Caring for Shoreline Properties

Changing the Way We Look at Owning Lakefront Property in Alberta

Alberta Conservation Association
Funded by Alberta Anglers, Hunters, and Other Conservationists

This booklet was produced in cooperation with the County of St. Paul; the Summer Village of Horseshoe Bay; the Public Lands Branch of Alberta Agriculture, Food, and Rural Development; the Water Management Division and the Fisheries and Wildlife Management Division of Alberta Environmental Protection; and the Alberta Conservation Association.

Concepts and conclusions have been freely borrowed from the earlier publications listed in the References section. Much of the material found in the many lists throughout this booklet have been taken from referenced material, particularly from publications by Alberta Environmental Protection and the Ontario Ministry of Environment and Energy. The author would like to acknowledge the Ontario Ministry of Environment and Energy's very excellent Environmental Living: Protecting the Environment series. Volume 4 - At the Cottage, was a valuable source of information for many of the issues dealt with in this booklet, particularly the chapter on aquatic plants.

Many individuals have contributed to this project. Especially important contributions were made by Alfred Jackson (S. V. Of Horseshoe Bay); Ken Yettaw and Darlene Smereka (Cty. of St. Paul); David Park, Blake Mills, and Natalie Cook (ACA); Dave Ealey (Comm. AEP); Gerry Haekel, Allan Hare, and Jim Lindquist (PL-AAFRD); Larry Kuchmak (WMD-AEP); Hugh Norris (NRS-AEP); and Terry McCue.

Principal author: Pat Valastin,
Alberta Conservation Association,
Edmonton, Alberta.

Concept and principal editor: R. Wayne Nelson, Fisheries and Wildlife Management Division, St. Paul, Alberta.

Project manager: David Park,
Alberta Conservation Association,
Edmonton, Alberta.

Line Drawings: Terry McCue.

Design: John Luckhurst / GDL

Photographs: John Luckhurst,
David Park and Pat Valastin

Published by:

Alberta Conservation Association
P.O. BOX 40027
Baker Centre Postal Outlet
Edmonton, AB T5J 4M9
1-877-969-9091
Charitable Registration Number
88994 6141 RR0001

and

Fisheries and Wildlife Management Division
Natural Resources Service
Alberta Environmental Protection
Main Floor, Provincial Building
#416, 5025 - 49 Avenue
St. Paul, Alberta
T0A 3A4

1999

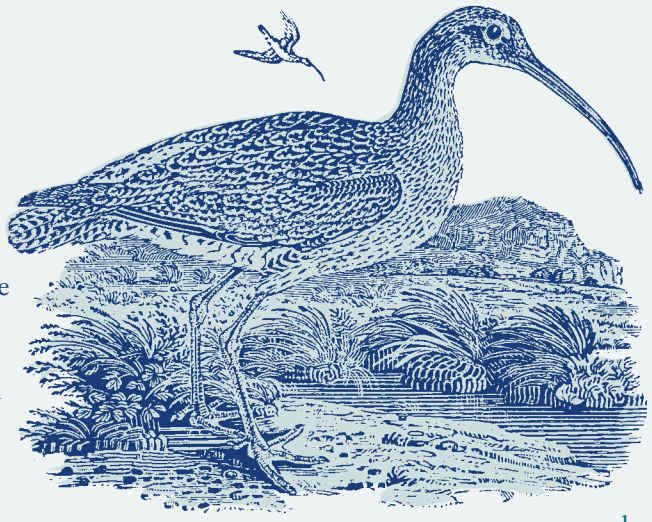
The concepts, recommendations, and requirements in this booklet are strongly supported by:

Caring for Shoreline Properties

Changing the Way We Look at Owning Lakefront Property in Alberta

Contents:

Introduction



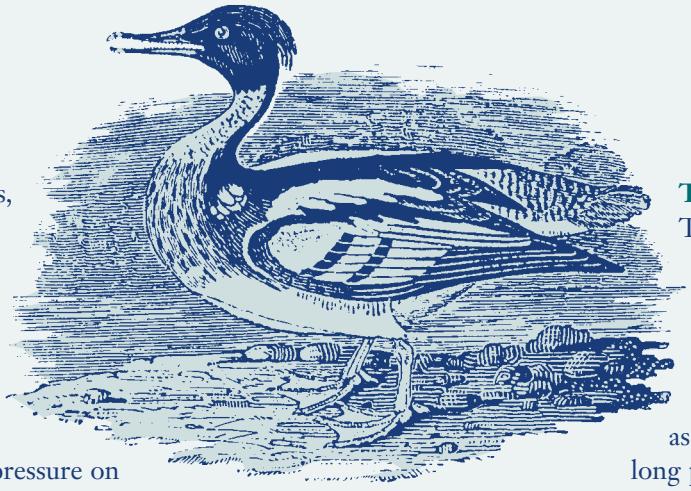
Having a cottage at the lake has certainly changed over the years. Today there are many people living along side lakes, the ecological balance has been disrupted at many lakes, and at some lakes, fish populations are reaching critical lows. Biologists are very concerned, as are many cottage owners, and governments are starting to take lakeshore issues very seriously. As a result, the laws regarding fish habitat and environmental reserves are being closely examined, and more rigorously enforced.

This booklet describes management practices that can be adopted on lakeshore properties to help protect the shoreline and preserve the water quality of the lake. It will also include ways of restoring damaged shorelines to their natural state. In most cases, the best management for shorelands involves retaining the natural characteristics of your property. Maintaining a healthy waterfront is far less costly than trying to fix a disturbed system, and the benefits are far greater. Repairing shoreline damage can be costly, and difficult, if not impossible to achieve fully. This booklet is a guide to making sound choices that will benefit both you and the lake you enjoy.

Twenty years ago, Bob and Jane Cook bought their dream cottage on Antler Lake. In time, this cottage became their permanent year-round home. Like their neighbours around them, they set out to transform the land upon which their cottage sat into the perfect lakefront lot. They started to "clean up." They cut down willows, brought in fill, and planted grass down to the water. They picked all the rocks from the sandy lake bottom, and they pulled out all the bulrushes and aquatic plants. They worked hard. Twenty years later, with three meters of property lost to shoreline erosion, Bob and Jane conceded victory to nature.

Bob and Jane saw the error of their ways, and the Cook family's lakefront property has now become a restoration project. Their lawn was made smaller and separated from the shoreline by a buffer strip of vegetation. Dogwood, willows, bulrushes, and cattails (plants native to their lake) were planted to "naturalize" and hold together the shoreline. By planting, and by letting the aquatic vegetation grow, they hope to restore their lakefront to a relatively stable, natural state, one that is resistant to the forces of wind and water, and home once again to wildlife and fish. Their eroding property value will also be stabilized and enhanced by this work. After much expense and hard work, finally, the Cook family may be able to really enjoy living by the lake.

Lakes Under Pressure



At many Alberta lakes, there are a growing number of lakefront cottages and residential developments. There is also a definite trend toward year-round lakefront living. People are putting unprecedented pressure on lakes and their shorelines. Shorelines can be altered in many ways. Some cottage owners have created sandy beaches; others have built retaining walls, and still others have lawns down to the water. Unfortunately, when people alter the shoreline, it often becomes difficult for plants and animals to survive there.

Our Responsibility to The Lake

Most people buy lakefront property, or visit Alberta's lakes, to enjoy the natural scenic beauty and to take part in recreational activities. When we focus on the waterfront, however, our activities can adversely affect water quality and the lives of many species of fish and wildlife. These adverse effects can be minimized when we practise stewardship as we enjoy lakefront property and participate in outdoor activities. Stewardship implies responsibility and obliges us to understand that what we do on the land and in the water affects the lake and our enjoyment of it. Our responsibility extends not just to our human neighbours, but also to all the plants and animals for which the lake is home, and whose presence enhances the quality and enjoyment of our time spent at the lake.

Times Have Changed

The area of land that drains toward a lake is called its **watershed**. We all live in a particular watershed, and our activities affect other people and other species within it, just as their activities affect us. Over long periods of time, a waterfront environment will develop a natural "balance" due to interactions among water, land, vegetation, and wildlife. This delicate equilibrium can be easily disrupted when humans rearrange the lakefront area, or when any of the components are destroyed.

If we do not stop our damaging activities at the lakefront, and help restore natural shorelines, the quality of our lakes will continue to deteriorate. We need to change the way we look at lakeside properties. Rather than seeing shoreland as something to be "cleaned up," something to "civilize," we need to respect and enjoy the natural state of lakes.

A lake watershed

The Life Cycle of Alberta Lakes

Types of Alberta Lakes

The majority of Alberta's lakes were formed as glaciers retreated. As a result of glacial action, shallow depressions were created in the earth's surface, and when the glaciers melted these depressions became lakes.

In many Alberta lakes, the water is shallow and becomes cloudy and green in the summer. The nutrient-rich soil surrounding the lake is constantly eroding, and the lake is slowly filling in with sediments. There are many aquatic plants, and the fish are cool-water species such as perch and pike. This type of lake is called an **eutrophic lake**.

Most of Alberta's lakes are eutrophic (nutrient-rich, highly productive) and even **hypereutrophic** (very highly productive). Alberta also has a small number of **oligotrophic** lakes (relatively deep, clear, nutrient-poor, and less productive), and some that are classified as **mesotrophic** (mid-range levels of nutrients and productivity).

A Lake's Aging Process

Lakes and the plants and animals that live in and near lakes, are all part of an **ecosystem**. An ecosystem includes all the living things in a certain environment and their interactions with one another and with their habitat. Temperature, water depth, the amount of oxygen in the water, the nutrients available to feed the living things in the lake, and many other factors all effect this complex ecosystem.

