animal watering capabilities. Proper management of both pasture and riparian areas can benefit your property in the following ways:

- Reduces the risk of any human health concerns.
- Creates diverse vegetation and root systems which protect and stabilize stream banks and reduces the likelihood of flooding.
- Maintains water table and saturated zone and increases subsurface water storage which promotes deep root growth and reduces the threat of invasive weed species.
- Reduces stream channel icing in winter; insulates and shades water in summer heat.
- Increases quantity and quality of animal forage.
- Reduces soil erosion and off-site sediment delivery.
- Reduces the risk of both surface and groundwater contamination.
- Improves aesthetic values and related property values.

Recommended Reading:

Living On A Few Acres, Jack Hayes, Bob Bergland and the US Department of Agriculture.

For More Information

Call, write or visit...

Natural Resources Conservation Service
7830 Meadowlark Way, Suite C-1
Coeur d'Alene, ID 83815
(208) 762-4939

Kootenai Shoshone Soil and
Water Conservation District
7830 Meadowlark Way, Suite C-1
Coeur d'Alene, ID 83815
(208) 762-4939 Ext 101

Idaho Department of Environmental Quality
2110 Ironwood Parkway
Coeur d'Alene, ID 83814
(208) 769-1422

Idaho Department of Water Resources
7600 Mineral Drive, Suite 100
Coeur d'Alene, ID 83815
(208) 769-1450

Kootenai County Building and Planning Dept.
451 Government Way
Coeur d'Alene, ID 83814
(208) 446-1070

See Resource Directory (Appendix B) for additional agency contacts.

Notes:

Lake*A*Syst

Keeping Hauser Lake Clean

Assessing and preventing the risk of lake water contamination

Pasture and Riparian Management

Home-Owner Risk Assessment Sheet

WORKSHEET 9

ASSESSMENT 1 – ***Pasture and Riparian Management*** – The assessment table below will help you identify potential environmental risks related to Hauser Lake and the way you manage your pasture and riparian areas. For each question indicate your risk level in the right-hand column. Your goal is to lower your risks. Some choices may not correspond exactly to your situation. Choose the response that best fits. When finished turn to the **Action Checklist** on page 9-8 and record your medium and high-risk practices. Use the BMP recommendations in Section #9 *Pasture and Riparian Management* to help you decide how to best reduce pollution.

	LOW RISK	MEDIUM RISK	HIGH RISK	YOUR RISK
Streambank condition:	More than 90% of the streambanks are stable with plant cover or large rocks. Little or no active erosion.	70-90% of the streambanks are stable with plant cover or large rocks. Some active erosion.	Less than 70% of the streambanks are stable with plant cover or large rocks. Active erosion very evident.	❒ Low ❒ Medium ❒ High
Livestock access to stream:	Stream fenced to exclude livestock.	Limited livestock access to stream.	Unlimited livestock access to stream.	❒ Low ❒ Medium ❒ High
Streamside (riparian) vegetation:	Stream well shaded with trees and/or shrubs. Perennial plants dominate with few or no annual plants.	Trees and/or shrubs providing some shade. Perennial plants dominate with some annual plants.	Little or no shade provided by trees and/or shrubs. Perennial or annual plants may dominate.	❒ Low ❒ Medium ❒ High

ASSESSMENT 1 CONTINUED – ***Pasture and Riparian Management*** – Use the table below to rate your risks related to managing your pasture and riparian areas.

