

This is an introduction and overview of the basics for riparian health assessment as done by Cows and Fish. Key areas we will focus on are:

- What is riparian health
- Why evaluate riparian health
- When to do riparian health assessment
- What to look for to determine healthy riparian area (or not)

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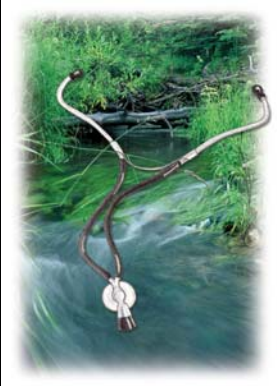
Supporting reference material:

- Caring for the Green Zone: User's Guide to Health* (booklet)
- Invasive and Disturbance-caused Plants in Riparian Areas* (factsheet)
- Invasive and Disturbance-caused Plants List* (factsheet)
- Riparian Health Assessment and Inventory* (factsheet)

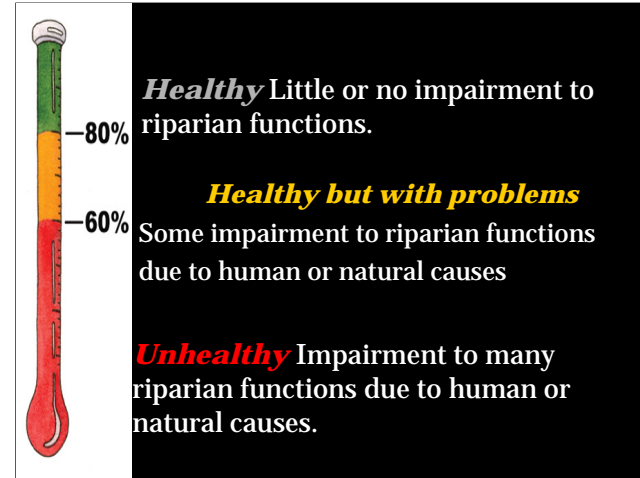


Before we get going with learning about the tool of riparian health assessment we need to always be reminded about the role riparian areas play on the landscape. The most important aspect of riparian areas is the ecological integrity of that riparian area which allows for those products, goods and services as a by product. That ecological integrity within a riparian zone is founded in the functions that riparian area provides. Things like trapping sediment is linked to water quality, recharging groundwater is linked to water quantity, primary productivity is linked to livestock forage options.

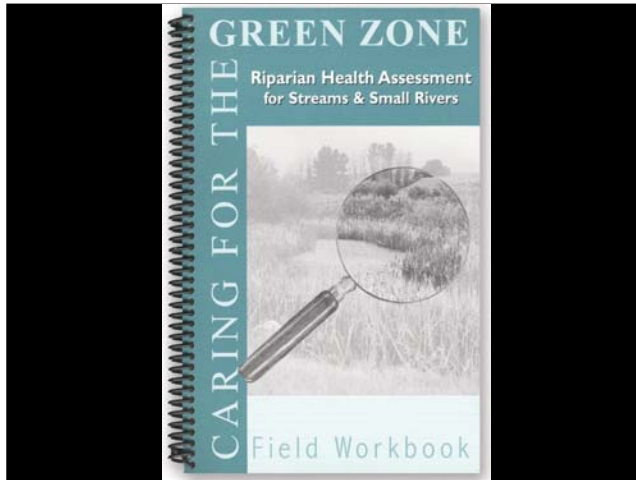
What is Riparian Health?



The concept of riparian health is a measurement of how well a riparian zone is performing these functions or the degree to which they are impaired. The end result can be an indication of the risk to our overall environment. It's kind of like you or me going for a check-up at your physicians – your circulation, respiration, etc are measured with parameters (like blood pressure, heart rate, breathing) to provide the physician with clues to the status of your health. In riparian health we measure ecological functions using a set of parameters to determine riparian condition.



Riparian health will fall into one of the three categories: A riparian area is healthy when all of the key functions are intact. Riparian areas that have most of the functions intact but there may be a few that are impaired fall into the healthy but with problems category. The last category includes polygons where most of the riparian functions have been lost, or are seriously impaired.



In order to determine how healthy or unhealthy a riparian area is we need a tool to assess or monitor these systems. Cows and Fish uses a standardized tool that is widely accepted throughout the province called: Riparian health assessment or inventory . There are currently three methods that can be used for assessing riparian health on the ground: a checklist which is very simple and coarse with a series of yes/no questions. It is designed for anyone to pick up and begin to get a feel for health. On the other end of the spectrum is riparian health inventory which is much more detailed and best used for watershed planning and baseline monitoring data. The in between and most popular for awareness and education is riparian health assessment which I'll talk about today.

Tool used for variety of land uses

There are field workbooks for Lotic (flowing) waterbodies & Lentic (non-flowing) waterbodies. They are all slightly different but the goal is the same, create some common language about riparian health, so that we may understand the function.

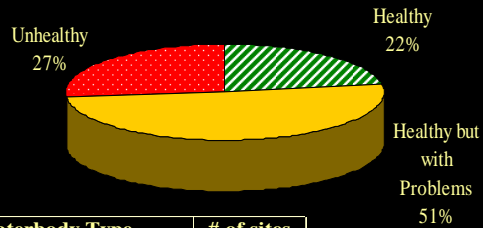
Why Evaluate Riparian Health?

