

Monitoring Riparian Areas

Why Monitor?

Monitoring, while labour intensive, is an important component of any grazing management plan. It provides measurables that allow you to determine whether the objectives of these plans are being met. Without it, you have no ability to determine whether your grazing practice has positively or negatively influence the functionality of your riparian area.



Types of Monitoring?

In addition to your riparian assessment (Factsheet 2 of the Range Riparian Factsheet Series - **Riparian Assessments**) you may want to consider adding other methods of monitoring to your program. If you wish to do this, we would recommend adding either or both long-term and short-term components to your system.

Where do I Monitor?

All grazing management plans should identify *key areas* that allow you to monitor grazing use. A key area as defined by the Society for Range Management is a relatively small portion of a pasture that is selected because of its location, use or grazing value as a monitoring point for grazing use. It is assumed that key areas, if properly selected, will reflect the overall acceptability of current grazing management over the entire pasture. A key area should not include areas of livestock concentration, such as stream crossings, bridges, fencelines and driveways. Although it is preferable to have a key area for every pasture, it is also important to limit the number of areas so that they can be monitored in a timely and acceptable manner. Overall, a *key area* should serve as an indicator of grazing use for the pasture and not include areas of livestock concentration.

When do I Monitor?

All monitoring programs should take place at the same time each year and should be repeated at regular time intervals. In general, long-term monitoring is every one to five years whereas short-term monitoring may be repeated at any time interval. Overall, it is important that any monitoring program to be both systematic and rigorous.



Long-term Monitoring:

This type of monitoring allows you to determine whether changes in the condition of your land, permit or lease are occurring (shrubs increasing/ decreasing, bare ground present/increasing/decreasing). This is generally termed as monitoring trend. We recommend use photo points as a long-term monitoring strategies.

Photo points: If done correctly, photo points can be a very powerful tool that will assist you in monitoring vegetation (plant) changes over time. The following section has been taken directly from Herrick et al. (2003). Permanent Photographs of a landscape are useful for detecting changes in vegetation structure and for visually documenting measured changes. Even if you take digital photos, be sure to print and store photos in plastic photo storage sheets. Slide the photo card (**page**) behind the photo in the plastic storage sheet.



Example of Photo point ID board:

Site:

Date:

Plot:

Line #:

Direction:

Materials

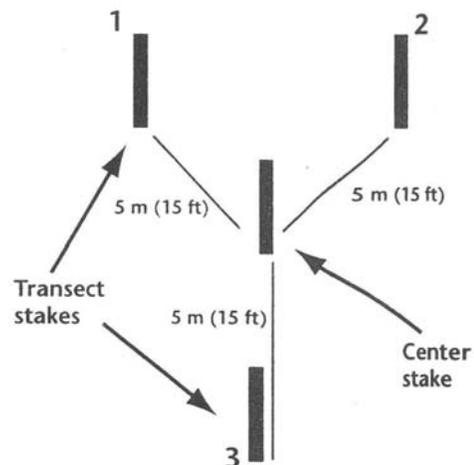
- Tape measure (5 m (15 ft) minimum)
- Four 60 cm (2ft) rebar stakes
- Four 60 cm (2 ft) $\frac{3}{4}$ -inch PVC pipe
- Compass
- 35 mm or digital camera with a 50 mm equivalent lens (1:1 ratio). If a wide angle, telephoto or zoom is used, be sure to record lens and camera information.
- Photo point (ID) board (chalk or whiteboard) or photo point (ID) card (adjacent) on a clipboard.
- Thick marking pen
- One 1.5 m (5 ft) long, $\frac{3}{4}$ -inch diameter PVC pipe.

Methods:

1.0 Establish photo point:

Rules:

- 1.2 Drive transect stakes into ground 5 m (15 ft) from center stake at 120 deg. intervals.
- 1.3 Cover stakes with 60 cm (3/4 inch) PVC (optional for safety and visibility).
- 1.4 Mark the far end (50 m) of each transect with a stake if the location will be used for vegetation and/or soil measurements. Use same procedure described in 1.2 and 1.3.



2.0 Record photo information:

Rules:

- 2.1 Record date, location, precipitation and management history since the last photos were taken on a 7.5x12.5 cm (3x5 inch) card or on one of the Monitoring data form (**back page** of this factsheet).

3.0 Set up first photo:

Rules

- 3.1 Remove PVC sleeve from center stake and replace with 1.5 m (5 ft) PVC pipe. Be sure that the pipe rests on the ground.
- 3.2 Label photo point ID board and lean it next to or hang it on the stake, marking the beginning of the first transect.

