ASSESSMENT OF RIPARIAN AND WETLAND HABITAT STATUS IN THE SOUTH SASKATCHEWAN RIVER SUB-BASIN

SEAWA Watershed Report 2009-4

SEAWA Web-based State of the Watershed Report

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Introduction:

Geographically the South Saskatchewan River sub-basin belongs to Great Plain Grasslands. It is important for wildlife and humans to evaluate and understand the riparian health and animal habitat status along the river. Livestock and wildlife have used the riparian areas for protection, food and nesting. From the first European settlement the riparian area has been altered, but riparian alteration occurred earlier with Bison causing the greatest seasonal grazing pressure on the riparian area. This report is focused upon the riparian areas of the South Saskatchewan River sub-basin.

Summary:

The research area identified in this report is divided into two reaches; Reach SS-01 and Reach SS-02. Reach SS-02 is from the confluence of the Oldman and Bow Rivers (where they join to form the South Saskatchewan River), to the Medicine Hat gauging station. Reach SS-01 is from Medicine Hat gauging station to the Alberta / Saskatchewan border, as shown in Map 1 on the next page. The total length of the two reaches in the South Saskatchewan River sub-basin is 286 kilometers and the watershed area is 12,148 square kilometers.

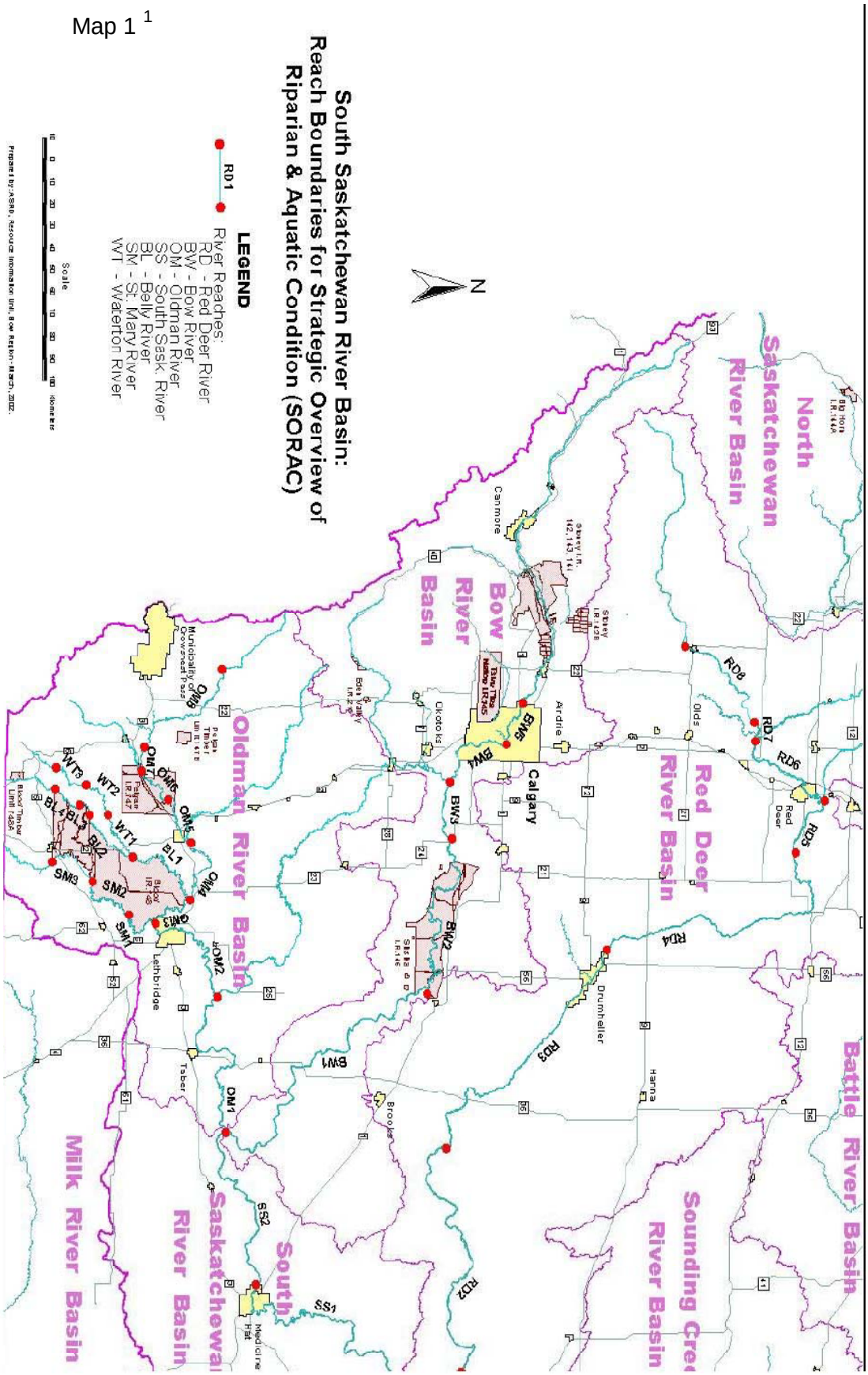
Riparian health is determined by the diversity of organisms, (especially plants), and human activities, (such as dams). Animals, (which include species at risk), along the South Saskatchewan River are also important to maintain riparian health. Dams have an impact on the downstream river and its health.

Not all riparian areas were evaluated in this report as most of the lands along South Saskatchewan River are privately owned which without permission restricts access to research.

History of the South Saskatchewan River sub-basin

The riparian health along the South Saskatchewan River has been altered prior and since settlement by Europeans. About 11,000 years ago indigenous people hunted and camped along the South Saskatchewan River. In 1754, Anthony Henday of the Hudson's Bay Company explored the region; and David Thompson, another Hudson's Bay Company explorer, camped near the Bow River with a group of Piikani over the winter of 1787-88. Before Euro-Canadian settlement, the South Saskatchewan River Basin was the homeland for the Blackfoot Confederacy (Piikani, Kainai and Siksika) and the Tsuu T'ina and Nakoda; and used in the continental fur trade.

Map 1 [1]


South Saskatchewan River Basin:
Reach Boundaries for Strategic Overview of
Riparian & Aquatic Condition (SORAC)
LEGEND
River Reaches:
RD - Red Deer River
BW - Bow River
OM - Oldman River
SS - South Sask. River
BL - Belly River
SM - St. Mary River
WT - Waterton River
RD1
Scale
Kilometers
N
North Saskatchewan River Basin
Bow River Basin
Oldman River Basin
Red Deer River Basin
South Saskatchewan River Basin
Milk River Basin
Battle River Basin
Sounding Creek River Basin
Canmore
Calgary
Airdrie
Olds
Red Deer
Drumheller
Hanna
Brooks
Taber
Lethbridge
Medicine Hat

Overall Assessment;

In 2004 Cows and Fish researched the riparian habitat in the South Saskatchewan River sub-basin. Their research results stated that about 37.5% of the area was rated as healthy but with problems or functioning at risk and 62.5% of the area was rated as unhealthy.