- ✓ *Creates awareness*
- ✓ *Builds a common language*
- ✓ *Monitors progress*
- ✓ *Identify riparian issues*
- ✓ *Highlight good news stories*



Measuring the health and function of riparian areas is beneficial for many reasons from community involvement, capacity building, and monitoring

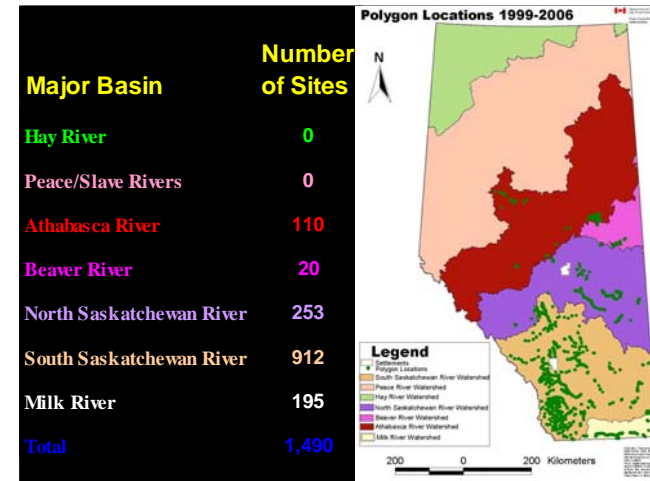
Riparian Health in Alberta 1997-2006



Waterbody Type	# of sites
Streams & Small Rivers	904
Large Rivers	402
Lakes and Wetlands	168
Springs and Seeps	16
Total	1,490

Average site length: 1 km

Here is the state of health for riparian areas we've worked on since 1997 to 2006. Note we collect this information in watershed where we are invited to collect it. The sites we do are mostly representative—sites generally represent a longer, similar area on that waterbody. Majority of this data is derived from riparian health inventories (detailed data collection) but is supported with field-based riparian health assessment as well. This only includes the most recent data for any site. Up to 2008 we can add approximately another 300 sites and pie chart does not change that much.



Province-wide and by major basin the majority of information has been captured in the south but the central and north-central regions are also working at it. Now these are only the sites we've done up until 2006. First Nations communities we have collected riparian health inventory information for include: Driftpile, Pikani, Siksika. We have also been in contact with others who are at different stages of the process.

When to do RHA

- June to September
- Close to normal flow conditions
- Either before or after grazing use

BE CONSISTENT!



- When plants are in the growth phase and can be identified
- When flow conditions are close to normal – should not do during peak spring run-off or immediately after a major storm
- Either before or after grazing use
- Ensure followup assessments follow the same timing (every 5 years or so and within 2 weeks is what we recommend)



Avoid going in too early or too late when the plants generally have not had time to green up sufficiently (like May) or have already died off (like October) to identify properly

Picking your site

a) Goal of assessment

- Entire length
- Critical point
- Representative



Site selection will depend on a number of factors and variables.

Figure out what you want to achieve with your assessment.

-If you have enough time or the stream length is short you might consider assessing the entire stream length

-If time and distance are impediments you can either:

-pick a critical site, one that may be sensitive, or already has some specific problems, OR

- choose a representative site that is typical of a much longer reach of stream and can be used as an estimate of overall health in the pasture

Critical Site

-Problem spots indicating management concern

-Sensitive area including key habitats for fish or wildlife

-Places that may respond quickly to a management change

-Shorter reaches, easy to monitor



A Critical site may be one of particular interest for some reason.

Representative Site

-Overall impression for a long stretch of stream

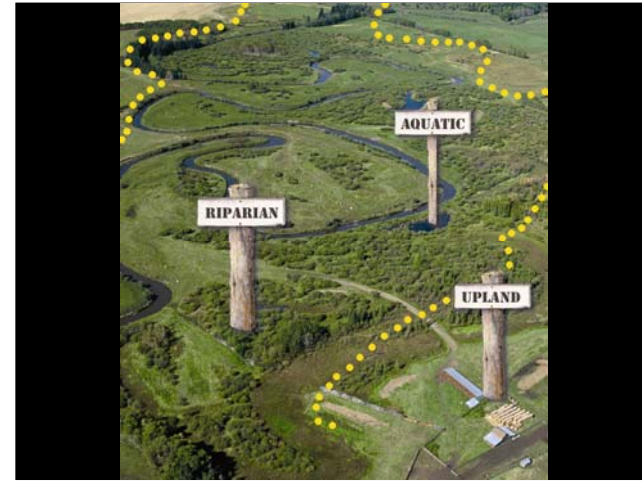
-Broader measurement of management actions or choices

-Broader measurement of key indicators like weeds or disturbance species

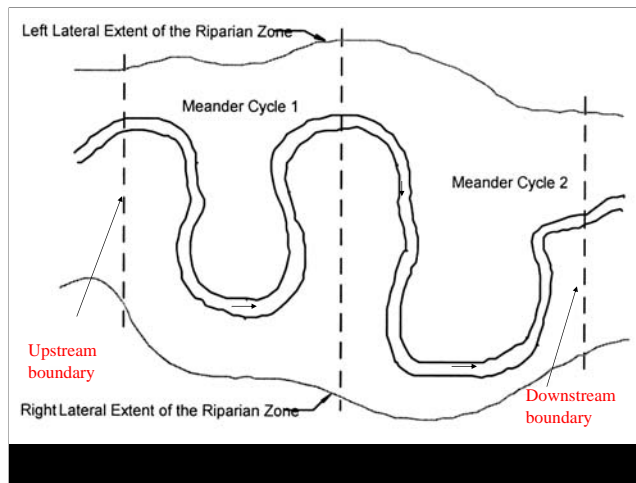
-Longer reaches for more comprehensive monitoring



A representative site is one that can be used to get an overall picture of a longer section of stream or shoreline.



To select a site that is representative, become familiar with the entire length of stream and riparian area. Pick a short reach that will represent the average condition of a longer stretch of stream. Vegetation use/utilisation, channel characteristics and stream gradient in the representative reach should all reflect what is found in and is common to a longer reach.