	LOW RISK	MEDIUM RISK	HIGH RISK	YOUR RISK
Streamside (riparian) vegetation trend:	Streamside tree and/ or shrub seedlings present and growing well.	Streamside tree and/ or shrub seedlings present but not growing well.	Streamside tree and/or shrub seedlings not present.	❒ Low ❒ Medium ❒ High
Grazing management:	Two or more pastures used in rotation to allow plant rest. Grazing period begins at a 6" leaf length and ends at 3". Plant height at least 3" going into winter.	Two or more pastures used in rotation to allow plant rest but grazing period begins at less than a 6" leaf length and/or plants grazed shorter than 3". Plant height less than 3" going into winter.	Pastures not allowed rest. Grazing period begins at less than a 6" leaf length and/or plants grazed shorter than 3". Plant height less than 3" going into winter.	❒ Low ❒ Medium ❒ High
Plant health:	Forage plants are healthy with dark green leaves, deep roots, and vigorous regrowth. Very few weeds. High production.	Forage plants somewhat unhealthy. Plant production beginning to decrease. Weeds increasing.	Forage plants are unhealthy and may have yellowish colored leaves, shallow roots, small size, or slow regrowth. Weeds common. Low production.	❒ Low ❒ Medium ❒ High
Heavy use area(s) (corrals, troughs, or salt areas with little or no protective plant cover):	Heavy use area(s) established well away from stream or irrigation ditch.	Heavy use area(s) near stream or irrigation ditch and runoff is not diverted or captured.	Heavy use area(s) located adjacent to stream or irrigation ditch.	❒ Low ❒ Medium ❒ High

ASSESSMENT 2 – ***Pasture and Riparian Management*** – Use the table below to rate your risks relating to pasture and riparian areas. When finished turn to the **Action Checklist** on page 9-8 and record your medium and high-risk practices.

	LOW RISK	MEDIUM RISK	HIGH RISK	YOUR RISK
Irrigation (complete only if irrigated):	Sprinkler irrigated with little runoff, OR surface irrigated with no stream in or adjacent to pasture, OR surface irrigated with tailwater captured.	Surface irrigated with 20' wide or greater buffer of ungrazed vegetation along the stream.	Surface irrigated with no buffer along the stream; tailwater is not captured.	❒ Low ❒ Medium ❒ High
Fertilizers:	Fertilizers applied based on soil test or County Extension guidelines and manure scattered with harrow, OR fertilizer not used and manure scattered.	Fertilizer applied without soil test or County Extension guidelines, but manure is scattered.	Fertilizer applied without soil test or County Extension guidelines and manure is not scattered.	❒ Low ❒ Medium ❒ High

ACTION CHECKLIST

Pasture and Riparian Management

Write all high and medium risks below.	**What can you do to reduce the risks?**	**Set a target date for action.**
Sample: Don't have any type of plan to manage pasture and riparian areas.	Contact a natural resources professional for on-site consultation to develop a plan.	One week from today:

Eurasian Watermilfoil

Myriophyllum spicatum

Eurasian watermilfoil is a non-native aquatic plant found in much of the shallow areas of most lakes in the region. It is suspected this incredibly invasive aquatic weed was recently introduced into nearby lakes from other parts of the Columbia River drainage, most likely on boat trailers. Because it is widely distributed and difficult to control, Eurasian watermilfoil is considered to be the most serious aquatic weed problem in the Northwest.

As its name suggests it has its origins in Europe and Asia. It probably arrived in the United States in the 1940s and has quickly spread to all but a few states. Eurasian watermilfoil, commonly referred to as simply watermilfoil, (there is also a less invasive native watermilfoil), is actually an attractive plant that was once commonly sold as an aquarium plant.

Even a tiny fragment of the plant is enough to establish a colony that can quickly out compete beneficial native aquatic plants. These massive rooted colonies can become so dense that they not only compromise the water quality, but can suffocate fish and destroy spawning habitat for some species.

Watermilfoil also has a serious impact on an areas economic well being. Most water based recreational activities are affected by it to some degree. Boats can have trouble navigating through the nearly solid floating mats occasionally getting stuck. Fish populations can decline and swimmers have been known to drown in rare instances. Dense floating mats can also clog the inlets of power generating plants and increase the cost of maintenance.

One of the leading causes of the proliferation of Eurasian watermilfoil is excessive nutrient input into the lake and it's tributaries both from improper land use practices and from individual home owners. As you read through the Lake*A*Syst materials keep in mind the effect of nutrient runoff, especially nitrogen and phosphorous, and the effect on the water quality of Hauser Lake. What you do or don't do can make a difference.

