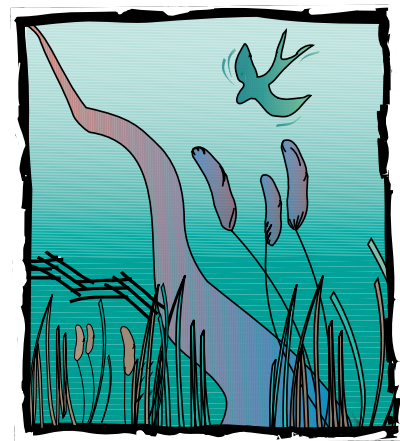




FRASER RIVER ACTION PLAN

Fringe Benefits: A Landowner's Guide to the Value and Stewardship of Riparian Habitat



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Environment
Canada
FRASER RIVER
ACTION PLAN



Environnement
Canada
PLAN D'ACTION
DU FRASER

Where there's water...

Along each side of a river or stream, or around a lake or wetland such as a bog, seep, or meadow occurs a fringe of land wet enough to support natural vegetation that is usually distinct from the



Bill von Dieren

Stream

vegetation in neighbouring freely drained upland sites.

Michael Dum



Wetland

Trudy Charwin



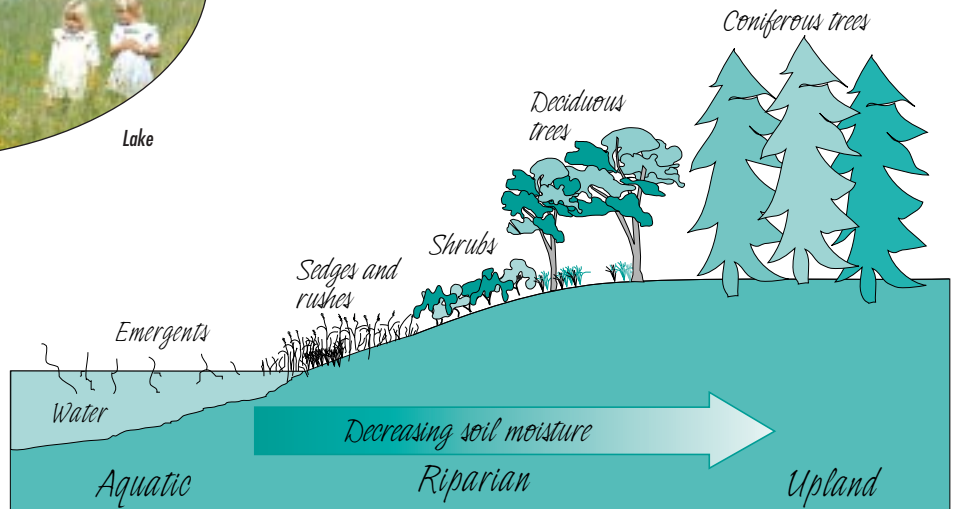
Lake

there's riparian habitat...

The ecological term describing this fringe of distinct vegetation is 'riparian'. Riparian areas are characterized by a transition from aquatic to upland vegetation along a gradient of decreasing soil moisture (see figure). The width of riparian areas varies depending on the steepness of the slope, the soil properties, and the permanence of the water body. Riparian areas cover only a small portion of the land in a watershed, but because they are often more diverse and productive than upland areas, these habitats are critical to wildlife and fish, and an important reservoir of biodiversity. Approximately 60% of British Columbia's terrestrial vertebrates at risk use riparian areas for all or part of their habitat needs. If you have a stream, lake, or wetland on your property, you play a vital role in the lives of a myriad of species.

Biodiversity is the variety of life in all its forms and levels of organization, including genes, species, ecosystems, and the evolutionary and functional processes that link them.

One example of a riparian ecosystem showing the transition from aquatic to upland habitat



Riparian habitats are important to...

Studies have shown that many wildlife species are more abundant in riparian than upland areas. Some species are entirely dependent on riparian habitats, while others use them for only a portion of their life requirements such as feeding or reproduction. The attraction that wildlife have to riparian areas is largely based on the presence of water and its effects on plant characteristics and interrelationships.

...Plants

The plants in a riparian area are characteristically those that are dependent on the presence of elevated soil moisture — deciduous trees and shrubs such as aspen, cottonwood, willow, red alder, salmonberry, dogwood, as well as grasses, and rushes. However, the value of riparian areas to wildlife habitat lies not only in the individual plants that grow there, but in seven characteristics which develop in plant communities adjacent to water.



