

# Cows and Fish

Alberta Riparian Habitat Management Society

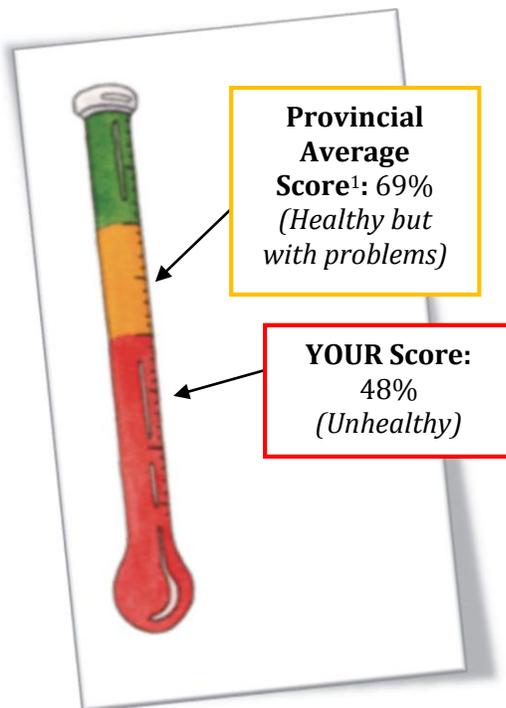


## Riparian Health Summary Report 2021

Sarah Rice, Town of Bonnyville

Jessie Lake

A Riparian Health Inventory is a tool designed to help evaluate and understand the health of riparian areas within your landholdings.



This summary report provides information on the current health of **Jessie Lake in SW 8-61-5 W4M** based on data we collected on **June 22, 2021**. This information is intended to help direct your efforts to promote important riparian functions such as improved water quality, forage production, and wildlife habitat.

This project was initiated by you and the **Lakeland Industry and Community Association (LICA)** and funded through **Watershed Resiliency and Restoration Program (WRRP)** and Cows and Fish. Two sites were assessed within the town of Bonnyville at Jessie Lake. Overall, the average riparian health for sites assessed in Alberta is *healthy but with problems* (69%).<sup>1</sup> Currently, your site scores 48% (*unhealthy*), well below the provincial average. An explanation of your score begins on page 2.



T. Dupuis, RHIP02JES003

<sup>[1]</sup> Cows and Fish Riparian Health Inventory Data 1996 – 2020. Based on 3,061 sites, on 868 waterbodies in Alberta.



## ***Riparian Site Description***

Riparian areas are defined by the presence of vegetation and soils that are highly influenced by water. In some wetland habitats, this may extend some distance inland and/or into the water, including the littoral zone where cattails, bulrushes, and sedges typically grow. This riparian site is located along the north shore of Jessie Lake, south of Lakeshore Drive, approximately between 46 St. and 41 St. This site is approximately 6.3 hectares (15.7 acres) in size and encompasses 740 meters of shoreline. The riparian area varies in width from 75 to 160 meters, with an average width of approximately 115 meters. See the aerial image included in Appendix A (page 9) for a representation of the riparian site boundaries.

This riparian area encompasses a recreational park area with a paved walking and biking trail along the lakeshore of Jessie Lake along with a manicured lawn, and ornamental trees and shrubs. Dense native vegetation is found in some areas closer to the water's edge. In 2019 and 2020, with the help of LICA, native shrubs (willows and red-osier dogwood) were planted (rooted-stock and live-staked) within the riparian area to increase woody plant cover and improve site stability. At the time of the site visit water levels were much higher than in past years, flooding out some of the paths.

Benchmark photographs of the site are provided in Appendix A (page 9). A list of plant species found in the riparian area is given in Appendix B (page 12).

## ***Riparian Health Score Discussion***

The following points elaborate on the Riparian Health Score outlined in the table above:

- **Overall, the riparian area is well vegetated.** A diversity of both grasses and grass-like plants, dominated by Kentucky bluegrass, provide nearly full vegetative cover throughout the riparian area. Forbs (broad-leaf plants) are prominent throughout the the riparian area covering approximately 40% of the site. Trees and shrubs also cover about 40% of the site, with a variety of native willows growing closer to the lakeshore, and non-native ornamental trees and shrubs growing further back from the water. The majority of native species present occur along the shoreline, whereas much of the non-native plants are present within the mowed portion of the site, away from the water's edge. A high amount of vegetative cover helps to perform riparian functions such as filtering nutrients and stabilizing shorelines and soil surfaces.
- **Invasive plant species are present.** Invasive plants include *prohibited noxious* and *noxious* weeds listed under the Alberta *Weed Control Act*, and other non-native species known to be problematic in riparian areas. Invasive species spread rapidly, often outcompete native plants, and are difficult to control. Canada thistle, perennial sow-thistle, white cockle, and common tansy are all present in trace amounts (less than 1% cover) throughout the riparian area. Canada thistle, smooth perennial sow-thistle, and white cockle are growing in a few patches plus several well-spaced plants, while common tansy is growing in a single patch. Although caragana is not included in the Alberta *Weed Control Act*, it can outcompete native plants and can be problematic in riparian sites, and is included as invasive for this parameter. Caragana covers less than 1% of the site and is growing in a few patches in this riparian area. The presence of invasive plants should always be monitored as these plants tend to fluctuate in abundance from year to year and there is always the potential of new invasive plant species establishing. Invasive plants decrease the ecological health of the landscape, which is reflected in the score of this parameter. Since invasive plants can spread rapidly into areas of exposed soil, it is important to limit further disturbance to the site and to maintain the health and vigor of native riparian plants.