A representative site needs to be:

- long enough to capture the variability of inside and outside bends (minimum of two meander cycles),
- large enough to be representative of the plant communities and management reflected and wide enough to encompass the lateral extent of the riparian area.

The upper and lower boundaries should be easily identifiable and findable for repeat assessments (e.g. fencelines, rock outcrop, some distance from a bridge, tributary stream entering)



Our memories are imperfect so take pictures from the upper and lower boundaries, of the upper and lower boundaries and of anything else of significance within the site.



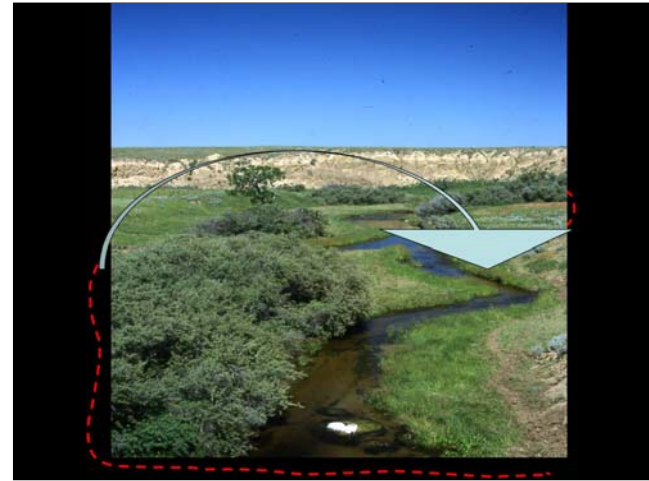
On most streams and small rivers both sides of the waterbody need to be considered. Both sides of the stream should be assessed together unless the stream is an ownership boundary or there is significantly different management on either side.



A site or polygon should remain within one management unit and not cross fencelines for two reasons. 1) ownership and confidentiality 2) different management



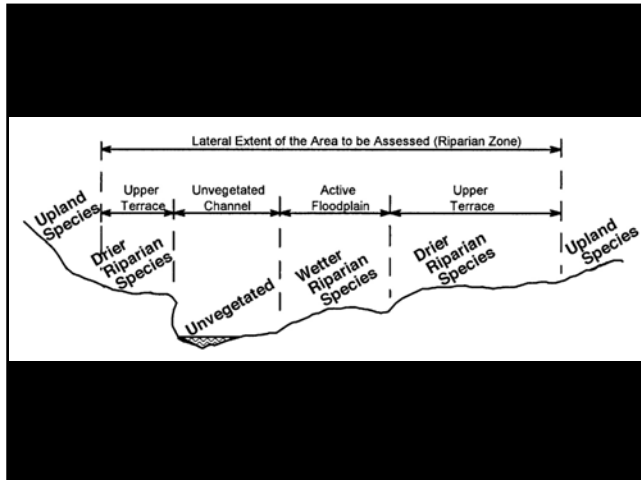
Use air photos and county maps to help determine and document boundaries and different management



The width to be assessed starts at the water where persistent emergent vegetation exists. This is the inner boundary.

The outer boundary depends on:

- Vegetation changes from water loving to more dryland species
- Topographic changes like terraces, cutbanks or steep banks that signal a clear line between greener, more lush or more dense vegetation and the upland
- Old channels or meander scars exist that show movement patterns of the stream and may still indicate a high ground water table
- Level to which flood water reaches seasonally or on a regular basis, as high water breaks out of the channel



Sometimes the line is not easily defined. When in doubt it is better to overestimate the width than underestimate it.

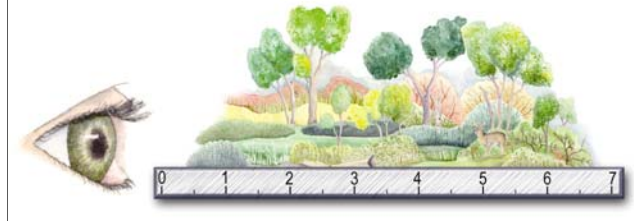


Use a combination of clues like flood debris, bankfull width and floodprone area, historical accounts of flood widths, topography and vegetation to help determine where the lateral extent of the riparian area is. Lengths and widths should be estimated using pacing or eyeball and documented on your form.

Site Selection Summary

- Decide on goal of assessment
- Walk the area and use air photos to get an idea of what the pasture looks like
- Identify an upper and lower end boundary with a minimum distance of 200m and 2 meander cycles
- Determine lateral extent of riparian area for width to assess using topography, vegetation, flood indicators

Getting Started



There are 11 questions to answer related to components of the site you have selected (on a lotic system). Most of the characteristics rated in health evaluation are based on measurements using your eyes and your judgment. The eye is a remarkable measuring device. It may seem imprecise, but with training and practice, the methods are repeatable and accurate. Let's see if we can get you doing some ocular estimates by introducing you to the canopy cover concept.....

Understanding the “canopy cover concept”



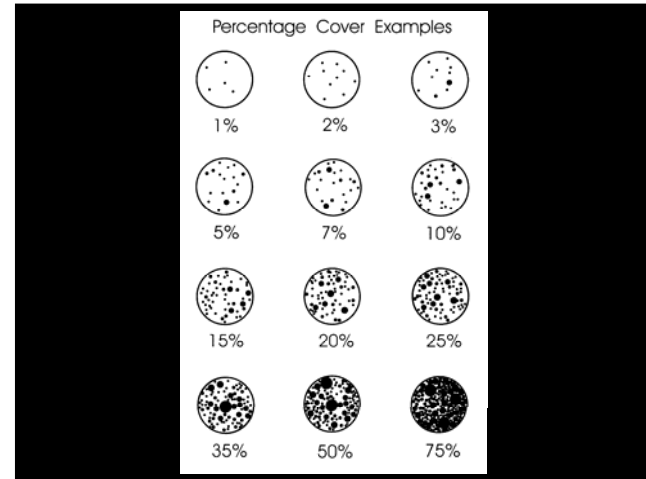
A major concept in answering the questions on the riparian health assessment involves determining canopy cover. This means determining how much of the study area is covered by something (i.e. the amount of area covered by invasive weeds, or bare ground). Canopy cover of vegetation is the amount of ground that is covered by the canopy of a particular plant or group of plants. When looking at the canopy cover of an plant, draw a line around the entire plant, connecting the leaf tips and project that area onto the ground. Like an umbrella.