Scouler's corydalis, a species at risk in B.C., grows on moist stream banks and gravelbars.

Bill van Dieren

Biomass: The presence of water allows plants to grow rapidly and to escape summer drought conditions. Higher biomass means greater abundance and diversity of plant species, and therefore lots of forage for herbivores and in turn, food for predators. Dense vegetation is also favoured for cover and shelter.

Stepwise plant layers: Because the amount of water in the soil decreases as the distance from the water source increases, a series of plant 'layers' appear along this gradient, providing a wide choice of nesting and feeding opportunities.

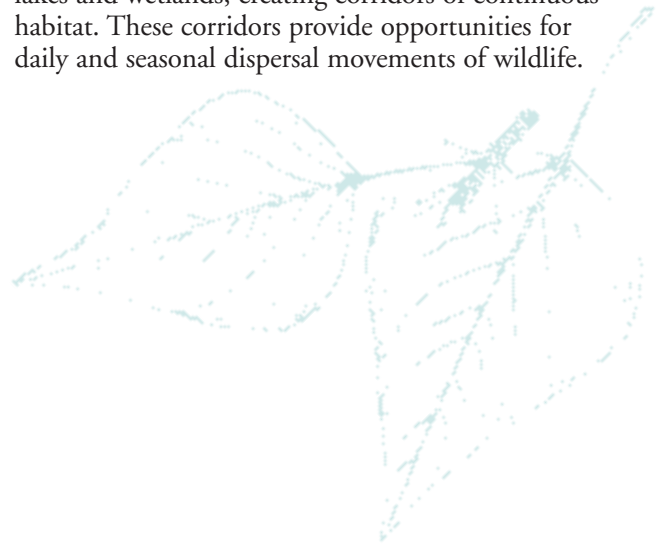
Wildlife trees: Wildlife trees are trees that provide critical wildlife habitat. Dead or dying standing trees, wildlife trees provide numerous nesting, feeding, hiding, and roosting sites for many species. Riparian areas typically support larger numbers of wildlife trees than the drier uplands because of the presence of greater numbers of shorter lived deciduous trees.

Downed wood: Logs, stumps, and branches provide refuge from predators and weather, and habitat for resting, feeding, and breeding. When large pieces of wood fall into the water, they provide structural stability and help create habitat for fish, amphibians, reptiles, insects, and mammals. As downed wood rots, it provides a source of nutrients that are slowly released to the environment.

Canopies: The canopy, or upper layer of the trees acts like an umbrella, providing shelter from snow, heat, and the sun's radiation. It also traps humidity, creating a relatively moist, moderate microclimate favoured by many species.

Edges: Edges are transitional areas between two different vegetation types. Because of the moisture gradient and their linear nature, riparian areas tend to have a high ratio of edges. The greater diversity of plant species in edge zones creates a wide variety of habitats.

Corridors: Riparian vegetation tends to follow along rivers or streams, and around lakes and wetlands, creating corridors of continuous habitat. These corridors provide opportunities for daily and seasonal dispersal movements of wildlife.



..Invertebrates

Until recently, invertebrates were not considered to be wildlife. However they are actually critical components of riparian systems. Turn over a rock, examine a rotting log, or dig into the mud and you will be guaranteed to find them. Some invertebrates are entirely aquatic. Most invertebrates are insects; many require water for one or more stages of their development. This requirement for water means that riparian habitats are used by many invertebrates during their lifetime. Aquatic invertebrates play an important role in food chains. Removing riparian vegetation greatly reduces the number of invertebrate species, depleting the food base for fish, amphibians and reptiles. Invertebrates are also sensitive to changes in water conditions and low levels of pollutants. The kinds and numbers of invertebrate species can be a good indication of stream, lake, or wetland health.

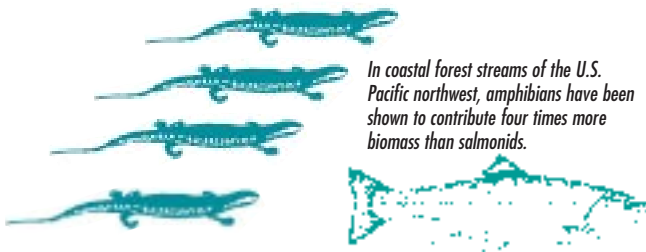


Ken Mangum

Tiger swallowtail butterflies require riparian plants for larval food.

