THE SHORE PRIMER

A COTTAGER'S GUIDE
TO A HEALTHY WATERFRONT

Fisheries and Oceans Canada
Pêches et Océans Canada

Cottage Life

Produced by Cottage Life
in association with
Fisheries and Oceans Canada

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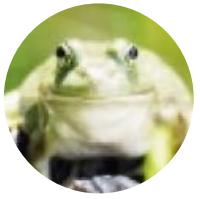
THE SHORE PRIMER

By Ray Ford



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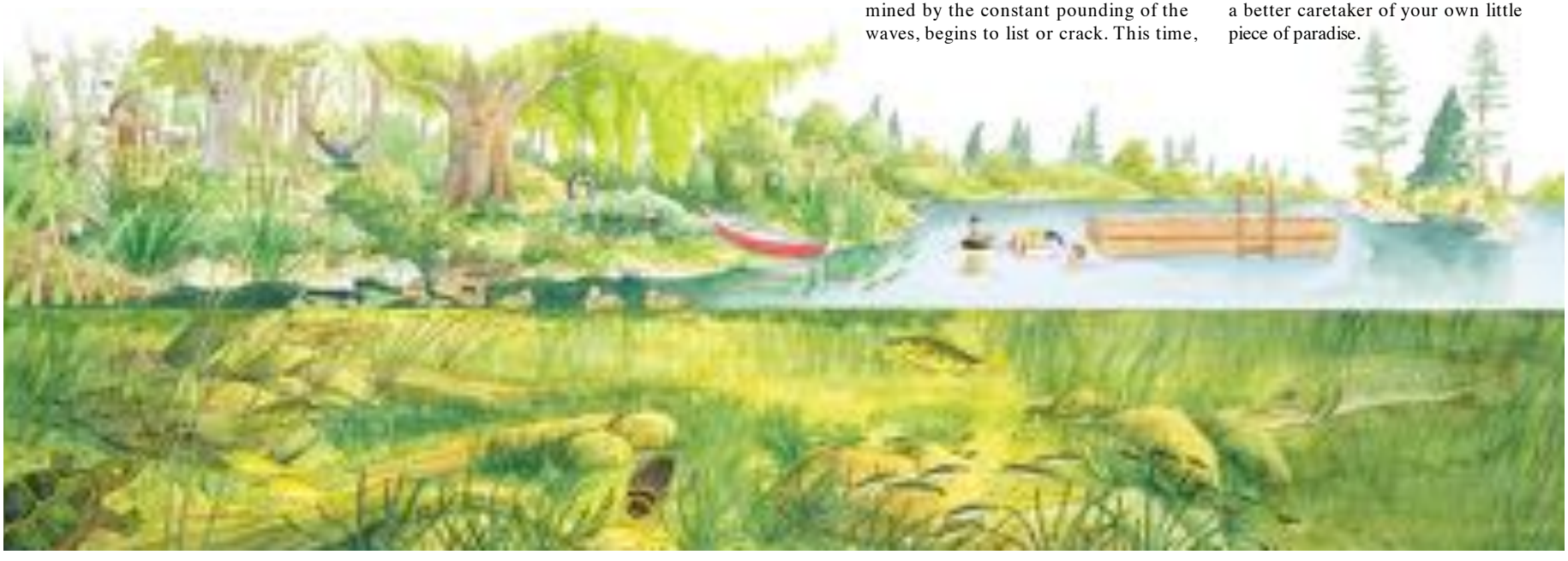
YOUR SHORE: A NATURAL WONDER

For many cottagers and other waterfront residents, the quiet spot by the lake is a little bit of paradise where we can relax, play, and enjoy being closer to nature. But it's a special place for another reason too. The zone where the water meets the land is the richest natural environment most of us will ever come into contact with, and almost certainly the most complex piece of the earth we'll have the opportunity to live near and share. Equally important, the waterfront is crucial to your lake's health, acting as lungs, doormat, cafeteria, and daycare for the lake, as well as a living retaining wall for the shore.

When a natural shoreline is altered, often by well-intentioned projects meant to improve waterfront living, that intricate balance between the creatures, plants, and earth is toppled. Call it the "domino effect." A typical scenario goes like this: After smashing the piggy bank to pay for a cottage lot, the new owners want to enjoy that priceless view of the water (and who wouldn't?). So they gather the extended family for a weekend logging bee and clear out the thicket of plants, shrubs, and trees lining the shore. But once the trees and shrubs are gone, the soil their roots held in place begins to erode. Now the cottager family spends uneasy weekends watching their frontage become lakefill. Worried about the erosion of their property and investment, they forego renovations to their city home and use the cash to build a break-wall. In a few years, the wall, undermined by the constant pounding of the waves, begins to list or crack. This time, the owners dip into the kids' university fund to underwrite a new series of repairs. What began as a bid to see the lake turns into a grudge match between the cottagers and the waterfront – and both sides are taking a beating.

Why not declare a truce and weave your cottage needs into the natural shore? This booklet will show you how to protect and nurture the qualities that make it such a special location. Because much of our waterfront is no longer in a natural state, however, it also offers cottagers and other landowners constructive solutions for restoring an altered shoreline to its former health and beauty. *The Shore Primer* is the second in a series of booklets on waterfront stewardship published by Cottage Life in association with Fisheries and Oceans Canada. It, in combination with *The Dock Primer* (see p. 22), can help you become a better caretaker of your own little piece of paradise.



HOW TO PRESERVE YOUR SHORE'S TRUE NATURE

First, prepare for a waterfront expedition (sunglasses, big hat, sunscreen, binoculars to see what the neighbours are doing) and take along a supply of refreshments – this kind of in-depth field study can be demanding. Next, park yourself in a deck chair with a waterfront view (the dock makes a good spot) and take a good look around. The natural shore has four components, beginning underwater and extending upland (farther than you'd think). Shore experts call these components the *littoral zone*, the *shoreline*, the *riparian zone*, and the *upland zone*, and each plays a critical role in keeping your lake healthy. As important as these separate roles are, however, it's vital to remember that the shore is a natural progression – each area shades into the next in a gradual, almost seamless transition. Altering any portion of this region affects the whole, diminishing its ability to support life on the lake.