Figure 1 Overall health in the South Saskatchewan River research area. [11]

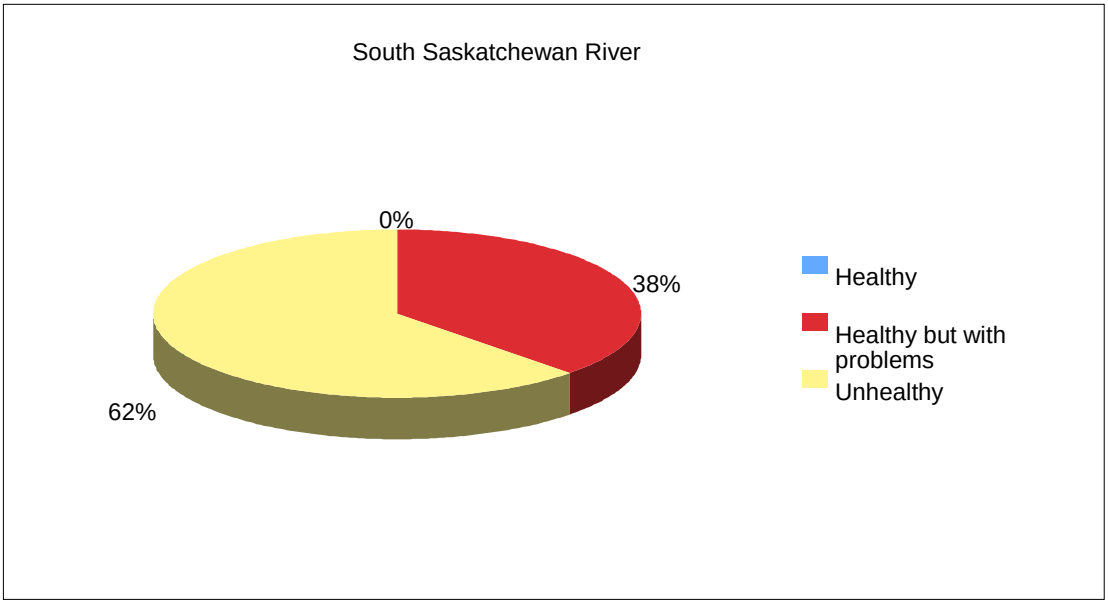
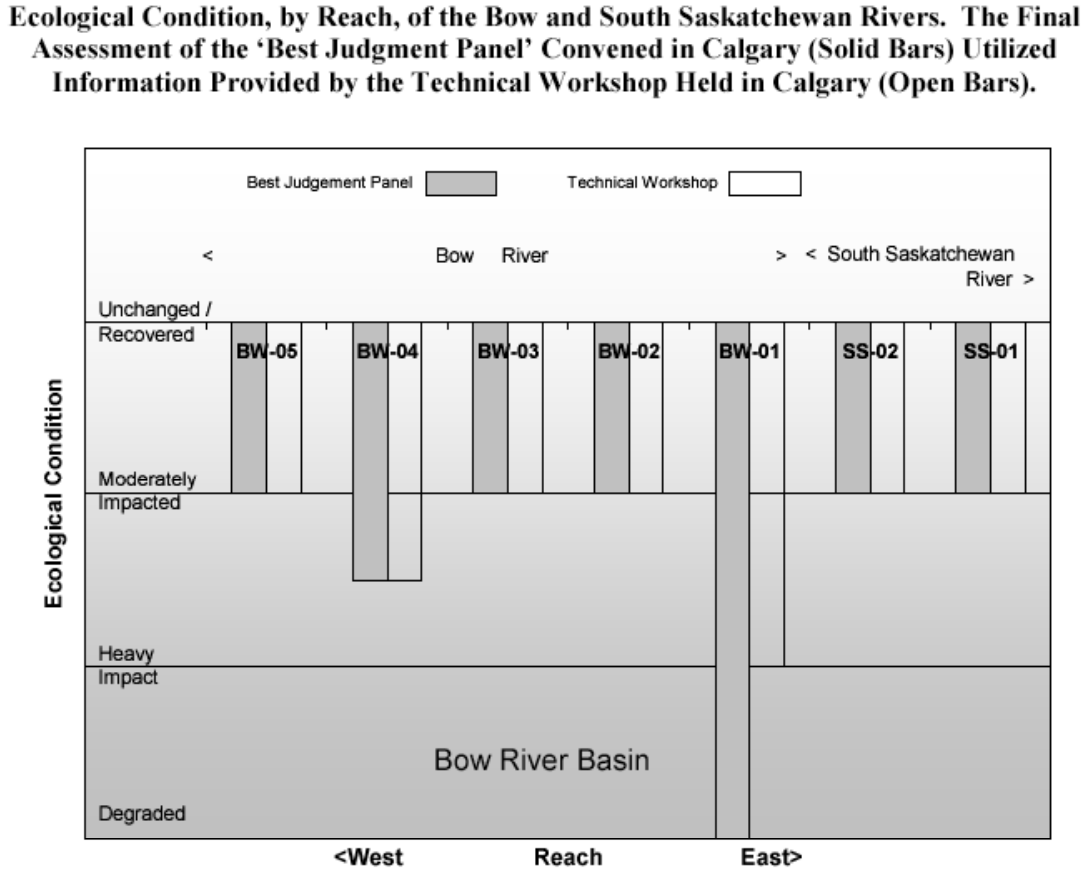


Figure 2 South Saskatchewan River Riparian Health including the Bow River sub-basin [5]



Note: The assessment ratings are relative within the individual sub-basin. The degree of cross-calibration between sub-basins by the 'Best Judgment Panel' was limited.

Table 1 The number of research sites and their assessment [11]

Reach	Healthy	Healthy but with problems	Unhealthy
SS-02	0	0	2
SS-01	0	3	3
Total	0	3	5

In 2003, Golder stated that the Best Judgment Panel (BJP) respondents thought the reaches of the South Saskatchewan River were in better condition than the lower reaches of either the Bow or the Oldman Rivers. [4] The reason why the two reaches of South Saskatchewan River were in better condition might be that the two rivers form the South Saskatchewan River, and therefore, increase the flow and quantity of water.

