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Riparian Areas and Riparian Plants in Seven Persons Creek Watershed

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Riparian Areas and the Seven Persons Creek Watershed

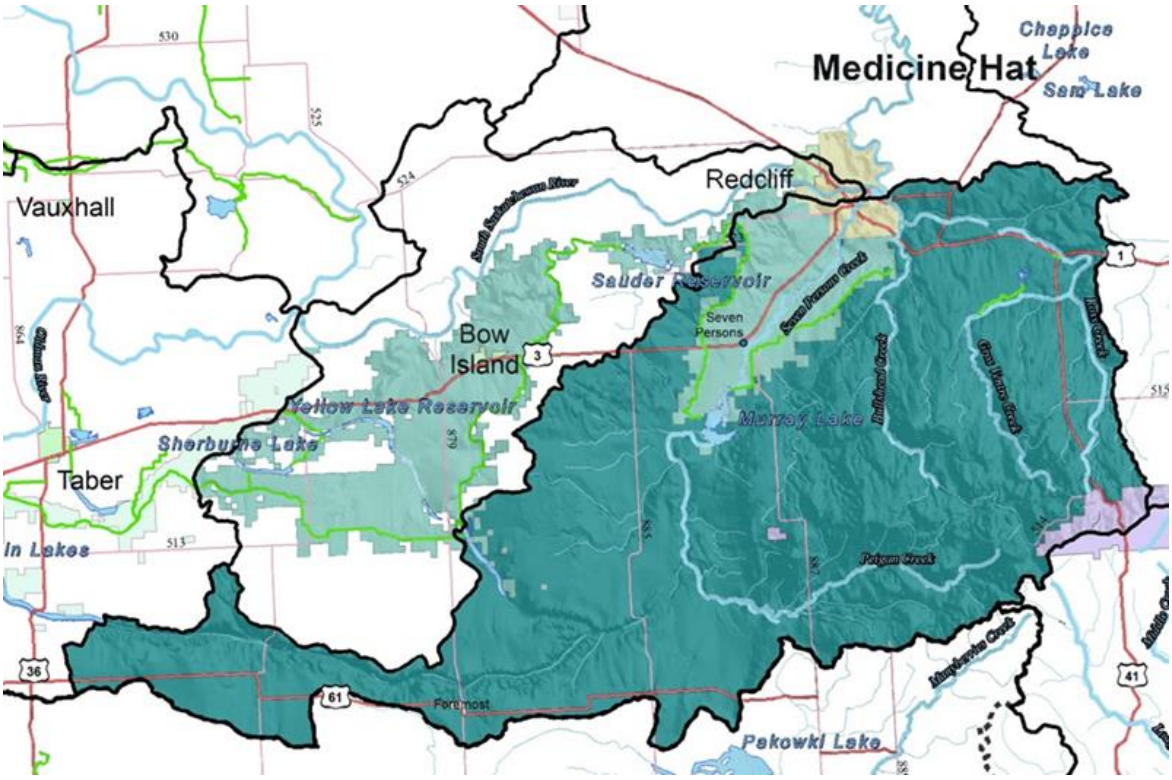
Riparian areas are transitional zones between surface water bodies such as lakes and streams, and adjacent uplands. Though they vary a great deal in physical characteristics and size, all riparian areas have common features: (1) there is water movement in three directions: upstream to downstream flows (longitudinal - for streams), exchanges between the water body and the stream or lake banks (lateral), exchanges between groundwater, the water body, and the riparian areas (vertical); (2) these water movements and exchanges are accompanied by movement and exchanges in materials such as sediments, organic matter and debris, nutrients, contaminants, plant seeds, and organisms; (3) the interaction of water and materials between the riparian areas and the water body provides food sources and creates habitat for fish, and riparian habitat for wildlife; and (4) these natural processes provide ecological services that benefit people and the overall environment.

In regions with a dry, semi-arid climate such as the Seven Persons Creek watershed, variable width strips of green vegetation adjacent to streams and lakes contrast sharply with upland areas during summer, and even more so during droughts.

Riparian areas are easy to distinguish in a dry climate.

The Seven Persons Creek watershed is a sub-watershed of the Alberta portion of South Saskatchewan River Basin (map below). The Seven Persons Creek watershed drains into the South Saskatchewan River through its stream network. This watershed is situated within a gently rolling prairie landscape fragmented by coulees and badlands. Natural riparian areas in the Seven Persons Creek watershed include, lake shores, streambanks and shorelines, and floodplains.