Control of Eurasian Watermilfoil

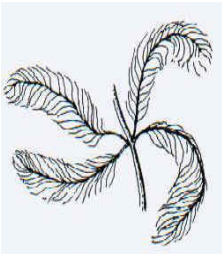
Once watermilfoil becomes well established within a body of water, it is difficult or impossible to remove. There has been some success using aquatic herbicides, however significant control is difficult considering the expense of herbicide application.

Timing the application is also critical. Keep in mind that the application by a private landowner of any herbicide to a body of public water or a tributary of public water is **illegal** no matter what the herbicide package may say.

One method of helping prevent the spread of milfoil is utilizing the **Hauser Lake Watercraft Rinse Station**. Lead by local citizens of the Hauser Lake Watershed Coalition, Idaho's first Rinse Station was built in May of 2007. When properly utilized by boaters, this facility will help prevent the infestation of many kinds of invasive species. Do your part to protect your lake…**Rinse Before You Launch.**

Identification

As a group, watermilfoils are easy to identify, however identifying the exact species is more challenging. All watermilfoil have feather-like leaves arranged in a whorl of four leaves around the stem. Here are some tips to identify Eurasian Watermilfoil from the native milfoils. The Eurasian variety usually has twelve or more leaflets per leaf while the native northern variety has fewer than ten. The leaves of the Eurasian variety tend to collapse around the stem while the northern species tend to remain more rigid when removed from the water. Also the stem is generally more reddish with the Eurasian species.



Resource Directory

City of Hauser
11837 N. Hauser Lake Road
Hauser, Idaho 83854
(208) 777-9315

Hauser Lake Watershed Coalition
10980 N. Hauser Lk. Rd.
Hauser, Idaho 83854
(208) 660-4213

Idaho Department of Environmental Quality
2110 Ironwood Parkway
Coeur d'Alene, Idaho 83814-2648
(208) 769-1422

Idaho Department of Fish and Game
2750 Kathleen Avenue
Coeur d'Alene, Idaho 83815
(208) 769-1414

Idaho Department of Lands
3780 Industrial Avenue South
Coeur d'Alene, Idaho 83815
(208) 769-1525

Idaho Department of Water Resources
7600 Mineral Drive, Suite 100
Coeur d'Alene, Idaho 83815
(208) 762-2800

Kootenai County Building and Planning Dept.
451 Government Way
Coeur d'Alene, Idaho 83814
(208) 446-1070

Kootenai County Extension Office
1808 N. 3rd Street
Coeur d'Alene, Idaho 83814
(208) 446-1680

Kootenai County Noxious Weed Control
10905 N. Ramsey Road
Hayden, Idaho 83835
(208) 446-1290

Kootenai Shoshone Soil and Water
Conservation District
7830 Meadowlark Way, Suite C-1
Coeur d'Alene, Idaho 83815
(208) 762-4939

Natural Resources Conservation Service
7830 Meadowlark Way, Suite C-1
Coeur d'Alene, ID 83815
(208) 762-4939

Panhandle Health District
Environmental Health
8500 N. Atlas Road
Coeur d'Alene, Idaho 83835
(208) 415-5200

Stormwater Erosion Education Program,
Administered by Panhandle Area Council
11100 N. Airport Drive
Hayden, Idaho 83835
(208) 772-0584

U.S. Army Corps of Engineers
3815 Schreiber Way
Coeur d'Alene ID 83814
(208) 765-7237

USDA Forest Service
3815 Schreiber Way
Coeur d'Alene, Idaho 83815
(208) 765-7223

Glossary

Algal blooms: Proliferation of one or several species of phytoplankton to high cell densities during favorable environmental conditions.

Biological controls: Control of pests through the use of organisms that are natural predators, parasites, or pathogens.

Bioswales: Vegetated filters for stormwater pollution.

Buffer zone: Vegetation strip maintained along a stream or lake to mitigate the impacts of actions on adjacent lands.

Dripline: The area surrounding a tree, where water drips off the tree.