Lake Types

Oligotrophic Lakes – above. These lakes are generally deep. Their littoral zone is small. They hold low amounts of dissolved nutrients and organic matter.

Mesotrophic Lake – above.

Eutrophic Lakes – left, are relatively shallow. They have a larger littoral zone than oligotrophic lakes. They contain high levels of dissolved nutrients and organic matter.

Encouraged by sunlight and nutrients, aquatic plants, including algae and **macrophytes** (large aquatic plants) grow in the water, providing food and habitat for fish and other animals. When these aquatic plants die, they sink and decompose at the bottom of the lake.

A lake changes from open water to wetland to dry land over a very long time. This evolution usually takes many thousands of years, depending on, amongst other things, the initial depth of the lake. The transformation happens naturally as the lake fills in with soil eroded from the watershed, and from the plant materials that decompose on the bottom. Eutrophic lakes are "old" lakes. They are well into the process of transforming from open, clear water to wetland, and eventually to land.

How People Affect the Life of a Lake

Some people believe that Alberta's lakes were crystal clear and free of plants before the arrival of the Europeans, but the evidence shows that this was not so. Core samples taken many meters down through the sediments at the bottoms of Alberta lakes show that they have been fertile for thousands of years. The soils surrounding these lakes are very fertile, and nutrients are continually being washed into the lake.

However, even though many Alberta lakes are naturally eutrophic, we know that human activities have contributed to lower water quality in these lakes over the past 50 years. Too many nutrients (specifically **phosphorus** and **nitrogen**) entering a lake can upset the balance of the lake's ecosystem. We know that clearing the land for agricultural or cottage development increases the flow of nutrients from the land into the water. Many heavily developed lakes certainly have a greater supply of nutrients now than ever before. Nutrients can be added to a lake in many ways. Whether the lake on which you live is warm and rich in nutrients or cold and clear, you and your neighbours can have a tremendous effect on the biological balance of the lake.

Accelerating the Aging Process

On a large scale, activities such as farming, developing cottage lots, and discharging industrial or municipal wastes into the lake can alter the biological balance of the lake. These activities increase erosion, sedimentation, and the flow of nutrients into a lake. High amounts of nutrients can accelerate the natural eutrophication process of the lake.

On a smaller scale, activities at the cottage can also add harmful nutrients to the lake. Nutrients such as phosphorus, a fertilizer, help your lawn and garden grow. It follows that they also encourage the plants in the lake to grow. Increased growth of aquatic plants can result in problems such as slime or foul-smelling ooze that may develop on the surface of the water. Dense mats of algae and other decaying vegetation may form. The lake water may start to taste strange.

When algae and other aquatic plants die, they settle to the bottom of the lake and decompose, a process that consumes **dissolved oxygen** in the water. If a lake receives an excess of phosphorus (a plant food), usually from human activities, plant growth is accelerated and, when the plants die, the decomposition process uses up much of the oxygen in the water. If enough oxygen is used, it may result in fish kills. Even in deep, cold lakes, dissolved oxygen can be depleted by algal decomposition.

SHATTERING COMMON MYTHS

I own the property right to the water's edge!

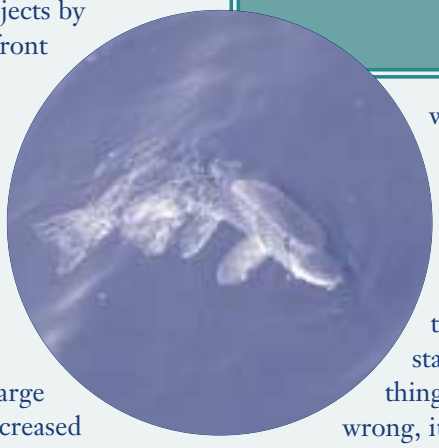
The vast majority of lakefront property owners in Alberta do not own the land right to the water's edge. In fact, even if a Municipal or Environmental Reserve doesn't separate your lot from the lake, the most lakeward extent of your property is usually the bank of the water body. Very few exceptions exist. It doesn't matter what the real estate agent said, the land title will tell you what you own and the survey plan will show you visually the dimensions and extent of your property. *– Haekel 1996*

We Are Not Alone

Including lakes, rivers, and streams, only 2.5 percent of Alberta is covered by water. The total number of lakes in Alberta is very small compared to that of our neighbouring provinces. Balanced against this is the fact that the population of Alberta in 1997 was greater than that of Manitoba and two Saskatchewans combined. Consequently, certain Alberta lakes have a concentrated level of development. In Alberta, shoreline is a valuable, precious resource, particularly in this day and age.

Many people buy lakefront property with the intention of developing it to conform to preconceived ideas of what lakefront property should be. The shoreline is a narrow but extremely rich habitat for many animals from insects to mammals. Unfortunately, it does not take much to upset the balance of this ecosystem. One or two little "clean-up" projects on the shoreline may not seem like much, but multiply the number of your projects by the number of lakefront cottages, and it is a different picture. We are losing our natural shorelines bit by bit, beach by beach.

When added together, individual changes that seem small can result in large problems such as increased plant/algae growth, chronic erosion, deteriorating water quality, and a loss of fish and wildlife. We may not even notice the changes at first. When they do become apparent, it is often hard to associate the changes with our activities. Besides, it is always easier to blame problems on someone else. The dilemma is that by the time we start seeing that things have gone wrong, it is often very difficult to fix the situation. Natural ecosystems are very complex. Although no one really understands completely how they work, we do understand parts of the puzzle. For example, we know that local fish populations in some lakes have declined drastically, in part because of indiscriminate removal of the aquatic plants that fish need for spawning and rearing their young. Putting all the parts of the puzzle together is an ongoing task. We have to understand that our very presence makes a difference, and we do not always know what that difference will turn out to be.



DID YOU KNOW?

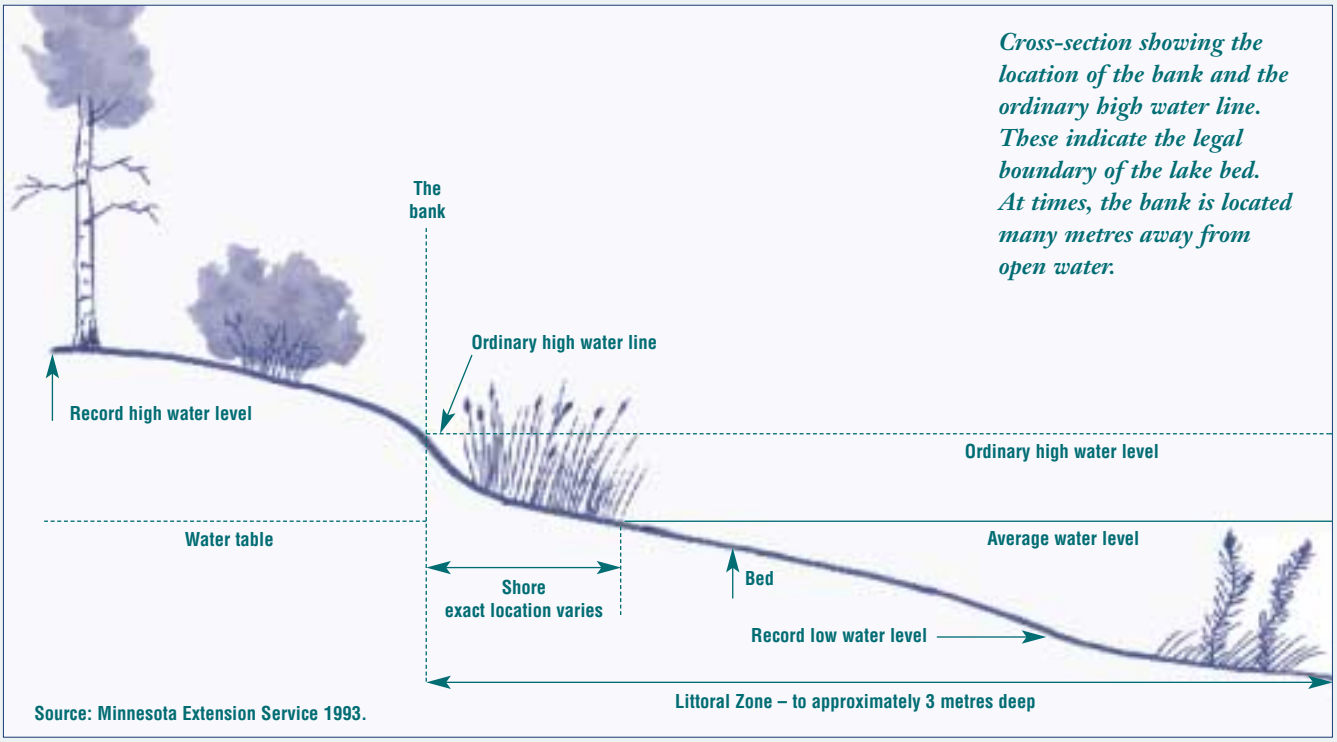
Ontario has 250,000 fish-bearing lakes, with 585,000 licensed anglers, or 2.3 anglers per lake. Saskatchewan has 94,000 fish-bearing lakes, with about 184,000 licensed anglers, or 1.9 anglers per lake. Alberta has only 800 lakes with fish, but 250,000 licenced anglers, or 312 anglers per lake. *– Alberta Environmental Protection 1997*

Anatomy of a Shoreline

The area we refer to as the shoreline is a transitional zone between land and water, and it is affected by what happens on the land and in the water. If you alter either land or water, the other will be affected as well. For the purposes of this booklet, the lands of the shoreline include both the **riparian** zone and the **littoral** zone.