...Amphibians & Reptiles

There are 20 known species of amphibians (salamanders, frogs, and toads) and 19 known species of reptiles (turtles, lizards, and snakes) living in British Columbia. Most amphibians and some reptiles living on land return to water to breed and spend much of their lives in riparian ecosystems.



In coastal forest streams of the U.S. Pacific northwest, amphibians have been shown to contribute four times more biomass than salmonids.



A frog can lay up to 30,000 eggs each spring.



Of these, only about 3000 will become frogs. The other 90% will be eaten as eggs or tadpoles by other organisms.



Only 3 may live to reproduce.

Many rely on downed wood and snags for protection in sloughed bark and pockets of moisture. Seasonal wetlands provide critical breeding habitat particularly in areas of the dry interior of the province.

In addition to being naturally rare, many amphibians and reptiles are very sensitive to environmental impacts, such as changes in water temperature, pollution from herbicides and pesticides, and habitat fragmentation. This sensitivity is reflected in the number of amphibians and reptiles which have been placed on British Columbia's list of species at risk. Six of the nine listed species are strongly associated with riparian areas: tiger salamander, Pacific giant salamander, Couer d'Alene salamander, leopard frog, tailed frog, and painted turtle.



MOECP

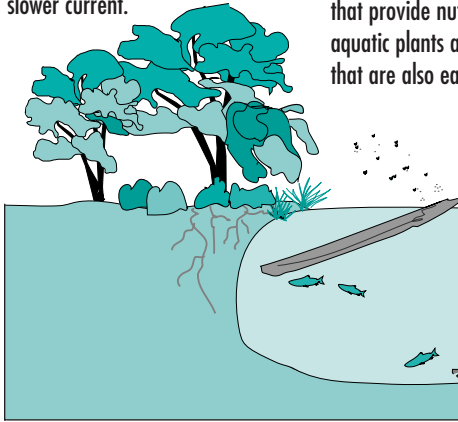
The painted turtle is on British Columbia's list of species at risk.



Fish...

Even though fish don't live on land, they benefit directly from riparian vegetation for their life requirements. Fish have six basic interrelated needs:

Cover – Overhanging banks and downed wood in the water are used as hiding places from predators. Large pieces of wood in streams create pools preferred by fish because of the accumulation of food in the slower current.



Food – Most fish eat insects. Riparian vegetation acts as a nursery for many insect species, and insects dropping into the water from overhanging riparian vegetation are a critical source of food for fish. Overhanging vegetation also contributes leaf litter and small debris that provide nutrients for aquatic plants and organisms that are also eaten by fish.

Water quantity – Extreme flooding can destroy spawning beds while low flows can isolate fish into pools and expose them to predators. Vegetated riparian areas act like a sponge, absorbing water during flooding and retaining water in the soil during dry periods.

The Fraser River produces the greatest number of salmon of any river on the Pacific Coast of North America.

Access – Anadromous fish, including most salmonids, are bound by genetics to return to their natal stream to spawn. Riparian vegetation helps ensure access by maintaining a high water table in dry seasons.

Water quality – Most fish rely on clean, clear water with high levels of dissolved oxygen and relatively stable temperatures. Riparian vegetation and root systems filter out toxic contaminants and stabilize banks, preventing sedimentation. The riparian canopy and overhanging vegetation shade the water surface, moderating water temperatures in both summer and winter.

Substrate – Clean, unsilted gravel is essential for the spawning of salmon and trout. Riparian vegetation and root systems stabilize banks, reducing erosion and sediment input to streams and lakes, helping ensure maximum egg survival.



Fisheries program, MOELP

Bull trout, a species at risk in B.C. is considered a good indicator of ecosystem health because it has a narrower tolerance of environmental changes than other species. It is declining throughout its range.

...Birds

Riparian habitats are three dimensional worlds of opportunity for many species of birds. The multi-layered canopy, thick underbrush, diversity of shrubs and trees, the presence of water, and the large number of wildlife trees provide a multitude of perching, feeding, nesting, roosting and hiding places. Many song birds rely on deciduous thickets for nesting and resting habitat during migration.



Yellow-headed blackbirds can often be observed singing among riparian grasses and shrubs.

