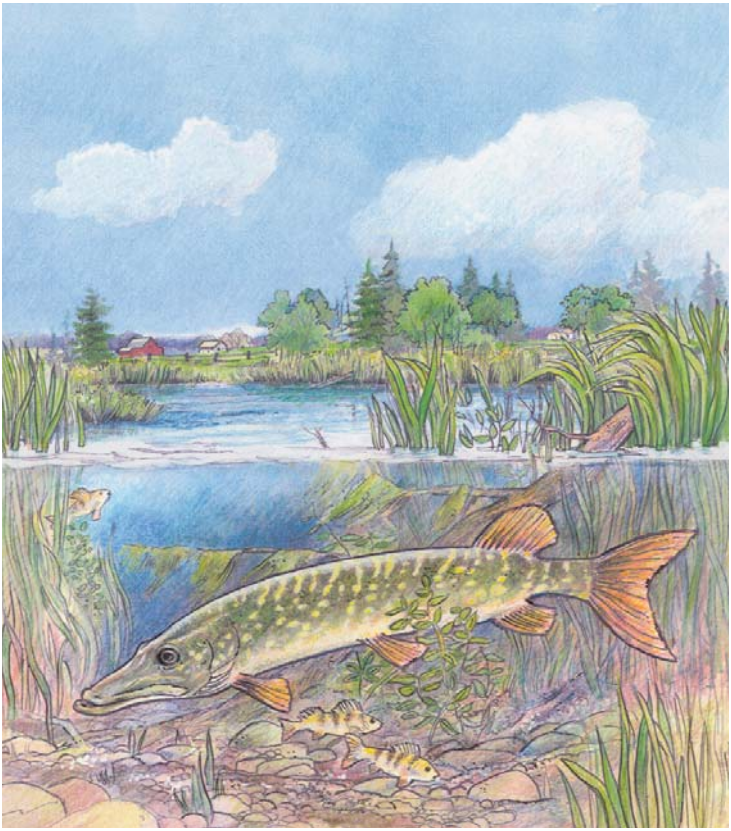
PRAIRIES EDITION

THE FISH HABITAT PRIMER



A GUIDE TO UNDERSTANDING FRESHWATER FISH HABITAT IN THE PRAIRIES

Fisheries and Oceans Canada
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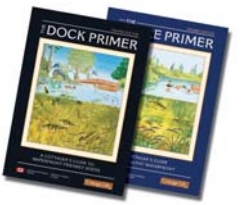
TABLE OF CONTENTS

Life on the Watery Side: What We Should Know

Why should we care about a fish's world? Well, because fish are more than an important source of recreation and commercial revenue. They are key players in the complex aquatic balancing act that keeps our rivers and lakes healthy, and our ecosystems strong. Yet most of us haven't the faintest clue where in the water fish actually live, let alone what they require to survive. It's not surprising then, that even with the best intentions, a cottager thinking of rearranging their shoreline or a developer considering a lakeside investment has little idea how to avoid harming fish habitat.

Even on dry land, our actions -spreading chemicals on fields and lawns, letting sewage seep from faulty septic tanks or paving roads and walkways resulting in increased runoff - have consequences for the waterways in which fish live. Wherever land actually meets the water, the physical changes we make too often completely rearrange nature's design for the underwater world.

So we need information. For anyone who lives, plays, or works around water, the answers are in this and other booklets on conservation and stewardship, including The Dock Primer and The Shore Primer. The Fish Habitat Primer - Prairies Edition is an essential guide to recognizing and respecting the environments on which fish depend to keep their - and our - waterways vibrant with life.



Surviving: How Do Fish Do It?

Fish, like humans, require certain characteristics of their environment for their survival. For fish, these essential prerequisites include a dependable food supply, a place to spawn (reproduce), adequate cover and reliable migration routes. Those parts of a fish's world that contribute to sustaining these life requirements are what we refer to as fish habitat.

Streams provide travel corridors for fish

Plants protect the shoreline, keep the water cool and provide food for fish

Some fish species will travel long distances to reach their spawning grounds

Spawning Sites:

You may stop a fish's life cycle from getting started in the first place by eliminating the places they need to lay their eggs. Most fish are fussy about where they spawn. It may be a rock shoal in a lake, or the vegetation of a spring-flooded stream bank, or among the boulders at the base of a waterfall. These prime areas where fish choose to spawn are often so important that other fish species may also choose that same location. If suitable spawning sites are in limited supply or if they are altered, the overall fish population and diversity may be compromised.

Northern pike prefer spring flooded stream banks and marshy lake edges for spawning

Many fish will travel long distances to find just the right spawning habitat. Walleye will migrate considerable distances up rivers and streams in search of gravels and cobble found in quick flowing water, or will seek out specific locations along windblown shoals or shorelines with gravel and cobble bottoms. Walleye spawning takes place at night in water less than one metre deep, possibly along your small piece of shoreline (even though you may never actually see them!).