The riparian zone is the strip of moisture-loving vegetation growing along the edge of a natural waterbody such as a river or lake. The littoral zone is the zone below the bank, and it includes the portion of the lake and its bed that is relatively well lit by the sun and which supports photosynthetic plants. At most Alberta lakes, the littoral zone extends out to about the three-meter depth interval. Within the lake, the littoral zone sustains the greatest diversity of plants and animals. A natural shoreline area protects against erosion and provides some of Alberta's most productive fish and wildlife habitat. For this reason, it is protected by a variety of laws.

Ownership of lakeshore property is limited to what is defined by the land title. People with lakefront property often assume that they own the land right down to the water. This may not be true. In almost all cases ownership does **not** extend to the water's edge or beneath the water. Very often a municipally owned and administered **environmental reserve** separates the lot from the lake. Environmental reserves are usually left in a natural state to



Cross-section showing the location of the bank and the ordinary high water line. These indicate the legal boundary of the lake bed. At times, the bank is located many metres away from open water.

Source: Minnesota Extension Service 1993.

protect sensitive banks and shorelines. They also allow for public access to the lake. They cannot be altered by lot owners without the municipality's permission.

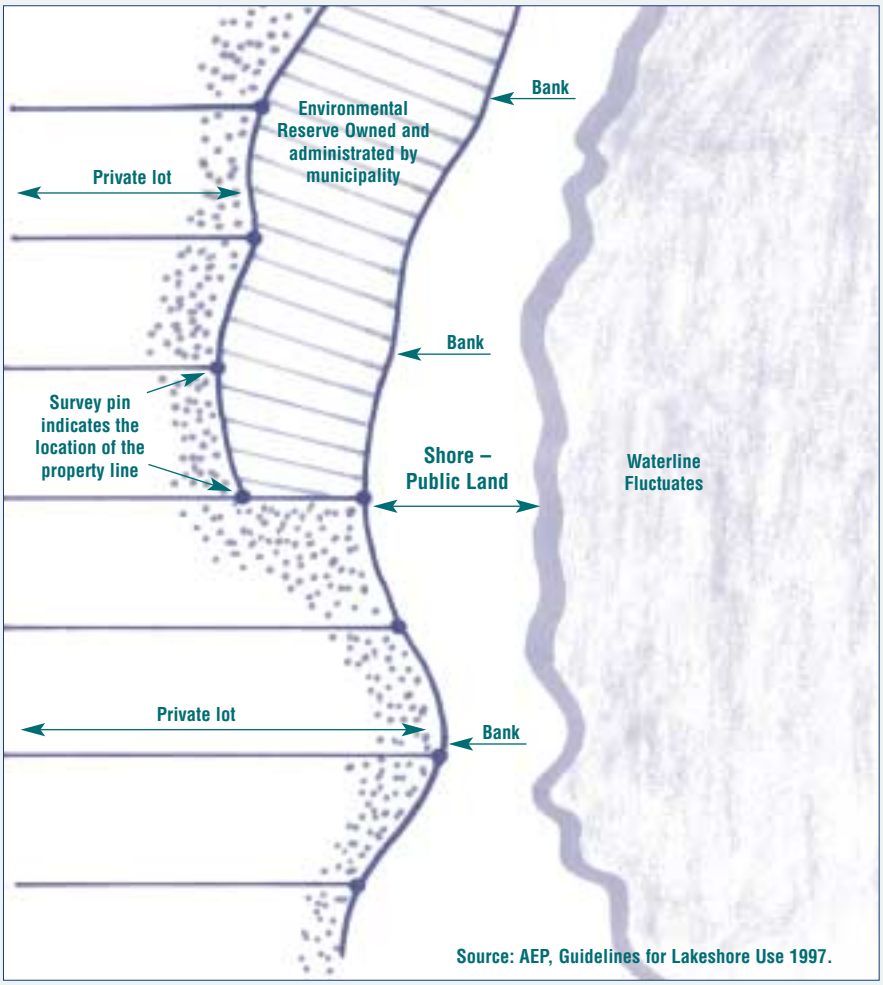
With or without a reserve, and with only rare exceptions, the area from the bank to the water is considered **public land**. Survey plans for lakeshore subdivisions will indicate whether the lakeside boundary of the property is at the bank (not the water's edge) or at the edge of a reserve.

But where exactly is the bank? Determining the location of the bank can be difficult. That is why it is important that we all learn the "anatomy" of the shoreline. Failing to do so may lead us to change things that legally are not ours to change, and to some unpleasant results.

What Is the Bank?
What Is the Shore?

All lakes have a bank, shore, and bed. The **bed** is the land upon which the water sits. The **shore** is that part of the lake below the bank, but above the present water level. It is the part of the lake bed that is exposed when water levels are low. When water levels are normal to high there may be no shore at all, while at times of low water there could be many meters of shore. The bed and shore of a lake are public lands owned by the Crown.

The **bank** separates the shore and bed of a lake from "terrestrial" land. Water levels in lakes fluctuate naturally and tend to return to "normal" levels after periods of drought or periods of above-bank flooding. "The location of the bank is not affected by occasional periods of drought or flooding" (Alberta Environmental Protection 1997). In most cases, the bank can be found by careful examination of a shoreline. Look for a distinct line formed by normal, continuous wave action or the presence of water at the edge of the lake. It usually is distinguished by a distinct change in the soil and/or vegetation, such as a change from sand or cobble to topsoil, or from aquatic and semi-aquatic vegetation, or mostly "invader" land weed species such as nettles or thistle, to purely terrestrial vegetation. Unless the lake level has been low for many years, trees will not be found growing on the lake bed, but will be growing just above the bank. The bank separates public land from adjacent land.



Source: AEP, Guidelines for Lakeshore Use 1997.

Clues to Finding the Bank

Along with physical evidence, documentary information such as aerial photos and survey maps are used when looking for the location of the bank. They show where the lake water historically has interacted with the land. Physical evidence of the bank includes, but is not limited to the following:

- the point at which there is a distinct change from aquatic or semi-aquatic vegetation such as cattails and bulrushes, to upland vegetation like shrubs and trees. Sometimes finding this location can be difficult. There may be mostly terrestrial plants growing in varying amounts on the shore if the weather has been dry for many years, the lake level has remained low, and terrestrial plants have successfully - temporarily - invaded the shoreland. In this situation, cattails and bulrushes may be found near the water's edge, dozens of meters below the bank;
- a change in the character of the soil, caused by surface water. Sand often indicates the bed and shore, whereas topsoil usually confirms upland terrain, above the bank. After many years of low lake levels, the upper areas of the shore may give the appearance of topsoil, but it will be found to be much thinner than terrestrial topsoil a short distance above the bank;
- a ridge of gravel or rocks high on the beach that is created by long-continued wave action. Fine materials, such as sand, are washed out into the lake by waves, leaving the large materials behind. At low lake levels, a series of these might be found as one walks from the water up the beach, each one created by wave or ice action at a different lake level; the highest one may be at the "true" bank.

(Adapted from Alberta Environmental Protection and Alberta Agriculture, Food and Rural Development 1995.)

In some cases, this line is not clear. The exact location of the bank can be determined by an Alberta Land Surveyor. For more information regarding the Crown's ownership and for help finding the location of the bank, contact your local Public Lands officer, or:

Land Research and Analysis Section
Land Services Branch
Land Administration Division
Environmental Protection
9915 - 108 St. NW 2nd. Floor
Edmonton, AB T5K 2C9
phone: 427-3509

SHATTERING COMMON MYTHS

The Environmental Reserve is an extension of my property!

It is a common mis-belief that if Environmental Reserves are "publicly" owned, then it's an adjacent landowners right to use this land for his enjoyment. Such reserves are separate parcels of land titled to the municipality. These parcels are created at the time the land is subdivided. Unauthorized developments or use of reserve lands are a trespass on another persons land. *– Haekel 1996*

SHATTERING COMMON MYTHS

I'm entitled to a view of the lake - I paid good money for my lot!

You are one of the few privileged land owners to have a property directly next to a lake. However, this does not entitle you to a view of that lake. If a municipally owned reserve that is treed separates your lot from the lake, you do not have the right to cut down the vegetation on someone else's property. *– Haekel 1996*

You Need a Permit!

Permits? I Didn't Know We Needed Permits!

The Public Lands Act, Section 3, states that the beds and shores of all naturally occurring lakes, rivers, and streams, belong to the Government of Canada or (usually) to the Province, unless your land title (rarely) specifically states that your property does include the bed and shore.

Cottage owners often treat public land as though it were their own. Some cottage owners may not realize that it is illegal to modify environmental reserve lands without permission from the municipal authority, and that it is illegal to alter the shore or lake bed below the bank without permission from provincial Public Lands and Water Management agencies. Other cottage owners may feel that because a neighbour did it, they can do it too. Not so! Keep in mind that public lands are public. Work on the bank, bed or shore may require permits before the project begins.

Government agencies are increasingly enforcing existing regulations to protect these public lands. As more and more people buy lakefront property, and more and more of these small, fragile lake ecosystems are damaged, there is a real need to look at why regulations protecting the shoreline exist, and to enforce these regulations. Further, public viewpoints **are** changing. It is becoming socially unacceptable to develop or damage sensitive shoreland areas.

Anyone planning work that might affect the bed or shore of a lake, or the environmental reserve immediately above the bank, should first inquire as to how Canada's water and fisheries habitat protection laws, Alberta's public lands and water protection laws, and the municipality's environmental reserve bylaws, could affect their plans.

Fish and the Law

Protection of fish and their habitat is provided for under the federal Fisheries Act. Canada's first Fisheries Act was drafted in 1867. It remains a very useful guide to ensure that Canada's fisheries, which belong to all the people of Canada, are protected.

An important mandate of the

SHATTERING COMMON MYTHS

I can do what I want with my property once I've bought it!