- **Disturbance-caused undesirable plant species are *abundant*.** These plants are typically non-native grasses and forbs that tend to aggressively displace native plants once the soil surface has been disturbed, but also include some native species with similar tendencies. Disturbance-caused plants are generally shallow rooted and have limited value for bank binding, nutrient filtration, and erosion prevention. The main disturbance species is Kentucky bluegrass, which covers over 75% of the site, predominantly away from the water's edge. Dandelion is also prominent throughout the riparian area covering approximately 40% of the site, mostly growing with the manicured Kentucky bluegrass.
- **Preferred woody plants (e.g. willows) are present but regeneration is somewhat lacking.** 'Preferred' woody plants refer to native trees and shrubs that have high forage and habitat value for livestock and wildlife. These plants also help stabilize shorelines and soil surfaces with their extensive root systems. The relative abundance or lack of preferred woody vegetation is generally a good indicator of riparian health. Preferred shrubs, including several species of willow, are present mainly along the shoreline. These plants display multiple age class structures – young, middle-aged, and mature plants are all present – but overall young plant cover is low. Much of the willow cover is dominated by mature plants. Some species of preferred shrubs, like red-osier dogwood, chokecherry, and saskatoon, have a higher proportion of young plants; however their cover is limited. About half of the red-osier dogwood cover is young, and most of this young cover has been planted as part of the project with LICA, which is contributing positively to the score of this parameter. The presence of young plants is particularly important to ensure the longevity of woody communities since they are needed to replace the older individuals as they die off.
- **Browse (utilization of preferred woody plants by livestock or wildlife) is not occurring.** Wildlife appear to not be browsing in this section of the shoreline. All plants display their normal growth form and not the *flat-topped* or *umbrella-shaped* appearance of heavily used plants, leading to full score for this parameter.
- **The amount of live woody vegetation removal by means other than browsing animals is *high*.** This parameter includes the removal of parts of, or whole, trees and shrubs by beaver and/or human causes (such as clearing or cutting). A few beaver-cut stems were observed, though human-caused woody vegetation removal is much more extensive. Compared to more natural areas closer to the water's edge, over 50% of the of the woody vegetation within the site is estimated to have been removed historically, which has been sustained to maintain the park/recreation area.
- **Plant communities within the riparian area are *extensively* altered.** Alterations to plant communities are a deviation from the expected or native plant mix that would otherwise be there if certain disturbances had not happened. In comparison with nearby undeveloped sections of the shoreline, this reach is extensively altered – approximately 80% of the riparian vegetation is altered. Historically, large sections of the shoreline were likely cleared of riparian plants, possibly for grazing, or to offer recreational users a better access to the lake. The vegetation cover that replaced this cleared area is mainly disturbance-caused grasses that can withstand consistent mowing. Modifications to natural plant communities within riparian areas can diminish riparian performance and function.
- **Human-caused bare ground is limited, though structural alterations to the riparian area are *extensive*.** Less than 1% of the site is bare soil, and was found mostly along the water's edge due to natural drawdown, which does not contribute to a decrease in score. Recreational activities are not contributing to bare ground at this time, which is positive. However, recreational use has resulted in approximately 70% of the site being structurally altered. The paved walking and biking paths account for some of the alterations, as they prevent water from infiltrating the soil where they occur and contribute to runoff. Frequent mowing of the manicured lawn has also caused significant alterations,

and has contributed to soil compaction. In combination, the mowing and compaction make it difficult for native vegetation to establish. Soil structure changes can affect the hydrology of the site; when soil is compacted water infiltration rates decrease. Plants, especially deeply rooted trees and shrubs, help protect the soil from erosion during flooding or runoff events. Plants also help to bind soil in place and trap moving sediment, helping to build soils and prevent sediment from entering the lake. As a result of this lack of buffer, some bank erosion is occurring in some of the areas where mowing is occurring right to the water's edge. The structural alterations to the site are widespread, and they are considered **severe**, due to the permanent nature of the paved pathways, and the degree of compaction, leading to a low score for these parameters.

- **This waterbody is *not subjected to artificial water level change (i.e. removal or addition of water by human activities)*.** Naturally, lakes and wetlands experience cycles of higher and lower water. Native vegetation is typically adapted to respond to this variability, particularly by growing in areas of exposed shore when the water level goes down. At the time of the assessment, no artificial water level changes (i.e. drawdown, stabilization, or addition) were impacting the riparian area, although the water levels were very high at the time of the site visit, due to natural variability.