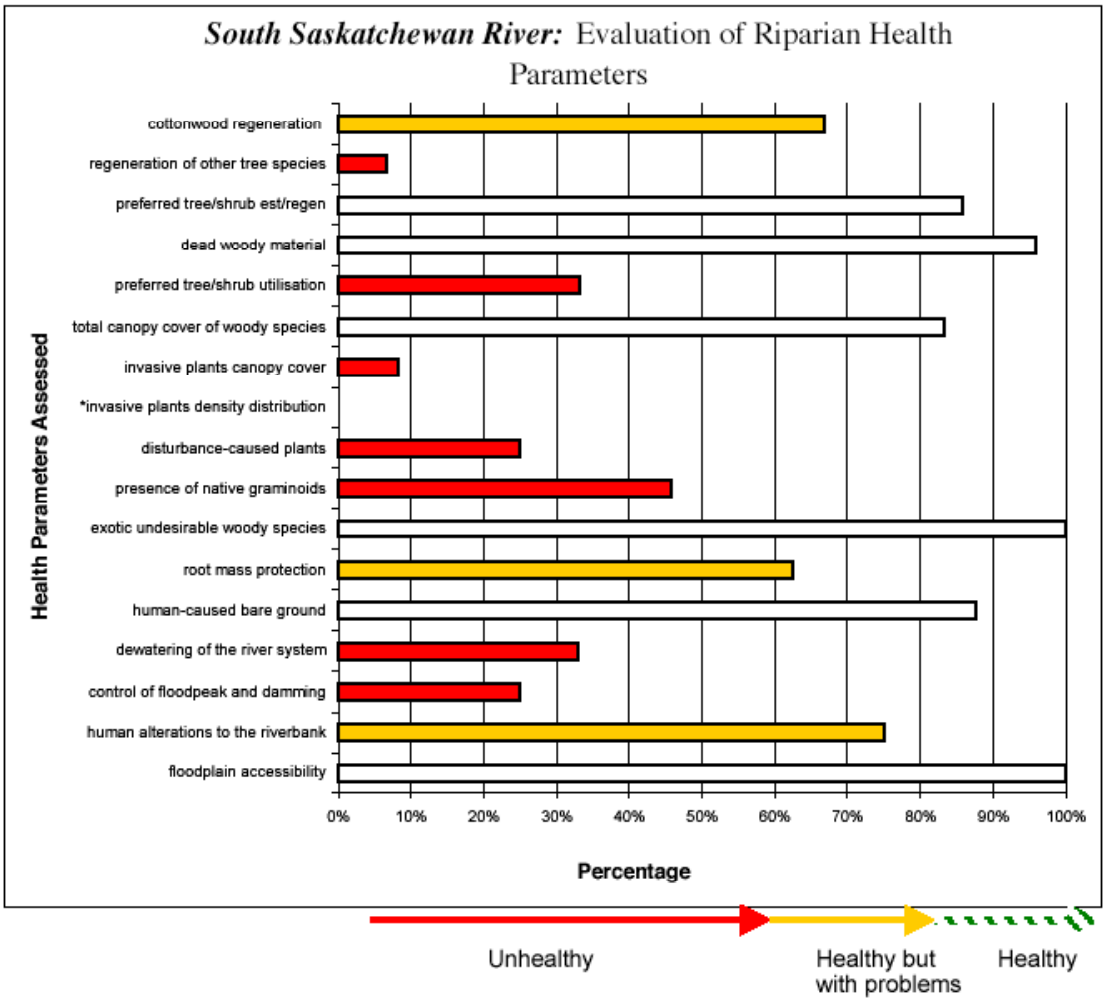
Figure 3 South Saskatchewan River sub-basin compared to other river sub-basins [7]

Stream	Water Quality	Sediment Quality	Non-fish Biota
Red Deer RSB: Blindman River; Haynes Creek [1] (M1 and M6); and Ray Creek	G	P	P
Red Deer RSB: Renwick and Threehills creeks	G	P	P
Bow RSB: Crowfoot Creek	G	P	P
Oldman RSB: Prairie Blood Coulee	G	P	P
Oldman RSB: Battersea Drain	G	P	P
Oldman RSB: Trout Creek	G	P	P
South Sask. RSB: Drain S-6	G	P	P
Good	Fair	Marginal	Poor

RSB = River Sub-Basin.

Notes: [1] Haynes Creek more intensively studied.

Figure 4 Overall Riparian Health in the South Saskatchewan River. [11]



The research was divided into two areas: Reach SS-01, which is from the Medicine Hat gauging station to the Alberta/Saskatchewan border, and Reach SS-02 from the confluence of the Oldman and Bow Rivers to the Medicine Hat gauging station. In the region studied by Cows and Fish, only two properties in the SS-02 area were examined. In the SS-01 area, six properties were examined therefore it may not be suitable to compare SS-02 to SS-01.

Figure 5 Evaluation of riparian health in the research area, Reach SS-02 [11]