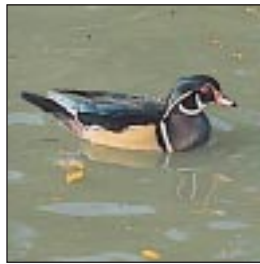
Mitread McPhee



Brant Matsuda

Birds of prey like this Red-tailed Hawk, often perch in tall trees near water where food is plentiful and the view is expansive.

Birds of prey are attracted to riparian areas because of the abundance of prey, as well as the presence of large trees and wildlife trees for nesting and advantageous perch sites.



Ken Morgan

Wood ducks nest in cavities of trees close to water.

Wildlife trees are critical to cavity nesters such as owls, woodpeckers (e.g., pileated woodpecker) and some waterfowl (e.g., wood duck).



Mark Wyhof

Ruffed grouse feed on buds of riparian shrubs during winter.

Harlequin ducks often nest beneath riparian vegetation along coastal mountain streams. Some upland game birds such as ruffed, sage and sharp-tailed grouse are seasonally dependent on riparian/wetland areas.

...Mammals

For most of us, it is rare to catch a glimpse of a bear, an elk, a fisher or mink. For those who have the opportunity to spend time in riparian habitats, the chances of sighting a wild mammal are greatly increased. Mammals of all sizes are attracted to the shore for drinking water, but also for the abundance of prey and/or quality forage, for protection from winter snows and predators, and for denning.

Bats are one of the most misunderstood group of mammals and one of the most helpful to humans. Bats eat insects and for this reason, the majority of their foraging takes place near or over water. Some species roost in tree cavities which are also common close to water. With 16 species of bats, British Columbia has the greatest diversity of bats in Canada.



Trudy Chamwin

Bats can eat 50-100% of their weight in insects every night!

Small mammals, such as shrews, voles and mice find the dense riparian underbrush ideal places to build runs in which to hide from predators.

Several medium sized furbearing mammals, such as beaver and muskrat are highly dependent on riparian habitats, building dens and lodges on or near water. Coyotes, bobcats, and fisher find that the reduced snow under the riparian canopy makes winter travel easier.

The dense, succulent leaves and branches of riparian deciduous shrubs are preferred forage for ungulates: deer and moose. Stands of trees along waterways also provide a mild microclimate for wintering, and travel corridors between summer and winter ranges.



Ernie Cooper

Grizzly bears use riparian areas especially in spring and summer, when they rely on wet site plants such as cow parsnip, common horsetail, and sharp-tooth angelica.

Fringe Benefits

What's good for wildlife is also good for you. Maintaining a healthy riparian fringe for wildlife habitat, imparts many valuable benefits to you as the landowner. Riparian vegetation and root systems ensure reliable supplies of quality water for domestic livestock, agriculture and human consumption by:

- stabilizing banks and reducing erosion and sediment input to lakes and streams;
- acting like a sponge to dissipate the energy of floods during wet periods, and retaining water in the soil during times of drought;
- recharging ground water and aquifers; and
- filtering out potentially harmful industrial and agricultural pollutants.

Healthy riparian areas provide opportunities for a sustainable supply of:

- lush forage;
- wood products such as fence posts, timber and firewood;
- native berries, honey, and other natural foodstuffs; and
- fish.

Because healthy riparian areas provide quality habitat for birds, bats, frogs, and other insect eaters, they:

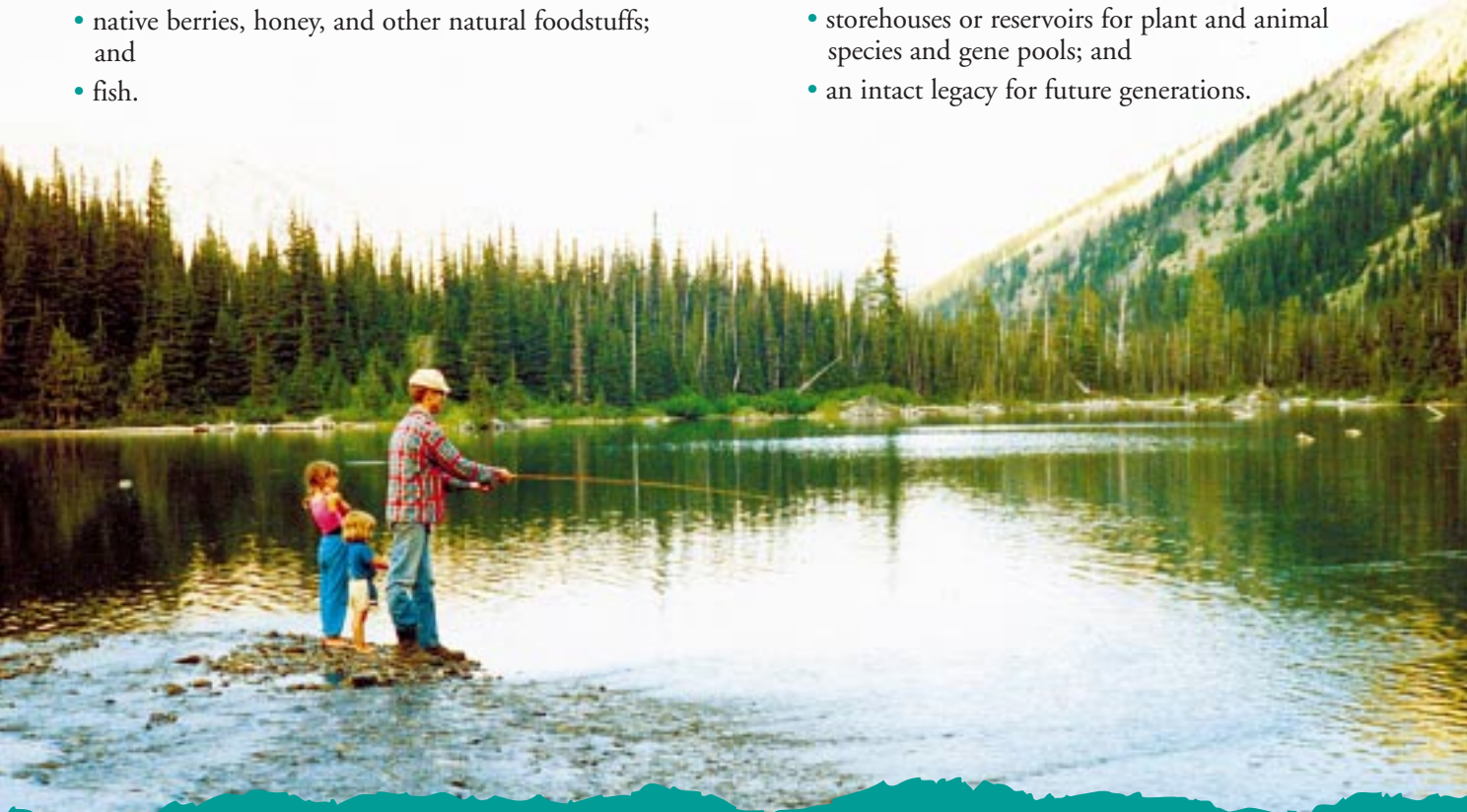
- help control populations of herbivorous insects; reduce the need for pesticides;
- decrease populations of mosquitoes and flies; and
- increase comfort of humans.

Riparian areas provide natural places where humans can nurture physical, educational, aesthetic and spiritual needs by creating opportunities for:

- recreational activities such as fishing, hunting, boating, hiking, photography, and painting;
- wildlife viewing and nature interpretation;
- natural scientific classrooms;
- enjoying a peaceful setting near water; and
- developing an intimate knowledge and understanding of the wildlife that share the land.

Long term stewardship of riparian habitat for the purpose of maintaining wildlife biodiversity ensures:

- safe havens for rare and endangered species;
- storehouses or reservoirs for plant and animal species and gene pools; and
- an intact legacy for future generations.



Habitat under Siege

Riparian areas can be thought of as the first and the last line of defense in a watershed. They protect the land from what happens in the water, and the water from what happens on the land. We are losing our riparian areas at a frightening rate. Comparison of historical and present day data suggest that more than 75% of



This slash-filled gully, once a productive stream, is the result of poor logging practices.

wetlands and associated riparian habitat in the Fraser River delta have been built on, diked or turned into farmland since the turn of the century. For aesthetic and practical reasons, we often like to live, work and play where there is water. Unfortunately, riparian areas are susceptible to severe disturbance because they are



Grazing of livestock in riparian areas can reduce, alter or eliminate vegetation through over-consumption, trampling, or lowering of the water table.

relatively small and located in depressions, basins and valley bottoms where pollutants accumulate and people like to build. They are also very sensitive because of their distinct plant communities and microclimate.