Building a sand beach is tempting but against the law. It erodes easily, and snuffs out aquatic life.

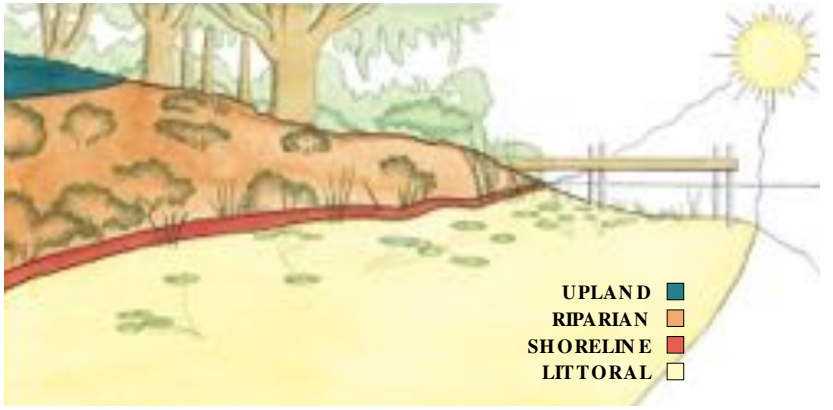
THE LITTORAL ZONE: A LAKESIDE DAYCARE

Sitting on your dock, you're perched in the *littoral zone*, the area from the water's edge to roughly where sunlight no longer penetrates to the lake bottom. As much as 90 per cent of the species in the lake either passes through or lives in this zone. Algae float freely in the water or attach themselves to twigs, stones, and plants. Microscopic water bears (freshwater invertebrates that look like tiny lumbering bears – if you ignore the two extra legs) graze on aquatic plants. Yellow perch spawn in the shallows, while northern pike lurk among the sedges. Black ducks forage in the pond weeds, and turtles loaf on the trunks of fallen trees.

The water in front of the shore acts as the nursery, daycare, and cafeteria for a range of species, offering foraging areas and hiding spots and a shallow, relatively protected area for young fish and amphibians to grow. Aquatic plants and downed trees are a crucial part of the system, with the plants acting as the lungs of the lake, converting sunlight into food and releasing oxygen in the process, and providing food and shelter for other creatures. Once submerged, wood becomes a 24-hour diner for turtles, crayfish, and small fish, its surface covered by a smorgasbord of tiny plants and invertebrates. Downed trees also act as hiding spots for small fish, nesting areas for bass, and good spawning zones for yellow perch.

How we can help the littoral zone stay healthy: The water's edge is also a focal point for human activity. Perhaps even now you can see the kids leaping from the swimming raft and hear Grampa muttering curses as he fiddles with the outboard. While we don't intend to, it's easy for humans to interfere with the delicate operations of the littoral zone. If Grampa accidentally spills two-stroke fuel, for example, the juvenile perch will be looking for a new daycare. The simplest way to keep the littoral zone vibrant and healthy is to tinker with it as little as possible:

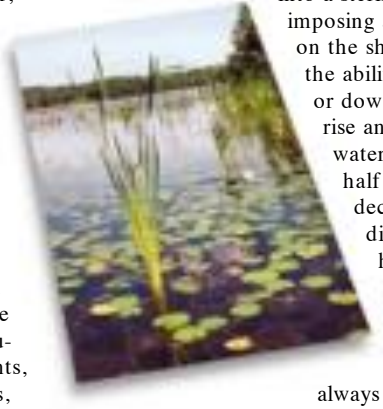
- Use your dock as a bridge over the weedier shallows, and moor a swimming raft out in deeper water, rather than frightening away fish and birds by ripping out aquatic plants to make a swimming area.
- Leave trees where they fall, unless they're a hazard to boats or swimmers. Typically, only a few trees along a kilometre of waterfront will tumble into the water during a year. When a cottager yanks out all the trees lining the waterfront, habitat formed by fallen trunks and branches that took decades to accumulate is destroyed in a single summer.
- Don't even think about building a beach. Until shoreline regulations were imposed to discourage the practice, many folks liked to "improve" their swimming areas by bringing in a few truckloads of sand and dumping them on the shore. So what's the harm in that? When the sand erodes, as it almost certainly will, it smothers spawning areas for smallmouth bass, buries mayflies in their burrows, and covers the vegetation where frogs and toads lay their eggs. The impact ripples through the food chain: Without frogs and tadpoles to eat decaying aquatic plants and insects, more oxygen-depleting algae fills the lake and more bugs swarm the shore;



the blue heron moves on when its amphibian quarry grows scarce. While a beach may be fun for sunbathers, it is no picnic for littoral residents.

THE SHORELINE: GLUE FOR THE WATERFRONT

Thanks to thousands of years of practice, natural shores are among the world's most effective, least expensive erosion controls. The mix of plants, shrubs, and trees forms a complex web of roots and foliage that knits the waterfront together, holding the bank in place and fending off the impacts of wind, rain, waves, and boat wake.



The bulwark against erosion is the *shoreline*, the place where land and water meet. In its natural state, the shoreline is a profusion of stones, plants, shrubs, fallen limbs, and tree trunks. But it's also a busy intersection, with animals, insects, and birds travelling back and forth. Moose and deer pick their way down to the water to forage or drink. Mink skulk about on hunting trips. Water birds waddle from their nests to the water. Overhanging vegetation shades and cools the water, and acts as a fast-food outlet for fish by producing a rain of aphids, ants, and other insects that slip from their perches above.

How we can help keep the shoreline together: Things start to come apart when people remove the vegetation whose roots act as the glue that holds the shoreline together. The resulting erosion sends a stream of silt coursing into the water where it damages spawning areas. Lake trout, for example, lay their eggs on a clean, rocky shoal. Water circulating around the eggs carries oxygen to the nascent trout, but when silt covers the eggs, the unhatched fish are suffocated.