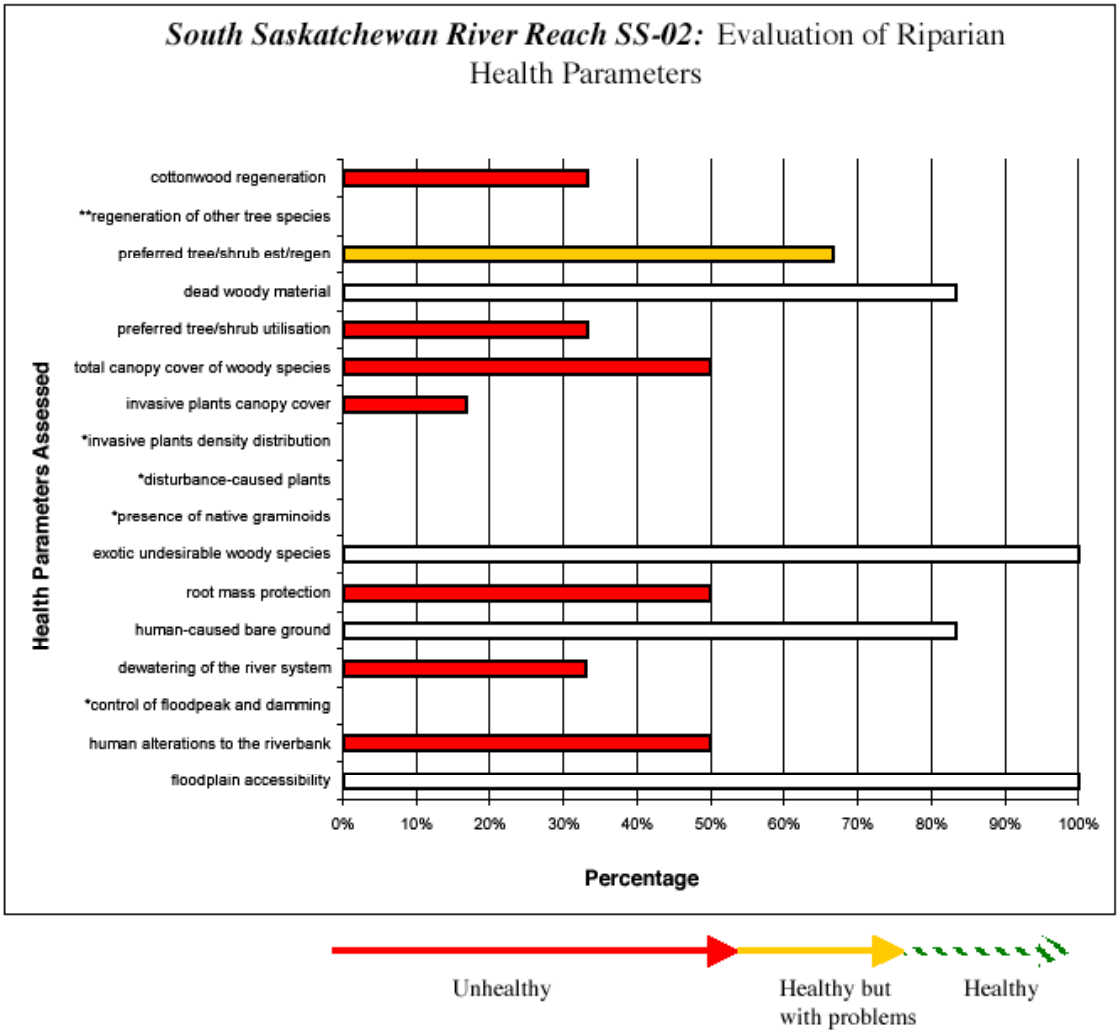
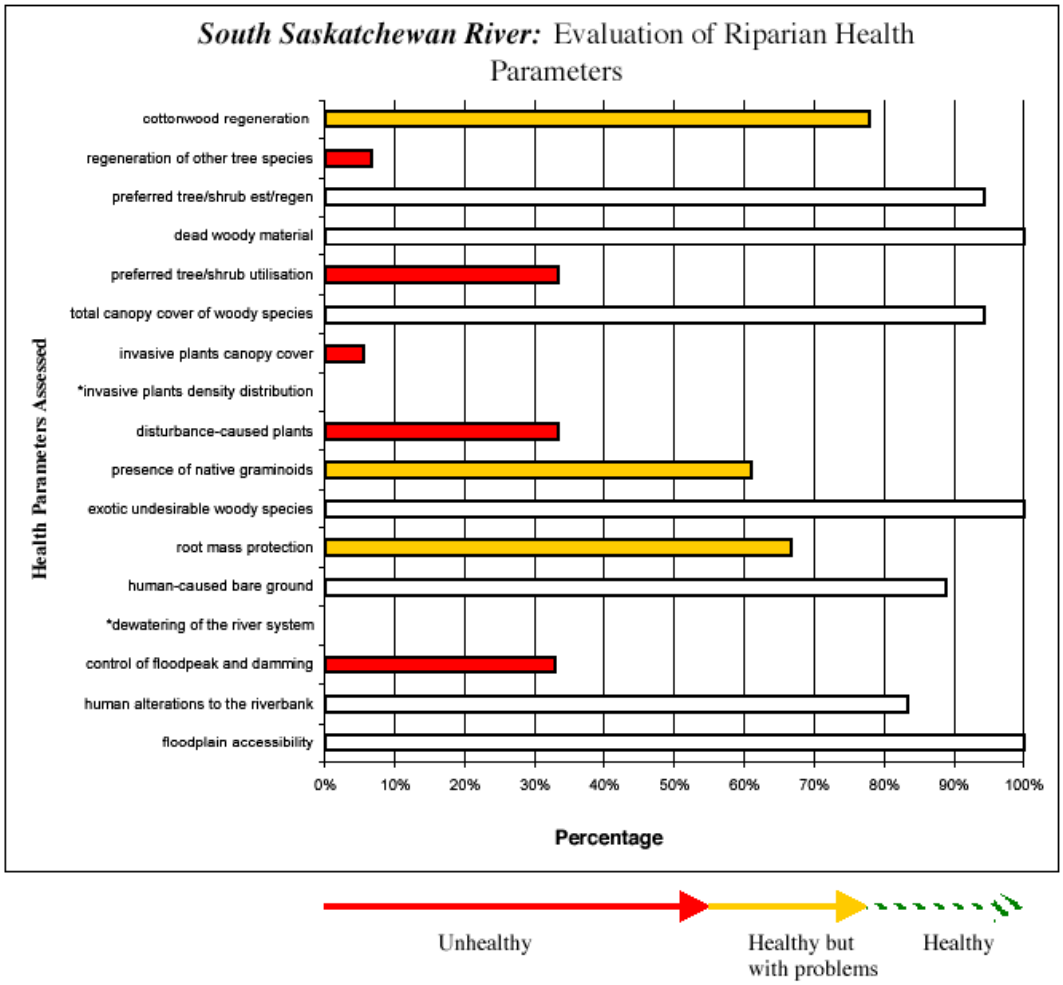


Figure 6 Evaluation of riparian health in the research area, Reach SS-01 [11]



There are four main factors of land use related to riparian health: grazing animals,(livestock and wildlife), cropland cultivation, water availability and overall watershed activity as shown in Table 2. The major land use in the area is grazing animals. Grazing of livestock has been performed for hundreds of years, and grazing wildlife such as bison caused seasonal grazing pressure on the riparian area along the South Saskatchewan River [11]. Proportionately, little has been examined with respect to cropland cultivation..Historically, cultivation has increased the presence of undesirable plants and invasive plant species [11]. Availability of water also affects the riparian health along the South Saskatchewan River. Dams upstream of the South Saskatchewan River, located on the Oldman, Bow, and Red Deer rivers, can be used to decrease or increase the South Saskatchewan's flow. The overall activities upstream including agriculture, dams, urbanization and industry affect the riparian health of the South Saskatchewan River and have an impact on the quantity and quality of water, amount of sediment, and the number of invasive plant species[11].

Table 2 The percentage of Land Uses [11]

	Land Uses (%)			
Reach	Grazing	Crops	Developed	Undeveloped
SS-01	68	0	7	25
SS-02	94	1	0	5
Total	78	0	5	17

The overall assessment of the South Saskatchewan River indicated that it was in better condition in 2003 than the two rivers that come together at the confluence (Bow and Oldman Rivers). Over the same period of time, the flow of the South Saskatchewan River has increased more than the sum of the flows from the other rivers.

Plants

Overall assessment in the South Saskatchewan River sub-basin for Woody plants

In the South Saskatchewan River sub-basin plant species include native and non-native, or invasive, plants. The plants in the research area can be divided into woody and non-woody plants. Invasive plant species are spreading widely throughout the research area.

Table 3 The summary of plants communities [11]

Reach	# of Plant Communities	% of Area Examined with:	
		Tree Species	Shrub Species
SS-02	5	16	28
SS-01*	17	29	57

*In addition to graminoid and forb communities at most reaches, these reaches have some area as unclassified wetland types.