Just like in the city, bylaws and development restrictions limit what can and cannot be done on private property. A permit from the municipality's (County or Summer Village) development office is usually required for all structural improvements, and for permission to occupy or develop within reserve lands. *– Haekel 1996*

Fisheries Act is to protect **fish habitat**. Fish habitat includes not only the water in the lake, but also the plants and other life forms that interact to make fish life possible. The Fisheries Act defines this habitat as follows:

"Spawning grounds, and nursery, rearing, food supply and migration areas on which fish depend directly or indirectly in order to carry out their life processes. [Section 34(1)]" (Fisheries and Oceans 1991).

To prevent damage to our fisheries resources, the Fisheries Act (Canada) Section 35(1) states that no person should do any work in or near the water that would result in the harm or destruction of fish habitat. It continues in Section 36(3) to advise that no one shall place any material into the water that would harm fish or fish habitat (Fisheries and Oceans 1991). This forbids a wide range of activities, including the clearing of aquatic vegetation, dumping sand, the dredging of sediment, or the removal of bank materials.

The primary goal of the federal policy is "no net loss" of fish habitat. Alberta endorses this goal. The intent of the law is that projects at the shoreline, at best, produce a gain in fish habitat, and, at worst, produce no net loss of fish habitat.

The federal Department of Fisheries and Oceans, and the Fisheries and Wildlife Management Division of the provincial Department of Environmental Protection, would rather prevent damage to habitat and avoid losses to the fisheries resource, than to take court action against offenders who have altered, destroyed, or degraded fish habitat. When violations occur, however, departmental enforcement officers will carry out enforcement action.

SHATTERING COMMON MYTHS

My cottage needs a sand beach to add value to the property!

If time and geology didn't create a sand beach naturally, it's unlikely an artificial sand beach will remain where you put it. Don't waste your money on replacing lost sand year after year - use the public beach. *– Haekel 1996*

Water and the Law

The Province of Alberta also has legislation concerning construction near or in water, whether or not the water contains fish. The Water Resources Act requires that a permit be obtained before building anything that might interfere with the conservation or management of water. The new Water Act (January 1999) strengthens the protection of the aquatic environment.

Environmental Reserves

Land identified as municipal reserve or environmental reserve is owned by and is the responsibility of the local municipality (city, town, municipal district, county, or summer village) within whose boundaries it lies. This booklet will only deal with the environmental reserves.

The Municipal Government Act, 1994, Chapter M26.1, states that environmental reserves can be created when land is subdivided and where that land is a natural drainage course, subject to flooding, unstable, or next to the bed and shore of a lake, river, or stream. This Act also states that environmental reserves should be left in their natural state or used as public parks.

People who own lakefront property should check their survey plans to see whether or not an environmental reserve separates their property from the lake. Any subdivisions surveyed after 1978 will have the environmental reserves marked ER. If your subdivision plan shows a strip of land marked R between your property and the lake, this stands for Reserve, and it is to be treated as environmental reserve.

Modification of environmental reserves requires a development approval from the municipality that owns this land. Development within environmental reserves must comply with established local bylaws. Developers must check the municipal zoning bylaws to ensure that they are not in conflict with local regulations and to obtain a development permit. To obtain information regarding individual land titles, property boundaries, or subdivision plans, contact the local municipal government office.

SHATTERING COMMON MYTHS

As a lakefront property owner, I can keep people off "my" lakeshore and restrict others from using my dock!

The beds and shores of most lakes are Crown owned and therefore public land for everyone to use. You cannot prevent the public from using the shore or a reserve in front of your cottage. Seasonal piers and boat lifts located on a lake bed without a permit are technically (legally) a trespass on Crown land. Any structure left on public land without authority could be assumed by the public as an invitation for use. Although a private structure, it would be difficult for a cottager to initiate a civil action against someone else for using their pier.

– Haekel 1996

Note: the owner of such a structure is, however, liable for it and its use by others.

Yes — You Need a Permit

Before undertaking any project in, on, or near the water, check to see if a permit is needed. A provincial permit is required before diverting (impounding or withdrawing) water, or the development of the following structures or modifications on lake beds, shores and floodplains:

- "any projects (temporary or permanent) involving the disturbance or modification of a lake's bed, shore, or floodplain;
- any projects that involve the placement onto or the removal of material from the bed, shore, or floodplain. This includes the removal of pressure ridges caused by ice thrusts and the addition of sand for beaches;
- any commercial development (temporary or permanent);
- the cutting or removal of aquatic vegetation;
- erosion protection, retaining walls, groynes, breakwaters, and causeways;
- permanent piers, boat launches, boathouses, and other improvements supporting these structures;
- permanent waterline installations into or beneath the lake; and
- other permanent structures on the bed, shore, or floodplain of the lake"

(Alberta Environmental Protection 1997).

Anyone wishing to make any permanent changes on public lakeshores must have legal access to the relevant lakeshore before permission can be given. Permits for lakeshore projects must be obtained **before** construction begins. Contractors should ensure that their clients have the proper permits. Copies of permits must be on the site during construction. Contractors may be liable for work done without the proper permits.

Getting a Permit

Applying for a permit is not necessarily a complicated business, and it may save you and the lake from some unpleasantries. In Alberta, shoreline projects require approval from the Public Lands Branch of Alberta Agriculture, Food and Rural Development, and also from the Water Management Division of Alberta Environmental Protection. These agencies have adopted a "one window" approach so that applying to one means applying to the other, and also involves the Fisheries Management Division of the Natural Resources Service. Complete an "Application for Lakeshore/Water Body Modification" form, available from your nearest Public Lands, or Alberta Environmental Protection office. Every application must contain the following information:

- "a legal land description;
- a location plan, a site plan, and a cross-sectional sketch that show the existing conditions of the site and the proposed works in relation to property lines;
- a letter explaining the proposal, why it is needed, and when it is to be built; and
- the appropriate fee (if required) to cover the cost of processing the application"

(Alberta Environmental Protection 1997).

Apply for the permit well in advance of when you would like to start the project. It would be wise to apply in the fall or winter for work to be done the following summer. You probably will not be allowed to do work in the water until after July 1, so as to not disturb spawning fish.

Proposals are reviewed for poten-

tial repercussions to the lake's bed and shore, water quality, fish and wildlife habitat, and public access. The less disturbance the project has on the shoreline, the more likely it is that a permit will be given. Consult with these agencies to find environmentally safe ways to carry out your project. Advice from experts will help you do your work without harming the environment. It may even be possible to improve the habitat. Following good advice will also help you to avoid penalties resulting from failure to comply with provincial legislation, or the federal Fisheries Act.

Applicants are advised in writing when a project is rejected or approved. The approval will contain the conditions under which the project may be constructed. For more information about the need for shoreline permits in Alberta, contact the nearest regional Public Lands, or Alberta Environmental Protection office.

Riparian Rights - Misunderstood Rights

People often ask about riparian rights. What are they? Do we own them? Some people assume that having riparian rights enables them to do whatever they want on the shoreline without a permit. This is **not** true. Riparian rights are much more limited in nature. Riparian rights do not confer ownership of the bed or the shore or the water on the holder of the right, nor do they confer development privileges.

In common law, a person who owns land adjacent to water has certain rights to access and use the water. The common law rights of an adjacent landowner to access and use the water are known as riparian rights. The terms "riparian rights" and "common law rights" are sometimes used interchangeably in reference to an adjacent landowner's right to access and use the water. Riparian rights were modified by the *Water Resources Act*, and were modified further on January 1, 1999, when the new *Water Act* came into force.

Riparian rights also include the right of an adjacent landowner to lands formed by accretion. Accretion is the natural process where new land forms upon the bank of a lake, river or stream. For accretion to occur, the accreted land must have been exposed over a long period of time in an imperceptible manner. Accretion does not occur when a landowner has intentionally produced accretion through artificial means. Accretion does not occur during periods of drought or low water. If accretion has truly occurred, an adjacent landowner may apply to the Registrar of Land Titles to amend the description of the parcel to include the accreted land. Ownership of the bed and shore of the lake, river or stream will remain vested in the Crown, and will require a permit before any developments may be constructed or other alterations may be made.

Ignoring the Rules Can be Costly

Damaging the bed and shore of a lake, or the environmental reserve, is not being tolerated. Infractions may result in a fine as well as you being required to reclaim the land back to its original state. This will often involve a lot of hard work, great expense, or both.

As an indication of what could happen, consider the effects of unauthorized activities (for example, tree removal, slope grading, installation

SHATTERING COMMON MYTHS

A lake or stream is a convenient place to dispose of sewage and waste water. Because it's diluted, it won't hurt anything!

Streams link surface runoff within a watershed directly to some collection point like a lake. Wastes diluted by water in a stream will enter a lake and any nutrients dissolved in the water are then available for algae growth. Wastes from cottage use can result in a considerable input to the nutrient load within a lake. *– Haekel 1996*

of a beach, and planting of a lawn) that damaged a significant part of the environmental reserve and extended out onto the dry lake bed and into the shallow water of a fish-bearing lake.

1. The County, Municipal District, or Summer Village that owned the environmental reserve would, through their bylaws, order reclamation of that land to the original slopes and vegetation type, and may impose a fine.
2. Public Lands Branch and Water Management Division would order removal of all foreign material (such as earth fill that would eventually erode into the water) from the Crown owned bed and shore. They would require stabilizing of the up-slope areas, including private land if necessary, to prevent further erosion onto the public land and into the lake. They might require seeding with a native seed mix or planting native plants on the damaged shore lands and shallows or might allow those areas to revegetate naturally depending on the setting. Fines might also be imposed for unauthorized use of the land and for excavation and placing fill on the Crown land with no permits.
3. Fisheries Management may recommend laying of charges under the federal Fisheries Act for destruction of fish habitat, and that could result in court proceedings and similar or additional reclamation orders and fines imposed by the courts.