## How Can You Improve or Maintain Riparian Health?

Now that you know and understand the current health of your riparian area it is important to set management goals that will improve this state of health. Some riparian areas may take a long time to recover to a healthy state, but there is generally room for improvement in the short term.

### Priority Management Goals

From our observations, your riparian area would benefit most from the following management actions:

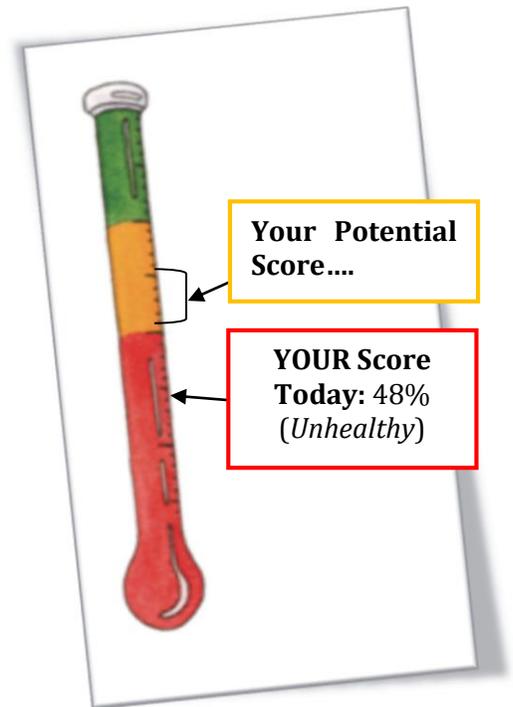
- Reduce invasive and disturbance-caused plant cover;
- Maintain existing tree and shrub cover, and promote regeneration of young plants, and;
- Create a riparian buffer strip along the shoreline .

Combining what we have observed with your own practical and intimate knowledge of the landscape will provide the best foundation for sound management planning. The shrubs that have been planted with the help of LICA is a great first step in improving riparian health.

### Riparian Management Strategies

To improve your riparian health, here are a few helpful **management strategies** to consider:

- **Monitor and control invasive plants.** Ensure that invasive plant control efforts avoid harm to desirable native plants. Minimizing ground disturbance will help reduce the potential for invasive plants to spread. Mowing and hand-pulling are also management techniques useful in riparian sites. Please contact Janice Boden, Assistant Agricultural Fieldman at M.D. of Bonnyville (Ph: 780-826-3951, Email: jboden@md.bonnyville.ab.ca) for further information. For additional information on invasive plant management and identification refer to the Alberta Invasive Species Council website: [www.abinvasives.ca](http://www.abinvasives.ca).
- **Promote natural recovery of your shoreline – give it a rest!** An easy way to improve the health of your lakeshore is to create a riparian buffer strip by leaving an un-mowed, undisturbed area near the water's edge. By simply leaving some grass uncut, desirable native plants can begin to re-establish in disturbed areas. Nature can be resilient if you give it a chance to make a comeback.
- **Continue planting native plants along your shoreline and naturalize low use areas of the park.** Manicured lawns along our lakefronts do little to filter runoff, stop erosion, or benefit fish and wildlife. Bring the riparian area back to life and health by replanting native plants. Recommended native plants for this area are balsam poplar, willows, and red-osier dogwood. Refer to the enclosed "*Growing Restoration*" and "*Planning Your Riparian Planting Project in Alberta*" Fact Sheets for more information.
- **Retain and protect natural vegetation along your lakeshore – the wider your natural riparian buffer, the bigger the benefits!** A healthy shoreline, with abundant native vegetation growing in the water (e.g. cattails) and along the shore (e.g. willows) benefits water quality and fish and wildlife habitat



and is your best insurance policy against erosion and property loss. Where possible, retain a riparian buffer of at least 30 meters in width, or protect any natural vegetation close to the shoreline where 30 meters no longer exists.