Cottonwood trees *(cottonwood poplar*) trees are found in both reaches along the South Saskatchewan River, and at one site Manitoba maples (*Acer Negundo*) were present. The Manitoba maple is a native species to North America, but it is considered invasive since it colonizes quickly whether or not the area is cultivated. About 63% of the project area was covered with preferred trees. There is moderate to heavy grazing pressure from livestock, and to a lesser degree, from wildlife in the area.

The regeneration of trees is very good at all but two sites where their levels of regeneration were considered low to moderate. Successful regeneration of the woody plants maintains and promotes riparian health [11]. The number of dead trees is normal to moderate in the area.

Reach SS-02

In this reach, the main woody plant species is plain cottonwood [1]. About 28% of the area is covered with shrubs, and 16% of the area is covered with trees as shown in Table 3. The regeneration of cottonwoods and preferred trees is poor to absent [11]. Invasive cover 66% of the area. The reason for the poor occupation by native species, (which are less than 5%), is unknown.

Reach SS-01

In reach SS-01, the number of trees and shrubs are twice as many as in SS-02. About 57% of this area is covered with shrubs and 29% with trees. Regeneration of trees and shrubs, cottonwoods and preferred trees, in most of the areas in SS-01 is quite good but some areas are poor or moderate.

Table 4 The number of species of woody plants in each research area [11]

Reach	# of Tree Species	# of Shrub Species	% of Reach Area that is Woody Species
SS-02	2	8	36
SS-01	3	14	65

Table 5 Assessment of the regeneration of woody plants and its mean value [11]

Reach	Cottonwood Regeneration (seedlings/ saplings)	Other Tree Species Regeneration (seedlings/ saplings)	# of Sites with seedlings /saplings >5% of total woody cover	Means for health…
SS-02	1 site poor, 1 site moderate	No other tree species present, poor, potential is there for Manitoba maple (*Acer negundo*)	1 (half of the sites)	Poor to moderate regeneration
SS-01	3 sites excellent 2 sites moderate 1 site poor	1 site Manitoba Maple, poor. 5 sites no other tree species present, poor, potential is there for Manitoba maple	5 (5 of 6 sites)	Moderate regeneration overall, but variable and poor at some sites

Overall assessment in in the South Saskatchewan River sub-basin for non-woody plants

There are forty-one species of grasses and grass-like plants and seventy species of forbs within the South Saskatchewan River area [11]. One of the important indicators of riparian health is the presence of native grasses. The function of the native grasses is to diminish the disturbances to the soil surface and to provide deep, binding root masses and summer and winter forage production for livestock and wildlife. There are three poisonous plants species recorded in the research area. These are: common horsetail (*Equisetum arvense*), showy milkweed (*Asclepias speciosa*) and Indian hemp (*Agropyron repens*) .

About two thirds of the research area is covered with disturbance-caused plants, grasses and forbs. Most of them are smooth brome (*Bromus inermis*) and quack grass (*Agropyron repens*). The disturbance-caused plants do not have deep, binding root masses; therefore, they cannot provide stream bank protection as well as non-disturbance, native plant species [11]. Unfortunately, undesirable and disturbance-caused plants are abundant in the research area of South Saskatchewan River. About 25-50% of the riparian area is covered with 50% disturbance-caused plants, and 38% of the research area is covered with more than 50% disturbance-caused plants. Matters of concern in the research area include the abundance of disturbance-caused plants, the reduced quantity of native grasses and forbs and the abundance of invasive species

Invasive plant species found in the research area of the South Saskatchewan River were bladder campion (*Silene cucubalus)*, leafy spurge *(Euphorbia esula)*, scentless chamomile *(Matricaria perforata)*, Canada thistle, (*Cirsium arvense)*, and perennial sow thistle (*Sonchus arvensis)*.

Reach SS-02

Cows and Fish state that the existence of extensive disturbance-caused species and invasive plants suggests cumulative, longer term impacts from livestock, intentional introduction of tame species, or perhaps, some relationship to hydrologic parameters and past flood events (e.g. creation of exposed soil and seed sources) [11].

Reach SS-01

Invasive plants species are widely spread, and 62% of the area in SS-01 is covered with disturbance-caused plant species as shown in Table 6. Native graminoid cover is good, with 25-50% cover in each examined area as shown in Table 7[11]. The riverbank root mass protection in this area is rated from excellent to poor condition.

Table 6 The summary of the non-woody plants assessment [11]

Reach	% of Area Examined with:		
	Grass Communities	Forb Species	Disturbance Species
SS-02	82	32	66
SS-01	75	36	62

Table 7 The number of non-woody plants species in each research area [11]

Reach	Total # of Grass/ Grass-like Species	Total # of Forb Species	Proportion of site covered by native graminoids	Means for health…
SS-02	16	30	Both sites less than 5%	Poor
SS-01	44	64	5 sites 25-50%; 1 site <25%	Fair, to mostly good

Table 8 The undesirable herbaceous species in each research area [11]

Reach	% of Reach with Disturbance Plants	Disturbance Plants Cover	Means for health…
SS-02	66	Both sites > 50%	extensive; of concern
SS-01	62	1 site >50%; 4 sites 25-50%; 1 site 5-25%	variable from moderate to extensive; of concern

Table 9 The most common invasive species in each research area [11]

Reach	Species
SS-02	Canada thistle and leafy spurge
SS-01	Leafy spurge and Canada thistle

Species at risk and other species

In the South Saskatchewan River sub-basin, five major fish species are present; Goldeye (*Hiodon alosoides*), Lake Sturgeon (*Acipenser fulvescens*), Northern Pike (*Esox lucius*), Sauger (*Stizostedion canadence*) and Walleye (*Stizostedion vitreum*). Eleven species of reptiles and amphibians, fifty-two species of mammals including big species such as antelope and moose, one hundred forty species of birds and another thirty-eight species of fish are recorded in the South Saskatchewan River research area.

Species at Risk – Plants

Small-flowered sand verbena

This species is stated and ranked as "May Be at Risk" by the Alberta National Heritage Information Centre. The essential environment for small-flowered sand verbena is sand plains that have disappeared. The main limiting factor of small-flowered sand verbena is its preference for unstabilized sites within a dune field [12]. The absence of this species is caused from both grazing by buffalo and fire.

Slender mouse-ear cress

Status is "May Be at Risk". The habitat of this plant is the Dry Mixed Grass Natural Subregion where the climate is characterized by a warm and dry growing season from early May to the end of October. However, extreme dry conditions may have reduced this species [10].