In some cases, you can look ‘up’ to determine the area of influence. In this case, draw an imaginary line around the edge of the tree cover. The area of influence of these trees is about 50%.



By looking at the ground, parameters such as the canopy cover of invasive or disturbance plants, or bare ground can also be determined. In this example, the amount of influence that this flower has in this image is about 5-10% (I believe it is 7.5%).



There are charts like this one that can be used to help practice tuning your eye. These are just guidelines and you could have more or less than any shown value.

Riparian Health Parameters (streams and small rivers)

Vegetation

- Vegetation cover
- Invasive plants
- Disturbance-caused plants
- Tree/Shrub establishment & regeneration
- Tree/Shrub utilisation
- Dead/Decadent woody Material

Physical (Soil/hydrology)

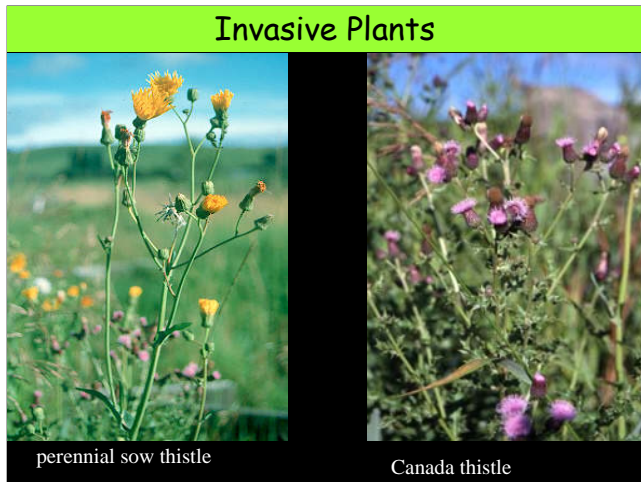
- Root mass protection
- Bare ground (human caused)
- Alterations to banks (human caused)
- Alterations to riparian area [beyond banks] (human-caused)
- Channel incisement

Near the beginning of this presentation we talked about parameters for assessing riparian health. These are the ones we look at for streams and small rivers. There are slightly different ones for large rivers as well as lakes, wetlands, ponds, and sloughs.

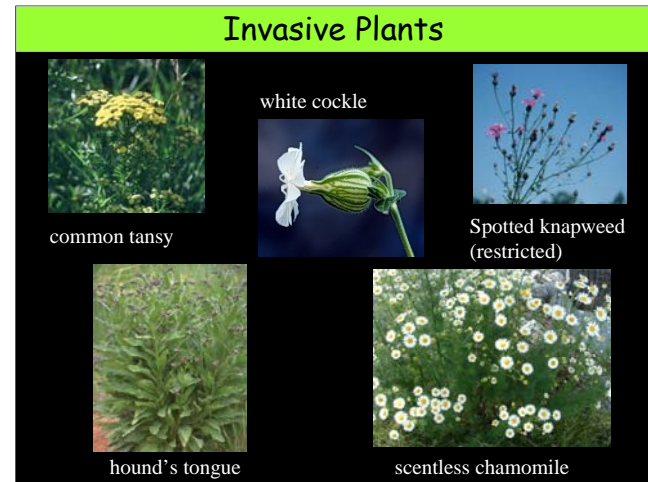
Vegetative Cover



Vegetative cover. This how much of the ground is covered by any sort of vegetation, of any life form. Vegetation is an important indicator of riparian health and it is the main ingredient for many of the other functions.



Once we've identified the overall vegetation cover we start to look at some particular indicators such as invasive plants. For riparian health invasive plants are classified as those that are considered noxious or restricted through the Alberta Weed Act and have highly aggressive tendencies in riparian areas and do not perform functions adequately. The two most common invasive plants in the province are Canada thistle and perennial sow thistle.



But plants like scentless chamomile, leafy spurge, common tansy, hound's tongue, toadflax (yellow and dalmation), white cockle, bladder campion, russian olive, caragana and knapweed also fall into this category. Invasive species generally include restricted and noxious weeds because they are aggressive, hard to get rid of, and are poor at performing riparian functions, like providing deep binding root mass. There is a list on page 87 of the workbook that describes which species to include in this category.



Disturbance-Caused Plants

smooth brome

common dandelion

clovers

Disturbance-caused plants are ones that increase under soil disturbance or when the native plant community becomes stressed (like with over grazing). Some common disturbance-caused plants are dandelion, smooth brome, clovers, plantain, timothy, quackgrass.



Disturbance-Caused Plants

Encroach into high-use areas

Displace native plants

Poor bank stabilisers

Because disturbance-caused plants tend to have shallow roots, they can establish quickly in less than ideal conditions and out-compete native plants under stress. Their shallow roots also do not do a very good job of resisting erosion and holding banks together during floods.....



Preferred trees and shrubs are those that are the best indicators of riparian health. They are ones that are unique, somewhat sensitive to pressure, and sometimes the most palatable for livestock and wildlife. Species like willow, red-osier dogwood, Saskatoon, choke cherry, balsam poplar are considered *preferred*.