The usual solution is to replace the natural shoreline with a breakwall made of concrete or steel. In environmental terms, this converts a lively waterfront into a sterile environment. By imposing a sharp vertical drop-off on the shore, a breakwall limits the ability of plants to re-root up or down the bank as water levels rise and fall, typically reducing waterfront vegetation by one-half to three-quarters. The decline in the number and diversity of aquatic plants has a ripple effect, reducing habitat for fish, birds, and amphibians. (In financial terms, a breakwall is almost always an expensive temporary fix. Because artificial materials lack the resilience of the natural shore, a homemade vertical shorewall often lasts only a decade or so before cracking and falling apart.) To maintain a healthy shore:

- Leave the natural vegetation on the land and in the water.
- Don't replace the shoreline with a concrete walkway or breakwall.
- Don't infill the shore, or build groynes – stone fingers stretching into the water that

are designed to control erosion. Not only does this destroy parts of the littoral zone, but it may alter water currents and increase erosion on adjacent properties, irking human and non-human shoreline residents alike.

THE RIPARIAN AND UPLAND ZONES: THE LAKE'S DOORMAT

Most parents install a mat at the cottage door so little shore rats can wipe their bare feet or remove their shoes. Lakes have a similar "contaminant" barrier: the riparian and upland zones.

There are a lot of nasty things waiting to catch a lift down to the lake when a heavy rain courses down the slope, including seepage from septic tanks, fertilizers and pesticides, deposits from family pets, and oil or gas spilled on the driveway. One of the main contaminants from cottage runoff is phosphorus, a "nutrient" that occurs in nature, as well as human-made products, such as fertilizer and detergent. On its own, it helps nourish life in the lake, but when we add to that natural load, phosphorus leads to poorer water quality, algal blooms, and less oxygenated habitat for cold-water fish.

Fortunately, the jumble of trees, shrubs, and grasses along a natural shore forms a "buffer" that helps filter out these undesirables: In the *riparian zone* – the section of land closest to the shore – the thick layer of low foliage controls erosion and sifts impurities out of surface runoff. Leaves and branches break the force of falling rain, which is further slowed by the rough surface of leaf litter, pine needles, and broken twigs; the water is then absorbed by plant roots or the soil. But as well as being a filter for the lake, the riparian zone is also a refuge for wildlife: Water birds nest in the tall grasses near the water; warblers flit among the jewelweed; and when the area is flooded during the high-water period – even if there is only 18 cm of water – pike will thrash their way over the spring-flooded banks, scattering their roe in the lake-edge nursery.

The higher, drier ground called the *upland zone* is typically forested with the kinds of trees that take advantage of better drainage, including sugar maples, white and red pines, red oaks, ash, hemlock, balsam, and birches. The deep roots of the trees stabilize the slopes, while their foliage buffers the shore from winds. The forest canopy also cools the area by maintaining shade and boosting humidity in the summer. In winter, it shelters deer, chickadees, porcupines, grouse, and snowshoe hare.

Together, these two zones form a doormat so effective that one shoreline expert estimates *only 10 per cent* of the runoff actually makes it into the lake, and much of the sediment and other pollutants is filtered out before reaching the water. If the lake bottom doesn't drop off too quickly, then the remaining guck will tangle with another barrier of aquatic plants in the littoral zone, where the jumble of bulrushes, arrowhead, cattails, and pickerel weed slows the influx of runoff and consumes many of its nutrients.

How we can keep the riparian and upland zones in place: Almost any kind of development can fray the lake's doormat, and some projects can toss it out altogether.

Even in the upland zone, the hard surfaces of paved driveways, shingled roofs, and patios shed water, increasing runoff and heightening the danger of erosion. Sediment carried into the water is a greater concern during construction, when land is being cleared for a cottage, garage, or even just a lawn. Here are a few ways you can assist the lake's natural filtering system:

• Eliminate potential pollutants by being careful with gas and oil around the cottage, avoiding the use of fertilizers and pesticides, and maintaining your septic system with regular pump-outs. Be careful not to overload the septic system with too much water, especially if you have a dishwasher or hot tub that drains into it, or a big crowd for a weekend. Working the system too hard shortens its life, and can send some unpleasant things seeping toward the lake.

•Maintain as much riparian and upland vegetation as possible.

• Opt for softer surfaces (pea gravel, wood chips, interlocking brick) rather than concrete and asphalt.

• When building on your property, replant disturbed areas as quickly as possible, and landscape grassed swales around the cottage to catch and encourage infiltration of rainwater flowing off the roof. Be especially careful in the riparian zone, where any soil dug up is apt to be washed straight into the lake during the next rainfall.

Leave the riparian plants, shrubs, and trees in place.

• Keep flower and vegetable gardens well away from the lake.

