Tipping the Scales

The introduction of non-native plants or animals to an ecosystem can have a devastating effect. Non-native plants can take over the natural area beside waterways (the riparian zone) and can lead to a changes in the production or quality of food, shelter and habitat for fish and wildlife. The introduction of non-native fish species, (also called exotics), can lead to a change in the qualities of the water (pH and nutrients) and, in some cases, can lead to the extinction of native species of both fish and wildlife. If you find an exotic fish contact Fisheries and Oceans Canada at: 1-604-666-6529.

Government Guidelines

Fisheries and Oceans Canada and B.C. Ministry of Water Land and Air Protection have developed *Land Development Guidelines for the Protection of Aquatic Habitat.* These guidelines provide alternatives to altering aquatic areas and promote the protection of natural vegetation adjacent to any river, stream, lake or wetland.

It is an offence under section 35(1) of the *Fisheries Act* to harmfully alter, disrupt or destroy fish habitat unless authorized by Fisheries and Oceans Canada. It is also an offence to deposit a deleterious substance, section 36(3), into water frequented by fish or at a place where it may enter such fish-bearing water.

Anyone who intends to carry out work that might result in damage to fish habitat or the deposit of deleterious substances to waters inhabited by fish should consult with the appropriate government agencies prior to work being started.

Think Ahead...

Before you do any work in or near the water talk to your local B.C Ministry of Water, Land and Air Protection representative. For septic and water quality issues, contact the Environmental Protection Branch. Fisheries and Oceans Canada may also have jurisdiction if migratory salmon frequent lake waters or if the proposal could affect fish habitat.

Take Charge !

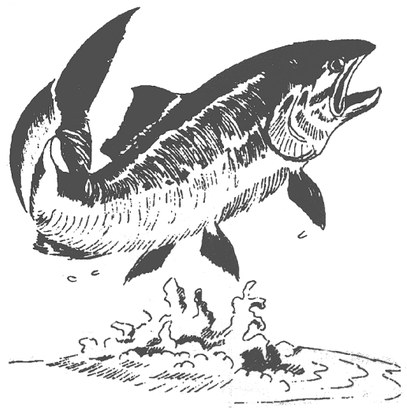
How can you become a steward of your shoreline?

Start at home - Plan your own property development carefully to conserve natural vegetation and consider replacing lost habitat where possible.

Observe and Report - Notify BC Water Land and Air Protection or Fisheries and Oceans Canada if you notice anyone carrying on work that could be harmful to the lake environment or fish habitat.

Educate and cooperate - Discuss conservation issues with your neighbours and promote the idea of shared responsibility for the whole lake.

Form a group - If there isn't already a local lake conservation society, consider forming one. There are a growing number of such organizations in B.C. As a group it is possible to persuade local government to implement bylaws that limit the impact of residential and commercial development.



Contacts:

To discuss plans or concerns about your shoreline property, please contact our office at:

Shoreline Care

A property owner's guide to conserving fish habitat in B.C.'s waterways

As a waterfront property owner, you have an important part to play in preserving a valuable, publicly-owned resource. Fisheries and Oceans Canada is working to ensure that you are aware of the complex and delicate eco-systems that exist in our rivers, streams and lakes. We hope that the information in this brochure will help you appreciate the importance of leaving the shoreline as natural as possible.

Why Take Care of Shorelines?

B.C. is blessed with thousands of rivers, streams and lakes. Some have been relatively undisturbed since the end of the Ice Age. However, most of BC's waterways have been impacted by pressures from commercial, residential, agricultural and industrial development as well as resource extraction. These types of developments along B.C.'s shorelines must be managed in a way that considers the needs of a sustainable environment and balances it with the need of community development.

River, stream and lake systems are important for many different reasons. Their beauty and serenity attract people who want to relax and enjoy themselves. They also:

- Are important sources of clean, fresh water
- Provide food and rearing habitat for fish and wildlife
- Provide recreational opportunities for boaters and anglers

Rivers, streams and lakes are also home to many unique species of fish, plants, and animals.

A Natural Balance

An aquatic environment is made up of not only the water in which fish live, but also the adjacent land, animal and plant communities. These parts work together in complex ways and are referred to as an *ecosystem.* Each ecosystem has evolved over thousands of years in response to local conditions. The stability of an ecosystem depends on a variety of species and physical features.