Spawning preferences vary quite a bit between fish species. Lake trout prefer wind-swept rock shoals, while northern pike prefer the spring flooded banks of streams or the marshy edge of a lake where the pike's eggs can stick to the vegetation. Not only can the spawning areas be different for each species, spawning times can vary as well. Spawning times are generally dictated by the temperature of the water. Northern pike spawn early in the spring, heading out into the icy waters in search of their spawning grounds. Catfish spawning follows in the warmer months between May to July. Lake trout and whitefish wait until the fall before they begin their spawning activities, while burbot, a freshwater member of the cod family, lays its eggs under the ice during the winter months.

Food on Tap:

Once hatched, young fish need to eat - plankton, bugs, or other smaller, less fortunate fish. The type and amount of food available for the fish depends on the presence of diverse healthy shoreline areas that are rich in foods and provide great hiding places for fish to lie in wait. While it may not be obvious that cutting back plants, shrubs and trees from the edge of a stream or lake can affect fish, these areas are actually very important as they often provide the basic food supply for the bugs and smaller fish at the bottom of the aquatic food chain.

The Right Cover:

Fish, depending on the species, can be both predator and prey. As prey, fish increase their chances of survival by seeking out hiding places where they evade predators. Great hiding places are often found in the shallows, where logs, boulders and aquatic vegetation can be found. When we clear these materials from our shorelines to "tidy up" the swimming area, we've carried out an unwanted house cleaning for the resident fish populations. Other potential hideouts can be found in deep water and in the shadows of an undercut stream bank. The types of hideouts might even vary over the course of their lifetimes. As an example, the young northern pike lurks at the edge of shorelines near vegetated areas and fallen logs to escape bigger fish predators. As the pike grows bigger, it ventures further offshore to deeper water to use aquatic plants and submerged timber as cover so that it can ambush prey of its own.

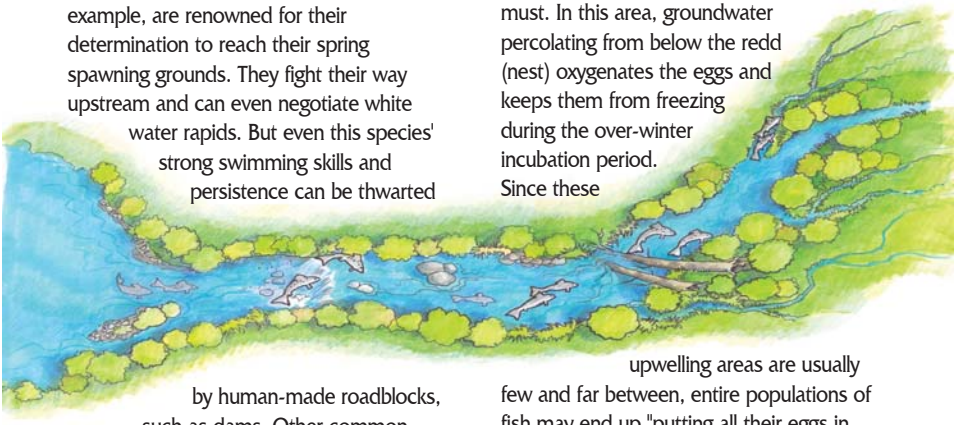
Fallen logs and rocks provide cover for insects and fish

Vegetation in and around the water provides shade, hiding places and food

Although it may look messy, it is home and a source of food for fish

Reliable migration routes:

All species of fish require the freedom to move from one type of habitat to another as seasonal changes and life cycle urges dictate. Most people are already familiar with the idea that many species migrate upstream to spawn and that dams and other obstacles can block fish from accessing these important spawning beds. Since fish can travel great distances within a watercourse to spawn or feed, any activity that blocks their migration can disrupt whole populations. Walleye, for example, are renowned for their determination to reach their spring spawning grounds. They fight their way upstream and can even negotiate white water rapids. But even this species' strong swimming skills and persistence can be thwarted by human-made roadblocks, such as dams. Other common barriers to migration are undersized culverts that can funnel a lazy creek into a high-velocity jet of water. Fish may be unable to fight their way upstream through this unnaturally fast water. Undersized culverts may stop or delay migrations of strong swimmers such as walleye and suckers, and can pose an even greater threat to weaker swimmers such as northern pike. These impacts can often be lessened or avoided by installing a wider culvert or bridge to allow fish to migrate easily both up and down stream.