Tree & Shrub Regeneration



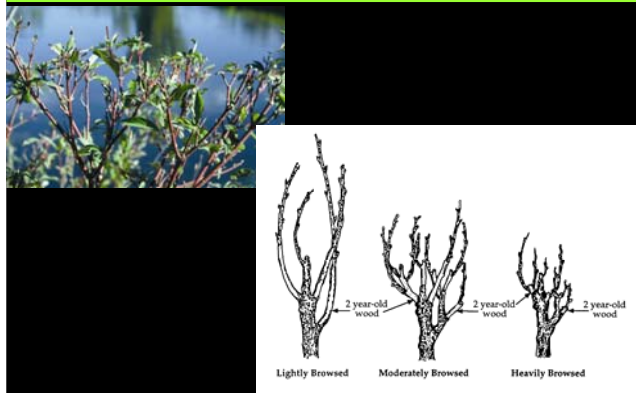
This parameter is measured by a proportion of the woody plant community that is seedlings and saplings. If the canopy cover of seedling and saplings is 15% of the total canopy cover of all trees and shrubs, this indicates successful regeneration and potential for establishment for the future is good.

A high proportion of seedlings and saplings in the woody plant community allows for recruitment and establishment/replacement of older stands.



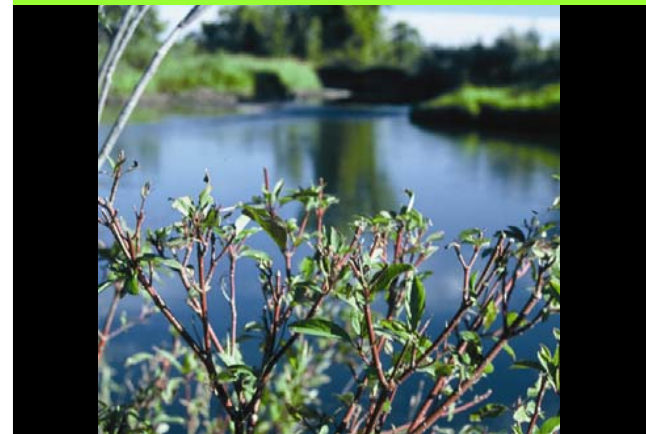
There are certain woody species that we exclude from this parameter because their presence on a site is generally not hindered by disturbance or heavier use. Such species include rose, buckbrush (snowberry), hawthorn, Russian Olive, common caragana etc. They are, however, included as vegetation cover and can be assessed for dead and decadence.

Tree & Shrub Utilization of Preferred Species



Utilisation on preferred trees and shrubs is assessing removal of woody material that could hinder regrowth and successful regeneration of these important woody species. To determine browse, we look at the second year and older growth.

Tree & Shrub Utilization



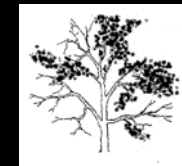
Also look for growth form indicators like hedged or flat-topped appearance. Other human activities like cutting or pruning or mowing can also create this appearance and should be considered as utilisation using the workbooks we'll use in this workshop.

Tree & Shrub Utilization of Preferred Species



and umbrella, or mushroom-shaped mature shrubs that can be caused by rubbing or trampling or browse. Again, those other human impacts could create the same result and should be considered here.

Dead / Decadent Woody Plants



In order to determine if a healthy tree and shrub community exists, we also look at the % of dead + decadent woody cover. A high value suggest there is a dying woody community and this is a concern especially where there are limited young individuals to replace older ones.

Dead and decadence applies to those standing trees that either are completely dead or that have more than 30% of the canopy with dead branches.



All of the parameters need to be assessed throughout the entire site so we can't sit in one spot, must keep moving.



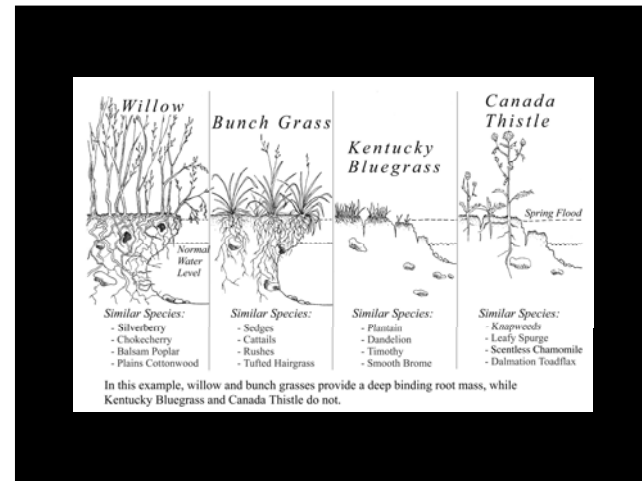
On streams and rivers, the next question refers to the proportion of streambanks that have deep binding root mass. Different size streams can be held together by a variety of life form types.

Streambank Root Mass Protection

System Size	Trees	Preferred Shrubs	Other Shrubs	Native Grasses Forbs	Introduced Grass	Disturbance Species	Weeds
Small River	E	E/G	F/P	F/P	P	P	P
Large Stream	E	E	F/P	F	P	P	P
Small stream	E	E	G	G	P	P	P
Intermittent Stream	E	E	E	E	G/F	P	P

Effectiveness of vegetation for root mass protection

The larger the system, the larger the material needs to be to hold it together. A combination of trees, shrubs and native grasses will provide the best ability for function on any stream



A good diagram to show how banks can be changed with a shift from good deep binding root species (on the left) to poor ones (on the right).