Fish in B.C. Waterways

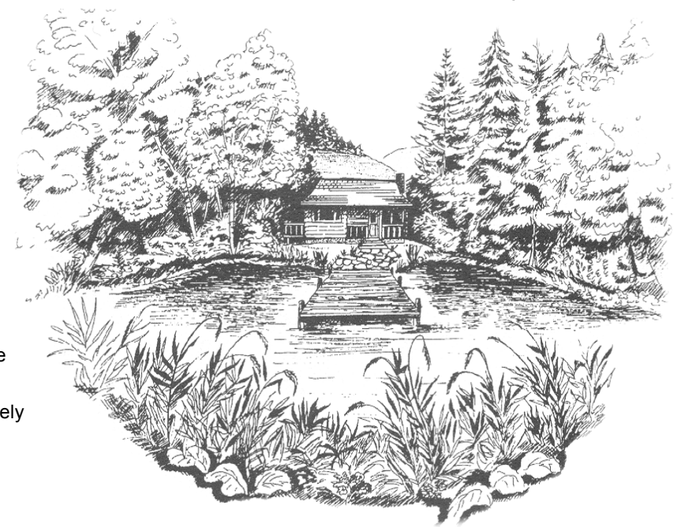
British Columbia's rivers, streams and lakes offer some of the best recreational opportunities in the world. There are few countries that can boast the beauty and cleanliness of our waterways, coupled with the abundant diversity of wildlife and native fish stocks.

Fish in all B.C. waterways share the same basic needs:

- Cold, clean water that is free from excessive nutrients and toxins,
- Habitat: places to hide from predators and carry out basic activities such as feeding and reproduction.

The Issues

Many shoreline property owners wish to make changes to the shorelines. The most common changes are clearing vegetation, adding fill, rock or sand and building docks or retaining walls. Often these projects are undertaken without knowledge of the environmental impacts. Unfortunately, these "improvements" do not always benefit a waterways' natural inhabitants, especially when you add up changes throughout the watershed. Alterations to a shoreline can upset the delicate natural balance that exists and can negatively impact fish and fish habitat.

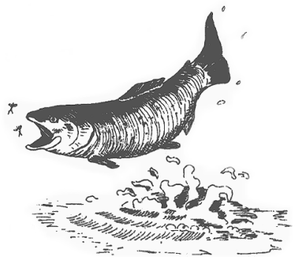


Fisheries and Oceans Canada | Pêches et Océans Canada

Canada

Fish Species Top Ten List

Chinook Salmon
Coho Salmon
Sockeye Salmon (Kokanee)
Pink Salmon
Chum Salmon
Rainbow Trout
Bull Trout
Steelhead Trout
Whitefish
Char



What is Fish Habitat ?

Under the *Fisheries Act*, fish habitat is defined as:

> *" spawning grounds and nursery, rearing,food supply and migration areas on which fish depend directly or indirectly to carry out their life processes."*

Habitat needs vary according to the different stages of the fish lifecycle. In the spawning phase, salmon and trout require swift flowing water and clean cobble or gravels in a stream or river to lay their eggs. Once these eggs hatch, the young fish require shaded, covered shoreline areas to grow and mature. Young salmon may spend up to two years along the shoreline, before migrating to the ocean. Similarly, freshwater fish species may spawn in streams, rivers and lakes and may spend the remainder of their lives growing and maturing in these environments.

Most fish are both predators and prey, so they depend heavily on cover for feeding and for safety. They are also constantly on the move. Even though we often see fish jumping in open areas of rivers or lakes, it is the hiding places, often in the vicinity of the shoreline, where fish spend most of their time.

How we change or effect the waterways, through the alteration of a shoreline or by introducing changes to lakes or streams can significantly alter the survival of these fish.

Types of Habitat

Riparian Vegetation

Aquatic ecosystems are dependent on influences outside the water. Trees, shrubs, grass and other plants around the edges of lakes and on the banks of rivers and streams are important fish habitat. There are many reasons why both fish and the rest of the ecosystem benefit from this fringe of vegetation:

- vegetation roots stabilize banks and prevent erosion;
- roots absorb septic field nutrients and runoff, improving water clarity and quality;
- overhanging water vegetation provides shade and stabilizes temperature;
- provides a source of food (land-based insects);
- roots, partially submerged vegetation, overhanging or fallen trees and shrubs provide cover for fish;
- rotting wood, leaves and pine needles add nutrients to the water;
- vegetated areas near waterways and lakes support wildlife species including deer, waterfowl and birds.

