

Fact Sheet

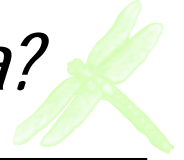


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What Makes a Healthy Riparian Area?



"The Riparian Zone," the distinctively lush green ribbon between streams and uplands, is home to diverse communities of plants and animals. It also performs many valuable ecological functions. Although occupying only a small area of the total land base, management of riparian areas influences watershed function and has important economic and environmental consequences.

Both the streambank and the floodplain make up the transition zone between water and uplands which we call the riparian ecosystem. The uplands support drought tolerant plants whereas plants in riparian areas tend to love moisture and grow vigorously in response to the greater availability of moisture and nutrients.

Each Stream is Unique

Streams are controlled by climate, geology, topography, vegetation and land use. The relationships are incredibly complex and dynamic. Streams and streambanks are continually being reshaped by flooding, deposition and erosion.

Over time, streams shape their own channels. This natural process is dynamic, as the stream continually seeks a balance between its abilities to erode a new channel and to carry and deposit sediment. Both are related to the speed of the water and the size of the particles being eroded or transported.

Each stream is different. The riparian area along a seasonal stream fed by melting snow in southwestern Saskatchewan differs from the riparian area associated with a spring-fed stream in the central part of the province.



Photo courtesy Denis Hue

Healthy Riparian Areas are usually dominated by woody species like willow and silverberry.

Neither has precisely the same characteristics as the lands fronting the South Saskatchewan river. The volumes are different; the seasonal waterflow patterns are different; the plant, insect and animal life around them naturally differ as well.

Did you Know that Healthy Riparian Areas Provide Many Benefits?

- *purify water*
- *reduce excessive erosion*
- *maintain perennial stream flow*
- *recharge ground water*
- *provide critical habitat for wildlife, birds, fish and other aquatic organisms*
- *produce abundant, high quality forage for livestock and wildlife*

Many Characteristics Many Functions

Despite their differences, healthy riparian areas share many common characteristics if they are functioning properly.

A narrow, meandering channel with a broad floodplain and overhanging

vegetation on the banks typically indicates a healthy riparian area, particularly if the vegetation includes woody, deep-rooted plants such as willow. By binding the soil, deep rooted vegetation reduces erosion and stabilizes streambanks. Although woody species are particularly important, grasses, sedges and rushes also contribute to the root mat and absorb nutrients. Healthy above-ground vegetation reduces the velocity of flood water and surface runoff. Consequently, water infiltration into the soil is increased and ground water is recharged. Downstream flooding and flood peaks are reduced. The higher water table provides more seepage back to the streams, thus stabilizing flows. Streams will flow for a longer period and seasonal flows will be less variable. In this way, the riparian area acts like a sponge, holding water in the ground table and then releasing it back into streams later in the season.

Water quality is improved as sediment and nutrient rich organic matter are 'trapped' and nutrients are filtered out.



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This filtering function has become even more crucial in modern times, when runoff may contain fertilizers, pesticides, heavy metals or other pollutants. Increased nutrient levels may stimulate algal growth. Decomposition of the dense algal blooms may reduce oxygen availability and create toxic conditions for some aquatic organisms.

Water quality also affects habitat quality. A gravel stream bed, free of fine sediment, is required by some fish for spawning. Cloudiness of the water can reduce the growth of stream microorganisms and invertebrates that are the foundation of several food chains. Shade, from overhanging vegetation, optimizes water temperatures for fish habitat.

Dead twigs, leaves and needles also have important functions. This "litter" provides an essential source of food for aquatic organisms. The organic carbon in the litter aids in nutrient cycling and decline of algal growth. Litter also prevents algal blooms and toxicity problems by acting as a sink for phosphorus, residues and other contaminants, pesticides and heavy metals.

Flooding is Natural

A floodplain which is flooded annually is not a sign of a stream out of control.