When all was said and done, the people who committed the intrusion and damage would have achieved little if any of their original objectives and would have brought upon themselves a very expensive clean-up and reclamation task.

Three broad principles apply in dealing with such infractions:

(a) the perpetrator of the damage to public property, resources, and values should not ultimately be allowed to benefit from causing such damage. If the perpetrator is "rewarded" for such harmful behaviour, others will be encouraged to follow suit;
(b) the lake shoreline must be reclaimed to a stable, non-eroding configuration; and
(c) the reclamation that is put in place should quickly provide the habitat values and water quality protection that are equivalent to or better than what was originally at the site of the damage. The lake's many values should not be degraded as a result of the damage and reclamation.

Your project may seem minor in the vast scheme of things, but the cumulative effect of "minor" projects undertaken by you and all your neighbours can be devastating to the lake. Think about whether the project is absolutely necessary. If it is, consider how you can do the work in the most environmentally friendly way, and set it all out in your permit application. In the long run, we, and the lake, will all be better off for it.

Weeds!

"... A WEED IS JUST A FLOWER OUT OF PLACE" - RALPH WALDO EMERSON

HAVE A LITTLE RESPECT

Most of us have **learned** to hate the aquatic plants in a lake. When people are inconvenienced by aquatic vegetation during their recreational activities, they may feel that the lake is being overcome by these plants. Cottagers must put things into perspective. A lake is not a backyard swimming pool. "A lake is a community of many living things — plants, fish, wildlife — connected in a complex ecosystem" (Ontario Ministry of Environment and Energy 1993, Vol. 4). Aquatic plants play the same critical role in the lake ecosystem as do trees in the forest and grasses on the prairie.

When cottagers first came to most Alberta lakes, the lakes had aquatic plants in them and they were ringed by sedges, rushes, and cattails. The water was likely cleaner than it is today, and populated by numerous fish, frogs, and waterfowl. This was the **normal** state of our lakes. Today, after decades of cutting and improper treatment of these "weeds," the quality of water in many Alberta lakes is deteriorating and fewer fish, birds, and animals live in and around the lakes. It is time to recognize the important role that so-called "weeds" have in the lake.

TYPES OF AQUATIC PLANTS

The large aquatic plants that we often call weeds are properly named **macrophytes**, meaning "plants large enough to be seen with the naked eye." Most, but not all, are rooted plants that obtain most of their nutrients (food) from sediments in the lake bed. Some macrophytes are **submergent** (the plant is underwater, although some leaves may float on the surface), some are **emergents** (most of their foliage is on or above the water surface), and others (e.g., duckweed) are **floating** plants that easily drift on the water surface.

Macrophytes provide oxygen, food, and shelter for fish. They also provide spawning and rearing habitat. A number of fish species rely on rooted aquatic plants for the reproduction and rearing of their young. Northern pike, for example, attach their eggs to the stalks of bulrushes and other submerged vegetation. These plants also support wildlife. Many animals, including moose, feed on them. Macrophyte beds provide hiding and nesting sites for birds, amphibians, reptiles, and other animals.

We may feel that macrophytes are a nuisance, but in addition to their importance to fish and wildlife, they help stabilize shorelines and lake bottoms, reduce erosion by suppressing wave action, and help maintain good water quality. Macrophytes take up nutrients in the lake that would otherwise be left for unwanted algae growth.

Algae are the microscopic plants that float or are suspended in the water. Like other plants they acquire energy from sunlight, but, because they have no roots into soil or bottom material they obtain their nutrients from the water itself. Algae form part of the base of a lake's food chain. They provide food for microscopic animals, which in turn provide food for fish and other aquatic life.

AN OUNCE OF PREVENTION — A POUND OF CURE

Generally, the benefits that algae and macrophytes offer a lake far outweigh the inconveniences. At times, however, excessive aquatic plant growth can upset the biological balance of the lake ecosystem. Algae thrive under conditions of high nutrient concentrations. If a lake becomes very fertile, or nutrient-rich, it may have rapid growth (blooms) of green and blue-green

SHATTERING COMMON MYTHS

Aquatic plants in front of my lot have to go. These "weeds" decrease the quality of my lake and value of my cottage property!

Many people consider aquatic plants like cattails and reeds as "weeds" and a nuisance. These plants, however, play an important ecological role in maintaining the health of our lakes. They stabilize the bed and shore, reduce soil movement and erosion, and are important habitat areas for fish, waterfowl and other wildlife. Aquatic plants also make use of nutrients in lakes that would otherwise contribute to unwanted algae growth. Too much growth, however, limits boat access to open water. In such cases, a boat lane may be cut through heavy stands of aquatic plants. A permit is required. *– Haekel 1996*

algae. These blooms are most common in central Alberta lakes from late June to mid-September. In most lakes they last for two to three weeks, but can persist throughout the summer and early fall if the weather stays sunny and warm. Besides being aesthetically unappealing, such as when masses of algae wash up on the shore, algae can be troublesome in other ways. Although live algae produce oxygen, the decomposition of dead algae consumes oxygen dissolved in the water. Occasionally, decomposing algae may reduce oxygen levels to the extent that fish suffocate and die. Decomposing blue-green algae also release toxins into the water which, if ingested in large quantities, can be toxic and lethal to animals, including people.

Excessive aquatic plant growth and algae blooms can be worsened by human activity around a lake. An increase in the amount of sediments washing out of the watershed and into the lake, bringing nutrients, occurs when people clear their shoreline areas of natural vegetation. "Improving" the natural shoreline (e.g., by bringing in sand or fill) can cause a problem with sediment input. The only practical, long-term solution is to reduce the amount of sediment and nutrients entering the lake.

The best way to combat sediment input is to keep the shoreline intact. Do not clear away vegetation near the lake. Instead, consider planting even more vegetation. Plants such as willows and dogwood offer very good erosion control.

As serious a problem as sediment input is nutrient loading. Nutrients are continually washing into a lake from its watershed, but cottagers add to this when they allow extra nutrients, particularly phosphorus (found in fertilizers and most detergents), to enter the lake. Nutrients also leak into the lake from septic systems.

Cottage owners can help reduce the nutrient input into lakes by maintaining a strip of well-vegetated land between any cleared areas and the water, and by repairing or upgrading septic systems and not using fertilizers. Cottagers and recreational users of lakes can also put pressure on local governments to control agricultural runoff and industrial effluent entering lakes.

Short-term Control of Excessive Aquatic Plants

Occasionally, some control of aquatic plants may be necessary to create a boat lane to open water, or to maintain a community beach and swimming area. Random, unrestricted removal of aquatic plants by cottage owners, however, can harm the lake environment and disrupt the ecological role of these plants in providing fish habitat and in maintaining water quality. Aquatic plants are considered to be fish habitat and are protected under the federal Fisheries Act. Except for very small-scale hand removal of aquatic vegetation, the removal of aquatic plants from the provincially owned bed of the lake requires a permit from Public Lands or Water Management Division.

The preferred way for an individual cottager to control macrophytes is to remove some, but not all of them. To remove some vegetation, manually pull out plants, or use a scythe. This is practical for small areas, and is perhaps the least damaging form of plant control. Be sure to remove the pulled or cut plants from the lake. Mechanized, self-pro-

pelled cutters are sometimes used when several cottagers get together to do some plant control in front of more than one property. Typically, machine operators are hired to do the cutting. Depending on the type of machine used, mechanized cutters can cause much more damage than manual techniques. It is important to know that cutting these plants stimulates further growth (similar to mowing a lawn).

Regardless of the method used, authorized aquatic plant cutting will be limited to what is necessary for the intended project. The primary reason for issuing a permit to remove aquatic vegetation is to allow for boat access to open water. But if, in front of a lot, 25 per cent or more of the waterfront offers clear access to open water, no permission to cut additional vegetation would be given. Provincial Park and community beaches are exceptions, where concentrated recreational opportunities for many people are provided by means of beach manicuring and vegetation removal. On the other hand, in certain parts of certain lakes no aquatic vegetation removal is allowed because of its very good, perhaps localized, importance for fish.

For recreational cottage areas, permits usually can be obtained stipulating the following conditions:

- aquatic plant control is limited to a maximum width of 4 meters adjacent to a temporary pier, and to a boat lane that provides access to open water, is perpendicular to the lakeshore and not more than 4 meters wide.
- controlling rooted aquatic plants is restricted to a single cut after July 1 to prevent the loss of spawning or nesting habitat. This timing ensures that the reproductive cycles of fish and waterfowl are mostly complete before the area is disturbed.
- cutting must be less than 1 meter from the water's surface.
- disturbance to the bed and shore of the lake while cutting is to be minimized. Stirring up sediment in the water releases nutrients and may contribute to future algae growth problems.
- all plant cuttings are to be removed from the water and shore area as the plants are cut. Plant cuttings can take root and grow again. If they die and sink to the bottom of the lake, they remove oxygen from the water as they decompose. They are to be disposed of in such a way that they cannot reenter the water or decay on the shore. They may be composted.

Chemicals are sometimes used to kill aquatic plants, but chemical use is restricted because of environmental and health concerns. Unfortunately, many chemicals are toxic to other forms of life, including fish and fish food organisms, and their use can often create more problems than it solves. Chemical methods of plant control are prohibited within 30 meters of any water body in Alberta, except by specially licensed operators.

Either large plants or small plants will flourish if nutrients and oxygen are present in the water. "As a rule of thumb, rooted aquatic plants will be dominant over algae if the area colonized by these plants covers 40 percent or more of the lake's bottom" (McComas 1993).

SHATTERING COMMON MYTHS

A highly manicured lot in front of my cottage is the best way to landscape a lot. Regular fertilizing of the lawn at my lake shore property won't affect the quality of the lake!