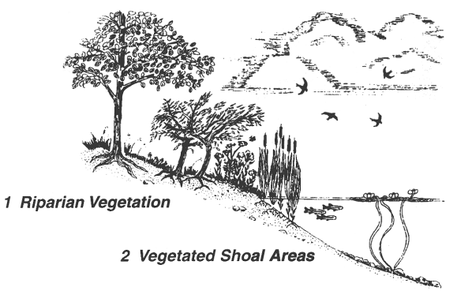
Vegetated Shoal Areas

The most productive parts of rivers and lakes are shallow, protected shoreline areas, including those areas that are only wet in high water. Nutrients collect in the fine silt and mud on the shoreline, providing sites where aquatic plants can grow. These plants provide food and living areas for algae, shrimp, snails, insects and other invertebrates, which are important fish food. The plants help stabilize soils and reduces wave and current action. They also provide protective cover in which many fish live, feed and reproduce. The greatest variety of species in any aquatic environment are present in these vegetated shoals. Not only are these areas the dining rooms of many of the important game fish, but they act as important supply kitchens for the open water as well.

Rocky Stream and Shore Habitats

Various fish species require different types of rock and gravel for spawning. Eggs are laid in gravel, cobble or large stones along the shoreline or in stream or river systems. Clean gravel and a good flow of cool water is essential to productive spawning habitat. Salmon spawning occurs in the fall. The eggs remain in spaces between the rocks through the winter. Eggs hatch in early spring and the young fish rely on the rocky cover for a few more weeks before beginning their life in the open water. By removing, adding or changing the rocks that exist in a system, you could:

- change the flow downstream from the work;
- flush out fish eggs or young fish;
- reduce water quality or quantity;
- reduce essential spawning habitat.



1 Riparian Vegetation

2 Vegetated Shoal Areas

3 Rocky Lakeshore Habitat

Shoreline Development - What are the Impacts ?

Shoreline development and tourism put pressure on rivers, streams and lakes throughout B.C. The main impacts are felt on the larger lakes and rivers, but many smaller rivers, streams and lakes that experience private land development are also areas of concern. The following list shows how you can make better choices for your shoreline.

Activity	Impact	Better Alternatives
***Foreshore Infilling* to:** ■ create beaches ■ build docks ■ extend property ■ move submerged rock to form "breakwater" piles to improve access for swimming and retention of sand	1. Covers spawning beds. 2. Destroys fish rearing habitat by killing plants and burying food organisms. 3. If infill is eroded silt is deposited on rocky spawning areas in deeper offshore areas due to wave action. 4. Infilling alters normal shoreline currents, deposition patterns, plankton and fish movements.	1. Retain or restore shoreline to natural state. 2. Build a small floating dock for swimming and/ or lake access. 3. Use public beaches or boat launches. 4. Design docks with pilings, rather than solid core supports. 5. Focus development upland from shorelines areas, above the high-water mark and within existing property lines.
Installation of Retaining Walls to: ■ prevent erosion ■ landscape the shoreline	1. Alters normal shoreline currents and deposits silts in fish habitats. 2. Sterilizes and hardens natural shorelines. 3. Changes natural wander of stream or river systems leading to increased downstream erosion.	1. Design natural retention systems with input from government agencies listed on the back page 2. Protect or replant native plants that naturally stabilize the shoreline. (cottonwood, cattails, willow and red-osier dogwood are common)
Destroying Aquatic or Riparian Vegetation to: ■ create beaches ■ remove danger trees ■ clean up shoreline lawn ■ enhance view ■ dispose of yard waste	1. Reduces natural diversity and productivity of the foreshore. 2. Results in loss of food, nutrients and shade for young fish and wildlife. 3. Reduces bank stability and increases erosion. 4. Yard waste smothers natural plants and insect habitats.	1. Protect native plants. 2. Create narrow paths for access to water. 3. Replant with native plants. 4. Consult with government agencies before removing dangerous or hazardous trees. 5. Dispose of yard waste in approved facilities.
Placing of Water Intakes in Streams, Rivers or Lakes to: ■ irrigate crops ■ water livestock ■ draw off domestic water	1. Juvenile fish get sucked into unscreened intakes, killing them, increasing system maintenance and reducing system efficiency. 2. Creates health impacts from fish in domestic water systems. 3. Poor installation destroys habitat.	1. Locate intakes away from valuable fish habitat. 2. Maintain properly sized screens on intakes. Guidelines are available for screening. Ask for the *Freshwater Intake end of Pipe Fish Screen Guidelines*. 3. Consult with government agencies before installing or placing intakes.
Introducing Nutrients and Toxic Runoff from: ■ leaking septic fields ■ lawn and garden treatments ■ soaps and detergents ■ agriculture ■ fuel handling	1.Degrades water quality. 2.Leads to excessive algae blooms and aquatic weed growth. 3. Causes fish kills. 4. Raises human health issues.	1. Install septic tanks and fields as far from water as possible (at least to setback distances required in your area). 2. Maintain septic tanks and fields. 3. Use phosphate-free and non-toxic cleaners. 4. Minimize lawn size and watering, maximize distance of lawn from lakeshore and refrain from using fertilizers, herbicides and pesticides.