Since slender mouse-ear-cress is rare in Alberta, the effort to monitor it is lacking. Additionally, it is difficult to identify the species. The limiting factors of this species are that more than two thirds of the Dry Mixed Grass Natural Subregion has been destroyed by cultivation and an extremely dry climate. The effects of recent drought conditions in southeastern Alberta have been to greatly reduce the amount of rainfall available throughout the growing season and to delay the critical early and late stages when femination and initial growth of slender mouse-ear-cress may occur [10].

Tiny cryptanthe

Status is “May Be At Risk”. This species is found in the Dry Mixedgrass Natural Subregion and restricted to the vicinity of the South Saskatchewan River valley [2]. The main factors affecting this species are petroleum and natural gas activities. The status of tiny cryptanthe is also listed as Endangered in Schedule 1 of the Federal Species at Risk Act (Government of Canada) [2].

Species at Risk - Animals

Burrowing owl

Status is “Threatened”. The burrowing owl is a small owl and its average weight is about 125g to 235g. Interestingly, they have no nests in trees but burrow under the ground. It depends on the season but generally burrowing owls prey on small vertebrates and invertebrates such as deer mice, meadow voles, sagebrush voles, grasshoppers and other insects. Burrowing owls have two types of potential predators; one breaks the brood and eats the eggs and/or adult female, another eats old burrowing owls when they are away from the nest.

According to data from a report by Danielle Todd, the density of burrowing owl nests in the Hanna trend blocks has been declining, and the density of burrowing owl nests in the Brooks trend blocks has been decreasing as well [13]. In 1978 the population of burrowing owls in Alberta was estimated at more than 1,500 pairs, but by 1990 the population had declined to an estimated 1,000 pairs, and to fewer than 800 pairs by 1997 [13]. The status of burrowing owls has been historically stated as “endangered”. In 1997 the Endangered Species list was divided into two categories, Endangered and Threatened, and burrowing owls have been categorized as a Threatened Species since 1997.

Northern leopard frog

Status is “At Risk”. Northern leopard frog populations experienced drastic declines in Alberta near the end of 1970s [9]. A survey performed in 1990 and 1991, stated that leopard frog populations were locally abundant at a number of sites: in the Cypress Hills, along the Milk and the South Saskatchewan

rivers, along the lower reaches of the Bow and Red Deer rivers, and at sites along the Little Bow River, and the Canal and Manyberries creeks [9].

The limiting factors of this species are natural population fluctuations, extremes in climatic conditions or anthropogenic factors such as loss of habitat, acidification, contaminant releases and introduction of the non-native, invasive, species. Many other cases of population declines cannot be explained [9]. The status of the leopard frog in 1984 was stated as “Declining”. In 1991, it was recognized as “Red List”, and, in 2000, it was stated as “At Risk”.

Prairie rattlesnake

Status is “Non-game animal”. Prairie rattlesnakes usually live in the bottom of a coulee or along the river in the Grassland Natural Region. Historical research indicates that the number of rattlesnakes has decreased since the first European settlement. Recent research indicates that the population size of depends upon location. In some areas, the population size has increased or moderately increased, while in other areas, the number of prairie rattlesnakes has declined [14].

The limiting factors of the prairie rattlesnakes population are: natural limiting factors, the absence of suitable hibernacula in winter and human activities. The major influence toward prairie rattlesnake population is human activities such as road and pipeline construction, agricultural activities and intentional persecution [14]. Until 1987 prairie rattlesnakes were considered “Non-licensed animals”, which people could hunt without permission. However in 1997 rattlesnakes were stated as a “Non-game Animal” that people cannot hunt without permission.

Ord’s Kangaroo Rat

Status is “May Be At Risk”. Kangaroo Rats prefer habitats that provide smooth, sparsely-vegetated substrates with workable soils such as sand dunes because of their bipedal locomotion, fossorial nature, and medium body size.However, in southern Alberta, Kangaroo Rats do not show their affinity for a particular vegetation community [6].

Ord’s Kangaroo Rat is an important prey for many predators. Most of the population of Ord’s Kangaroo Rats in Alberta, are located at Canadian Force Base Suffield. The status of Ord’s Kangaroo Rat is “non-game animals”, which means that it is illegal to capture or kill that species without any specific permission. Additionally, this species is included in the “Blue List”, “May Be at Risk”.

Eastern short-horned lizard

Status is “May Be At Risk”. This lizard is a very interesting species that does not lay eggs. Historically, the distribution area of short-horned lizards is along the South Saskatchewan River, Chin Coulee in Forty Mile, Manyberries, Milk River, and tributaries of Milk River [8].

The population of short-horned lizards is divided into five subpopulations along the South Saskatchewan River. One of the subpopulations of this species is in the vicinity of the City of Medicine Hat and has been degraded by adjacent irrigation and cultivation. Another subpopulation is also affected by surrounding traffic and urban development. The other three subpopulations along the South Saskatchewan River are affected by gas and oil development. Human activities may be significant risk to these subpopulations. The population size of short-horned lizards in Alberta is historically low. The overall population of short-horned lizards in Alberta appeared to be declining between the time of the early fieldwork done by Powell in 1978-1982 and the fieldwork done in 1991 [8].

From a research estimate in 2001 a suitable habitat for the short-horned lizard is about two lizards per hectare or two hundred lizards per square kilometer. By research estimates there are approximately 5,871 individual short-horned lizards. Because only 69% of the survey captures were mature adults, the reproductive population may be even lower, at about 4051 individuals. This estimate probably represents a provincial reproductive population minimum [8]. However, the population of short-horned lizards has decreased In 1991, the population was less than 1980 [8].

Some limiting factors considered as the reasons for the decreasing population of short-horned lizards are: agricultural activities, oil and gas exploration and development, urbanization, and roadways and traffic.

Swift Fox

Status is “Endangered”. Due to the rapid decline in their numbers during the late nineteenth century to early twentieth century Swift foxes were reintroduced to the Alberta / Saskatchewan border area in 1983. Swift foxes are one of the predators of Ord’s Kangaroo Rats and they are prey for other predators as shown in Table 10.

Table 10 The causes of mortality for Swift Foxes and the percentages of each cause [3]

Cause of Death	Persentage (%)
Coyote Predation	31
Suspected Coyote	7
Avian Predation	6
Suspected Avian	2
Badger Predation	3
Suspected Badger	3
Unknown Predation	6
Road Kills	6
Accidental Death	2
Unknown Cause	34

Research in 1994 showed that 192 Swift Foxes were found in Alberta / Saskatchewan border area. Since the Alberta / Saskatchewan border is just a political border and not a biological border Swift Foxes can move freely across the border. Therefore, it is difficult to determine the actual numbers of Swift Foxes in the area. There are three major limiting factors with respect to the number of Swift Foxes: habitat fragmentation, Coyote abundance, and range management. Conversion of native prairie to agricultural lands is also one of the major factors contributing to the decline of the Swift Fox in Canada [3]. According to research, 66 natural Swift Fox dens were located in Alberta alone, with a minimum of 209 young, between 1982 and 1993. These dens were established both in native prairie and in pens used during the early stages of the release program [3].