A highly manicured grass lawn is high maintenance! Think how much work it is in the city. Remember, you are at the cottage to escape the chores and demands of city life. Never fertilize at the lake. Fertilizers promote grass growth and increase the maintenance required to keep it in check. Excess fertilizer ends up washing into the lake where it contributes to algae growth. Maintain your yard with as much natural vegetation as possible (it doesn't need to look wild). Landscape your lot based on your recreational needs. Most people don't need nor regularly use 1000 square feet of lawn. A sitting and play area with a good path to the water should provide more than enough weekend work. *– Haekel 1996*

It's Never Too Late: Restoring the Natural Balance

If the lake bed in front of your lot has been routinely "deforested," here are some things you can and should do to help turn back the clock on water quality deterioration and loss of fish habitat:

- Do nothing. Allow aquatic plants to come back on their own. They will.
- Instead of cutting all the plants to make a near shore swimming area, cut a 4-meter-wide pathway out to clear water and anchor a swimming raft there, or use a common area already maintained by the municipality.
- If you must **do** something and decide that you want to re-plant, use only plant species native to your lake. Importing plants from other lakes is potentially dangerous. Transplanted plant species can grow out of control and become a nuisance. For example, purple loosestrife is an exotic that spreads primarily by abundant seed production and by broken stems that root in moist soil. Like most nuisance exotics, it has no local insects, diseases, or grazing species to control its population, so it out-competes native plants. Purple loosestrife has become a serious problem in lakes across North America.

To determine what plants to use, find an undisturbed area of the shoreline and see what is growing there. Seed can be collected from these native plants, and planted on your lot in areas with similar water and soil conditions. If you take plants out of a natural area, be careful not to deplete it. Never take more than 10 per cent of the plants out. Plants will look more natural if planted in groups rather than in rows. Aquatic plants are sometimes available from a local nursery. For a list of native plant nurseries, contact the:

Alberta Native Plant Council
Garneau P. O. Box 52099
Edmonton, AB T6G 2T5

A single boat channel

Shoreline Alterations

"The first rule of intelligent tinkering is to save all the parts."
- Aldo Leopold

Ask any biologist the best way to make shoreline alterations and they will probably answer **"don't"**. Yet, many of you reading this booklet have probably changed your shoreline, some extensively, and maybe you think it looks great. Perhaps though, you are starting (or continuing) to have erosion problems, or your "beach" just keeps washing away, and certainly, you are spending a lot more time working at the lake than you ever expected. As well as being time consuming and expensive, projects such as retaining walls and artificial beaches damage the shoreline.

In this section, we will look at the function of the shoreline and talk about why maintaining this area in a natural state is so important. We will also tell you about more environmentally friendly ways to make changes to this sensitive environment, if changes are wanted.

Let Nature Do the Work

Remember that both riparian and littoral zones are included in our definition of the shoreline area. A natural shoreline usually has trees, shrubs, and other plants growing right down to the water's edge and beyond, providing shade and shelter for fish, insects, and other creatures.

Healthy shoreline vegetation zones, or **buffer strips**, provide excellent habitat for wildlife, supplying food, cover, and shelter, along with easy access to water. Songbirds, nesting waterfowl, upland game birds, aquatic furbearers such as muskrat and beaver, and big-game ungulates depend on this vegetation for their survival. And there is the added bonus of greater privacy for cottagers.

Shoreline vegetation also acts as a filter by trapping sediment and slowing runoff that can carry nutrients and chemicals (pesticides) into the lake. The dense, interlocking roots of these plants also hold the soil in place, and stabilize the bank. The underlying, saturated soil of the shoreline allows these moisture-loving plants and trees to grow. If the shoreline is damaged, for example, by excessive clearing of vegetation, it can turn into an unbeneficial eroded zone. The wider the buffer strip, the greater the benefits it provides. An ideal buffer strip extends a minimum of 30 meters from the bank.

Consequences of an Altered Shoreline

Lakes in a natural state are relatively stable ecosystems. Destructive practices in the shoreline area contribute to the overall degradation of the lake environment. When the natural vegetation has been altered or removed to accommodate artificial structures or landscapes, the lake will deteriorate more rapidly. Without natural lakefront vegetation the following occurs:

- increased erosion; waves and currents can cause the bank to collapse or erode into the water,
- an increased amount of silt entering the water, covering fish-spawning beds and killing aquatic bottom life,
- fertilization of the lake by nutrient-rich rainwater runoff that is normally used by the shoreline vegetation for their growth. This enrichment can contribute to an increase in aquatic plant growth and algae blooms,
- a loss of valuable fish and wildlife habitat,
- a loss of privacy for lakefront property owners, and
- an overall loss of the natural scenic beauty of the lake.

Protecting the Shoreline

There are a number of things people can do to prevent damaging shoreline habitat.

- Avoid removing tree cover or any other vegetation between the developed area and the lake. If you do want to remove some trees to improve your view of the lake, be selective. Eliminate as few trees as possible. Even heavily developed backshores can still leave lakes looking natural if changes are made in an environmentally friendly way.
- Do not create a beach where none existed before. It will not work over the long run. Artificial beaches usually wash away. Creating beaches by dumping sand or other materials on the lake bed and shore requires a permit because it alters the natural characteristics of the lake and can negatively affect water quality and fish habitat. Imported sand can introduce nutrients into the lake, increasing algae growth. Instead of bringing in sand, build a "floating beach" — a floating dock or swimming platform will give you some of the same amenities as a beach, but with a lot less damage to the environment. Consider building a "beach" in a large sandbox, set well back on your lot.
- If you rake plants out of the water, or back from the waterline, make sure that you remove them entirely from the shore instead of leaving them to rot and return nutrients to the lake.
- If there are rocks in front of your property, leave them. They actually help stabilize your beach, and provide habitat for aquatic insects and fish. If you must remove some for better swimming, or to protect boat propellers, move them selectively, by hand.

SHATTERING COMMON MYTHS

A septic field is good enough for getting rid of sewage and grey water!

This may have been true with limited development and when a lake cottage was only a weekend cabin receiving occasional use, but today we are living at the lake year round and in permanent homes. Septic fields can be effective in dealing with limited amounts of solid waste but are less effective at containing liquid wastes. Nutrient rich liquid wastes can move through soil and into our lakes. It is recommended, at the very least, that pump-out holding tanks be used instead. –

Haekel 1996

- When creating a boat lane, try creating a joint access channel with several neighbours, or get together with a neighbour to share a dock and boat access.
- When building a dock, consider floating, cantilever, or post-supported docks. These structures will minimize damage to the existing lake bottom, and do not restrict the movement of fish and wildlife.
- Build your boathouse back from the shore, and use a winch to take the boat out of the water.
- Rather than building a retaining wall to control erosion at the shoreline, keep existing vegetation and add new plants, such as shrubs and small trees. For most properties that slope toward the water, leaving the natural shoreline area undisturbed is the best and least expensive protection against erosion.
- Use stairs or a meandering path (maximum 2 meters wide) on slopes leading to the water. Make rainwater flow off the path, not straight down it into the lake. Try to keep the path or the slope beneath stairs vegetated, versus dirt, sand, or gravel.
- Leave natural ice ridges in place (they slow meltwater runoff into the lake).
- Do not wash vehicles, dogs, clothes, hair, or dishes in the lake. Carry out these activities inside or as far back from the shore as possible. Both soap and dirt contain nutrients that the lake does not need.
- Do not dump water from another source into the lake.
- Drive motor boats slowly in shallow water. Disturbance of nutrient-rich bottom sediments fertilizes the water above them. Motorized vehicles are also very disturbing to fish and waterfowl.
- Never put fuel or garbage into the lake, or on the ice in winter, and remember to clean up after ice fishing.

Permits Are Required

Before you start any work along the shoreline, remember that the shores and beds of almost all Alberta lakes are public lands. Make sure that you have a permit from Public Lands or Water Management Division. This permit requirement applies to anything you may want to build or alter on the bed or shore, including importing sand and controlling erosion. Unauthorized projects may be investigated, require restoration, and/or result in fines.

Structures that do not disturb the bed and shore of the lake may be erected on lake beds without authorization. "Examples of these include small removable piers or docks, and boat lifts. These structures are for seasonal use only, must not prevent public access along the shore, and must be completely removed from the lake bed or shore before winter"

(Alberta Environmental Protection 1997).

Damaged shoreline – right. All vegetation has been removed and sand has been brought in, creating an unappealing, very sterile shoreline.

The same shoreline – left, with natural vegetation allowed to grow in. Allowing natural vegetation to grow in will result in an interesting shoreline and create habitat for fish, frogs, birds and other animals.

On Your Lot

What you do in the water and on the shoreline is important to the health of your lake. So is what happens on your lot. Yes, this area is private, and it belongs to you, but what you do here can affect public land and water nearby.

Stop Feeding the Lake

We know that adding nutrients to a lake speeds up its natural aging process. Unless a great deal of care is taken, cottagers may contribute to nutrient loading of the lake every time a toilet is flushed, clothes are washed, or the lawn is fertilized. Recreational activities on or near the lake can also contribute to this. Fortunately, there are things that people can do to ensure that they are not contributing to nutrient "overload" of the lake.