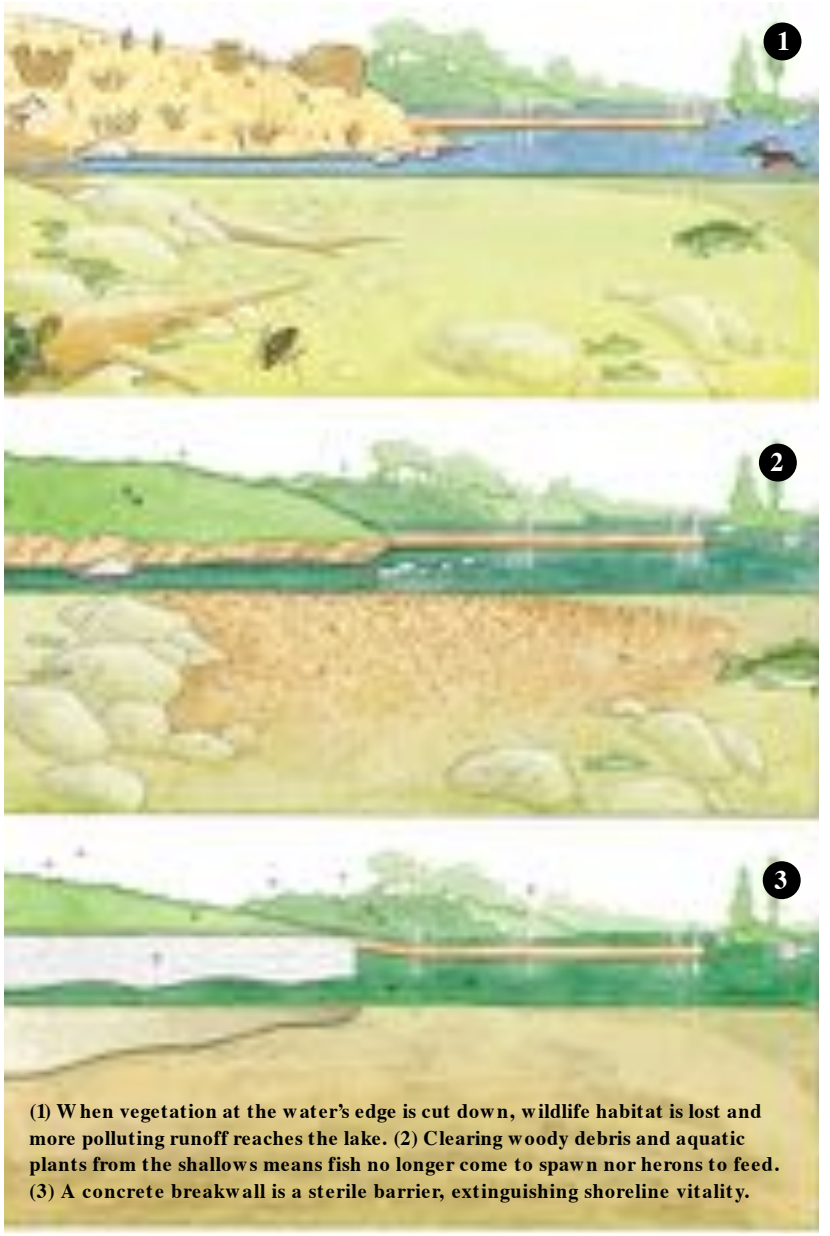
YOU CAN SAVE YOUR LAKE FROM PREMATURE AGING

Depending how you and your waterfront neighbours choose to treat the natural shore, you can dramatically alter your lake's lifespan – for better or for worse.

Like any cottager, a lake ages, in a natural process called *eutrophication*. Over thousands of years, it develops the aquatic version of midriff bulge as sediment, erosion, and the growth and decomposition of plants eventually fill in the bottom, converting it to a bog and, finally, more or less dry land.

On the geologic time scale, this is a good and normal thing – a healthy eutrophic lake supports all sorts of warm-water fish, such as largemouth bass and pike. But when humans fast-forward the process by tearing out the shoreline buffer zone and dumping too many nutrients such as phosphorus into the lake, the water begins to change too rapidly for the life that depends upon it. It becomes murkier as plant and algae growth explodes, the added vegetation consuming the oxygen normally shared with other aquatic creatures. Trout suffocate in the new environment, while carp flourish. The lake ages before its time.

Because eutrophication is often the result of a lot of small actions – poor septic systems, using high-phosphate soaps, removing shoreline plants – it can also be arrested by the efforts of landowners. By understanding how a natural shore functions, and then acting collectively to preserve, not destroy, that critical balance, individuals *can* make a difference.



(1) When vegetation at the water's edge is cut down, wildlife habitat is lost and more polluting runoff reaches the lake. (2) Clearing woody debris and aquatic plants from the shallows means fish no longer come to spawn nor herons to feed. (3) A concrete breakwall is a sterile barrier, extinguishing shoreline vitality.

MAKING AMENDS: WAYS TO RESTORE AN ALTERED SHORE

The trouble with the natural shore is there isn't as much as there used to be. The extravagant native greenery that once sprawled along the waterfront has been cut down, boxed in, built over, and otherwise shoved aside on many lakes, only to be replaced by the ordered and angular world of docks, grass, beaches, and breakwalls. Yet a "developed" shore is not a lost cause. Restoring the beauty and integrity of your waterfront need not cost a lot of money or require a lot of labour – after all, working with nature is cheaper and easier than working against it.

Because each stretch of shore is distinct, there is no one generic prescription for bringing an altered waterfront back to health. But the following scenarios and suggestions will help you begin to make amends with your shore.

BEFORE YOU RESTORE: THE APPROVALS PROCESS

At least six federal and provincial laws affect shore work in Ontario, not including additional regulations enacted by municipalities or Conservation Authorities. Whether you want to restore your shore, or build from scratch, check with the government experts before tinkering with the waterfront, just to see whether you require a permit. Remember, according to the federal *Fisheries Act,* the onus is on cottagers and other landowners to ensure that shoreline work does not "harmfully alter, disrupt, or destroy" fish habitat. Having a paper trail that includes a permit application will be helpful if there is any dispute down the line with the authorities.

Start with your local Conservation Authority (CA) or, if you don't have one, the nearest Ministry of Natural Resources (MNR) office. For landowners who have property fronting on the Rideau Canal, Trent-Severn Waterway, or other federal lands, call the folks at Parks Canada. Another handy source is the local office of Fisheries and Oceans Canada.

Projects that involve hard materials such as stone, steel, or concrete are more apt to become tangled in shoreline regulations, but it's a good idea to call the government experts even if you're mulling over a restoration. The folks in the know can guide you through the approvals process, toss around some options, and help select the best approaches for your shore, saving you much time and money later.

How to Prepare for Your Project: Make a plan for your shore-friendly property, including an inventory of existing plants and features, the different waterfront zones it will involve, and a notion of your final objectives. Find some graph paper (the kind divided into little squares, to make it easier to draw to scale) and draw up a map of your property, including buildings and structures, the shoreline, high and low water points, water intake, vegetation on the land and in the water, wildlife habitat (bass nests, areas where ducklings swim), and prevailing winds and currents. (You'll need this map later when you submit a work application, so make several photocopies.)

Next, note problem areas on your shore: places that have been clear-cut, eroding banks, failing breakwalls, ailing docks, and so on. Include high-activity areas such as the patch of lawn that acts as the badminton or volleyball court, and the pathways to the shore. Brainstorm with your family, other knowledgeable cottagers, and shore-care experts to find natural, environmentally friendly solutions.