Streambank Root Mass Protection

Small rivers: evaluate up to 10m on the floodplain

Large streams: evaluate up to 5m on the floodplain

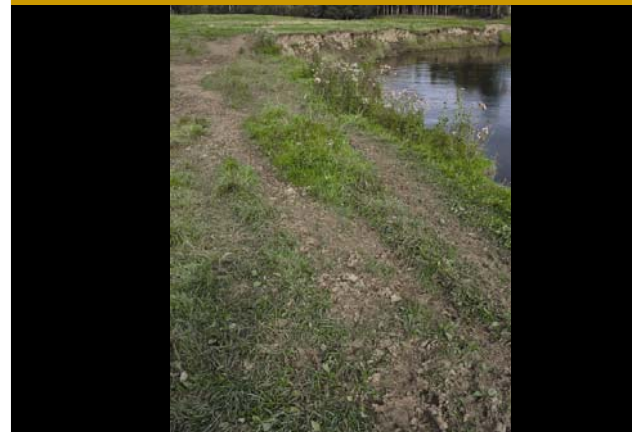
Small streams: evaluate up to 3m on the floodplain

Intermittent streams: evaluate up to 1m on the floodplain



This is based on percentage of a specific area of the site that has or does not have plants with deep, binding roots that are effective at binding the banks and promoting streambank stability. The larger the stream or small river, the wider the area that needs to have these deep binding species.

Human-caused Bare Ground



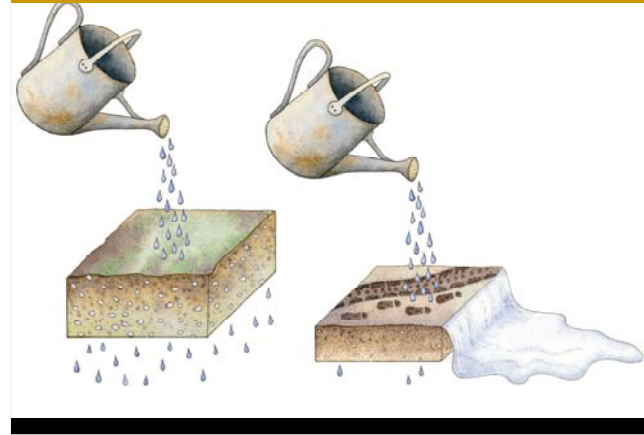
Bare ground is susceptible to erosion and invasion by disturbance and invasive plants. Human-caused bare ground is that created by human activity on a site or that of our agents (livestock, vehicles, off-highway vehicles) beyond what naturally may occur there (eg. From flood deposition). The impacts of human-caused bare ground are manageable. Human-caused bare ground is determined using the same canopy cover concept but instead of looking at how much is covered by vegetation, looking at how much is not.

Alterations to Streambanks

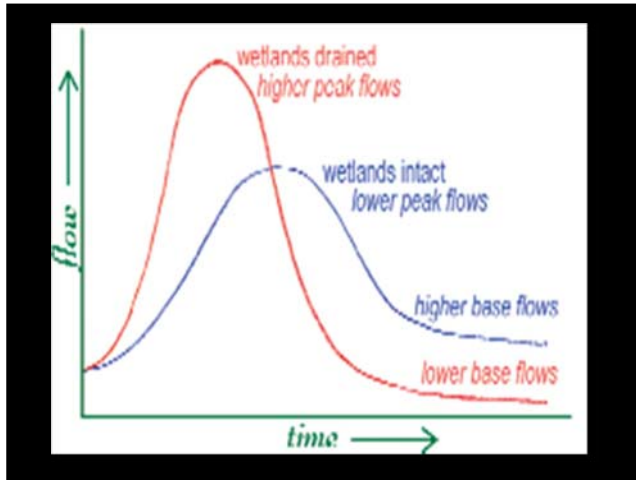


Alterations are determined on a percentage of length with shape, structure or integrity of bank altered. Look at an area 0.5m from top of bank. This is the zone of highest water-land impact and the greatest chance of erosion and instability.

Alterations to the Site



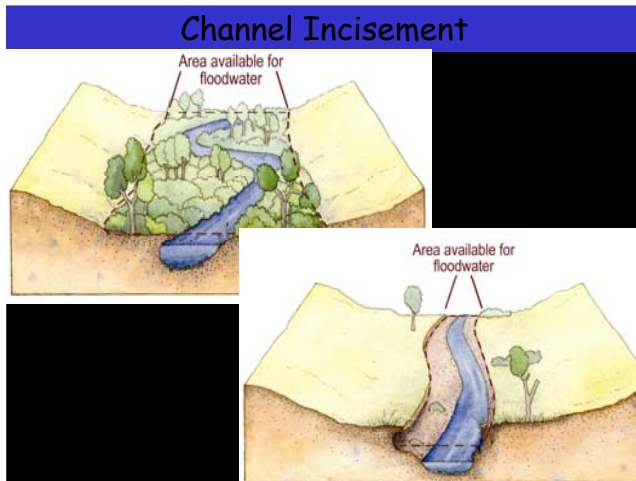
We don't measure compaction directly but can use percentage of the area that is altered as a surrogate. We are trying to determine how much of the sponge has been altered so to reduce infiltration and absorption of water into the soil for soil moisture, storage and recharge.



Compacting or removing the sponge completely results in a change in the way water moves throughout the year creating a higher peak in the spring and lower base flows over all compared to intact riparian areas and wetlands.



This is a highly altered riparian site. How much of this site has alterations to the floodplain? Almost all of it. So much so, that the plant community has changed to one that is drier and disturbed.



- Can the stream access it's floodplain to dissipate energy and provide temporary storage of flood water?
- High water events periodically access the highest terraces of the floodplain. Flooding is an important factor in dispersing moisture throughout the riparian area and in the formation of point bars (necessary for riparian vegetation establishment).