- **Prune don't remove! To keep your views of your lake, consider pruning rather than entirely removing trees and shrubs.** Native trees and shrubs such as aspen, balsam poplar, white spruce, birch and willows play a key role in maintaining lakeshore health, water quality and functioning fish and wildlife habitat. Trees and shrubs are nature's filter and sponge; their roots also keep your shoreline intact. Did you know, balsam poplar stands can increase the infiltration capacity of soil more than ten times compared to adjacent areas of lawn<sup>2</sup>!
- **Minimize new clearing of native riparian plants.** If you are planning a construction or recreational development project, reduce the footprint of your project as much as possible. Keeping as much of your lakeshore undisturbed and in a natural state as possible, will help protect your lake health into the long-term for all users of Jessie Lake.
- **Save time, money and your lake – keep it natural not neat!** Let natural debris such as fallen branches, leaves, driftwood and other natural organic matter accumulate in low use portions of the park area and along the shoreline. Natural debris adds organic matter and nutrients to your soil and helps to trap soil moisture and prevent against erosion.
- **“Soften” your shoreline and minimize creation of additional hardened surfaces.** Paved surfaces in the riparian area limit the moisture holding capacity of the floodplain and increase overland run-off of snowmelt and rainfall. Unfiltered runoff from paved surfaces is a contributor to degraded lake water quality. You can ‘soften’ your shoreline by letting natural debris wash ashore and by planting native plants in and around hardened structures.
- **Avoid the use of fertilizers and pesticides.** These products are easily washed into the lake after rainfall or snowmelt events, contributing to excess build-up of nutrients and chemical pollutants. Phosphates and nitrogen based fertilizers can contribute to excess algal growth in the lake and chemical pesticides can be toxic to fish and wildlife. Decaying algae blooms caused by fertilizer runoff uses up oxygen in the water and can contribute to late summer or winter fish kills.
- **Get to know your watershed.** Watershed activities may alter flow or water levels, impacting your riparian area.
- **Continue learning.** Watch for opportunities to learn more about riparian management techniques and your landscape at workshops, field days, and other events.

***Please note:** For a more specific Management Plan and more in depth analysis of your current management, further understanding of your operation's goals would be required. If this is something you are interested in, please contact us for more information.*

<sup>2</sup> Skorobogatov, A. 2014. Hydrological Functionality of Plants and Its Application to Stormwater Management. University of Calgary Master's of Environmental Design Thesis.

## ***Monitoring***

To track your progress toward improving the health of your landscape, we encourage you to document and take photographs of riparian sites where management changes are made. Monitoring may be as simple as re-taking photographs taken during our inventory or at other locations that are of interest to you.

To assess riparian health trends, we recommend that health assessments be repeated every three to five years. The field workbook ***Riparian Health Assessment for Lakes, Sloughs, and Wetlands*** is available from Cows and Fish. This workbook explains how to conduct a rapid survey to quickly check the health status of your riparian area.

Please contact Cows and Fish if you would like assistance in monitoring the long-term health of your riparian area. The Cows and Fish website ([www.cowsandfish.org](http://www.cowsandfish.org)) has additional information on riparian areas, community tools for dealing with riparian issues, and community and producer riparian success stories.

This report was prepared by the Cows and Fish Riparian Analyst team (Field Crew). For further information on any aspect of this summary, please contact:

### **Tonya Lwiwski**

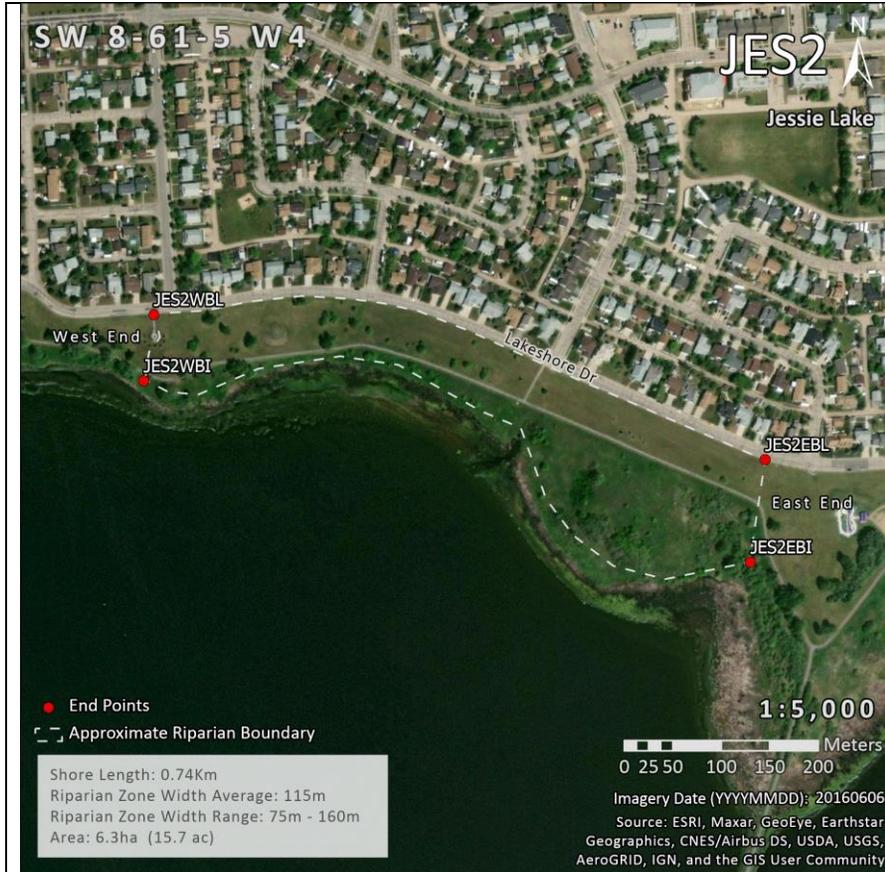
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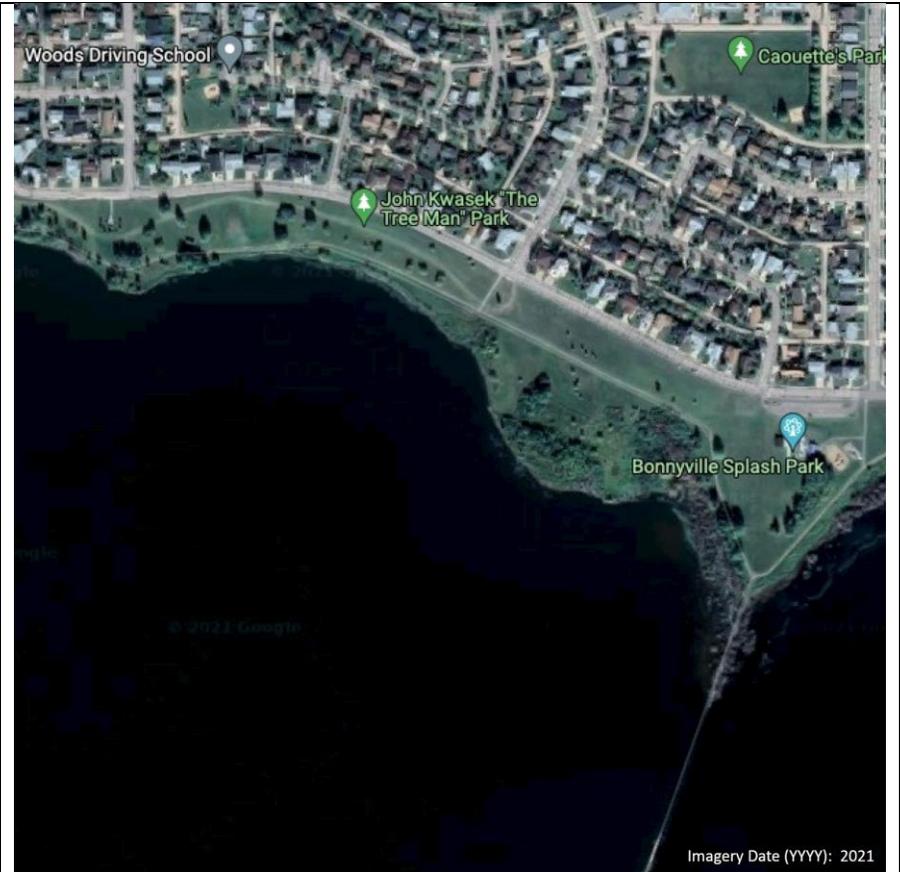
Email: [tlwiwski@cowsandfish.org](mailto:tlwiwski@cowsandfish.org)

## Appendix A – Aerial Photograph Comparisons



**Air Photo Date: Circa 2015**

**Air photo with the boundary of the riparian site. Mapping software uses an older image, which does not show recent flooding in the area.**



**Air Photo Date: Circa 2021**

**More current air imagery from Google Earth showing the recent flooding in the area. (See air photo on the left for site boundaries)**

## Benchmark Photography



T. Dupuis, RHIP02JES003

**JES2EBI.** Southeast end, north view. Some mature willows in foreground have been drowned out due to increased water levels in recent years. In the background, there is excellent native vegetation, protecting the shoreline at this location.



T. Dupuis, RHIP02JES015

**JES1WBI.** Southwest end, east view. Mowing occurs to close to the water's edge along the western parts of the assessed riparian area.

## Additional Photos of Your Riparian Area



T. Dupuis, RHIP02JES022

**JES2 A.** A variety of native grasses, forbs, trees, and shrubs provide vegetative cover to the shoreline within the east part of the riparian area. This helps trap sediment and stabilize the shores.



T. Dupuis, RHIP02JES024

**JES2 B.** Native aspen, where present, are displaying good age class structure with both young and mature trees present. Overall, this site could benefit from more cover of young preferred woody species like aspen and willows. It is important to have young trees to take over when mature trees and shrubs die off.



T. Dupuis, RHIP02JES025

**JES2 C.** In some locations, mowing is occurring within 1 meter of the water's edge. Leaving a larger natural buffer will allow native plants to establish and enhance riparian function.



T. Dupuis, RHIP02JES026

**JES2 D.** In this location where mowing does not occur to the water's edge, a small vegetation buffer has been allowed to thrive. Young willows are beginning to establish, and the vegetation overall is taller than the mowed area, which will trap more sediment and nutrients as water travels overland to the lake. The deep-binding roots of the willows and other native woody vegetation in this buffer will help protect the bank from wave action and other erosion.



T. Dupuis, RHIP02JES027

**JES2 E.** A paved recreation pathway, along with surrounding mowed lawn, leads to most of this riparian area being highly compacted. Compaction can decrease water infiltration, increase overland flow, and limit vegetation from establishing.