Even seemingly innocent human activities can have a significant effect on fish populations. What's more, while most fish are able to respond to changes in their environment by simply moving from one area to another, some species are less adaptable and are tied to a particular critical habitat. Critical habitat is generally defined as an area or environment type that a species absolutely requires in order to carry out some or all of its life processes. For a spawning bull trout, an "upwelling area" in a coldwater stream is a must. In this area, groundwater percolating from below the redd (nest) oxygenates the eggs and keeps them from freezing during the over-winter incubation period. Since these upwelling areas are usually few and far between, entire populations of fish may end up "putting all their eggs in one basket". The loss of these areas can be critical to the health and overall survival of an entire fish population. In cases where a project is proposed to be constructed in an area that has critical fish habitat, the best line of defense is to relocate the project to another area, often not far away, but safely removed from the critical habitat.

If we tinker with the water quality by degrading it with sediment, pesticides, or spilled chemicals, we'll force a fish to find a new home, or worse - go belly up.

Some Like It Cold, Cool, or Warm

Most fish species have certain temperature requirements and will seek out waterways that best suit their needs. Some fish are restricted to narrow temperature ranges, while others can adjust easily to a wide range of temperatures. If you take the temperature of a waterbody, you can probably guess who might live there: coldwater, coolwater and warmwater environments all have a different set of residents. Lake trout require cold, thermally stable water that maintains an average temperature of less than 14°C, even on very hot days. Lake whitefish, walleye and northern pike prefer slightly warmer water while bass, bullheads and suckers thrive in warmwater with average temperature up to 23°C, levels lethal to other species. By cutting down the overhanging vegetation that provides shade, we can turn the water thermostat up or down with sometimes devastating consequences.

Water Temperature Group	Species
COLDWATER	· Cutthroat trout, bull trout, lake trout · Mountain whitefish · Arctic grayling
COOLWATER	· Perch · Northern pike · Walleye · Lake whitefish · Lake sturgeon · Channel catfish
WARMWATER	· Smallmouth bass, largemouth bass, rock bass · Bullhead · Freshwater drum

Water, Water Everywhere: A Host of Habitat Types

Given how long the natural world has been evolving, it is not surprising that different species of fish have found uses for just about every kind of aquatic ecosystem on Earth. Fish live in beaver ponds, marshes, lakes, agricultural drains, shaded woodland streams, roadside ditches, rivers, and just about every tributary that fills them. Each type of waterbody differs from the others in what it has to offer fish, from its variety of food and cover to its temperature range, water clarity, and the amount of dissolved oxygen available to pass over their gills. A natural mix-and-match combination of characteristics determines which species live where. Just as we look for different qualities in our homes, have our own opinions about the settings on the thermostat and prefer some foods over others, so too do fish.

Going With the Flow: Roles of Freshwater Environments

Why stay put in the same familiar habitat when you can explore and reap the benefit of others? Waterways are all connected, and many fish use this to their full advantage by moving from one freshwater neighbourhood to another as they pass through different life stages. By understanding the wide-ranging needs of fish that are served by creeks, streams, rivers, ponds and lakes, we can better appreciate what fish are up against when we interfere with their environment.

The water's edge: what we do on the shoreline can affect fish habitat

What Creeks, Streams and Rivers Offer:

Much of the water that makes up fish habitat starts out as raindrops striking the earth and flowing across the land into small streams, rivers and lakes. From marsh to creek and river to lake, the character of the habitat changes along with its role in a fish's lifecycle. Even intermittent creeks found in the uppermost reaches of a watershed can be habitat for part of the year. A roadside ditch or the low area in a farmer's field or a forested area might dry up in the hot months of summer, but for short periods each year, water flows over the land and may play an important role in habitat. Northern pike will migrate upstream in the spring and spawn in flooded areas which are dry for much of the year. When the youngsters hatch, they quickly move with the receding water to a more permanent watercourse to avoid being left high and dry. Even the tiniest stream may offer a refuge or a spawning area to smaller fish during the wet season. But even if a stream is not accessible to fish, it may still provide both water and food to downstream fish populations.

As the smallest threads of water merge into permanently flowing streams, more habitats unfold. At its headwaters, a higher elevation stream will be cold with high levels of oxygen - perfect for trout to live and breed. Further downstream, as the landscape opens onto the prairies, the channel widens and begins to meander, slowing the current and allowing sediment to settle to the bottom. No longer good for trout, these warmer waters now appeal to white suckers and northern pike.

Continuing on, the small streams join together to form rivers. With their larger size, rivers provide habitat for many unusual and interesting fish, like lake sturgeon, goldeye, mooneye, sauger, several species of suckers and numerous species of minnows and other smaller fish.

Creeks, streams and rivers generally provide a variety of habitat types, including the more commonly known pool and riffle formations. A riffle zone is often characterized by shallow rapid areas of rivers that tumble and bubble over rocks and boulders to trap oxygen in the water. Trout, walleye and white suckers prefer to lay their eggs in this

Wetlands, creeks, streams, rivers and lakes; we're all connected

oxygen-rich water which helps the eggs breathe. Riffles also play a key role in food production as these areas are abundant in insects and other invertebrates. Downstream of the riffle you can generally find a pool. Pools are deeper, slower areas that often act as the feeding area for larger fish.