Table 11 From 1984 to1993, Swift Fox dens, numbers and litter size in Alberta native prairie [3].

Year	Number of Dens	Number of Young	Average Litter Size
1984	2	9	4.5
1986	1	2	2.0
1987	1	1	1.0
1988	5	9	3.5
1989	4	18	4.6
1990	13	47	3.6
1991	11	46	4.2
1993	5	16	3.2
Total	**43**	**158**	**3.7**

Animals along South Saskatchewan River (other than species at risk):

Birds(Aves):

Prairie Falcon This bird nests on the cliffs along the South Saskatchewan River, usually in old ferruginous hawk nests. Their primary prey are ground squirrels, small rodents, and sometimes grasshoppers and small birds. The population of Prairie Falcons decreased after the first European settlement. This may have been due to people misunderstanding Prairie

Falcons preying on farm poultry, or, DDT (Dichloro-Diphenyl-Trichloroethane) and other pesticides. DDT may have caused a decline in the number of eggs produced and the subsequently low reproduction rate[4].

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Ferruginous Hawk – The Ferruginous Hawk is the largest hawk in North America and listed in Canada as "threatened". It sometimes chooses the security of high cliffs or rocky outcrops for nesting [4]. The main habitat for Ferruginous Hawks is moderately grazed grassland. The main cause of population reduction is the cultivation, settlement and resource exploration of the hawk's habitat, which interferes with the Ferruginous Hawk's food supply and ability to hunt.

Swainson's Hawk - This bird is another common hawk along the South Saskatchewan River but it is smaller than the Ferruginous Hawk.

Great Blue Heron – The Great Blue Heron is the largest heron in North America. In 2002, 92 active nests were found across from Police Point in the City of Medicine Hat. People must be careful around them since if colonies of herons are disturbed the young may become frightened and fall from the nest in the tree. The parents will then make no attempt to feed the young, resulting in fewer herons by morning [4]. Herons will typically spend hours at their favorite feeding spot, remaining motionless or taking

slow, deliberate steps as they search the reeds and shallows for minnows, amphibians, small rodents, garter snakes and large insects.

Merlins (a variety of falcon) - At Police Point Park in Medicine Hat (400 acres) at least 14 pairs have nests in a season. The decrease in native grasslands and the abundant use of pesticides has substantially reduced the merlin population throughout the area. They are far less common than kestrels [4].

American White Pelican – Thirty years ago, this bird was not present along the South Saskatchewan River. In 1978, the pelican was listed as "threatened", and by 1987 the population size increased and they were removed from the threatened list. In Alberta it is listed as "sensitive" meaning that it may require protection to prevent it from becoming at risk of extinction [4]. Usually, the nests of pelicans are on isolated islands in rivers, and thus, mammalian predators are not available to hunt them.

Cormorants – Jet-black, stream-lined, double-crested cormorants are found along the South Saskatchewan and they are under the protection of Province of Alberta's Wildlife Act. Cormorants are interesting birds in that they dive into the river water and swim to capture their prey.

Eagles – Eagles are often thought to only live in mountains, but they also live in river environments. The population of golden eagles declined in the early part of the century, but with legislated protection they have increased somewhat, although their numbers are still low [4]. In 1999 there were an estimated 100 to 200 breeding pairs in Alberta[4].

<u>Frogs (Amphibians):</u>

Chorus Frog – The Chorus Frog is a striped frog, which is more common than the leopard frog and the smallest frog in Alberta. The breeding season of the chorus frog is from April to June. The chorus frog's voice has been described as the sound made by running your finger along the teeth of a stiff pocket comb.

Fish:

Lake Sturgeon – The Lake Sturgeon is a famous fish because of human's love of caviar. Male lake sturgeons live to about 55 years while females live to more than 80 years. The breeding age of females ranges from 20 to 25 years old, and the breeding age of males is about 20 years old. Additionally, males spawn every two or three years and females about every five years. In Alberta, the largest population of lake sturgeon is in the South Saskatchewan River. Seasonally, they move to the Bow, Oldman and Red Deer rivers. In Alberta, there is insufficient information to allow a status to be assigned. For many years, fishing for lake sturgeon was prohibited and the law strictly enforced [4].

Reptiles:

Bull Snake (*Pituophis melanoleucus*) The Bull Snake is the largest snake of the five species in the area. The adults are usually about 2 meters or more in length. They lay eggs whereas rattlesnakes have babies. When bull snakes feel threatened, they rattle like rattlesnakes but their rattling is not from their tail but from their throat. The bite of a bull snake is painful, but does not have any poisonous venum likes rattlesnakes.

Garter Snakes – In Alberta there are two species of Garter Snakes -the mountain garter snake (*Thamnophis elegans*) and the plains garter snake (*T radix*). Both species give birth to live young but do not lay eggs.

People are usually afraid of snakes because they believe snake bites are poisonous. This is not always the case since poisonous snakes represent approximately 25% (about 750 species) of the 3000 species on earth. Usually, snakes are not aggressive. Additionally, they do not attack people unless threatened. The primary prey of snakes are rodents; thus snakes are sometimes called "the farmer's friend".

Mammals:

Hare - The white-tailed prairie jackrabbit (*Lepus townsendii*), is not actually a rabbit. However,

Nuttall's cottontail (*Sylvilagus nuttallii*) is a rabbit. Both the cottontail and jackrabbit stop moving to prevent being caught when they sense danger[4]. Interestingly, jackrabbits bear their babies fully furred and with eyes open, whereas cottontails bear their babies naked and eyes closed.

Beavers - There are willow and cottonwood stands along the banks of the South Saskatchewan River which are a source of food for beavers. Beavers build dams to maintain suitable water depth to protect their lodges or dens.

Pronghorn Antelope – The Pronghorn Antelope along the South Saskatchewan River are not like those found in Asia or Africa. Pronghorn antelope are always wandering in search of food. The specific food of pronghorns are grasses, such as sagebrush, that other herbivorous animals will not eat because of their strong aroma. Historically, pronghorns thrived alongside the great bison herds of pre-settlement times. These herds, by grazing down the dominant grasses which compete with other plants, allowed better growth of forbs which form a large component of the pronghorn's diet [4]. In the early twentieth century the number of pronghorn antelope declined and they faced extinction. Wawaskesy National Park was assigned to protect pronghorn antelope, and is now known as CFB Suffield National Wildlife Area.

Riverbank and Floodplain

About 23% of the bank length of the South Saskatchewan River has been altered by human causes. Only one area had more than 50% of the riverbank altered by human causes, severely impacting riparian health. The three main causes that alter the South Saskatchewan River banks are livestock activity, recreation and pipeline crossings. These are not the only reasons for riverbank alteration. Bare ground causes a minor impact on riparian health since invasive plants species, for example, spread quicker than native plants on bare ground.