When you've come up with the best approach, discuss it with the CA, MNR, Parks Canada, or Fisheries and Oceans Canada. If you need to make a formal application (as you may if you're replacing a dock, for example), include:

- Your name, address, telephone number, fax number, and e-mail address.
- Your water body's name and location, including lot and concession number, municipality, county or district, and even the latitude and longitude coordinates, if you have them. (The coordinates are available off a good topographic map or a Global Positioning System receiver.)
- A copy of your hand-drawn lot map, signed and dated.
- An outline of your plans, including construction details, schedule, techniques, materials, and goals. (If the experts know what you are trying to

fix or achieve, they can often come up with solutions that are cheaper and easier than your building or landscape contractor might propose.)

• Photos of the work site and the surrounding shore are also a good idea. Photos throughout the seasons (summer, winter, and during spring breakup) may be helpful.

Give the regulators at least three months to consider your plans. Better still, do your planning the summer before you want to begin work, and file your application in the fall. That way, you'll have all the paperwork taken care of in time for the spring thaw.

What happens if you ignore all this good advice? That won't be a problem for the upstanding, salt-of-the-earth types who wouldn't dream of cutting corners or destroying shore habitat. But in case you know a shiftless brother-in-law who might consider such a stunt, warn him that the *Fisheries Act* packs a maximum fine of $300,000 for first offenders, and possible jail time for subsequent convictions. As well, the courts often order restoration of the property to its original state.

RESTORATION #1: LESSENING YOUR LAWN'S IMPACT

How many lawns can you count around your lake? Probably more than you used to, as increasing numbers of people are retiring to live full time at their cottages. While turf has its place (baseball parks come to mind), lakes and lawns have a relationship that is uneasy at best, and poisonous at worst. Indolent things that they are, lawns displace the hard-working native plants that protect the lake. When a heavy rain comes, the foppish blades lay down and let the rain beat all over them, eroding the topsoil and carrying it into the lake. According to one study, 90 per cent of the rain falling on a natural shore is absorbed before reaching the water, while *up to 55 per cent* of the rain falling on hard surfaces, including lawns, flows right into the lake.

All that runoff hastens erosion, sending a stream of silt coursing into the water where it damages spawning areas. Pesticides and fertilizers lavished on the lawn also play havoc with the aquatic ecosystem. Weed and bug killers may harm fish or destroy the plants and insects fish feed on, and fertilizers promote algae growth, leading to a greener, murkier lake. A kilogram of phosphorus fertilizer washed off the lawn and into

the lake fuels the growth of 500 kg of aquatic plants, snaring boat propellers and choking shorelines.

If you must have a lawn (over the septic bed, for example), don't make it a putting green by chemically feeding and weeding it. Try leaving the grass clippings on the sward to mulch and fertilize the sod, but only if the lawn is far enough from the water that the clippings won't be washed into the lake. Let the grass grow at least seven centimetres long between trimmings, to conserve soil moisture. Another option is to let the grass grow all season; knocking it down once a year with a trimmer or scythe will keep trees and shrubs out, while permitting wildflowers to put down roots. Tell your lawn to grow up and start looking after itself for a change.

Buffering Your Lawn from the Lake: Because lawns are the last thing a lake wants beside it, you'd be doing the shore and yourself a big favour by getting rid of the tidy plot once and for all. But if that's too radical a notion for first-time restorationists, take the next best step: Keep them apart with a buffer zone of natural vegetation, to filter contaminants in runoff, provide homes for wildlife, and enhance your cottage privacy. (For more detail on its function, see p. 9.)

The wider a buffer is, the better it works. As a rough rule of thumb, a buffer extending back 30 metres from the top of the bank is sufficient for most cold-water lakes (whose fish suffer more from nutrient runoff), while 15 metres will protect a warm-water lake. The natural area should be even deeper on properties with steep, erosion-prone slopes. The key thing to remember is any amount of buffer is better than none at all. If 30 metres sounds like too much, consider going *au naturel* in stages, adding a bit more each year by working back from the shoreline in two-to-three metre strips.

How to Build a Buffer: The easiest approach, especially for lots with patches of healthy native vegetation or erosion-prone soils, is to stop mowing the lawn. Native grasses, shrubs, and trees will colonize the area, with the wildflowers and grasses moving in the first year, and shrubs and trees following a year or two later. Troublesome invaders, such as garlic mustard or burdock, can be selectively cut or hand pulled.

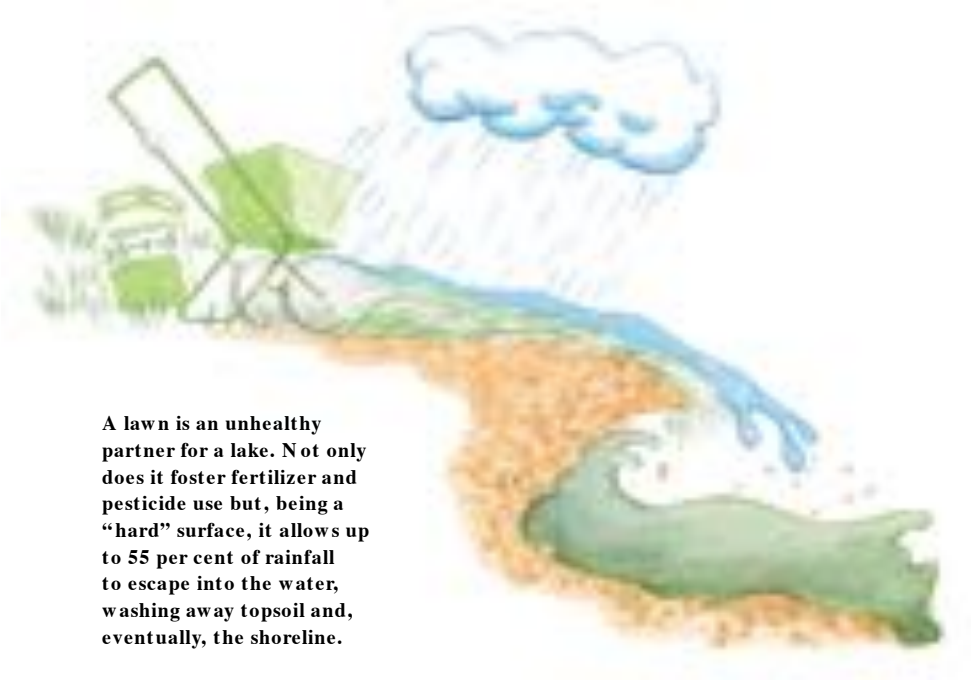
Restoring a heavily clear-cut area is a little tougher, but not beyond the skills of anyone who can handle a shovel and a watering can. Start by looking at the

Replace a hardened walkway with a more absorbent one made of wood chips, pea gravel, or wooden slats spaced apart so that rainfall can soak into the soil.