When we alter the land bordering creeks, streams and rivers, we may inadvertently alter fish habitat. Shoreline vegetation acts as a natural filter, removing contaminants such as fertilizers and pesticides. Excessive fertilizers entering the watercourse fuel the growth of algae which, in turn, uses up the precious oxygen in the water needed by fish to breathe. When shoreline (or riparian) vegetation is removed, the banks become unstable and can easily erode. The result is higher levels of silt being added to the watercourse which can damage fish gills and lead to suffocation of the fish. Also, as water temperatures increase, the oxygen levels decrease and the stream may become unsuitable for species that prefer cooler conditions.

What Lakes and Reservoirs Offer:

From a fish's point of view, lakes and reservoirs open up all sorts of possibilities for fish use, from deep-water feeding grounds to shallow shoreline nurseries. Lakes and reservoirs certainly fit this description, although some are more conducive to fish than others.

Most people can easily identify a lake by its surface features - the islands and bays, the pine tree on a point and the beach where we suntan. But not surprisingly, the features nearer and dearer to the hearts of fish are invisible to our eyes. The diversity of fish found in a lake is dependent on many things including the lake depth, temperature, abundance and type of plants, and the mud, sand and rocks that make up the lake bed.

Deep lakes are generally cold lakes as the sun is unable to warm the waters all the way to the bottom. As sunlight penetration through the water is limited, plant growth along the lake bottom is also limited. These deep cold lakes often provide ideal habitat for lake trout and lake whitefish. Both species hang out in the deeper cooler waters during the summer, and then move to more shallow waters in the fall to spawn. Lake trout need the rocky shoals for their spawning, while lake whitefish make use of the hard or stony bottoms. When these habitats are in short supply, removing or harmfully altering them will have devastating impacts on the survival of the population.

The opposite lake type is shallow, warm and rich in nutrients. The sun warms up the water quickly, and since the sunlight easily penetrates to the bottom, there is an abundance of plant life growing in the water. Many fish use this plant abundance to their advantage. For example, yellow perch are often associated with extensive aquatic vegetation which it uses for both feeding and spawning. A unique characteristic of perch spawning is that it attaches its eggs directly to the vegetation, making this habitat feature an absolute necessity for perch survival.

Another fish that prefers these shallow warmwater lakes is the brook stickleback. Swimming and hiding amongst the underwater jungle of plants, the stickleback stalks its prey of aquatic insects, snails and worms. The sticklebacks spawn in these shallow areas, using bits of vegetation to construct tiny nests attached to the stems of submerged grasses and reeds.

The streams and rivers that enter and exit lakes are also a critical part of the picture for fish. Some species that use open lake water habitat to support their adult lives also depend on these adjoining watercourses to reach their spawning grounds. In the spring, the white sucker