Characteristics of Degraded Riparian Areas

Signs of streambank degradation include:

- reduced or seasonal flow but increased flood peaks (relative to usual patterns)
- shallow-rooted vegetation with relatively low productivity, lacking woody species
- lack of shade and overhanging vegetation
- streambank collapse and excessive down cutting
- a wide stream channel with shallow, muddy water
- exposed soil on bank or flood plain
- invasion of undesirable plant species

Overbank flooding is a natural process, critical for streambank building and maintenance. Several plant species require flooding for seedling establishment. Cottonwoods, for example, have very specific flooding requirements to regenerate. Trees and shrubs of diverse sizes and ages indicate that populations are being rejuvenated.

The floodplain allows a stream to dissipate its energy naturally. As the width of the flooded area increases, velocity of the water decreases, as does its abilities to erode and to carry sediment.

Recharged regularly with new soil, nutrients and moisture, floodplains support vigorous plant growth. It is no accident that floodplains are among the most fertile areas in the world.

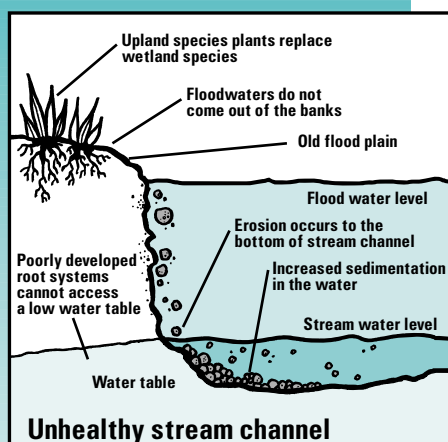
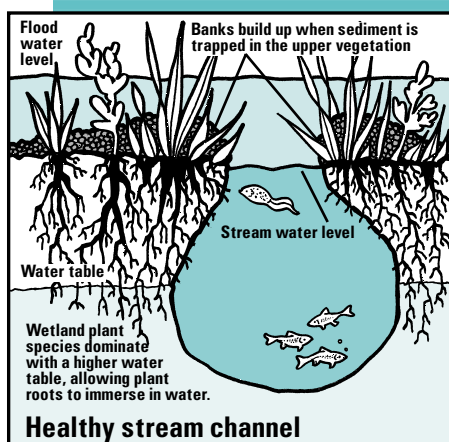
Why Protect and Conserve Riparian Areas?

With water so scarce in the arid prairie environment, riparian areas have generally been intensively used, and often degraded. It is now apparent that maximizing and sustaining the productivity of this rich ribbon will come from careful, moderate management rather than intensive use. Maintaining the functions of riparian areas will yield benefits felt far beyond the immediate land manager and will outweigh the cost or inconvenience of doing so.

Those who use these areas for pasture stand to see better livestock performance from improved forage production and better water quality.

Improved reserves of sub-soil moisture will increase crop and forage yields, providing a direct benefit to farmers. Weed invasions are less likely in healthy riparian vegetation.

Many food chains are dependent upon the plant and invertebrate life of riparian areas. Humans, wildlife, fish, waterfowl, upland birds, raptors, amphibians and mammals are all part of a complex interdependent web. Understanding the function of riparian areas helps us as human beings take a responsible place in this ecosystem.



Stream Channel Downcutting

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Regina, Saskatchewan S4P 2K5 Ph(306)787-0726 Fax(306)787-0780



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Farming Along the Stream

Producers whose land is crossed by a stream face an interesting dilemma. One choice is to protect the stream and its adjacent riparian area, foregoing the crop production possible if the shoreland were cultivated and seeded. Another is to cultivate as much of this productive land wherever possible, sacrificing the stream's shorelands, and possibly even removing the stream itself.

Throughout much of Saskatchewan's history, the pattern has been to choose the second option, draining land, breaking willow and poplar growth along stream channels, and creating large fields with few barriers to cultivation. The prevailing logic was to maximize the acreage under cultivation and improve the ease of operation.

This approach is being challenged as producers become more aware of the inherent value of a healthy stream and the benefits it confers to the land around it. They are becoming increasingly concerned about the green zone, the ecosystem made up of the stream, the streambank, its floodplain and the entire transition area between water and uplands. For many, this concern is leading to changes in their cultivation practices and to the creation of buffer strips along streams.