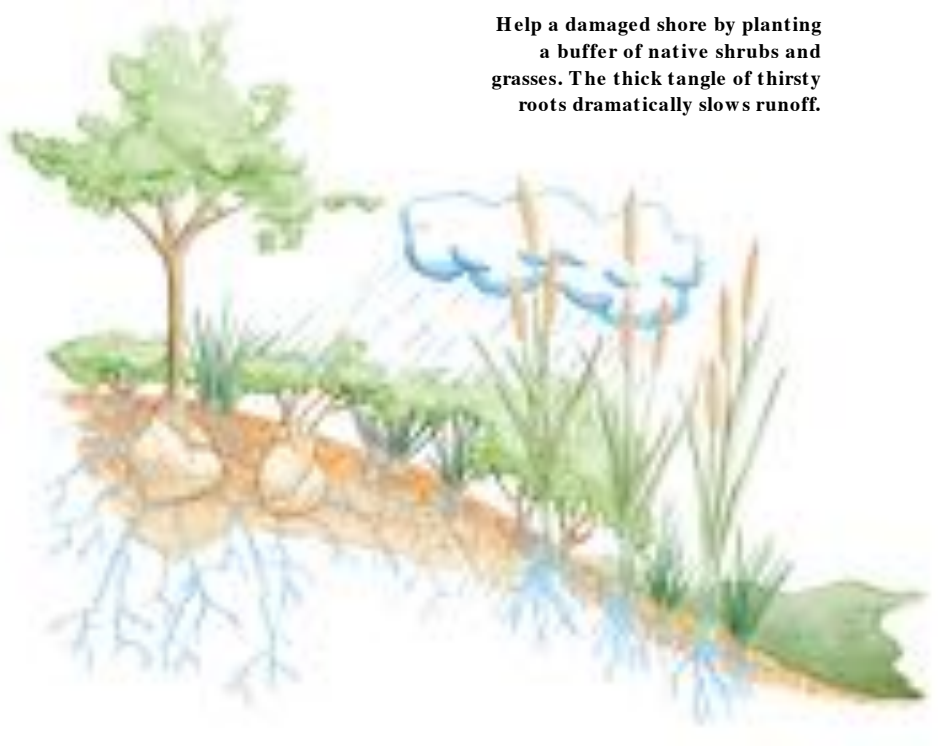
foliage covering natural areas of the lake, and try to duplicate it on your lot. By planting a mix of native plants and shrubs – elderberry, meadowsweet, shrub willows, red osier dogwood, Virginia creeper, and sweet gale – in the riparian zone, you can protect the soil, buffer the waterfront, and entice birds and other wildlife. In the upland area, you can add species that thrive on well-drained slopes, such as sugar maple, white birch, white pine, and white ash. Avoid pilfering wild plants (unless they're going to be built on or paved over) because you're simply denuding one area to clothe another. But do make sure that the species you purchase are, in fact, native to your area – consult with the various government shore experts, as well as local gardening centres, horticultural societies, and naturalists' clubs.

A natural area often looks more appealing to the eye if you plan a transition zone between it and the more manicured areas of your property. If you like, consider softening the shift from lawn and gardens to the wilder-looking buffer with a mix of showy native plants, such as black-eyed Susan, bee balm, blazing star, and cardinal flower. Adopt flowing, curving borders rather than straight lines to promote this natural aesthetic. Preserve a view of the water through judicious pruning, grouping taller trees to allow sightlines, or building an elevated viewing deck behind the cottage.

Use a meandering trail – angled along the slope, not running straight down to the shore – to lead visitors from the cottage to the dock. The path will look more natural



A lawn is an unhealthy partner for a lake. Not only does it foster fertilizer and pesticide use but, being a "hard" surface, it allows up to 55 per cent of rainfall to escape into the water, washing away topsoil and, eventually, the shoreline.