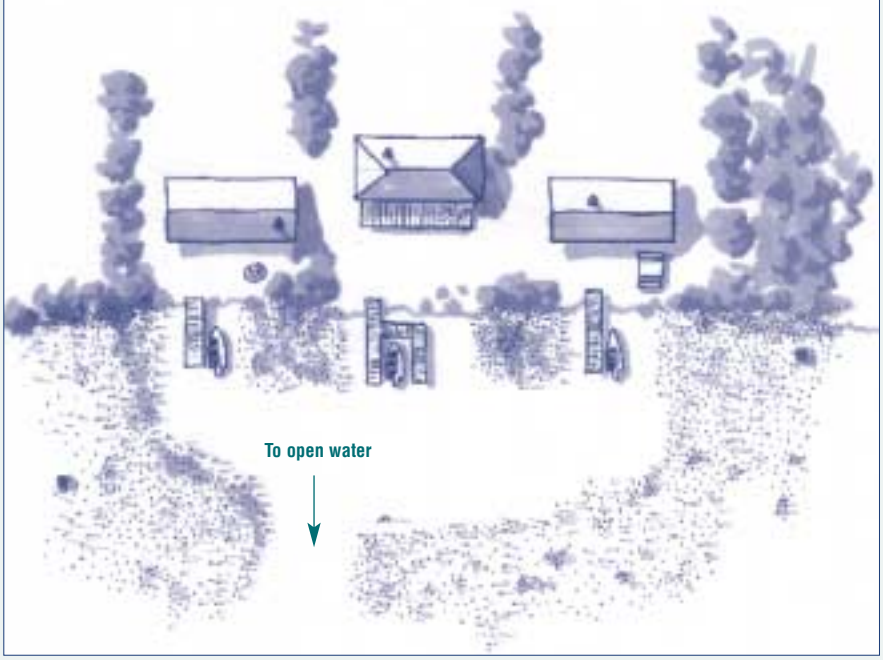
- Be sure your septic tank/waste water system is working correctly. Is it built and maintained according to municipal bylaws? Can you see evidence that your septic field is leaking or malfunctioning? If you have an outhouse, is it as far back from the shore as possible, and dug in proper soil (not sand)? Is your pump-out tank intact? Do you know where pumped-out material is being disposed?
- Reduce or stop your use of products containing phosphorus. Septic tank systems do not break down or dilute phosphorus — it ends up in the ground around the cottage, and eventually, in the lake.
- Use liquid dishwashing detergent for hand washing and dishwashers — it has one-third the phosphate content of powders. Wash dishes once a day, and cut down on dishwasher use at the cottage.
- Buy and use laundry detergent with a low-phosphate or no-phosphate content.
- Do not remove all the trees, shrubs, and other natural vegetation that grow on your property. They are valuable. They reduce soil erosion and therefore protect the lake waters. Vegetation slows down runoff and naturally filters rain water from roads, parking lots, patios, and cottage roofs. It also takes up some of those nutrients that reach the ground water from your septic tank system.

- Consider native vegetation as a quality alternative to turf grass lawns. Land will revert to a natural state if no maintenance is performed. Natural vegetation is "best" because it is adapted to the local climate and usually has strong, well- established root systems that provide better erosion control and water-cleaning ability. It also offers more typical habitat for wildlife and is more resistant to pests and disease, and occasional flooding.
- Consider making your lawn smaller. Let a buffer strip of wild grass or other plants grow up between the lawn and the lake. Planting trees and shrubs in this area will create habitat for a variety of birds and wildlife. Evergreens may be a good choice for planting near the shoreline because they will screen buildings from view during all seasons. The best buffer strip is mature woodland with undisturbed grass and shrub layers.

- If you have a lawn never use fertilizers. Commercial fertilizers make the lawn greener, but they also run into the lake and fertilize the algae and other aquatic plants growing there.
- Rake and remove leaves from lawn and garden areas from which the leaves or their breakdown products will rot and end up in the lake.
- Compost grass clippings or vegetable wastes, such as corn husks, pea pods, or other plant material away from the lake. Never put these materials into the water.
- In wooded areas, do not rake leaves or other forest floor debris; leave them to help trap and filter water.
- Never plant your garden on a slope leading toward the lake; accelerated soil erosion and runoff can occur. Bare soil is a nutrient source.
- Create meandering paths and trails to screen buildings from view from the lake and to slow down the flow of nutrient-carrying rain water into the lake. Paths should be no more than two meters wide. A winding, vegetated path aids in preventing erosion.
- Plan paths and roads with moderate or gentle slopes.
- Never dispose of any motor oil or other petroleum products on driveways or roads, or down drains. Most petroleum products are high in phosphorus and contain toxins. Motor oil can be recycled. Take it to a service station that collects used motor oil.
- When cattle are allowed to defecate near water, they can add large amounts of nutrients to lakes or to creeks draining into lakes. Their hooves break down banks, promoting erosion. They should not be allowed direct access to the lake or to inflow creeks near the lake. Use alternate watering techniques; they do exist.
- Treat creeks near or on your property as you would the lake. Creeks surrounding lakes carry not only water, but also large quantities of nutrients.

Improving lake water quality is not a simple task, but reducing nutrient inflow definitely helps. If you see any problems that you can't fix yourself, contact the appropriate government agency. The fewer nutrients from outside sources that enter a lake, the "healthier" it will be.

A community boat channel



Erosion

Erosion of the bank is a common problem at lakefront lots. As we continually remove vegetation in an attempt to "clean up" our property, erosion can become more and more of a problem. When cottage owners see erosion, they often try to stop it using unnatural materials such as tires and brick walls. Wouldn't you rather look at trees and shrubs, and the birds and animals that come with them?

Generally, erosion is a major problem only on properties where the shoreline has been altered. Even small ripples can erode banks that have had their protective vegetation removed. Remember, natural vegetation has been withstanding erosion at the lake for hundreds, if not thousands, of years.

Controlling Erosion

The best thing to do about erosion is to prevent it, or at least to reduce problems as soon as possible.

- Keep natural vegetation, natural rocks, and wave-hardened sand in place. They help hold the soil and shoreline in place and reduce erosion, especially on steep slopes, but also on wave-washed beaches. Limit the planting of turf grass to high traffic areas. Turf grass has few protective soil-holding properties.
- Keep heavy objects away from the bank. They may weaken the ground there and cause it to break away and slip into the water.
- The routes that people and vehicles use to reach the water should be only at locations where the land is very stable.

There are two main methods for protecting damaged shoreline from further erosion. Such work probably will require an approval if it is on an environmental reserve, may require a permit if the work extends to the bed and shore, and may also require considerable effort and expense.

1. Nonstructural Methods:
- reshaping (sloping) the bank;
- aquascaping; and

2. Structural Methods:
- protecting the bank with armour material.

Nonstructural Methods

Bank Sloping: Flatter slopes reduce the energy of crashing waves. Slopes of 3 to 1 (horizontal to vertical) are preferred, but some benefits can be obtained at slopes of 5 to 1. Planting vegetation on the reshaped bank will help stabilize and protect it. One drawback of contouring a gradual slope is that some loosened materials may be washed into the water by runoff and wave action before new vegetation can stabilize it. Some maintenance may be required.

Aquascaping: Planting aquatic vegetation to stabilize shorelines (aquascaping) has become popular in eastern Canada. This technique can be difficult on shorelines where a lot of wave action occurs. If you decide to aquascape, choose a combination of plants native to the lake. Do not introduce or use exotic plants. Use submerged or emergent vegetation to stabilize soil from the lake side. Aquascaping enhances wildlife and fish habitat and blends naturally into the landscape. Some maintenance will probably be required at first.

Structural Methods

Shorelines can be protected against erosive wave action by placing rocks or other inert materials against the bank. This type of protection is called a **revetment**. Revetments can be divided into two categories:

1. Flexible structures including;
   a) **Riprap** — which consists of large washed stones or gravel placed on a natural slope or on an artificially graded shore, and
   b) **Gabions** — which are rectangular wire mesh baskets that hold large washed rocks. Individual baskets are wired together. This type of revetment is most appropriate for areas without much foot traffic. The wire mesh may require occasional maintenance.
2. Rigid structures (such as retaining walls). Rigid structures are not recommended by Alberta Environmental Protection except in public use areas, such as marinas.

In constructing a revetment, several criteria must be met. For example, a filter cloth must be anchored behind the revetment to prevent the loss of fine grain material into the lake. When you receive the permit for your erosion control project, it will include advice for designing and installing the revetment. Follow this advice.

Shoreline Erosion – left. All natural vegetation (aquatic and terrestrial) was removed from the shoreline. Grass was planted to the existing water's edge. In high water years, wave action cut away under the turf, resulting in the loss of feet of property.

Erosion protection – right, using riprap, aquatic and terrestrial vegetation. All the components will work together to "protect" the bank. The aquatic plants will dampen wave action. The riprap will armour the vulnerable bank, keeping the waves from carrying away soil. The roots of the shrubs behind the bank will also help to hold the soil on the bank in place.

Final Notes

Buyer Beware

If you are contemplating buying a cottage at the lake, consider the following:

- Do not buy someone else's environmental headaches. Altered shorelines, as well as being damaging to the lake environment, are often troublesome and expensive to maintain. Natural shorelines are very resistant to erosion, whereas wave action wreaks havoc on altered, cleared shorelines.
- Select a property in a subdivision that respects environmental reserves, and be mindful of how your potential neighbours treat their shorelines. Often, problems caused by one alteration effect a larger area.
- Consider what you want in a property, and then find a parcel that meets your needs, rather than thinking that a property can be greatly modified to suit your desires. If you want a sandy beachfront, do not purchase a property with a soft, weedy shoreline. Instead, buy property fronted by a natural sand beach. Attempts to alter natural conditions are often futile, expensive, and environmentally harmful. Think about how you can live in harmony with the lake, rather than how the lake can be made to suit you.

Established Owners: Sit Back — Relax

If you own lakeshore property that has been "improved," consider restoring the shoreline back to its natural state. Often the best way to do this is to **do** nothing. Think about it — no more (or at least a lot less) mowing, cutting, digging, hauling. . . . Gives you a lot more time for relaxing, doesn't it?