Benefits of Maintaining Healthy Riparian Vegetation

A narrow, meandering stream channel with a broad flood plain and overhanging vegetation is considered healthy, particularly if the vegetation includes woody, deep-rooted plants such as willow.



Photo: Saskatchewan Wetland Conservation Corporation

Photos 1. & 2. Cultivating too close to the riparian areas or ditching and drainage has dramatic impacts on erosion and riparian health.

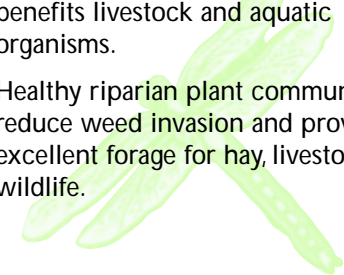


Photo courtesy of Denis Huel

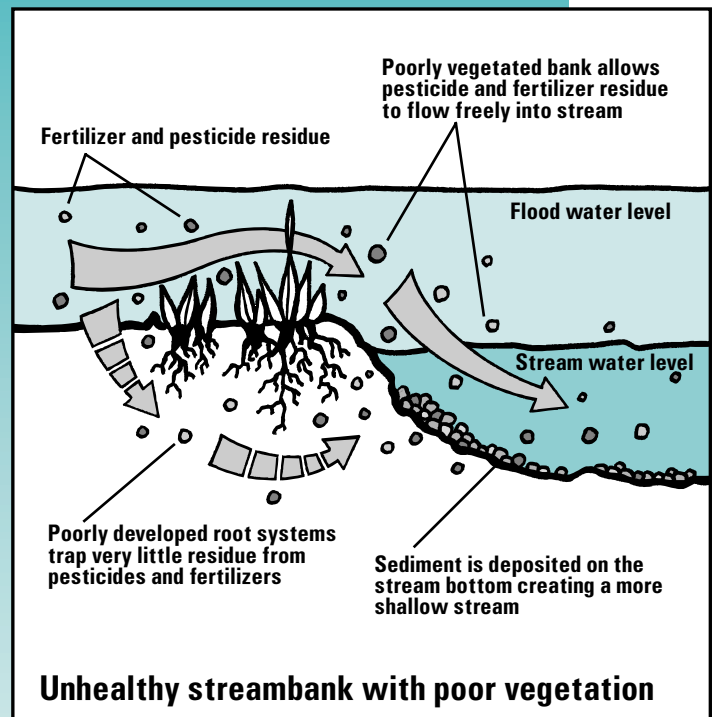
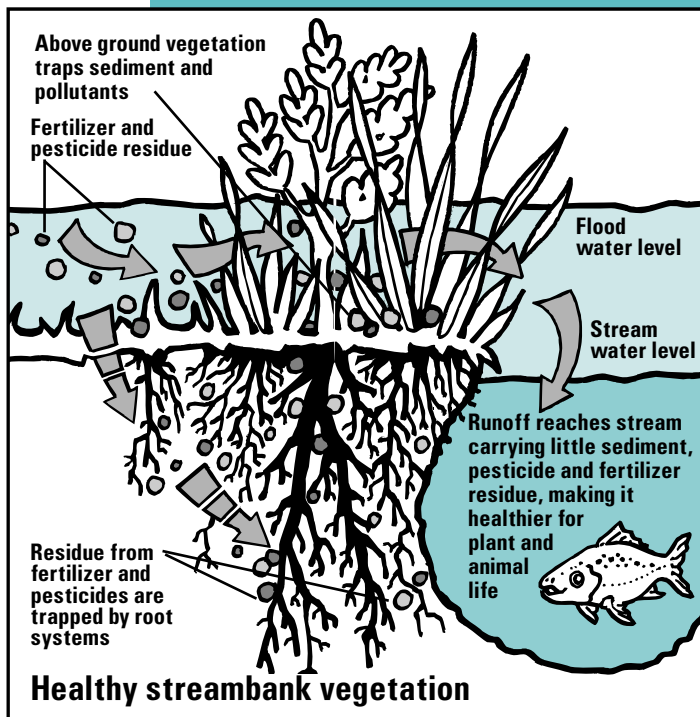
Dense vegetation traps snow and slows the rate of runoff and flood water. This increases moisture infiltration into the soil and contributes to ground water recharge.