Agriculture is the predominant land use in this watershed and irrigation has greatly influenced the water "landscape". The management of flows for irrigated agriculture has resulted in water infrastructure such as reservoirs, irrigation canals, and spill outlets. Some of the infrastructure has been built in place; others involved modifications to existing natural creek and coulee systems. The construction of transportation infrastructure over streams or adjacent to streams has also resulted in some straightening or channelization of streams. These activities have altered the rates, levels and duration of stream flows. Consequently, these have caused increased pressures on riparian areas and have prompted the armouring of stream banks with hard engineered structures. Recreational areas within riparian areas also add pressures to riparian soil and vegetation. Riparian areas in this watershed may therefore have both natural and man-made elements.



Map of the Seven Persons Creek watershed showing the Seven Persons Creek, its tributaries and Murray Lake.

Engineered structures play an important role in physically protecting streambanks from erosion, especially those stream banks which have been altered through modifications to stream flow and adjacent land use. However, hard structures obstruct the natural exchanges of water and materials between the riparian areas and the water body. This results in the impairment of natural processes and diminishes favourable habitat for fish, amphibians, other aquatic organisms, and native riparian vegetation. There is increased scientific understanding that strengthening of stream banks and

shorelines can also be effectively performed by natural native vegetation within healthy riparian areas. The advantage of vegetation (green structures) over hard structures is that natural processes continue to operate, and the water body and riparian areas remain suitable habitats in which native species can thrive. Also, green structures are more economical to install and maintain than hard structures. Therefore, in a developed and managed landscape such as the Seven Persons Creek watershed, hard and green structures have complementary roles in the restoration, maintenance and conservation of riparian areas.

An irrigation spillway outlet at Seven Persons Creek.

Gabions strengthen a streambank section of Seven Persons Creek.

Ecological Services

Healthy riparian areas provide valuable ecological services that benefit people, fish, wildlife and the overall environment. Deep-rooted riparian plants help build and maintain banks and shores by binding soil and reducing erosion. Plants also trap and store material from flood waters, or runoff from the land, and filter out and uptake excess nutrients. Healthy plant communities also slow down fast water, allowing it to soak in for later use, and to recharge groundwater aquifers. Healthy riparian areas also provide food, shelter and habitat for fish and wildlife.

Riparian areas do not all perform the same functions. This is due in part to their different land and water characteristics, different widths and elevations from the water's edge, and different locations within a stream's section (meanders or linear). The capacity of riparian areas to perform may also be compromised because of poor condition. Riparian plant communities are influenced by site conditions and surrounding land uses and they can become degraded over time. While they are generally resilient, overuse and disturbance can significantly affect their ability to function. Poor condition can result in an increase in nuisance weeds and invasive species, compacted soils, streambank erosion, siltation of fish spawning areas, or loss of shrub habitat for wildlife.

There has been growing recognition of the value of healthy riparian areas and the benefits they provide to people and the environment. Many government and non-government agencies are now turning to restoration to bring degraded natural systems back to health. Because all riparian areas are different, restoration requires an understanding of both physical (water availability patterns and soil characteristics) and biological characteristics (plants and other organisms), including the shape of the land, and the plants it supports.

Riparian Area Forms and Plant Zones

Riparian areas take many forms. Some gently slope up and away from the water's edge, and some form narrow threads in tight valleys or wide floodplains in broad valleys. Others form on mid-channel islands or bars, or slumped channel walls. Riparian areas can form almost anywhere water movement has influenced the adjacent low elevation landscape.

The location and size and shape of the riparian area influence the types of vegetation that can establish. Riparian plants have different water requirements and plant zones develop in response to proximity to water. Soil moisture is high at the water's edge and gradually decreases with distance and elevation towards upland areas. In general, certain plants grow at or near the water's edge, while others, such as shrubs, establish farther away. Trees can often be found even farther away and at slightly higher elevation. Many riparian areas are dynamic, such as those in river floodplains, and conditions can change over time. Trees or shrubs that established on shorelines, such as cottonwood and willow, may eventually find themselves higher and drier and unable to regenerate under the new conditions. The movement of water may also affect the type of plants that can establish in a riparian area. The amount of water flowing (cubic meters per second), the speed at which it flows (meters per second), or in case of lakes, the impact of wave action, can limit plants to those that can withstand the forces of water, in addition to the presence of saturated soils for most part of the year.

The types of riparian plants found in an area can provide insight into the health of the site. A plant community of native plants and woody species indicates a more highly functioning site than one covered in weeds and disturbance-caused species. The large root masses and deep roots of trees and woody shrubs bind banks and shorelines more effectively than introduced or weedy species such as smooth brome, foxtail barley, or Canada thistle.