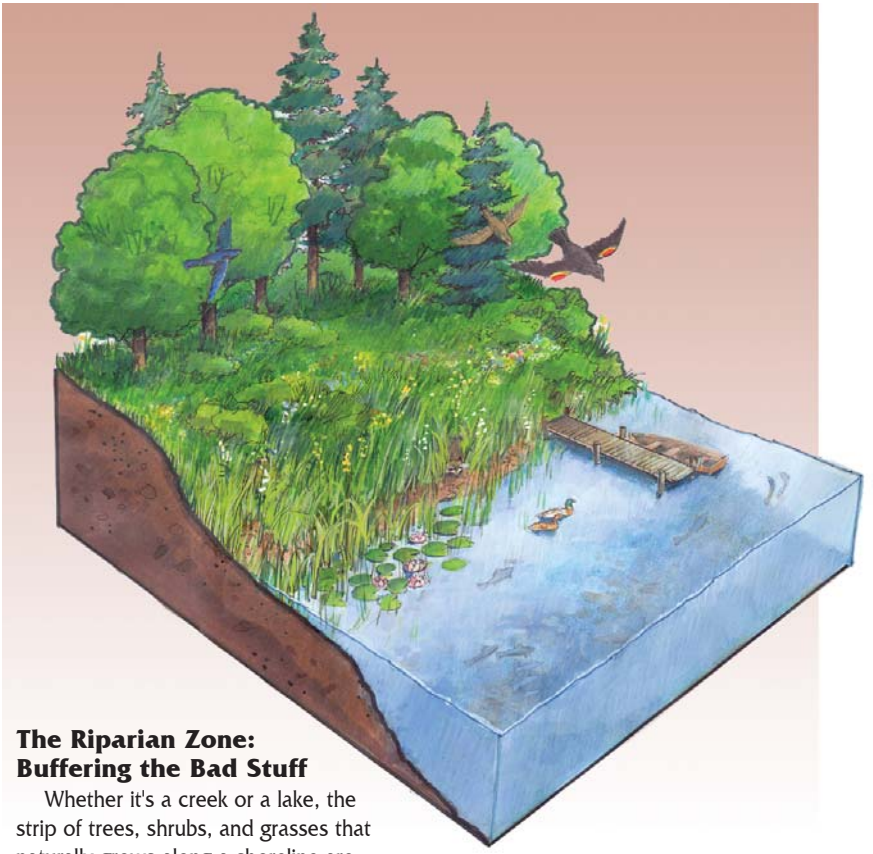
Lakes provide a variety of fish habitat

may migrate from the lake into gravelly streams to spawn. The lake sturgeon also migrates into rivers to spawn in areas with swift water or rapids, often at the foot of low falls that may prevent any further migration. As far as these and many other fish species are concerned, a lake's health extends well beyond its perimeter.

A reflective surface hides the vast world of habitats and fish below

Nearshore Waters: Close to Land...and Us

When it comes to bigger bodies of water like lakes and rivers, our greatest potential impacts don't occure where we get in over our heads, but rather where we get our feet wet! This area is known as the nearshore habitat. Shallow and sheltered by aquatic vegetation, these areas are sought by many fish species for a number of reasons like laying eggs, lying low from predators, or even stocking up on treats such as crayfish, dragonflies and leeches. When we muck about in a nearshore area, building breakwalls or clearing a swimming area, we damage a very sensitive ecosystem and put fish at risk. Nearshore aquatic plants may look like weeds to us, but they are often key to this sensitive ecosystem, harbouring rearing areas for young northern pike, habitat for minnows traveling along the shoreline, reducing algae in the water, and helping to filter runoff and settle sediment. Any work we do at the water's edge requires very careful planning (see the later section on "Working In and Around Water: How to Do It Right," p. 17).



The Riparian Zone: Buffering the Bad Stuff

Whether it's a creek or a lake, the strip of trees, shrubs, and grasses that naturally grows along a shoreline are important for fish habitat. This is the riparian zone and, if left alone to do its job, it acts as a buffer between land and water. The network of roots act as both a shoreline stabilizer and a water filter to control erosion and remove impurities from surface water runoff (for example, phosphorus is a nutrient that occurs in nature, but it also occurs in human products and waste. Excessive phosphorus can throw off the nutrient balance of a waterway and cause algae and aquatic plant populations to explode). Leaves and branches break the force of falling rain, and runoff is slowed by the piles of leaf litter, pine needles and broken twigs. By slowing down the runoff, the riparian zone allows the water to be absorbed into the ground, resulting in less surface flooding and bank erosion. Without this green line of defense, the nearshore waters are vulnerable to both natural and unnatural forces.

The All-Important Wetland: Where Fish Start Out and Hang Out

Canada's Federal Policy on Wetland Conservation (1991) defines a wetland as "land that is saturated with water long enough to promote wetland or aquatic processes as indicated by poorly drained soils, hydrophytic vegetation (i.e. plants that grow in water), and various kind of biological activity that are adapted to a wet environment". Simply put, wetlands are the mid-way environment between aquatic ecosystems and land-based ecosystems. Wetlands include bogs, fens, marshes, swamps, prairie potholes and shallow waters.

Wetlands are spawning grounds and nurseries to a variety of fish species

Sometimes dry and sometimes wet, wetlands share characteristics of both dry land and aquatic habitat. This zone harmonizes water, soil, nutrients and sunlight to form an extraordinarily fertile environment for innumerable species, including insects, fish, amphibians, birds and mammals. Wetlands are among the most biologically productive places on Earth !

Some fish, such as brook stickleback, may spend their entire lives in a wetland. There are occasional users who periodically swim into wetlands for cover, or to feed on the forage fish that they harbour. For other fish, including northern pike, the use of a wetland is critical for the completion of their life cycle.

Wetlands are perhaps even more vulnerable to human activities than other types of fish habitats. Many of us have no idea that wetlands act like a giant sponge for a waterway, soaking up excess runoff and filtering sediment that would otherwise cover rock or gravel spawning beds. Yet there's a limit to what a sponge can absorb: our environmental abuses can overwhelm a wetland, sending pollutants downstream. Of course, some people simply want to "improve" their real estate by draining or dredging it. Unfortunately, this results in the complete destruction of a healthy and productive wetland. This is a huge mistake.