Soil moisture reserves help to maintain crop and forage yield during dry periods which often occur during the growing season in Saskatchewan. Vegetation also reduces erosion and purifies water. The roots produced by trees, shrubs and grasses stabilize streambanks. Foliage, stems and litter intercept raindrops and slow the velocity of runoff and floodwater. Vegetation also traps sediment and nutrient rich organic matter, enriching floodplain soils. There is less leaching of nitrates and heavy metals into the water system, reducing the potential for toxicity problems and algal blooms. Improved water quality also benefits livestock and aquatic organisms.

Healthy riparian plant communities reduce weed invasion and provide excellent forage for hay, livestock and wildlife.



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Sediment trapping and filtration

The Value of Seasonal Flooding

A flood plain which is flooded annually is not a sign of a stream out of control or an inconvenience which is being eliminated by engineering. Rather, it is performing naturally. Flooding replenishes soil nutrients and recharges subsurface moisture. It is no accident that flood plains are among the most fertile areas of the world.

The Consequences of Removing Riparian Vegetation

Cultivated fields may have insufficient vegetation and litter cover to reduce raindrop impact or slow runoff. When cultivation is too close to streams, riparian vegetation will not be able to trap all sediments, fertilizers, pesticides, pathogens or heavy metals before they reach a water body. Elevated levels of nitrates

and phosphorus in water bodies stimulate algae growth which may result in toxic conditions later in the season. Leaching of nitrates into the ground water may also increase.

Fish habitat may also be degraded. When gravel bottomed streams are covered by sediment, trout no longer use the areas for spawning. Many aquatic invertebrates are not tolerant of low light levels caused by sediment suspension. This impacts fish and other species which feed on them.

Buffer Strips: Regaining Riparian Function

Although it may be tempting to cultivate as much of the floodplain as possible, it is important to maintain streambank vegetation for bank stability and erosion control. Where cultivation has been excessive, the function of riparian vegetation may be regained by establishing buffer strips.

Buffer strips are strips of permanent vegetation, including grasses, shrubs and trees, between riparian areas and cultivated lands. To be effective, buffer strips should be at least 10 metres wide but 30 metres is ideal. When you think of it, that's a small price to pay for protecting agricultural "black gold," the rich floodplain soil.

We gratefully acknowledge the support of the following funding partners to the Streambank Stewardship Program. Canada-Saskatchewan Agri-Food Innovation Agreement, Environment Canada, Action 21, Prairie Farm Rehabilitation Administration (PFRA) with special thanks to Bill Bristol for his assistance in technical editing, Saskatchewan Grazing and Pasture Technology Program, and to the contributions to riparian activities through support of the Saskatchewan Prairie Shores program by the California Waterfowl Association, The Nature Conservancy (US), Nebraska Game and Parks Commission, North American Wetlands Conservation Council, Pheasants Forever, Inc., Wildlife Habitat Canada and Wyoming Game and Fish Department.

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Ranching Along the Stream

Ranchers customarily build their operations around streams. They depend on water and vegetation in riparian areas for feed and shade for their livestock. However, these areas are highly attractive and subject to heavy use which can degrade them.

Good quality water and healthy productive forage is “money in the bank” for ranchers who stand to see better cattle performance. A healthy riparian area, with abundant vegetation and stable streambanks indicates a high water table that can release moisture throughout the growing season. Thanks to the moisture, sediment and nutrients trapped from runoff and flooding, riparian forage has a longer growing season and better regrowth than in the uplands. In fact, riparian areas are among the most productive ecosystems on the prairies, and can be an important source of forage for livestock operations even though they only occupy a small percentage of the land base.

Historical Management

The early development of livestock grazing operations across North America tended to focus on streams as water sources only. Although the banks and adjacent areas were recognized as providing excellent grazing and shelter for cattle, there was little understanding of the interactions among water, soil, vegetation and grazing animals.