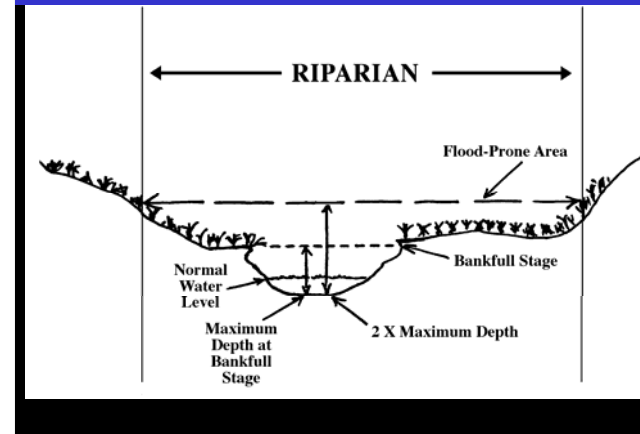
During flooding this stream can access a wide floodplain to store water and reduce energy. It is vertically stable and not incised.

Channel Incisement

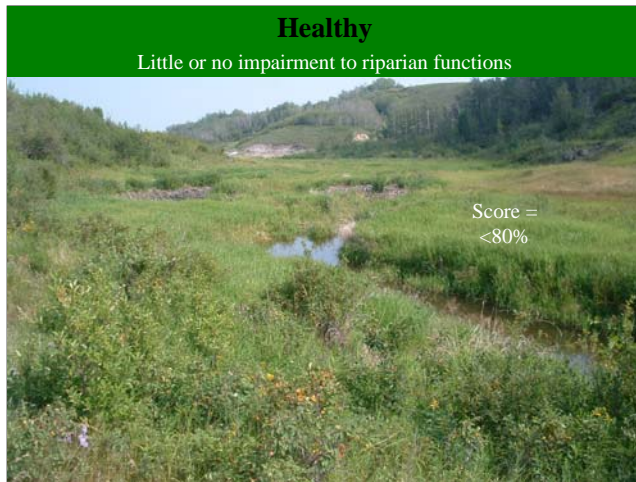


This down-cutting or incisement is a form of vertical erosion. It means that the water will have trouble getting up and out onto the floodplain to dissipate energy. Flood water in this incised channel has no where to go and all of the water and energy are compressed in the channel. It has to begin to build a new floodplain at the lower level if it cannot access its floodplain and will take a long time to recover.

Channel Incisement



There are many versions of incisement. Some are vertical, others are lateral. To determine the floodprone width (or how wide a floodplain can be accessed by a stream, we need to introduce the concept of bankfull. Determine the bankfull depth, double it and project a distance across the floodplain.



•Example of a Healthy site



•Example of a Healthy with Problems site



Unhealthy

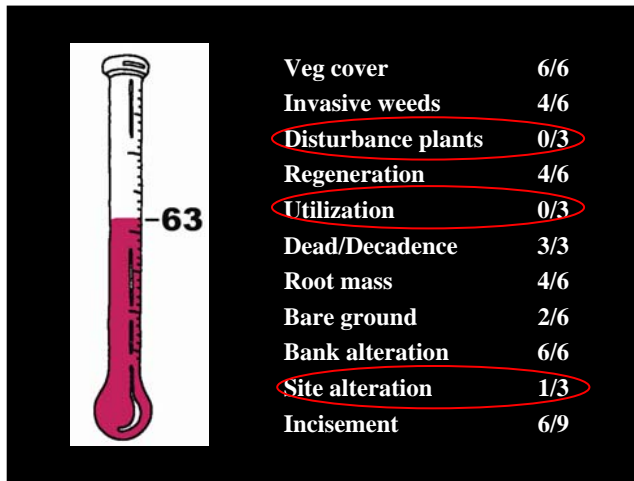
Impairment to many riparian functions due to human or natural causes

Score =
<60%

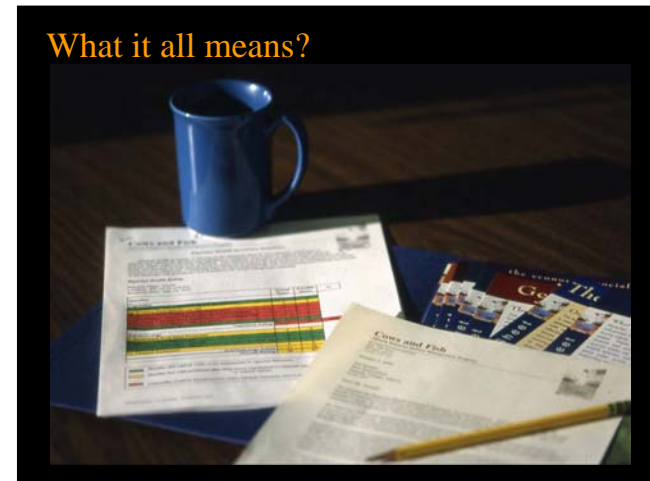
- Example of an unhealthy site

Scoring and Documentation

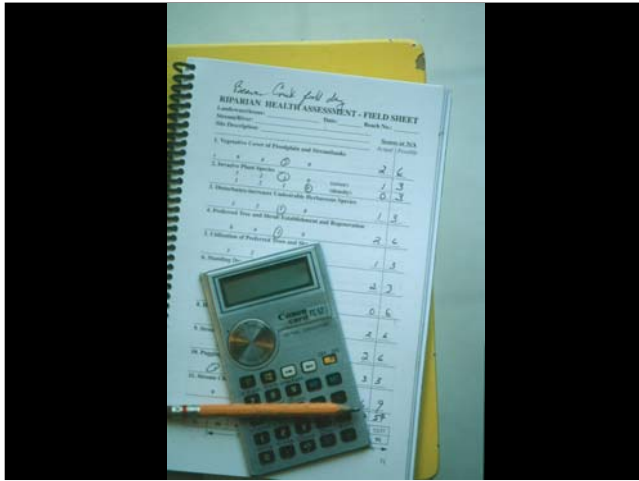
- For Streams and Small Rivers in Alberta use *Alberta Lotic Wetland Health Assessment for Streams and Small Rivers (Survey) Field Workbook*
- For Lakes, Wetlands, Potholes or Sloughs in Alberta, use *Alberta Lotic Wetland Health Assessment (Survey) Field Workbook*