T. Dupuis, RHIP02JES020

**JES2 F.** The back edge of this riparian area is located along a road. Much of the area consists of a manicured lawn with mature horticultural and native trees in background.

## Appendix B – Riparian Plant Information (JES2)

Category	Species Common Name (Scientific Name)	Plant Status <sup>1</sup>	% Canopy Cover <sup>2</sup>
<b>Trees</b>	aspen ( <i>Populus tremuloides</i> )	native	3.0
	balsam poplar ( <i>Populus balsamifera</i> )	native	3.0
	cottonwood ( <i>Populus spp.</i> )	unknown, not unique	20.0
	crabapple ( <i>Malus spp.</i> )	<i>introduced</i>	0.5
	green ash ( <i>Fraxinus pennsylvanica</i> )	native	3.0
	Manitoba maple ( <i>Acer negundo</i> )	native	10.0
	mountain-ash ( <i>Sorbus spp.</i> )	unknown, not unique	0.5
	white spruce ( <i>Picea glauca</i> )	native	0.5
<b>Shrubs</b>	beaked willow ( <i>Salix bebbiana</i> )	native	3.0
	choke cherry ( <i>Prunus virginiana</i> )	native	0.5
	common caragana ( <i>Caragana arborescens</i> )	<i>invasive, introduced</i>	0.5
	common wild rose ( <i>Rosa woodsii</i> )	native	0.5
	crack willow ( <i>Salix fragilis</i> )	<i>introduced</i>	0.5
	false mountain willow ( <i>Salix pseudomonticola</i> )	native	0.5
	flat-leaved willow ( <i>Salix planifolia</i> )	native	0.5
	prickly rose ( <i>Rosa acicularis</i> )	native	0.5
	red-osier dogwood ( <i>Cornus stolonifera</i> acc. <i>Cornus sericea</i> )	native	3.0
	sandbar willow ( <i>Salix exigua</i> )	native	10.0
	Saskatoon ( <i>Amelanchier alnifolia</i> )	native	0.5
	tatarian honeysuckle ( <i>Lonicera tatarica</i> )	<i>introduced</i>	0.5
<b>Grasses (and grass-like species)</b>	awned sedge ( <i>Carex atherodes</i> )	native	3.0
	creeping spike-rush ( <i>Eleocharis palustris</i> )	native	0.5
	fowl bluegrass ( <i>Poa palustris</i> )	native	0.5
	golden sedge ( <i>Carex aurea</i> )	native	0.5
	graceful sedge ( <i>Carex praegracilis</i> )	native	0.5
	great bulrush ( <i>Scirpus acutus</i> acc. <i>Schoenoplectus acutus</i> )	native	0.5
	Kentucky bluegrass ( <i>Poa pratensis</i> )	<i>disturbance, introduced</i>	80.0
	Nuttall's salt-meadow grass ( <i>Puccinellia nuttalliana</i> )	native	0.5
	quack grass ( <i>Agropyron repens</i> acc. <i>Elymus repens</i> )	<i>disturbance, introduced</i>	10.0
	reed ( <i>Phragmites australis</i> )	native	0.5
	reed canary grass ( <i>Phalaris arundinacea</i> )	native	0.5
	sedge ( <i>Carex spp.</i> )	unknown, not unique	0.5
	slough grass ( <i>Beckmannia syzigachne</i> )	native	0.5
smooth brome ( <i>Bromus inermis</i> )	<i>disturbance, introduced</i>	10.0	

	three-square rush ( <i>Scirpus pungens</i> acc. <i>Schoenoplectus pungens</i> )	native	0.5
	water sedge ( <i>Carex aquatilis</i> )	native	0.5
	wire rush ( <i>Juncus balticus</i> )	native	3.0
	woolly sedge ( <i>Carex lanuginosa</i> )	native	0.5