Traditional grazing strategies were generally designed for the extensive uplands, and as a result, riparian areas were overgrazed and sometimes considered ‘sacrifice areas.’ If allowed continuous access, livestock spend much of their time in close proximity to the riparian areas. As a result, many streams were degraded.

In these streams, water flow may be more seasonal than in the past. Some may disappear completely, becoming no more than dry ravines. As a consequence, livestock must be moved to other natural water sources, or new water sources such as wells or dams must be developed.

Signs of Streambank Degradation:

- shallow-rooted vegetation with relatively low productivity
- no woody vegetation
- lack of shade and overhanging vegetation
- streambank collapse and excessive down cutting
- a wide stream channel with shallow, muddy water
- high levels of exposed soil and poor plant cover

Livestock Grazing: How does Unrestricted Grazing Impact Riparian Areas?

Heavy livestock grazing impacts streambanks by trampling, excessive vegetation removal and manure and urine contamination.

Trampling compacts soil, reduces water infiltration and increases storm runoff and peak flow discharges. Streamflow becomes more variable and increased erosion may shear away portions of the streambank decreasing bank stability. Stream channels become wider and shallower and gravel bottoms become covered with finer sediment, resulting in poor fish spawning habitat. Livestock trample, graze, browse and rub vegetation. Mushroom shaped shrubs may indicate overgrazing. Overgrazing reduces plant vigour and may lead to the invasion of unwanted species.



Overgrazing along water ways can lead to streambank slumping.

Photo - Saskatchewan Wetland Conservation Corporation



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Managing the System Today

It is becoming apparent that using riparian areas as “sacrifice areas” means sacrificing forage production, water quality and quantity and livestock performance. Fortunately, riparian areas are very resilient and generally respond more quickly to changes in management than uplands. However, in some cases it may take years, even decades, to recover the economic costs of a severely damaged streambank.



Photo courtesy of Denis Huel

Photos 1. & 2. Different grazing strategies can have dramatic effects on streambank vegetation.



Photo courtesy of Denis Huel

Ranchers are finding that livestock perform better when pastures and water are carefully managed. Livestock drink more water and consume more forage when provided good quality water. Toxins and water-borne pests and diseases are reduced. Some studies have shown performance has decreased approximately 20 per cent when livestock are infested with water-borne parasites such as Giardia or “beaver fever.”

Many ranchers have already changed their management approach. Improving riparian areas is considered to be a financially sound investment.

The recommended approach is not to eliminate grazing on the highly productive and profitable riparian area, but to monitor and adjust grazing so that all of the riparian pasture areas are kept in healthy

condition. This means leaving sufficient carry-over and allowing for woody species regeneration. Rest is therefore an important part of designing a grazing plan.

Corridor fencing, to prevent grazing of riparian areas, should only be used as a last resort on severely degraded sites access.

Although creation of a rotational grazing system may require investment in fences and alternate water sites, forage production and management flexibility are enhanced.

Resting pastures during vulnerable periods allows time for plant regrowth and minimizes streambank degradation. Alternate water sites may be developed in uplands to attract cattle away from creeks and to be used in rotational grazing systems.

Distribution of grazing pressure may be improved by herding or by placing salt, mineral blocks or oilers

in remote sections of the pasture, attracting cattle away from the stream. Creating artificial or natural shade may also improve distribution. Where a rancher wants to restore a degraded riparian area, woody species such as willow and poplar may be planted to stabilize streambanks.

These techniques and many others are now being used by ranch operators in Saskatchewan and throughout the North American plains. Each operation requires an individual management plan which takes into consideration the unique features of the land base.

Several resources are available to help ranchers develop plans that benefit their bottom line as well as their livestock and the riparian and upland ecosystems. One of the most recently published is a planning guide available from the Saskatchewan Wetland Conservation Corporation.

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Living On the Edge: Wildlife Along the Stream

Life abounds in healthy riparian areas. This green transition zone poised on the edge of aquatic ecosystems and adjacent uplands, provides water, food and cover - the essentials for survival. Variation in water depth, flow rate, substrate, slope and vegetation produce diverse habitat niches which meet the needs of many mammals, birds, reptiles, fish, amphibians and invertebrates. In fact, riparian ecosystems are among the most productive and diverse ecosystems on the prairies.