While natural disturbance such as fires and floods can negatively affect riparian wildlife habitat, it is human activities that have had the greatest impact. Riparian wildlife habitat has been lost or severely altered due to:

- large scale urban and industrial developments;
- agriculture;
- overgrazing and trampling by domestic livestock;
- channelization and damming;
- timber harvesting; and
- road building.

Damage to riparian habitat is often so slow, occurring over generations, that it goes unnoticed.

When these activities occur in riparian areas, they can result in any or all of the following:

- complete removal of native riparian vegetation;
- loss of the natural protective function of riparian vegetation;
- increased runoff and severe flooding;
- collapse of banks;
- increased erosion and sediment inputs;
- alteration of stream shape and loss of structure;
- increased chemical and organic pollutant loading into the stream, lake or wetland;
- warming of surface and ground water temperatures;
- decrease in downed wood; and
- loss of natural streambed materials.

Even small scale domestic developments and recreational activities can have an impact on riparian habitats. Clearing, adding fill and building retaining walls, removing 'weeds', building beaches and trails, creating lawns and opening up views cause a loss of natural riparian vegetation, and in turn a decrease and fragmentation of wildlife habitats.

Everyone lives in a watershed. About 25% of British Columbia's watersheds remain undeveloped.



An expanse of lawn stretching down to the water's edge may look pristine, but it represents complete destruction of the native riparian vegetation.

Causing damage to riparian areas is a violation of the federal Fisheries Act.

The Public responsibility

With more than 90% of British Columbia in public (Crown) land, provincial legislation and guidelines play a critical role in the landscape dimension of riparian management. The following tables list key legislation, guidelines, and resources that assist managers of public land and private landowners to maintain the important functional roles of riparian areas at both the local and regional level. The laws protecting streams and streamside habitat apply to all landowners, public or private.

Legislation	Administering Body	Applicability of Act to Riparian Areas
Federal Fisheries Act	Fisheries and Oceans Canada, Environment Canada, Provincial Ministry of Environment, Lands and Parks	This act states that an activity is illegal that will harm fish habitat, or deposit a substance deleterious to fish into water frequented by fish.
Provincial Fisheries Act (RS 1979)	Ministry of Environment, Lands and Parks	Some regulation of dams and other hydraulic projects, and related protective devices for fish.
Forest Practices Code of British Columbia Act	Ministry of Forests	Enables the Operational Planning Regulations.
Forest Practices Code - Operational Planning Regulations	Ministry of Forests	Provides specific widths of Riparian Management Areas (RMAs) for classifications of streams, lakes, and wetlands (see below).
Forest Renewal Act	Ministry of Forests	One of the purposes of the act is to "enhance the productive capacity and environmental value of forest lands." When forest lands are within a riparian zone of influence this act is directly applicable.
Waste Management Act (SBC 1982)	Ministry of Environment, Lands and Parks	Allows for the provision of waste permits for litter, effluent, refuse and special wastes, and for their enforcement. Some of these may find their way into streams, lakes, or wetlands.
Water Act (RS 1979)	Ministry of Environment, Lands and Parks	Concerned with the determination, issuance, and removal of water licences.

Guideline & Resources Developed for:	Application to Riparian Areas	
Land Development Guidelines	municipal or private developers	These guidelines protect fish populations and their habitat by suggesting approaches to erosion control, storm water management, and leave strip maintenance.
Managing Identified Wildlife Guidebook	Forest Practices Code users	Provides necessary information for the manager to comply with the Forest Practices Code Act and regulations. In this case, the information concerns how to protect the habitat of species and plant communities at risk. Many of these use riparian areas.
Riparian Management Guidebook	Forest Practices Code users	This guidebook concerns the protection of riparian areas, specifically, stream channel dynamics, aquatic ecosystems, and water quality.
Stream Stewardship: A Guide for Planners and Developers	municipal planners and developers	The objective of this guide is to help developers and planners protect streams, streamside vegetation, and the amount and quality of water entering streams during urban development.
Lake Care (BC Environment)	property owners	Guide to conserving fish habitat in lakes.
Stewardship of the Aquatic Environment	farmers, ranchers and farm communities	Specific rules and guidelines for good stewardship of streams, lakes, and wetlands directed to agricultural enterprises.
Naturescape Series 1	property owners	A general resource for landscaping and habitat issues for the whole province.
Naturescape Series 2	property owners	A list of native plants for the Georgia Basin Ecoprovince (other ecoprovinces are under development).
Naturescape Series 3	property owners	A list of resources in the Georgia Basin Ecoprovince such as conservation organizations and nurseries with names and phone numbers (other ecoprovinces are under development).
Streamkeepers Handbook	volunteers committed to protecting and restoring stream habitats	Specific suggestions for the protection and restoration of streams, wetlands and associated habitats.