<b>Forbs (broad-leaf plants)</b>	Arctic butterweed ( <i>Senecio conterminus</i> )	native	0.5
	black medick ( <i>Medicago lupulina</i> )	<i>disturbance, introduced</i>	0.5
	Canada goldenrod ( <i>Solidago canadensis</i> )	native	0.5
	Canada thistle ( <i>Cirsium arvense</i> )	<b>invasive, introduced</b>	0.5
	celery-leaved buttercup ( <i>Ranunculus sceleratus</i> )	native	0.5
	common cattail ( <i>Typha latifolia</i> )	native	0.5
	common dandelion ( <i>Taraxacum officinale</i> )	<i>disturbance, introduced</i>	40.0
	common fireweed ( <i>Epilobium angustifolium</i> )	native	0.5
	common horsetail ( <i>Equisetum arvense</i> )	native, <b>poisonous</b>	0.5
	common plantain ( <i>Plantago major</i> )	<i>disturbance, introduced</i>	0.5
	common tansy ( <i>Tanacetum vulgare</i> )	<b>invasive, introduced, poisonous</b>	0.5
	common yarrow ( <i>Achillea millefolium</i> )	native	0.5
	cow parsnip ( <i>Heracleum lanatum</i> )	native	0.5
	cream-colored vetchling ( <i>Lathyrus ochroleucus</i> )	native	0.5
	curled dock ( <i>Rumex crispus</i> )	<i>introduced</i>	0.5
	Fremont's goosefoot ( <i>Chenopodium fremontii</i> )	native	0.5
	hemp-nettle ( <i>Galeopsis tetrahit</i> )	<i>disturbance, introduced</i>	0.5
	marsh hedge-nettle ( <i>Stachys palustris</i> )	native	0.5
	perennial sow-thistle ( <i>Sonchus arvensis</i> )	<b>invasive, introduced</b>	0.5
	seaside buttercup ( <i>Ranunculus cymbalaria</i> )	native	0.5
	silverweed ( <i>Potentilla anserina</i> )	<i>disturbance, native</i>	0.5
	sweet clover ( <i>Melilotus spp.</i> )	<i>introduced</i>	0.5
	white clover ( <i>Trifolium repens</i> )	<i>disturbance, introduced</i>	0.5
	white cockle ( <i>Silene pratensis</i> acc. <i>Silene latifolia</i> )	<b>invasive, introduced</b>	0.5
wild mint ( <i>Mentha arvensis</i> )	native	0.5	
wild vetch ( <i>Vicia americana</i> )	native	0.5	
yellow avens ( <i>Geum aleppicum</i> )	native	0.5	

<sup>1</sup> Plant status is designated by Cows and Fish in association with Alberta Public Lands and the Alberta Weed Control Act.

<sup>2</sup> Based on visual estimates of the amount of ground the canopy of the plant covers. The percent cover values presented are the mid-values for the following ranges: 0.5=less than 1%; 3.0=1%-5%; 10.0=5%-15%; 20.0=15%-25%; 30.0=25%-35%; 40.0=35%-45%; 50.0=45%-55%; 60.0=55%-65%; 70.0=65%-75%; 80.0=75%-85%; 90.0=85%-95%; 97.5=greater than 95%.

## **Appendix C – Riparian Health Score Sheet Categories for Lakes and Wetlands**

Each riparian health parameter is rated according to conditions observed on the site at the time of evaluation. Parameters are assessed using ocular estimates by trained practitioners. The parameter breakout groupings and point weightings were developed by a collaboration of riparian scientists, fisheries biologists, range professionals, and land managers. Some riparian health parameters will not apply on all sites. For example, sites without potential for woody species are not rated on questions concerning trees and shrubs. On severely disturbed sites, vegetation potential can be difficult to determine. On these sites, clues to potential may be sought on nearby sites with similar landscape position.

### **1. Vegetative Cover of Site**

- 6** = More than 95% of the riparian area is covered by plant growth.
- 4** = 85% to 95% of the riparian area is covered by plant growth.
- 2** = 75% to 85% of the riparian area is covered by plant growth.
- 0** = Less than 75% of the riparian area is covered by plant growth.

### **2a. Total Canopy Cover of Invasive Plant Species**

- 3** = No invasive plants (weeds) on the site.
- 2** = Invasive plants present with total canopy cover less than 1% of the site.
- 1** = Invasive plants present with total canopy cover between 1% and 15% of the site.
- 0** = Invasive plants present with total canopy cover more than 15% of the site.

### **2b. Density/Distribution of Invasive Plant Species (Table 1)**

- 3** = No invasive plants (weeds) on site.
- 2** = Invasive plants present with density/distribution in categories 1, 2 or 3.
- 1** = Invasive plants present with density/distribution in categories 4, 5, 6, or 7.
- 0** = Invasive plants present with density distribution in categories 8 or higher.

**Table 1.** Density/distribution of invasive plant species.

CLASS	DESCRIPTION OF ABUNDANCE	DISTRIBUTION PATTERN
0	No invasive plants on the site	
1	Rare occurrence	•
2	A few sporadically occurring individual plants	•   •   •   •
3	A single patch	•••
4	A single patch plus a few sporadically occurring plants	•••   •   •   •
5	Several sporadically occurring plants	•   •   •   •   •
6	A single patch plus several sporadically occurring plants	•••   •   •   •   •
7	A few patches	•••   •••   •••
8	A few patches plus several sporadically occurring plants	•••   •••   •   •   •   •••
9	Several well-spaced patches	•••   •••   •••   •••
10	Continuous uniform occurrence of well-spaced plants	••••••••••••••••
11	Continuous occurrence of plants with a few gaps in the distribution	••••••••••••••••
12	Continuous dense occurrence of plants	••••••••••••••••
13	Continuous occurrence of plants associated with a wetter or drier zone within the site	••••••••••••••••

### 3. Disturbance-Caused Undesirable Herbaceous Species

- 3 = Less than 5% of the site covered by disturbance-caused undesirable herbaceous species.
- 2 = 5% to 25% of the site covered by disturbance-caused undesirable herbaceous species.
- 1 = 26% to 50% of the site covered by disturbance-caused undesirable herbaceous species.
- 0 = More than 50% of the site covered by disturbance-caused undesirable herbaceous species.