Streams are valuable sources of drinking water in the prairie environment. Water is also habitat or "home" for fish and other aquatic organisms.

In a landscape dominated by cultivation and grassland, trees and shrubs provide valuable cover. Coulees and brush associated with riparian areas provide browse, nesting, perching, building materials and shade in summer and protection from harsh cold and wind in winter for all kinds of wildlife.

Beaver and muskrat use poplar, willow and other woody vegetation for food and for building their lodges and dams. By modifying stream flow and creating deep slow water, they also create habitat for other organisms.

Grasses and other herbaceous vegetation are used as food and cover by small mammals such as voles, mice and ground squirrels which feed on seeds, nuts and berries. Waterfowl and other birds nest in dense grass growth.

Highway of the Prairies

Riparian areas are the highways of the prairies, linking larger blocks of habitat. Wooded coulees and valleys may be the only places that far-ranging cougar and bear may be seen in the cultivated prairies. Smaller animals also use riparian areas for movement. For migratory birds, riparian areas are vital refueling stops on the long journey.

Aquatic and terrestrial ecosystems overlap in the green zone. Many species such as raccoons feed on aquatic and terrestrial life.



The Northern Flicker is among the many species which uses woody vegetation in riparian areas.

Photo - Saskatchewan Wetland Conservation Corporation



Riparian areas in the prairies provide valuable travel corridors for wildlife in addition to shade and water.

Photo - Saskatchewan Wetland Conservation Corporation

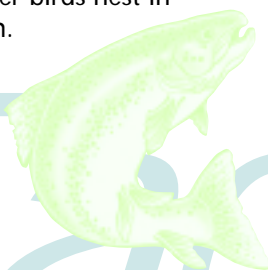
Hawks, owls, coyotes, foxes and weasels may hunt in the uplands as well as riparian areas where prey is abundant. Many food chains are based on the small insects living in and on the water.

Healthy Streambanks Make Good Fishing

You don't need to go to northern Saskatchewan to find fish. Healthy riparian areas in southern Saskatchewan are important sources of fish habitat.

Northern pike, for example, use flooded grassy lowlands for spawning whereas walleye and trout prefer pebble-bottomed streams.

Healthy streams have narrow deep channels with stable undercut banks and overhanging vegetation. The shade provides cover and cool, oxygen rich water.



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Water temperature of degraded streams, which have wider channels and shallower water, is much warmer. Some species, such as trout, are very sensitive to water temperature. High temperatures can induce stress, promote disease, reduce spawning and reproductive success, slow growth and stop migrations.

Healthy streams are associated with clear water. Although there is always some sediment in the water, excessive muddy water impacts negatively on many aquatic organisms. Suspended sediment blocks sunlight and reduces growth of microscopic plants and animals. Although some species of fish can tolerate sediment for limited periods, others, like trout, cannot. Gravel spawning beds may be destroyed by deposition of fine sediment.

High levels of dissolved nutrients may also adversely affect fish habitat. Excessive phosphorus and nitrogen may stimulate growth of heavy blooms of algae. Microorganisms decompose the algae, and in doing so, consume oxygen. Resident fish may suffocate for lack of oxygen.

Good Fishin' is Found in Healthy Riparian Areas with ...

- narrow, deep channels with stable streambanks
- undercut banks and overhanging vegetation for shade and cover
- clear, cool water

Protecting Riparian Habitat

Protecting riparian habitat begins by understanding the habitat requirements of resident insects, fish, birds and wildlife.

When managing for fish habitat it is important that riparian vegetation remain intact and the streambank remain stable. This means that if grazing is occurring, livestock should



Good livestock & land management goes hand in hand with good riparian and wildlife habitat management.

Photo - Saskatchewan Wetland Conservation Corporation



Healthy fish production is associated with healthy riparian areas.

Photo courtesy of Denis Huel

be managed to prevent excessive vegetation removal and bank collapse. Where the riparian area has been cultivated, buffer strips of perennial vegetation may be established. To be effective in intercepting nutrients, and reducing erosion, buffer strips should be at least 10 metres wide. Ideally, buffer strips are 30 metres wide and planted to perennial grasses, shrubs and trees.