Riparian Areas in the Seven Persons Creek Watershed

Within a watershed, widths and shapes of riparian areas are variable within a single stream and between streams.

A typical riparian area; gentle slope and plant zonation from the water's edge to upslope - wetland plants, shrubs, then trees.

Lower elevation vertical channel walls covered with grasses, with shrubs growing farther away from the water's edge. Notice the stabilized and vegetated slump on the right.

A flood plain adjacent to a hill.

A floodplain on the opposite bank of the hill.

A floodplain used for recreation.

The outer curve stream bank incised by the eroding forces of water; deposition of sediments is on the inner curve.

The inner curve stream bank slumped; the outer curve is stable with a riprap and woody vegetation.

Riparian Plants in the Seven Persons Creek Watershed

At or near the water's edge - shoreline wetland plants

Arum-leaved Arrowhead (*Sagittaria cuneata*)

Awned Sedge (*Carex atherodes*)

Baltic Rush (*Juncus balticus*)

Common Cattails (*Typha latifolia*)

Creeping Spike Rush (*Eleocharis erythropoda steud.)*

Common Great Bulrush or Soft Stem Bulrush (*Scirpus validus*)

Giant Bur-reed (*Sparganium eurycarpum* Engelm.)

Great Basin Calicoflower (*Downingia laeta*), a rare plant

Hard Stem Bulrush (*Scirpus acutus*)

Lakeshore Sedge (*Carex aquatilis*)

Northern Leopard Frog within the sedges

Mannagrass (*Glyceria grandis*)

Alkali Cordgrass (*Spartina gracilis*)

Three-Square Rush (*Scirpus pungens* Vahl) (Note: there is trampling by dogs)

Northern leopard frog within three-square rushes

Reed Canary Grass *(Phalaris arundinacea)*

Sea Milkworth (*Lysimachia maritima*)

Water Smartweed (*Polygonum amphibium* L.)

Wild Mint (*Mentha arvensis* L.)

Riparian Shrubs and Forbs

Canada Goldenrod (*Solidago canadensis*)

Smooth Aster (*Symphyotrichum laeve*)

Tufted White Prairie Aster (*Symphyotrichum ericoides)*


Western White Clematis or Virgin's Bower (*Clematis ligusiticifolia*)

Clematis climbing on a group of chokecherries

Starry Lily of the Valley/False Solomon's Seal (*Maianthemum stellatum*)

Chokecherry (*Prunus virginiana* L.)

Common Dogbane (*Apocynum cannabinum*)

Common Nettle (*Urtica dioica* L.)

Gooseberry (*Ribes uva-crispa*)

Golden Currant (*Ribes aureum*)

Mature fruits of golden currants

Horsetail or Common Scouring Rush (*Equisetum hyemale* L.) (Note: it has been browsed)

Creeping Juniper (*Juniperus horizontalis*), growing between Thorny Buffalo Berry and Wolf Willow zones.



Showy Milkweed (*Asclepias speciosa*)

Red Osier Dogwood (*Cornus sericea*)

Red Osier Dogwood in winter

Silverweed (*Potentilla anserina*)

Sandbar Willow (*Salix exigua*)

Silver sagebrush (*Artemisia cana*) grows on the top most zone of the riparian area. Deep roots prevent erosion of high cut bank. Midge galls attach to plant stems.

Tatarian Honeysuckle (*Lonicera tatarica*); non-native, escaped ornamental

Thorny Buffaloberry (*Shepherdia argentea*)

Western Snowberry (*Symphoricarpus occidentalis*)

Wild Rose or Prickly Rose (*Rosa acicularis/woodsii*)

Wolf Willow (*Elaeagnus commutata*)

Saskatoon Berry (*Amelanchier alnifolia*)

Wild Licorice (*Glycyrrhiza lepidota* (Nutt.) Pursh)



Fragrant Sumac (*Rhus aromatica*)

Riparian Trees

Western or Plains Cottonwood (*Populus deltoides ssp. monilifera*)

Seedling cottonwood recruitment, South Saskatchewan River at Medicine Hat

Cottonwood recruitment after flooding, Ross Creek near Medicine Hat

Green Ash (*Fraxinus pennsylvanica*)

Round Leaved Hawthorn *(Crataegus chrysocarpa)*

Manitoba Maple (*Acer negundo*)


White/American Elm (*Ulmus americana*) – non-native (Note: Sapling pictured)


White Poplar (*Populus alba*); non-native, escaped ornamental


Russian Olive (*Elaeagnus angustifolia*); a locally invasive species

Cottonwoods cut down by beavers are being replaced by Russian Olive. These invasive trees should be removed to allow cottonwoods to re-establish and thrive.