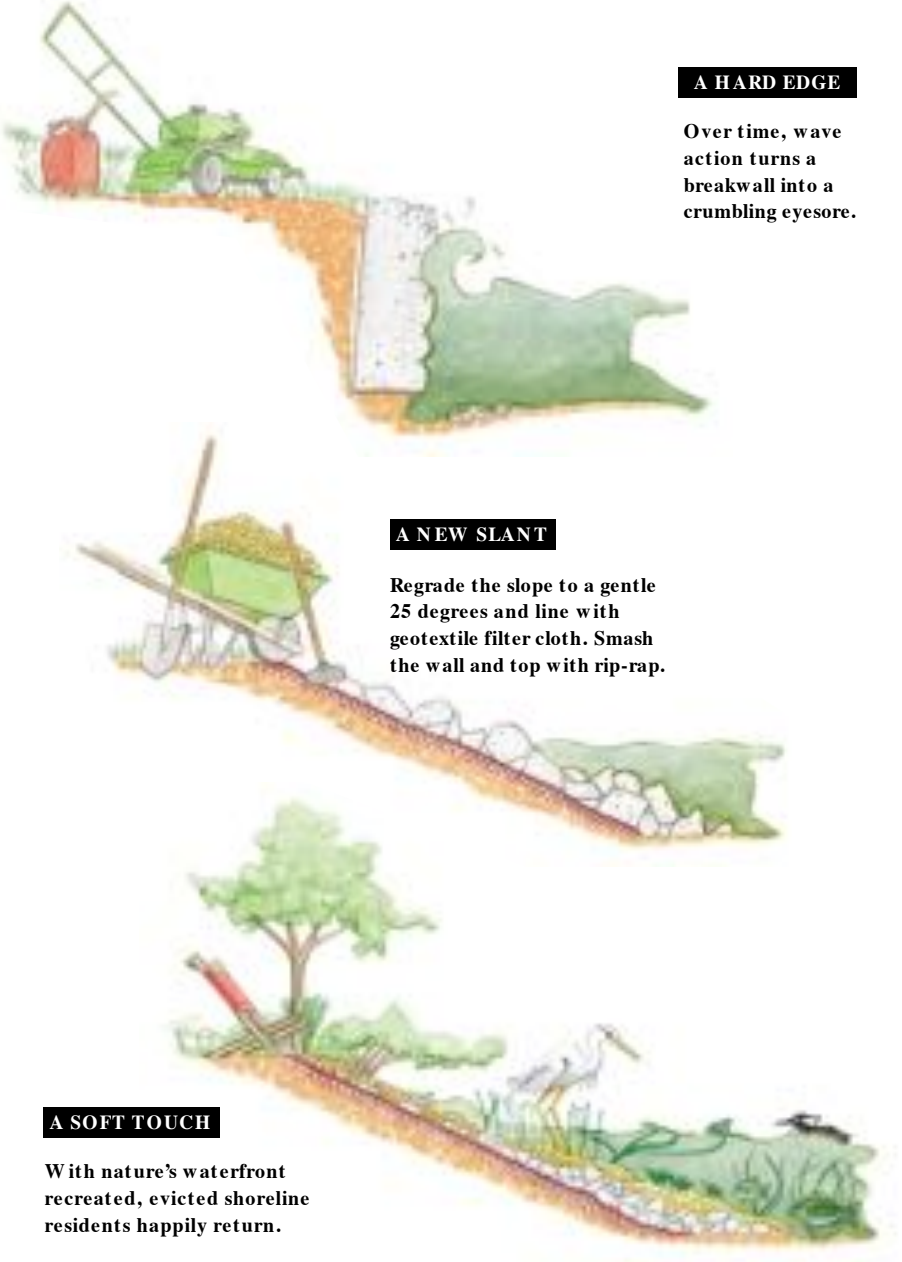


Help a damaged shore by planting a buffer of native shrubs and grasses. The thick tangle of thirsty roots dramatically slows runoff.

and allow rainwater to infiltrate the soil if it's covered with pea gravel or bark chips. Another option is a wood walkway, with slats wide enough to let rain and sunlight through. Creative types might also consider adding an elevated walkway or bridge over sensitive areas, built on posts rising 15–30 cm above the ground. The bridge protects vegetation and provides cover for ground-hugging woodland creatures such as frogs, toads, snakes, and salamanders. On slopes, it's best to opt for raised wooden stairs built on posts. Cutting into the slope to install steps only encourages erosion. Concrete steps and sidewalks will circumvent your buffer by channelling runoff towards the lake.

RESTORATION #2: SWITCHING TO A SHORE-FRIENDLY DOCK

Docks are so much a part of lakeside living, you probably see them as extensions of the shore. The truth is, ill-designed shoreline structures fragment the habitat so critical to lakeside creatures. When the time comes to replace the rickety old dock you've inherited, select one that suits your purposes but also does the least harm to the lake. Cottagers can find all they need to know about shore-friendly structures in *The Dock Primer* (to get a free copy, see p. 22), but here are a few key factors to keep in mind:



A HARD EDGE

Over time, wave action turns a breakwall into a crumbling eyesore.

A NEW SLANT

Regrade the slope to a gentle 25 degrees and line with geotextile filter cloth. Smash the wall and top with rip-rap.

A SOFT TOUCH

With nature's waterfront recreated, evicted shoreline residents happily return.

• **Type of dock:** A floating dock is among the top environmental choices because it causes the least disturbance to the lake bottom, provides some fish cover, rides out fluctuating lake levels, and doesn't alter water currents. But it isn't perfect. Floating docks shade some of the littoral zone, reducing the aquatic life that many fish, insects, and animals depend on. They also pose problems for ducklings. The waterfowl cling to the shore as they learn to paddle, and may shun an area where they have to circumnavigate a lot of docks jammed up against the land. You can easily fix this problem by pushing the dock a bit further out and using a gangplank to bridge the short stretch of water between it and the shore. This gives mama duck and her brood a marine underpass, while you can walk the plank – as it were – to the dock.

Pipe or pile docks may be an equally good option for lakes with more stable water levels. Because they rest mostly out of water on pipes or posts, these docks have a very small footprint on the littoral zone, provide some structural habitat, and allow more sunlight through to the lake bottom. Cantilever, suspension, and lift docks are anchored by their base to the shore and overhang the water. They're gentle on the environment, but they're expensive and fairly complex to build. A crib dock, usually built on a base of square-cut timbers filled with stones, creates some habitat, but not enough to compensate for the damage done by covering a section of the littoral zone. Last and definitely least, a concrete pier is a disaster in environmental terms, crushing the life in the littoral zone.

• **Building materials:** The safest option for waterfront construction is untreated wood, such as cedar, fir, Western hemlock, and tamarack. Plastic wood, if installed properly, offers long life, but may sag between spans or split during installation if you're not careful.

Treated wood is definitely a second choice. Wood preservatives kill the organisms that cause rot, but what destroys fungi can also harm other critters (including you, if you breathe in too much sawdust or get too much preservative on your skin). If you must go this route, buy lumber that's pressure treated at the factory rather than doing it yourself with a paintbrush, or buying old railway ties, which are heavily creosoted. (You'll still have to paint the exposed ends yourself. Be sure to do this well away from the water.) Pressure-treated wood is manufactured to strict quality-control and environmental standards, so it should provide more protection while limiting environmental risk.

• **Sensitive siting:** You can reduce the impact of waterfront development by selecting dock or boathouse sites with little or no vegetation, and developing 25 per cent or less of your total frontage. If, for example, you own 30 metres of lakefront, pick the three to eight metres where development will do the least harm, and set that section aside for a dock, swimming area, and so on. Keep the fish, ducks, and other wildlife happy by leaving the rest in its natural state.