Controlling livestock access to riparian areas by developing rotational grazing systems, gravel bottomed watering sites or alternative watering systems away from the riparian area enhances

water quality and streambank stability. Grazing intensity and timing should be managed to leave sufficient carryover to provide cover for waterfowl nesting and forage and browse for wildlife.

Livestock exclusion from critical areas may be required for a period of years in severely degraded situations.

A cottage owner can protect fish habitat by allowing vegetation to grow in shallow water, leaving rocks and gravel along the shoreline and avoiding construction of docks and boathouses where they would increase sedimentation. Culverts and ditches associated with access roads should not block fish migration.

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Beaver: Creator or Destroyer?

Beavers, by building dams and lodges, are masters at creating the surroundings they need for their survival. Studies indicate that beaver may have had an even larger role than previously believed in the creation of some of the most fertile lands in North America. Lowlands, previously regarded as prehistoric lakebeds, may actually have been marshes created by centuries of beaver activity.

Pre-historically, beaver ranged through most of North America, from the northern tundra to what is now northern Mexico. Virtually anywhere water and trees existed, so did the beaver. The continental beaver population, estimated at 60 million to 400 million animals, was dramatically reduced by trapping during the fur trade.

Settlement and cultivation of the beaver's wetland habitat further reduced their population. Today, with relative freedom from large-scale trapping and fewer natural predators, beaver populations are increasing. They are returning to streams and wetlands from which they have been absent for decades, and new generations of humans are learning first hand about the beaver's ability to modify waterways.

To protect their lodge and food supply, beavers need water deep enough not to freeze. A stream with poplar near the banks is ideal. Poplar bark is food and the barked limbs and trunks provide raw material for dam construction.

The dam grows, and with it grows the area of relatively calm water behind it - a pond which is taking the first steps in developing into a marsh, and ultimately into highly fertile soil. Sedimentation within the pond increases as soon as the beaver begin their work and the stream velocity slows. The amount of organic material in the water and on the bottom of the pond increases. So does the quantity of nutrients in the pond and along its banks.

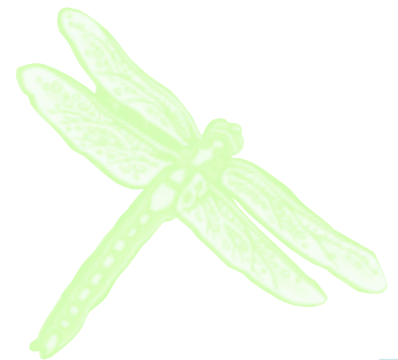
Even the type of vegetation in the riparian area changes. Poplar, the beavers' favourite food and building source, are typically cut down from the immediate shoreline. This encourages sprouting of poplar saplings. Eventually, though, the beaver exhaust the available food supply including new sprouts and saplings and move on.

When the beaver move to a more appealing location because the food supply is becoming distant or the pond is becoming shallow, the poplar rebound. The soil and brush conditions are ideal for rapid growth of new stands of poplar. The new stands mature, the beaver return, and the cycle continues, with more fertile area created each time.



Photo - Saskatchewan Wetland Conservation Corporation

Beavers and beaver dams have been historically associated with riparian areas.



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Pest or Benefactor?

As the population increases, beaver are earning a reputation as a pest. More beaver need more lodges and more dams, so they cut more trees and flood more land. That makes them a nuisance in the eyes of landowners who see wetlands expanding over land they had previously used for annual crops or forages. Swaths have been used for dam building, and roads flooded from plugged culverts.

However, in some areas, beaver dams provide water sources for livestock and wildlife and ranchers may view this as beneficial.

In rural Saskatchewan, people who find themselves in conflict with beaver should contact either their rural municipality or the nearest office of Saskatchewan Environment and Resource Management where Conservation Officers are available.

In the meantime, it may help to remember that the short-term damage from a beaver colony eventually will be more than offset by the healthy, fertile and productive environment the colony is working to create.



Beaver Pond

Photo - Saskatchewan Wetland Conservation Corporation

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