Ecosystem: Any complex of living organisms interacting with nonliving chemical and physical components that form and function as a natural environmental unit.

Ephemeral: A seasonal stream or tributary, flowing only a short period of time.

Erosion: The wearing away of land surface by wind or water, intensified by land-clearing practices related to farming, residential or industrial development, road building, or logging.

Eutrophication: The slow aging process during which a lake, estuary, or bay evolves into a bog or marsh and eventually disappears. During the later stages of eutrophication the water body is choked by abundant plant life due to higher levels of nutritive compounds such as nitrogen and phosphorus. Human activities can accelerate the process.

Evapotranspiration: the combination of water that is lost from the soil through evaporation and through transpiration from plants as a part of their metabolic processes.

Floodplains: (1) Area adjoining a water body that becomes inundated during periods of overbank flooding and that is given rigorous legal definition in regulatory programs. (2) Land beyond a stream channel that forms the perimeter for the maximum probability flood. (3) Strip of land bordering a stream that is formed by substrate deposition. (4) Deposit of alluvium that covers a valley flat from lateral erosion of meandering streams and rivers.

High Gradients: Steep slope, or the change in vertical elevation per unit of horizontal distance, of the water surface in a flowing stream.

Impermeable: Refers to a layer of material of sufficient composition, density, and thickness that it does not permit passage of a liquid or a gas.

Leach: Removal of soluble material in the ground by percolating water.

Nutrient: Element or compound essential for growth, development, and life for living organisms, such as oxygen, nitrogen, phosphorus, and potassium.

Permeability: Measure of the rate at which water can penetrate and pass through a medium such as soil or other substrate. The rate depends on the composition and degree of compaction of the substrate.

Porosity: Existence of interstices or "pores" in the soil or rock, and the ratio of the volume of pores to the total volume of solids plus voids. This also refers to the ease or speed with which water can move into or through the substrate.

Phosphorus: Key nutrient influencing plant growth which can contribute to the eutrophication of lakes and other water bodies.

Reclamation: (1) Most recently defined as any action that results in a stable, self-sustaining ecosystem that may or may not include introduced species. (2) Traditionally defined as the process of adapting natural resources to serve a utilitarian purpose. Historically this term this term included the conversion of riparian or wetland ecosystems to agricultural, industrial, or urban uses.

Riparian: Areas adjacent to rivers and streams with a differing density, diversity, and productivity of plant and animal species relative to nearby uplands.

Sediment Load: General term that refers to sediment moved by a stream in suspension (suspended load) or at the bottom (bed load). Sediment load is not synonymous with either discharge or concentration.

Sediment: Fragmented material from weathered rocks and organic material that is suspended in, transported by and eventually deposited by water or air.

Stream banks: Ground bordering a channel above the streambed and below the level of rooted vegetation that often has a gradient steeper than 45 degrees and exhibits a distinct break in slope from the stream bottom. The portion of the channel cross section that restricts lateral movement of water during normal streamflow. Right and left banks are determined while looking downstream.

Surface waters: Standing water above the substrate or water that flows exclusively across a land surface and includes all perennial and ephemeral water bodies.

Toe: The base of a slope along a bank or other geographic feature where a gentle incline changes abruptly to a steeper gradient.

Wastewater: Water carrying dissolved or suspended solids generated by human or animal activities.

Water table: Depth below which the ground is saturated with water; generally expressed as linear depth below the soil surface to the upper layer of groundwater.

Watershed: Region of area drained by surface and groundwater flow in rivers, stream, or other surface channels. A smaller watershed can be wholly contained within a larger watershed.

Wetlands: An area that is saturated by surface or ground water with vegetation adapted for life under those soil conditions, as swamps, bogs, fens, marshes, and estuaries.

Suggestions For Further Reading

Lawn and Garden Management

Bradley, and Ellis, *The Organic Gardeners Handbook of Natural Insect and Disease Control*, Rodale Press, 1984.

Ellis, Barbara W., *Rodales Encyclopedia of Gardening and Landscaping Techniques*, Rodale Press, 1990.