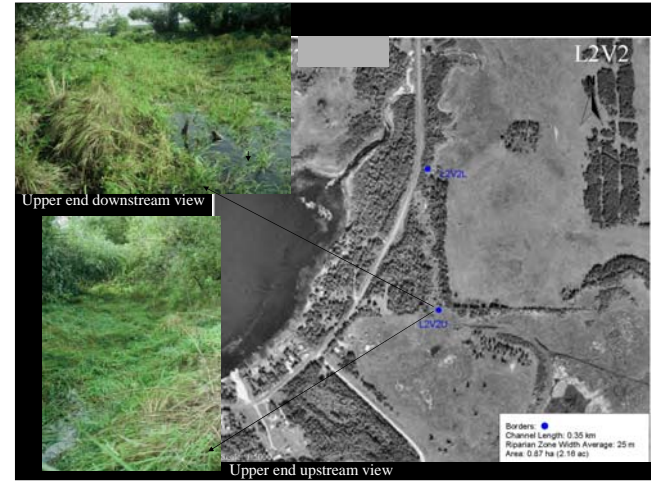
Here is an example of a site that scored in the Healthy with Problems category – with 63%. What can we pick out from the scores to help identify what might be the factors causing deterioration of health and the management options that may help to improve riparian health? From the notes this site had severe pug and hummocking in the remainder of the site, but not on the streambanks – heavy browse due to livestock (as compared to wildlife) and a high cover of KBG, brome and dandelion. This can help focus efforts for management and future monitoring



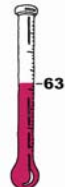
It's nice to be able to put what you've observed in the field form into a readable report format for landowners and yourself. Makes a good record of interpretation of what you saw.



The parameters of riparian health include looking at the vegetative (plant) community as well as the physical features of a site.



Use an air photo to mark and label the boundaries of a site. Upper and lower ends for sure. Could indicate the lateral extent as well.



63

Veg cover	6/6
Invasive weeds	4/6
Disturbance plants	0/3
Regeneration	4/6
Utilization	0/3
Dead/Decadence	3/3
Root mass	4/6
Bare ground	2/6
Bank alteration	6/6
Site alteration	1/3
Incisement	6/9

Things to Focus On

- Be sure to know what your data sharing agreement is – ours is *confidential* (i.e. no sharing) unless otherwise agreed
- Be general unless a specific request has been made regarding a certain issue
- Apply the riparian management principles (B.E.A.D)
- Suggest the potential for the site both plant community and health rating
- Work with the landowner to come up with solutions
- Highlight the positive as well as the challenges

This is how we report back to the individuals and community.

-All individual data is confidential (as is community data) unless previously discussed/agreed to share.

-Be general unless a specific request has been made regarding a certain issue or you have all of the information needed to make a specific request – landowners are usually looking for information and have ideas themselves. Most of them do not want to be told what to do.

-Apply the riparian management principles (B.E.A.D) – you can however provide examples of how the principles can be applied using a number of different strategies (e.g. improve distribution of animals by moving salt away from the bank and providing alternative water)

-Suggest the potential for the site both plant community and health rating – plants are a visual thing that people can relate to so we often discuss potential for improvement or reasons for decline based on plant communities

-Work with the landowner to come up with solutions – landowners are the managers of their land, they know it better than anyone. They also know what they can afford in time and resources to make changes if needed. We are their support, validation and assistance if needed.

Highlight the positive as well as the challenges – usually there are some positive parameters in every site. It is important to point them out as well as what might need improving.



A single health evaluation provides a rating for a particular point in time. Like health check-ups for us, once may not be enough. To monitor trends, measure effects of management and account for natural variation, it may be useful to repeat RHI's at an interval of once every 5 years. Monitoring riparian health on a watershed or individual site basis can also help to identify a variety of management options that seem to be working, impediments to change, parameter specific improvements to riparian health, and if your awareness efforts are having an impact.

Healthy riparian areas are complex, intricately functioning systems that provide us with a suite of ecological benefits.



A watch provides a service for us, it keeps time. It does this through the correct meshing of many interconnected parts. We depend on riparian areas to do many things for us, including providing places to graze livestock, clean water, fish and wildlife habitat, water supply etc. The ability of a riparian area to do these things depends on the correct meshing of a complex series of interconnected ecological functions.

The question now is, how can we graze these areas and still maintain health and function?



Riparian health assessments allow us to tune our eyes, to calibrate our observations with others, begin to appreciate the key pieces of the landscape and evaluate what we see. RHA is essentially an ecological measuring stick that provides some structure to our observations and allows us to determine the condition of a riparian area. Working with communities and watershed groups, RHA is a step to building a common language that can then lead to setting some common goals and developing management plans for individual landowners and the broader watershed.

The most important thing about RHA is that the methods are not done in isolation, they are part of a whole and the ultimate goal in applying these concepts is to build a better understanding and knowledge of riparian areas and the landscapes we live in.

Questions?