Riparian Standards from the Forest Practices Code

Feature	# of classes	size of riparian management area
streams	6	20 - 100 m
lakes	3	30 m - managers discretion
wetlands	5	30 - 50 m

On Private Land...

The term stewardship is used in place of ownership to convey the sense that you are part of a process that extends far beyond your lifetime. The river, stream, lake, or wetland that may be part of your private land today, was born many thousands of years ago. It developed along with the plants, animals, and soils in and around it with little or no human interference.

Good stewardship permits natural aquatic and riparian processes to continue.

Just as you are a small part of the stream's life history, you are probably only a small part of its journey to the sea. Good stewardship on your land alone does not guarantee that the upstream and downstream parts of the stream are healthy, or that upland practices are consistent with riparian well-being. Those living away from the water's edge can affect the well-being of a stream, lake, or wetland. Everyone lives in a watershed, and pollutants can find their way into a stream from anywhere in the watershed.

Good stewardship requires education toward a shared watershed ethic. People working together can accomplish visible results quickly!



Ann Eriksson

Stewardship of this urban creek, bounded on the right by private homes, and on the left by a park, requires cooperation between the landowners and the municipality.

Community Stewardship: A Guide to Establishing Your Own Group.

Fraser Basin Management
Program, CWS, DFO,
FRBC's Watershed
Restoration Program.

*A good reference for community groups
interested in riparian stewardship.*

Keys to good riparian stewardship

Get to know your stream, lake, or wetland, and its associated riparian zones. With knowledge comes understanding and a connection with place.

- Explore sections that are the least disturbed.
- Look for old photographs that show the natural condition.
- Talk to old-timers to get an historical perspective on your place.
- Consult local natural history books or naturalist groups.
- Keep records of seasonal wildlife observations.
- Try attracting birds and bats by erecting boxes.



Brian Penn

Giving the Land a Voice: Mapping Our Home Places.

(S. Harrington, ed.) Available from Salt Spring Island
Community Services, 268 Fulford-Ganges Road,
Salt Spring Island, V8K 2K6.

Good reasons to map your own place and how to map with beautiful examples.

Three interacting parts (vegetation, soil and water) of riparian ecosystems need protection, maintenance, or restoration depending on your situation. *Any work taking place in or around a stream, wetland, or lake, or the removal of any material below the high water mark, requires a permit. Contact your local Department of Fisheries and Oceans, and Ministry of Environment, Lands and Parks offices before attempting any work.*

Vegetation plays a predominant role in riparian ecosystem functioning, and provides the key to managing them. The stream, lake, or wetland affects the vegetation growing in the riparian area, which in turn affects the aquatic ecosystem.

- Maintain or restore a vegetative border, preferably with native vegetation (at least 30 m, but varies by ecosystem).
- Allow natural revegetation to occur.
- If serious damage has already occurred:
 - reshape bank to slow erosion;
 - rock lower portion of slope to prevent undercutting during high water events; and
 - revegetate with native plants (including deciduous shrubs and trees).
- Leave all standing and fallen dead trees. These elements provide essential wildlife habitat.
- Maintain emergent vegetation and native shoreline vegetation, rather than replacing with sand or lawns.
- Build a boardwalk or dock for swimming access, rather than converting shoreline to a beach.



Ann Eriksson



Ann Eriksson

Building docks and boardwalks instead of beaches and trails provides access to the water's edge without harming riparian vegetation and soil.