Greenwood, Holstead, Chase and Gilrein, *American Horticultural Society Pests and Diseases*, Dorling Kindersley Publishing, 2000.

Mollison, Bill, *Introduction To Permaculture*, Tagari Publications, Tasmania, 1991.

Worth, Thomas, *The Victory Garden Landscape Guide*, Little Brown and company, Canada, 1984.

New Construction and Access Roads

Burns, Max, *The Dock Manual*, Storey Books, 1999.

Idaho Department of Lands, *Forest Stewardship Guidelines for Water Quali*ty, 2000.

Forest Lot Management

Hilts and Mitchell, *The Woodlot Management Handbook,* Firefly Books LTD, 1999.

Mohlenbrock, Robert H., *Western Wetland Flora,* U.S. Department of Agriculture, 1988.

Morsbach, Hans W., *Common Sense Forestry,* Chelsea Green Publishing. 2002.

Drinking Water and Wastewater Management

Burns, Max, *Cottage Water Systems,* Cottage Life Books, Canada, 1999.

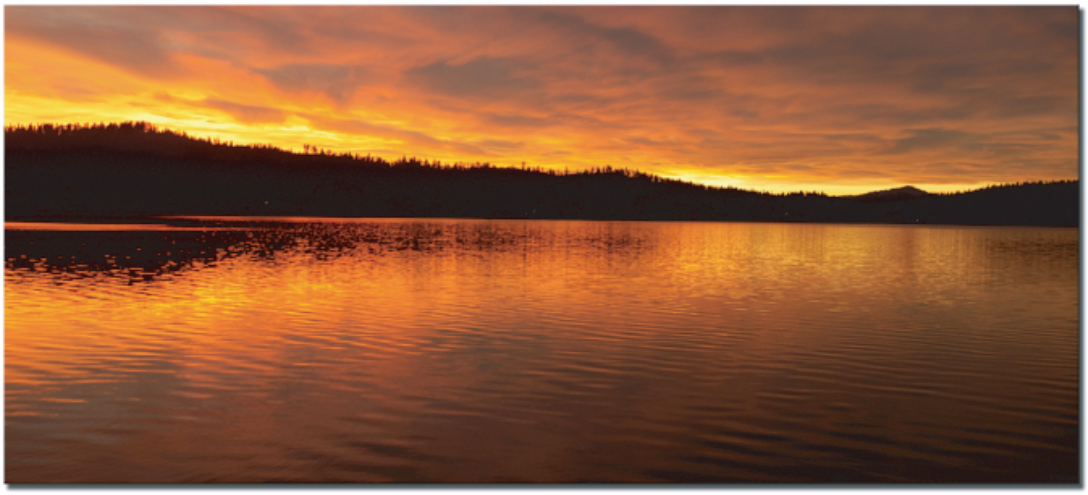
Stewart, John Cary, *Drinking Water Hazards,* Envirograghics, 1999.

Wilson, R. Dodge, *Builders guide to Wells and Septic Systems,* McGraw-Hill, 1996.

Living On and Above the Lakeshore

The quality of Hauser Lake and its tributaries can be affected by all of the land use practices within the watershed. Lakeshore residents, recreational users, and business owners are all stakeholders in its future water quality.

Employ the practices outlined within this booklet to better manage your property, and you will be doing your part to pass on Hauser Lake's precious water resource to future generations.



Copies of this Lake*A*Syst book can be obtained from the following:

Kootenai Shoshone Soil and Water
Conservation District
7830 Meadowlark Way, Suite C-1
Coeur d'Alene, ID 83815
(208) 762-4939 Ext 101

Idaho Department of Environmental Quality
2210 Ironwood Parkway
Coeur d'Alene, Idaho 83814-2648
(208) 769-1422

City of Hauser
11837 N. Hauser Lake Rd.
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(208) 777-9315

Hauser Lake Watershed Coalition
10980 N. Hauser Lk. Rd.
Hauser, ID 83854
(208) 660-4213