If you still really want that lawn, consider a compromise. Erect a small fence or grow a hedgerow that perhaps cuts the existing lawn in half. Let the half nearest the water revert to native vegetation. Leave dead trees on your property to provide shelter, nesting sites, and food for woodpeckers, wood ducks, and other species found along the shoreline. Plant some trees and shrubs and enjoy them as they grow.

Summing Up - Making a Difference

The condition of a lake reflects what is happening on the land around it. Our activities today will determine whether our children will be able to enjoy these lakes as we have. As increasing numbers of people seek relief from the stresses of city life, pressure on our lakes will continue to increase. Cottage owners and visitors to the lake must learn to understand and prevent the damage this pressure may cause. Ignoring the "health" of the shorelands will inevitably result in ruining the lake as a supply of drinking water, the loss of the lake for swimming, and the destruction of fish and wildlife habitat.

If the aesthetic value of having a cottage has to do with having a change from city life, natural habitat should be preferable to manicured lawns anyway. People often argue that they have to keep their yards shipshape to maintain their property values, but, in the long run, what will happen to property values if the lakeshore is monotonous and sterile, if the bank is eroding away, and the water quality of the lake is declining? Property value can, in fact, increase rather than decrease when natural habitat is protected.

By being careful and responsible, and by thinking about the conse-

quences of our actions, we can all help to keep the lake surroundings beautiful and healthy.

Please remember, even if you do own property down to the bank, the bed and shore of a lake **do not** belong to you. They are public property, belonging to all the people of Alberta. If your land is separated from the lake by an environmental reserve, this reserve is not your property either, but belongs to the people of your municipality. Be careful to avoid embarrassing and costly mistakes. Get the proper authorization before any alterations to these areas are made.

We see that there are good reasons to keep shorelines in a natural state, and we know why laws exist to protect these lands, but some of the recommendations in this booklet are not laws, but are just that — recommendations to better care for the lake. Cottagers must be responsible, practice conservation, and encourage their neighbours to do the same. Form a cottage association. This would provide an arena for discussing concerns about the lake and any future developments on it.

Cottage associations can help retain fish and wildlife in an area by discouraging such activities as the mass destruction of aquatic plants, chasing wildfowl with power boats, and disturbing nesting areas and known fish spawning grounds in the shallow parts of the lake. They can also organize projects or activities that benefit the lake, such as restoring buffer zones. Cottage associations can also work with local governments to establish and enforce guidelines and regulations on cottage developments and shoreline use.

You may be just one landowner, but you **can** make a difference. While some environmental issues can seem to be largely beyond our control, maintaining lakeshores as natural areas is not. If you **and** your neighbours think in these terms, shorelines can be protected on an even larger scale. Maintaining the natural lake environment is just common sense. It preserves the health of the lake and the quality of the environment, as well as protecting your investment in a natural, enjoyable property.

Alberta's lakes and shorelines are fragile and sensitive areas. They are enormously valuable, and they need **special** care. We must all work together to protect them — now, and in the future.

References

Alberta Environment. n.d. *Alberta lakes. . . a legacy worth protecting.* Alberta Environment. Edmonton, Alberta. [Pamphlet.]

Alberta Environment. 1986. *Controlling shoreline erosion.* Water Resources Management Services, Technical Services Division. Edmonton, Alberta. 11 p.

Alberta Environmental Protection. n.d. *Aquatic plant control - fact sheet.* Alberta Environmental Protection. Edmonton, Alberta. [Pamphlet.]

Alberta Environmental Protection. 1993. *How to be a "lake friendly" property owner.* Alberta Environmental Protection. Edmonton, Alberta. [Pamphlet.]

Alberta Environmental Protection. *Revised 1997. Guidelines for lakeshore use.* Agriculture, Food and Rural Development. Pub. No. 1/453. Edmonton, Alberta. [Pamphlet.]

Alberta Environmental Protection and Alberta Agriculture, Food and Rural Development. *Revised 1995. Permanent and naturally occurring water bodies. In* The "how-to" manual for common land use application forms. Alberta Forestry, Land and Wildlife. Pub. No. 118. Edmonton, Alberta.

Alberta Forestry, Lands and Wildlife. 1971?. *Riparian habitat.* Alberta Forestry, Lands and Wildlife. Edmonton, Alberta. [Pamphlet.]

Alberta Forestry, Lands and Wildlife. 1991. *Principles of water boundaries.* Technical Services Section, Public Lands Division. Alberta Forestry, Lands and Wildlife. Edmonton, Alberta. 103 p.

COLA (Congress of Lake Associations). 1994. *The lakebook: actions you can take to protect your lake.* Congress of Lake Associations of Maine. Yarmouth, Maine. 28 p.

Dresen, M.D. and R.M. Korth. 1994. *Life on the edge. . . owning waterfront property.* University of Wisconsin-Extension. 64 p.

Environment Ontario. 1989. *Cottage country: an environmental manual for cottagers.* Sixth edition. Queen's Printer for Ontario. 49 p.

Fisheries and Oceans. 1986. *Policy for the management of fish habitat.* Communications Directorate. Department of Fisheries and Oceans. Ottawa, Ontario. Cat. No. Fs 23-98/1986 E. 28 p.

Fisheries and Oceans. 1991. *Canada's fish habitat law.* Communications Directorate. Department of Fisheries and Oceans. Ottawa, Ontario. Cat. No. Fs 23-40/1991 E. 16 p.

Fisheries and Oceans. 199?. *Protecting your shorelands for better farming and ranching, and healthier fish habitat.* Department of Fisheries and Oceans. Central and Arctic Region. Ottawa, Ontario. 15 p.

Haekel, G. 1996. *The law and the lake: navigating Alberta's regulatory framework. In* G. Haekel, ed., Proceedings of the Alberta Lake Management Society's 1996 annual workshop, Sylvan Lake, Alberta. Privately printed. Pp. 113-134.

Kingsmill, S. 1992. Clean up the waterfront. *Canadian Living Magazine*, July, pp. 63-69.

MAPLE (Mutual Associations for the Protection of the Lake Environment). n.d. *Working towards a natural shoreline.* [Undated magazine clipping.]

McComas, S. 1993. *Lakesmarts — the first lake maintenance handbook.* Terrene Institute, Washington, DC. 215 p.

Minnesota Extension Service. 1992/93. *Protecting Minnesota waters: shoreland best management practices.* Minnesota Extension Service, Duluth, Minnesota. 60 p.

Mitchell, P. and E. Prepas. 1990. *Atlas of Alberta lakes.* University of Alberta Press, Edmonton, Alberta. 114 p.

Government of Alberta. *1994. Municipal Government Act.* Statutes of Alberta: Chapter M-26.1. Queen's Printer, Edmonton, Alberta. 335 p.

Ontario Ministry of Environment and Energy. 1993. *Environmental living: protecting the environment. . . volume 3 - when building or buying your dream cottage.* Ministry of Environment and Energy. Toronto, Ontario. 24 p.

Ontario Ministry of Environment and Energy. 1993. *Environmental living: protecting the environment. . . volume 4 - at the cottage.* Ministry of Environment and Energy.Toronto, Ontario. 35 p.

Ontario Ministry of Environment and Energy. 1993. *Environmental living: protecting the environment. . . volume 5 - in the great outdoors.* Ministry of Environment and Energy. Toronto, Ontario. 20 p.

An Unwelcome Lakeside Neighbour — Don't let this be you!

When the Wilson family moved to their new cottage on Snarling Lake, they immediately bulldozed down the trees on the slope between their lot and the lake to get a view from their front window. To make the slope more gentle they bladed off its top and pushed that earth down the slope, out onto the gravel shoreline, and into the water. But before their dump truck loads of sand could be backed down the new slope to the shore, a horrified neighbour phoned Natural Resources Service. A Conservation Officer soon arrived to advise the Wilsons to immediately cease any further work on their project. The Wilson's summer plans were suddenly changed. Their shoestring budget landscaping project, that mostly involved disturbing land which they did not own, turned into a lakeside nightmare of escalating reclamation orders and expenses.

Their Summer Village Council, supported by its Environmental Reserve (ER) Bylaw, soon met and instructed the Wilsons to reclaim the ER slope to certain specifications within 30 days, or the Summer Village would hire someone to do the job and bill the Wilsons. Those specifications included rebuilding and stabilizing the slope by replacement of topsoil, seeding with a native, shade tolerant grass mixture, and planting (and watering for at least two summers) nursery stock (minimum height 1.5 meters) white birch, willow, trembling aspen, white spruce, and saskatoon at a density of one tree per three square meters. Additional plantings might be required in two years if tree survival was poor. A carefully designed two meter wide meandering path through the ER to the lakeshore would be acceptable.

Public Lands Branch issued an order to the Wilsons to remove all of the hilltop soil that had been pushed onto the shore and bed of the lake, and to immediately spread a native grass seed mix onto the silt-covered lakeshore. Water Management ordered armouring of the vulnerable toe of the slope using rock rip rap; additional orders for erosion protection might arise as needed. And later that winter, in a effort to compensate for the input of mud and silt into the lake for the next several years until vegetation took hold, and for the damage to fish habitat that occurred, under the Fisheries Act a judge ordered the Wilsons to truck in and spread rounded cobble over the disturbed area and from the existing water line out to a depth of two meters.

Despite all of these efforts, it still would be a number of years before the disturbed ER slope was stabilized, providing satisfactory wildlife habitat and affording erosion protection for the lake, and before the shoreline and near-shore lake bed was again providing good fish spawning and rearing habitat. The Wilsons definitely had left their mark on the lake, and it was not good.

"The challenge in managing a waterfront property will be to find a balance that protects your property and preserves the environmental features of the shoreline" (Dresen and Korth 1994).