While a marsh or floodplain may not seem like the most hospitable place to raise a youngster, the abundance of cover and food make wetlands some of the busiest nurseries around. In their lake home, young suckers and walleye often migrate into these protected waters to feed. For other species, this is where life begins. In early spring, northern pike move into sedge (grasses that grow in wet areas) and grass-filled floodplains of rivers to spawn. In case you're not yet convinced of the fragility of wetland habitats, consider the delicate manner in which the pike gets its start. The northern pike leaves its eggs in the care of the wetland, attached to standing plants from the previous growing season. To us, the vegetation may look like an untidy mess, but it means everything to the eggs' survival. The wetland vegetation keeps them from sinking into the bottom muck where they'd either suffocate or be devoured by other aquatic organisms.

Wetlands are great at multi-tasking. They provide spawning, nursery and feeding grounds for fish while filtering out impurities and buffering waterways from flood waters

WORKING IN AND AROUND WATER: HOW TO DO IT RIGHT

Once we understand the intricate factors at play between waterways and their inhabitants, it becomes very clear that we all have a vested interest in protecting these special places. Simply put, if we lose fish habitat, we lose fish and other aquatic life - and if that loss occurs because of our actions, inadvertent or not, we may also be in contravention of the federal *Fisheries Act* or other provincial and/or municipal legislation. So it is the responsibility of folks living and working by water, such as cottagers, full-time residents, developers and farmers, to brush up on their fish-friendly practices as well as the rules that surround those activities.

According to the federal *Fisheries Act*, which protects fish and their habitat, the onus is on landowners or developers to ensure that their shoreline or in-water work does not harmfully alter, disrupt, or destroy fish habitat.

This boils down to a short acronym with big repercussions- HADD: the Harmful Alteration, Disruption, or Destruction of fish habitat (see "A HADD Is Bad, " p. 21).

Some of the projects that can damage fish and their habitat include:
- dredging
- relocating or channelizing streams
- aquatic and shoreline vegetation removal
- water withdrawals
- construction of a culvert or bridge
- bank armouring and shoreline hardening
- beach creation

And that's just a starting list. There's a lot to know when it comes to shoreline work, but your top priority should be to conserve and protect fish habitat, even if that means relocating your project or designing it differently. If you're absolutely certain there's no way around causing a HADD, you should be aware of your responsibilities under the *Fisheries Act* (see "Getting Approvals, Making Amends," p. 22).

Keeping Fish Happy: Habitat-Friendly Practices

Fortunately, for both human and fish peace of mind, there are many steps you can take to prevent harm to habitat when working in or around water. The following suggestions will keep you on the right side of the fish and all the other species that rely on our water:

Get Advice Before Starting Work: Eager as you are to grab the shovel and get going, it's smart to talk first to the fisheries experts about what you're planning. The first line of defence is contacting your nearest Fisheries and Oceans Canada (DFO) office and your local provincial natural resources department. These organizations are

working to protect and conserve fish habitat and the environment, and will provide direction and advice for your project.

These agencies will review your project proposal and point out better approaches or any regulatory pitfalls. For instance, you may be unsure if your project site is considered fish habitat, particularly in locations where the shore area has been dry for more than a year. DFO biologists will assist in determining where fish habitat starts and stops and let you know if your site requires protection under the *Fisheries Act*. Provincial officials will be able to advise you on any provincial requirements or approvals.

Talk to your local government agencies before planning work in or around water

Do your Shore-Work Homework: There's a lot of information you'd be better off having at the start, rather than the end of your project, such as the historic trends in water levels for your lake or river. This is important as many water bodies in the Prairies have recently been at record low levels, while other areas have been near record highs. You may need to contact your local provincial natural resources office for details so you won't have any surprises should water levels change. Beyond concerns about fish, this is just good sense. You don't want to build a new dock and then discover you need hip waders to reach it, or that your dock is now several feet from the water's edge!

Dealing with low water levels: Low water levels cause a lot of hassle, not the least of which is boating access. Many cottage owners want to dredge the lake bed during low water periods to allow better access to their docks. Besides damaging habitat, dredging is often a wasted effort since these spots quickly refill with sediment during the next rise in water levels. A better, less harmful alternative is to extend the dock with temporary floating sections. When water levels return to normal, the extra docking can be removed.

Don't "Clean Up" your Shoreline: If your project is to tidy up the waterfront, forget that idea right now! The fish will never forgive you. They and other aquatic dwellers rely on the habitat created by this jumble of aquatic plants rocks, stumps, logs and other woody cover - so leave the stuff in the water (or any dry areas normally under water). While the role of aquatic plants in fish

habitat is more obvious, rocks and wood are also important components. In lakes with very small streams feeding them, shoreline rocks are often the only place some species can successfully spawn. Rocks can also protect the shoreline. If you remove them, you may find your lot is washing into the lake. Bigger lakes often have a ridge of rock back from the shoreline. This is called an ice push ridge. It is caused by wind blowing ice on shore and it protects the area behind it from ice damage. If you remove that natural protection, you might find ice in your living room some spring. Woody debris provides important cover for fish, especially in streams. It also improves habitat by causing streams to scour deeper pools, and can even change their course. If, for some reason, your shore work requires you to temporarily remove rocks or woody debris from the water, save the material and put it back in the same area or a nearby area of equal depth. As an extra tip, make sure that when you replace the rocks and wood, you don't create any navigational hazards for boaters.