RESTORATION #3: SOFTENING A HARDENED SHORELINE

Take a look along your waterfront – wherever you see a breakwall, that stretch of shore looks almost lifeless, doesn't it? "Hardened" shorelines are like hardened arteries: Left without treatment, they can have serious health consequences. When a shoreline is

girded with concrete, steel, or stone, the flow of life along the waterfront is constricted. In serious cases, the waterfront has a kind of cardiac arrest, as plant habitat is destroyed, and fish, birds, and amphibians move on.

Worse still, hardened shorelines are only a temporary fix for an erosion problem usually caused by removing shoreline vegetation. When wave action slams against a vertical wall, the energy is deflected upwards, where the wave breaks against the top of the wall, and downwards, where currents scour out the earth at its base. As the ground beneath it washes away, the wall begins to list and break up. Eventually, it topples right over.

If you own a breakwall, there are a few things you can do to reduce the pounding it takes and improve habitat along the shore. First, plant a buffer zone (see p. 15), including lots of deep-rooted native shrubs to hold the soil together and prevent gullies from opening up behind the wall.

The next step, which requires the approval of government authorities, is to improve the habitat in the littoral zone. Stones piled at a 45-degree angle in front of the wall will add more places for fish to hide and feed, and may trap enough sediment to encourage the growth of aquatic plants. As a bonus, the stones will also absorb much of the force of the waves, extending the life of the wall. "Shore ladders," made by piling up enough stones to reach from the lake bed to the top of the wall, allow frogs, snakes, and mink to travel back and forth from land to water.

If the breakwall is already falling apart, view it as an opportunity to replace the crumbling eyesore with a new, more natural shore. After receiving the appropriate approvals and advice, dig out the bank behind the failing wall to restore a slope of 25 degrees or less, and line it with geotextile filter cloth to keep the soil in place. Ideally, you should remove the breakwall, but if that's not practical, you can pull it back onto the new slope and break the concrete into cobble-sized pieces of rubble. Be sure to add a veneer of additional stones known as "rip-rap" (usually 15–20 cm in diameter) to cover the filter cloth, and plant woody vines and shrubs, such as willow, dogwood, sweet gale, Virginia creeper, and riverbank grape, just behind the rip-rap. Eventually, the vines and plants will grow into the spaces between the stones. You'll have a shore-friendly waterfront that controls erosion and provides wildlife habitat.

Most shores can be held together by their natural vegetation. In erosion-prone areas, the existing plants can be augmented by shrub willows (which are as easy to plant as shoving a stick in the mud). CAs can also explain how to "bio-engineer" a shore to resist erosion with a tough and resilient combination of stones, wood, willow, and poplar cuttings.

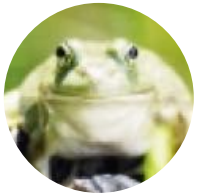
Finally, if you have a serious erosion problem – particularly if you're on one of the Great Lakes – you'll need good advice on protecting your shore. Check with your local CA or MNR office, and consider weighing your options with a coastal engineer. Well-engineered erosion controls that balance shoreline protection and habitat maintenance will cost more than a do-it-yourself job, but the investment pays off in longevity, peace of mind, and preservation of the waterfront environment.

THE NEW-LOOK WATERFRONT

Depending how developed your lake is, with lawns, breakwalls, and the like, a cottager opting for the "natural" look may be viewed by the neighbours with varying degrees of interest, curiosity, and bemusement ("Hmm, how come he's lying in that comfy hammock instead of mowing the grass?").

As you begin your restoration project, get other lake residents onside by explaining why you're forsaking the lawn in favour of dogwood and black-eyed Susan, and perhaps offering them a copy of this booklet. Explain that you're concerned about the health of the waterfront, and that you want to preserve the lake and its creatures for your kids – or their kids – to enjoy. On a wider scale, try contacting like-minded lake lovers through the local lake association. Forming an unofficial shore support group is a good way to share shore restoration information. Some associations even sponsor shore restoration programs, with prizes for the most improved lots.

Then, having ensured your reputation as a thoughtful, concerned lakeside resident – maybe even a visionary! – you can climb back in the hammock and let nature do the work.



FURTHER READING

• *The Dock Primer*, Max Burns. 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. For a copy, contact Fisheries and Oceans Canada, Referrals Coordinator:

Phone: (905) 336-4595
Fax: (905) 336-6285
E-mail: referralsontario@dfo-mpo.gc.ca
Aussi disponsible en français.

The Dock Primer is also posted on Cottage Life's Web site (see below).

• *Cottage Life* magazine, Cottage Life.

Published six times a year, *Cottage Life* is an excellent resource for anyone owning, or renting, residential waterfront property.

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Toronto ON M5T 1V1
Phone: (416) 599-2000
Fax: (416) 599-0800
E-mail: clmag@cottagelife.com
Web site: www.cottagelife.com

• *Waterfront Living*, The Living by Water Project – Ontario.

A handy, quick-reference brochure depicting good and not-so-good waterfront practices. For a copy, contact:

The LandOwner Resource Centre
Box 599, 5524 Dickinson Street
Manotick ON K4M 1A5
Phone: (613) 692-3571

• *Take the Plunge: Stewardship of Ontario's Waters,* Federation of Ontario Cottagers' Associations (FOCA).

A comprehensive lake stewardship manual for cottagers concerned about shoreline restoration and other environmental issues. To order a copy, contact:

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ACKNOWLEDGEMENTS

The author wishes to thank the following individuals and organizations for their assistance in the research of *The Shore Primer*: Canadian Museum of Nature; Federation of Ontario Naturalists; Fisheries and Oceans Canada; Linda Hellas, Bird and Hale Ltd.; Neil Hutchinson, Gartner Lee Ltd.; Paul Keddy, Southeastern Louisiana University; Lake Simcoe Fisheries Assessment Unit; Lake Simcoe Region Conservation Authority; Ontario Ministry of the Environment; Ontario Ministry of Natural Resources; Rideau Valley Conservation Authority; The Living by Water Project; Upper Rideau Lake Association; and Watershed Science Centre, Trent University. Illustrations by David Wysotski. Photography by Kevin Hewitt.

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(This Web site for the Toronto region lists contact info for Ontario's 38 Conservation Authorities. Click the link for "Things you should know about us.")

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ONTARIO COTTAGERS' ASSOCIATIONS

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