Weeds

Bittersweet Nightshade (*Solanum dulcamara*) (Note: it climbs on the invasive Russian olive tree)

Bull Thistle (*Cirsium vulgare*)

Common Burdock (*Arctium minus*)

Canada Thistle (*Cirsium arvense*)

Leafy Spurge (*Euphorbia esula*)

Hawk moth caterpillar was introduced as bio-control agent against leafy spurge in the 1990s. It has survived in the field but could not bring leafy spurge under control.

Sow Thistle (*Sonchus spp.*)

Field Bindweed (*Convolvulus arvensis*)

Cicer Milkvetch (*Astragalus cicer*)

Dame's Rocket (*Hesperis matronalis*)

Hoary Cress (*Lepidium draba*)

Kochia (*Bassia scoparia*)

Downy brome (*Bromus tectorum*)

Goat's Beard/Salsify (*Tragopogon dubius*)

Japanese Brome (*Bromus japonicas*)

Sweet Clover (*Melilotus albus*)

Considerations for riparian restoration using vegetation

The presence of native woody vegetation such as shrubs and trees is one of the key elements of healthy riparian areas. When a disturbance occurs, particularly constant trampling by people, pets, cattle, or machinery, woody vegetation is damaged and has difficulty recovering on its own when the disturbance is removed. Grasses, forbs and weeds colonize quicker after a disturbance is removed.

Therefore, revegetation for riparian restoration usually involves planting of shrubs and trees. In the semi-arid climate of the Seven Persons Creek watershed or in the broader Southeastern Alberta region, shrubs are as important as trees. Ecologically important 'forests' of shrubs and grasses are prevalent in this grassland ecosystem.

When planting to restore riparian areas, it is important to locate woody shrubs and trees in their appropriate zones considering their distance from the water's edge. Some shrubs thrive better nearer to the water's edge (example, Thorny Buffalo Berry) than others (example, Wolf Willow). Plains cottonwood can manage to establish farther away from the water's edge compared to Manitoba Maple. Observation of vegetation zones in natural healthy riparian areas is the best guide.

Other shrubs and forbs, examples, wild mint, asters and Canada golden rod may colonize on their own but seeding and planting are also helpful.

Shoreline wetland plants are usually not planted as they will come and recover on their own. It is difficult to determine the complex combination of soil types and characteristics and water level, velocity, and their duration over the season, meander and aspect locations that will suit a wetland species.

For more information, please visit: Riparian Restoration | South East Alberta Watershed Alliance (seawa.ca)

The suppression or control of invasive plants and weeds is another important element of healthy riparian areas. The use of chemicals for weed control in riparian areas is discouraged. The use of biological control using caterpillars and beetles has been tried in various field releases with mixed results. SEAWA has been studying the use of native plants to suppress certain weeds.

For more information, please visit: Invasive Plant Management | South East Alberta Watershed Alliance (seawa.ca)

Sometimes, some plants are not available commercially (example, silver sage brush) or what is available is not the exact subspecies suited to the South Saskatchewan River Basin or Southeastern Alberta (example, Western or Plains Cottonwoods, *Populus deltoides spp. monolifera*). *Populus deltoides* has many subspecies or varieties and not all are suitable as they may be more susceptible to

pests, diseases, and frost crack. Therefore, plant propagation using local materials (seeds or stems or root cuttings) is necessary.

For more information: Native Plant Propagation | South East Alberta Watershed Alliance (seawa.ca)

Photos

Photos were taken during the field seasons of 2017, 2018, 2019, 2020 and 2021 along the riparian areas of Seven Persons Creek, Murray Lake, Peigan Creek, Bullshead Creek, Connaught Pond, Bullhead Reservoir, Sauder Reservoir, Ross Creek, and their tributaries, by Marilou Montemayor, Natasha Rogers, Brooklyn Neubeker, Amy Adams, Ben White, Alexi Nelson, and Hannah Sabatier.

Plant identification

Plant identification was guided by Lahring (2003), Tannas (2001-2004), AAF (2015), and personal communications with Tony Blake, Central Director, Alberta Native Plant Council, and Cathy Linowski, Botanist and Instructor at Medicine Hat College, Medicine Hat.

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