Keep Buffer Vegetation in Place: You'll do your waterway a big favour by not clearing the trees and shrubs that line its shores, stabilizing soil and filtering runoff. Let laziness guide you in all such decisions; the smaller your effort, the greater your contribution to habitat health. Specifically, don't mow your grass to the water's edge or remove natural vegetation along the shoreline. Maintain a healthy buffer. If you feel the need to improve your view, consider trimming your trees and shrubs rather than chopping them down completely. Planting additional deep-rooted vegetation along the shoreline that does not grow too tall will also help to avoid erosion without obstructing your view. To access the water, cut a small pathway at an angle through the vegetation instead of clearing the whole shoreline area.

Avoid Shoreline Substance Abuse: Even if you have a buffer strip to help filter upland contaminants, don't make its job harder by careless handling of pollutants. If you must use fertilizers and pesticides on your property, apply (and store) them well away from the shoreline. Take care when refilling gas tanks. Ideally, refilling should be done well away from the water, or with precautions to avoid spilling directly into the water.

Always Preserve Wetlands: Whether you're a developer dreaming of a condo in place of that wetland or a cottager eyeing the little marsh nearby for next year's dock, hands off. During long periods of low water, wetlands may dry up, but they will rejuvenate when normal water levels return. In fact, wetlands are often characterised by the cyclical nature of low water and high water, and wetland plants and animals are highly adapted to these natural changes. Destroying even part of a wetland reduces its value, not only to fish, but to waterfowl and other wildlife as well.

Choose the Proper Season: Cool and warmwater fish species spawn during spring and early summer while coldwater fish generally spawn in the spring or fall. Knowing your local species' reproductive habits will ensure that any shore work you're considering does not interfere with the sensitive life stages of fish - the spawning process, the eggs, or the young fish themselves. Check with your nearest Fisheries and Oceans Canada office or provincial natural resources department about the best time of the year to work in or around the water (and the timing windows that may affect your approvals) in your area.

Work "In the Dry": Try to schedule your shoreline project to coincide with the lowest possible water levels, usually late summer or fall, to lessen impacts to fish and fish habitat. If you can't manage your timing to work in the dry, then it's important to talk to fisheries staff about ways to de-water your immediate work area to get the job done without harming the habitat. But remember that even in low water conditions, you need to consider spawning seasons for your local fish before you get started (see Choose the Right Season).

And Don't Forget To...

Allow sufficient time for the review process: Once you submit your project plans to the authorities, your proposal will be assessed for impacts to fish habitat. You can help the process by ensuring that complete, accurate and detailed information is provided in your application. See DFO's Working Around Water fact sheets for details (see Further Reading). Since the review and approval process can take time, especially for more complex proposals, you should start the ball rolling early.

Habitat Appearances Can Be Deceiving

During periods of fluctuating water levels in lakes, the boundaries of fish habitat do not change. If the shore of a lake slopes gradually, you'll see that a small decrease in the water level translates into a large retreat of the waters edge. Beaches grow farther out into the lake while vegetation flourishes, advancing towards the waters edge. So when water levels drop, don't make the mistake of treating the exposed shore as "dry" land - as far as the fish are concerned, these areas may remain essential nurseries and daycares for future generations when higher water levels return. Damaging or interfering with them can dramatically upset fish populations.

Such caution also applies to streams and rivers, where the boundaries of fish habitat may be wider than we first realize. Snow melt and spring rain can swell a watercourse so that it overflows its banks, submerging nearby vegetation. But curb the urge to butt in and "control" the flooding - keep your distance by not building anything in its path. For some fish species, such as northern pike, the flooded areas of overtopped banks provide ideal spawning grounds. It's all part of the annual plan.

A HADD Is Bad

Designing a shore project that preserves habitat will endear you to the authorities and make the review and approval process a whole lot easier. Your first priority when working in and around water is to avoid causing the following three fishery fiascos:

Harmful **A**lteration: any change to fish habitat that reduces its long-term capacity to support one or more life processes of fish but does not permanently eliminate the habitat.

Disruption: any change to fish habitat occurring for a limited period of time that reduces its capacity to support one or more life processes of fish.

Destruction: any permanent change of fish habitat, which completely eliminates its capacity to support one or more life processes of fish.

These three are otherwise known as a HADD.

Getting Approvals, Making Amends

Step 1: Does your project harm fish habitat? A number of projects have the potential to harm habitat, so your first step is to see whether your project falls into this category. So, assuming you've looked into friendlier approaches, such as relocating or redesigning your project, and it turns out that your project will still cause a HADD, then you need to go to the next step in DFO's review and approvals process.