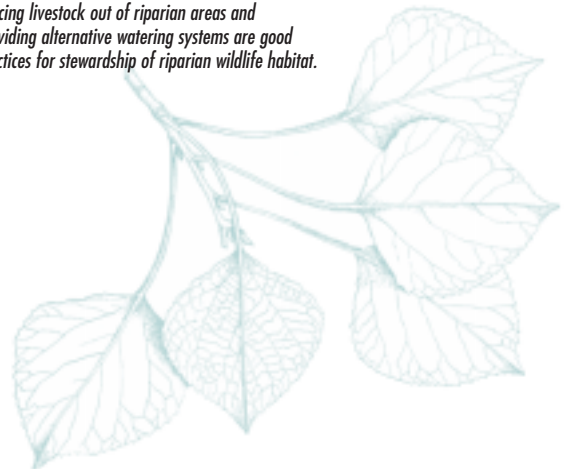
Soil supports the vegetation. Without the vegetation, the soil can erode into the aquatic portion of the system, causing damage to fish and invertebrates.

- Keep roads away from streams, wetlands, and lakes.
- Keep livestock from having free access to riparian areas (construct fences, pump water to watering facilities in upland areas, where crossing is necessary build a ford and limit area used).
- Collect building stone, sand, and gravel from above the high water mark.
- Build beaches above high water mark.



MAFF

Fencing livestock out of riparian areas and providing alternative watering systems are good practices for stewardship of riparian wildlife habitat.



Water is the focus of all of this activity. Keeping pollutants out of the water is essential.

- Properly dispose of septic and solid waste.
- Pump septic systems every two or three years.
- Ensure fish passage upstream.
- Prevent silt, sediment, and chemicals from reaching surface water.
- Preserve wetlands.
- Leave natural stream meander.
- Clean boat bilges and refuel away from water.
- Prevent runoff from livestock/manure piles running into streams.
- Keep vehicles, including ATVs away from the shore and out of streams and lakes.
- Build homes, barns, or other structures well away from water.

The Streamkeepers Handbook: a Practical Guide to Stream and Wetland Care. (G. Taccogna and K. Munro, eds.) 1995. Available from Salmonid Enhancement Program, Dept. Fisheries and Oceans, Vancouver, B.C.

Support and information for volunteers committed to protecting and restoring aquatic habitats.



Victoria Stevens

Looking Ahead...

Monitoring the recovery of a riparian area or simply noting seasonal and annual changes is rewarding. With an increased awareness of the natural processes of a place, it is natural to wonder how future landowners will treat the same place. How do you keep some continuity of good stewardship into the future?

To keep your efforts going for the future well-being of all species, consider land trusts or land covenants. The West Coast Environmental Law Association, Vancouver, can help with the most recent legal approaches to land protection. Community land trusts may be available in your locality, and can be contacted for information. Local conservation groups will also be aware of organizations and publications that will provide information and assistance.

The history of private ownership of a stream in the Fraser River watershed

10,000 years ago
(ice sheet receded)
Stream formation began

Aboriginal cultures did not have the current Western concept of private property

Columbus arrived in the Americas

European settlement in the Fraser Valley and the concept of private property has been an influence for only the last 150 years

Present

The Stewardship Pledge program is currently putting together a publication called Stewardship Options for Private Landowners. This will include legal tools. Call the Naturescape Hotline (1-800-387-9853) for availability.

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 CWS – Canadian Wildlife Service

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Lee Harding

Great Blue heron

Questionnaire on: **Fringe Benefits: A Landowner's Guide to the Value and Stewardship of Riparian Habitat**

Pamphlets are a way for Environment Canada to share information on important wildlife habitats. Please take a few moments and complete this simple questionnaire.

Was the pamphlet informative?
 If not, why not? Yes No

Did you learn anything new about riparian habitats?
 If yes, what did you learn? Yes No

Did the art work and photographs help you to understand the nature and value of riparian habitats?
 If not, why not? Yes No

How would you rate the overall appearance and layout of this pamphlet?
 1 2 3 4 5
 poor excellent

Suggestions for improving future publications

Do you currently have riparian habitat on your property?
 Yes No

see over

If yes, what problems have you had managing your riparian habitat (e.g., conflicting land uses, conflicting or insufficient advice, effects of upstream activities, etc.)?

Are you already or do you plan on modifying your land management practices to protect or enhance riparian habitats?

Yes

No

If yes, what are you or will you be doing differently?

Other comments/suggestions

*Thank you for your time. Your response is very important to us.
Please return this form in a stamped envelope to:*

Environment Canada
Canadian Wildlife Service
5421 Robertson Road
RR#1,
Delta, B.C. V4K 3N2