Human- caused bare ground occurs in all areas, but the majority of sites have less than 5% of the riparian area impacted [11]. Two of eight sites have received moderate and three of eight sites have received heavy pressure from livestock activities. The majority of human-caused bare ground is a result of livestock activity and recreation [11]. However, livestock activity and recreation are not the only reasons for human caused bare ground; there are several minor reasons. Three of eight sites have excellent riverbank root mass protection with deep-rooted vegetation covering more than 85% of the bank length [11]. Two other sites in the research area have 65-85% riverbank root mass protection with 35-65% of the bank covered with deep- rooted vegetation. One last research area has less than 35% of riverbank root mass protection [11].

Reach SS-02

The main reason for human caused structural alteration is livestock activities. More than 50% of the area at one site in SS-02 is impacted by human caused structural alteration. At another area in SS-02, human-caused structural alteration is less than 10%. There is a very small amount of human-caused bare ground. The negative impact on riparian health in this region is dewatering, with 25-50% of the average river discharge removed from this reach [11]. Dams, on major tributaries upstream, result in more than 50% of the watershed being controlled and introducing modifications to flood timing and intensity [11].

Reach SS-01

In half of the areas examined in SS-01, there is human-caused structural alteration present. About 10-25% of altered banks are found in the area and livestock activities are the main cause of the human-caused structural alteration. Approximately, 25-50% of the average discharge from this area is negatively impacted.

Table 12 The status of invasive plants in each reach [11]

Reach	# of Sites with Invasive Plants	Invasive Plants Cover	Density/ Distribution of Invasive Plants	Means for health…
SS-02	2 of 2	1 site high cover; 1 site moderate cover	patches to continuous occurrence	Canopy cover and distribution is a concern
SS-01	6 of 6	5 of 6 sites high cover; 1 site moderate cover	1 site patches to continuous occurrence [5 sites-density distribution not assessed in 2000]	Canopy cover and distribution/ infestation a concern

Table 13 Assessment of the human-caused bare ground in each region [11]

Reach	# of Sites with >5% Human Caused Bare Ground	Proportion of polygons covered by human-caused bare ground	Sites are…
SS-02	1 of 2	1 site <5% 1 site 5-25%	Well to fairly well vegetated
SS-01	2 of 6	4 sites <5% 2 sites 5-25%	Mostly well vegetated, some sites fairly well vegetated

Table 14 The number of sites in each research area with human-caused structural alterations [11]

Reach	# of Sites with Human Caused Structural Alterations	# of Sites with Human-Caused Structural Alterations Along:				Banks are…
		< 10% of length	10-25% of length	25-50% of length	> 50% of length	
SS-02	2 of 2	1	0	0	1	Variable: intact to significantly altered
SS-01	4 of 6	3	3	0	0	Intact to moderately altered

Dams

Dams are developed for several uses such as flood and drought control; and power and water consumption. For instance, the Oldman River dam is for drought control. Since dams control the quantity of water, they can have negative impacts to riparian areas [11]. There are six dams on the Bow River, three on the Oldman River, and one on the Red Deer River. All research areas are impacted by the upstream dams [11].

For 75% of the SS-01 area, from where the Bow and Oldman Rivers join to form South Saskatchewan River to the Medicine Hat gauging station, 25-50% of the watershed is controlled and impacted by upstream dams. In the SS-02 area, from the Medicine Hat Gauging Station to the Alberta / Saskatchewan border, over 50% of the watershed is controlled and impacted by upstream dams.

Table 15 The number of sites controlled by dams upstream affecting each research area [11]

Reach	# of Sites with Control By Dams Upstream Affecting:				Number of Dams
	<10% of watershed	10-25% of watershed	25-50% of watershed	> 50% of watershed	
SS-02	0	0	0	2	9
SS-01	0	0	6	0	9

*Data provided by AENV. Includes dams on main stem rivers only.

Table 16 The floodplain accessibility in each research area [11].

Reach	# of Sites with Flood Water Access to:				Major Obstructions to Flooding
	> 85% of floodplain	*65-85% of floodplain*	*35-65% of floodplain*	*< 35% of floodplain*	
SS-02	2	0	0	0	None
SS-01	6	0	0	0	None

Suggestions for Improvement

Improvement of overall watershed area in South Saskatchewan River sub-basin

Physical impacts from grazing, human-caused bare ground, seasonal grazing pressure from wildlife, and bank structural alteration are all present along the South Saskatchewan River. Even when minor, these physical impacts affect the riparian area and its health. The overall impacts are considered minor since the regeneration of shrubs is very good over the research area. Promotion and support of livestock grazing strategies that focus on keeping preferred tree and shrub utilization to light, and occasionally moderate, levels to benefit the establishment of seedlings and saplings, by allowing increased plant growth and vigour [11]. For reducing and preventing further invasion by invasive species it is important to have a combination of weed control and grazing strategies.

Damming is a harmful impact on the ecosystems of rivers, therefore it is important to identify and quantify minor or unlicensed upstream dams and include these potential modifications when considering the impact to the ecosystems[11].

Maintaining the groundwater reserves and rebuilding the riverbanks through sediment deposition depends on the flood events in the riparian areas.

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The **South East Alberta Watershed Alliance (SEAWA)** was formed in 2007, incorporated as a non-profit society in 2008, and designated as the WPAC (Watershed Policy and Advisory Council) for the South Saskatchewan River sub-basin.

SEAWA Vision: *A healthy watershed that provides balance between social, environmental and economic benefits.*

SEAWA Mission: *South East Alberta Watershed Alliance brings together diverse partners to plan and facilitate the sustainable use of the South Saskatchewan River Watershed for present and future needs.*

SEAWA Members include interested individuals throughout the watershed along with our communities, ranchers, farmers, industries, companies, governments, conservation groups and educational institutions. We are proud to include the following among our founding members:

Government Sector: Alberta Government, City of Medicine Hat, Government of Canada, Cypress County, Palliser Health Region, Town of Redcliff, Town of Bow Island, and Special Areas Board.

Land Resource - Industry and Agriculture Sectors: St Mary River Irrigation District, Murray Lake Ranching, GG Bruins Farms, Short Grass Ranches, Canadian Fertilizers Limited, Redcliff Technology Enterprise Centre, Box Springs Business Park, and Canadian Centre for Unmanned Vehicles.

Academic, Research and Non-Governmental Organizations Sectors: Medicine Hat College, Alberta Research Institute, Red Deer River Watershed Alliance, and Hyperion Research.

Tourism and Conservation Sectors: Grasslands Naturalists, Canadian Badlands, and Medicine Hat Interpretive Program.

SEAWA Web-based State of the Watershed Report is managed by the *SEAWA State of the Watershed Committee*:

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