Step 2: Does your project fit under an Operational Statement? DFO is working towards streamlining its review and approval process by identifying those activities that have a low risk to fish and fish habitat. By following specific guidelines, your project may not require DFO's review under the Fisheries Act. DFO's Operational Statements provide guidance on different types of activities and are tailored to different provinces to reflect the differences in environments as well as provincial regulations and laws. To see if your project qualifies under the Operational Statements, keep an eye on our website at www.dfo-mpo.gc.ca/canwaters-eauxcan

Step 3: And if your project doesn't fit under the Operational Statements? Well, at this point, you'll need to fill out a form with a very long title: "Application for Authorization for Works or Undertakings Affecting Fish Habitat." It's available online from the DFO at www.dfo-mpo.gc.ca/canwaters-eauxcan or you can pick up a copy at your nearest DFO office. As you'll see when you look over the application, you'll need to come up with a compensation plan - basically, a way of making amends for the damage your project will do to fish habitat. In the end, DFO is looking to achieve its policy objective of a net gain of habitat, but this may not always be possible. Compensation plans are designed to achieve DFO's habitat conservation goal by offsetting unavoidable habitat losses with habitat replacements to achieve a no net loss of fish habitat. So, for example, if a proposed marina will result in infilling, or a creek needs to be relocated, compensation may involve creating or improving fish habitat nearby. It all depends on the nature of your project and local conditions. But one thing's for sure: DFO won't give you the go-ahead until they're satisfied you've done your best to avoid a HADD. Ideally, any losses of habitat are offset by the gains to habitat resulting from your compensation. DFO will work with you

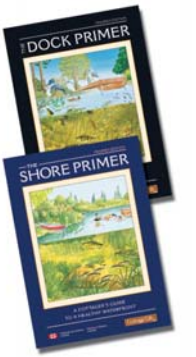
to figure out a way to conduct adequate compensation for your work. Although it may cost you some time and money, in the end it will help protect fish and the environment.

Step 4: If you need an Authorization, make sure you have it before you start any work. You should be aware that authorizations are not guaranteed. In some cases, the fish habitat affected by your project may be considered critical habitat and approval may not be granted.

Our Piscine Pact? Be Mindful of Fish Habitat

Every time you stand by the shores of a lake or on the banks of a river or stream, think of this: You are within the habitat of fish, an ecosystem so intricate that even the smallest change to one part can have much larger and unpredictable impacts in another. In learning how to tread more lightly at the edge of this ecosystem, we can all help to ensure our waterways remain a congenial place for those who live in them - and by them.

FURTHER READING



The Dock Primer: *Max Burns. 2003*
Co-published by Fisheries and Oceans Canada and Cottage Life.

The Dock Primer is an invaluable guide to waterfront-friendly docks, covering all the essentials from best building designs to the approvals process.

The Shore Primer: *Ray Ford. 2003*
Co-published by Fisheries and Oceans Canada and Cottage Life.

The Shore Primer is an essential guide to healthy waterfronts, showing cottagers and other landowners how to protect and restore their shorelines. A good complement to The Dock Primer.

Aussi disponible en français

Riparian Areas: A User's Guide to Health:
Fitch, L. and Ambrose, N. 2003.
Lethbridge, AB. Cows and Fish Program.
ISBN No. 0-7785-2305-5.

The Federal Policy on Wetland Conservation: *Government of Canada. 1991*
Environment Canada. Ottawa, ON. 14 p. Available from the Canadian Wildlife Service, or on-line at http://dsp-psd.communication.gc.ca/Collection/CW66-116-1991E.pdf

On the Living Edge: Your Handbook for Waterfront Living - Alberta/ NWT Edition:
Kipp, S and Calloway, C. 2002
Co-published by the Living by Water Project and the Federation of Alberta Naturalists.

To order, contact:
The Federation of Alberta Naturalists
1179 Groat Road
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Email: shorelines@fanweb.ca

On the Living Edge: Your Handbook for Waterfront Living - Saskatchewan/Manitoba Edition: *Kipp, S and Calloway, C. 2003*
Co-published by the Living by Water Project and Nature Saskatchewan.

To order, contact:
Nature Saskatchewan
206-1860 Lorne Street
Regina, SK S4P 2L7
Phone: 306 780-9834
Email: shorelines@naturesask.ca

These following publications and more are available electronically on the Fisheries and Oceans Canada (DFO) website at www.dfo-mpo.gc.ca.

Working Around Water? series of fact sheets
What the Law Requires
Guidelines to Attaining No Net Loss

For a copy of any of these DFO publications, please contact your local DFO district office

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Federal and provincial offices are listed in your phone book in the blue pages.

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