### 4. Preferred Tree and Shrub Establishment and Regeneration

- (N/A will appear in the Riparian Health Score Table if the site lacks potential for preferred trees or shrubs)
- 6 = More than 15% of the total canopy cover of preferred trees/shrubs is seedlings and/or saplings.
  - 4 = 5% to 15% of the total canopy cover of preferred trees/shrubs is seedlings and/or saplings.
  - 2 = Less than 5% of the total canopy cover of preferred trees/shrubs is seedlings and/or saplings.
  - 0 = Preferred tree/shrub seedlings and saplings absent.

### 5a. Livestock or Wildlife Browse Utilization of Available Preferred Trees and Shrubs

- (N/A will appear in the Riparian Health Score Table if the site lacks potential for preferred trees or shrubs)
- 3 = None (0% to 5% of available 2<sup>nd</sup> year and older leaders of preferred species are browsed).
  - 2 = Light (5% to 25% of available 2<sup>nd</sup> year and older leaders of preferred species are browsed).
  - 1 = Moderate (25% to 50% of available 2<sup>nd</sup> year and older leaders of preferred species are browsed).
  - 0 = Heavy (More than 50% of available 2<sup>nd</sup> year and older leaders of preferred species are browsed).

### 5b. Live Woody Vegetation Removal Other Than Browsing (i.e. beaver use/human clearing of trees and/or shrubs)

- (N/A will appear in the Riparian Health Score Table if the site lacks potential for trees or shrubs)
- 3 = None (0% to 5% of live woody vegetation expected on the site is lacking due to cutting and/or removal by beaver).
  - 2 = Light (5% to 25% of live woody vegetation expected on the site is lacking due to cutting and/or removal by beaver).
  - 1 = Moderate (25% to 50% of live woody vegetation expected on the site is lacking due to cutting and/or removal by beaver).
  - 0 = Heavy (More than 50% of live woody vegetation expected on the site is lacking due to cutting and/or removal by beaver).

### 6. Human Alteration of Site Vegetation

- 3 = Less than 5% of site vegetation is altered by human causes.
- 2 = 5% to 15% of site vegetation is altered by human causes.
- 1 = 15% to 35% of site vegetation is altered by human causes.
- 0 = More than 35% of site vegetation is altered by human causes.

### 7a. Human Alteration of Site Physical Structure

- 12 = Less than 5% of the site is physically altered by human causes.
- 8 = 5% to 15% of the site is physically altered by human causes.
- 4 = 15% to 35% of the site is physically altered by human causes.
- 0 = More than 35% of the site is physically altered by human causes.

### 7b. Severity of Human-Caused Alteration of Site Physical Structure

- 3 = **No physical alterations** to the site by human causes.
- 2 = Human alterations to the physical site are **slight** in effect.
- 1 = Human alterations to the physical site are **moderate** in effect.
- 0 = Human alterations to the physical site are **severe** in effect.

### 8. Human-Caused Bare Ground

- 6 = Less than 1% of the site is human-caused bare ground.
- 4 = 1% to 5% of the site is human-caused bare ground.
- 2 = 5% to 15% of the site is human-caused bare ground.
- 0 = More than 15% of the site is human-caused bare ground.

**9. Degree of Artificial Removal/Addition of Water (Table 2)**

**9** = The waterbody is 'Not Subjected' to artificial water removal/addition.

**6** = Degree of artificial water removal/addition is 'Minor'.

**3** = Degree of artificial water removal/addition is 'Moderate'.

**0** = Degree of artificial water removal/addition is 'Extreme'.

**Table 2.** Categories of Lentic Water Removal Severity.

CATEGORY	DEFINITION
Not Subjected	The waterbody is not subjected to artificial drawdown.
Minor	The waterbody is subject to no more than minor artificial water level change. The shore area remains vegetated and withdrawal of water is limited or slow enough that vegetation is able to maintain growth and prevent exposed soil. A relatively narrow band affected by the water level fluctuation may support only annual plants.
Moderate	The waterbody is subject to moderate quantities, speed and/or frequency of artificial water level change. Where water is removed, it is done in a way that allows pioneer plants to vegetate at least half of the exposed area resulting from drawdown. Where water is added, some flooding may occur at levels or times not typical to the area/season.
Extreme	The waterbody is subjected to extreme changes in water level due to volume (extent), speed and/or frequency of artificial water addition or removal. Frequent or unnatural levels of flooding occur where water is added, including extensive flooding into riparian and/or upland areas; or no natural annual drawdown is allowed to occur. In extreme artificial drawdown situations, a wide band of exposed bottom remains unvegetated.