4.0 Take first photo:

Rules

- 4.1 Set camera body on top of (1.5 m) center pole and point it down the first line.
- 4.2 Place bottom of nearest transect pole at the photo's bottom center.
- 4.3 Take photo.

5. Repeat Steps 3 and 4 for the other two photos.

6. Additional Photos:

If possible, it would also be beneficial to take the following two additional photos. Stand in midchannel, hold camera 1.5 m (5 ft) above the ground and position bottom of viewfinder on a point located 5 m (15 ft) away. Take one photo facing upstream and one downstream.

Short-term Monitoring:

This type of monitoring allows you to determine whether or not your management system is being followed (i.e., stubble height, browse utilization) and establishes a record of annual-use. We recommend monitoring the following two long-term monitoring strategies.

Plant Species	Average Stubble Height	
	centimeters	inches
Sedges	10 to 15	4 to 6
Kentucky bluegrass	5 to 10	2 to 4
Giant wildrye	10 to 15	4 to 6
Bluejoint	7 to 15	3 to 5
Tufted hairgrass	7 to 10	3 to 4
Rushes	Minimal use	

Stubble heights: When using average stubble heights as measurements of utilization it is also important to note that they also vary depending on current riparian condition, site potential, grazing system and management objectives. The adjacent table gives you general rules of thumb for end of season stubble heights for various British Columbia grasses. To determine stubble heights it is generally recommended that you establish a 50 pace transect in your *key area* and measure

The stubble height of your key plant species should then be measured at every pace and averaged out once 50 paces are reached. If possible, the stubble height of each species or life form should be calculated. If plant species identification is difficult you may want to consider lengthening your transect to 100 paces.



Browse utilization: In addition to grasses and forbs, it is also important to determine whether woody vegetation is being used. Woody plants play an important role in maintaining or restoring the functionality of a riparian area. Over utilization (heavy use in the diagram below) of woody plants can result in a reduction of woody plant vigor, leading to the elimination of preferred woody plants and an invasion of disturbance and/or weed species. It is also important to note however, that light to moderate use (diagram below) helps maintain woody plant vigour.

The following method for determining browse utilization has been taken directly from the Cows and Fish Riparian Health Assessment available online at <http://www.cowsandfish.org/health.html>.

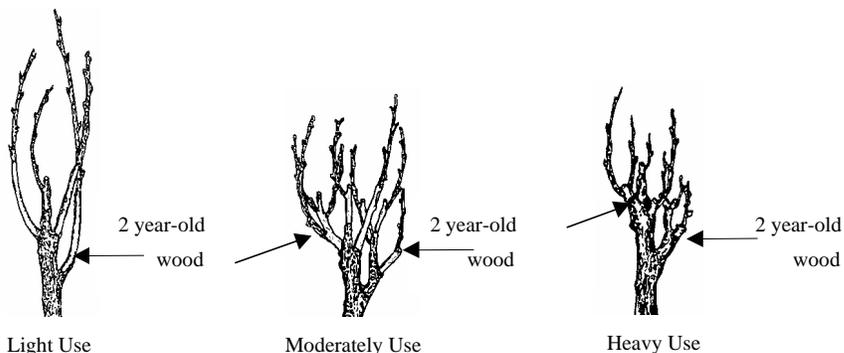
To determine browse utilization:

- first, randomly pick 2 to 3 plants of each of the preferred woody species found on the reach;
 - for each plant, select a branch that would be available or accessible to browsing animals;
 - count the total number of leaders (twigs) on the branch;
 - now count only the older leaders (2nd year growth and older) that have been clipped off by browsing;
 - determine the percentage of utilization by comparing the number of leaders browsed with the total number of leaders available on the branch; and
- do not count current year's use since an estimate in mid-season does not accurately reflect actual use, because browsing can continue year-round.

Scoring:

Browse utilization is typically classified in the following way:

- 0% to 5% incidental use
- 5% to 25% light use
- 25% to 50% moderate use
- Greater than 50% heavy use.



In general, heavy use (>50%) of preferred species signifies the need for a change in grazing management.

Important: Before considering these numbers, it is important to note that stubble heights and browse utilization are just tools that will assist you in determining livestock use and distribution. These levels will and do vary according to vary depending on riparian condition, site potential, grazing system and management objectives.

How Do I Develop a Monitoring Program?

The following checklist will assist you in developing and implementing a monitoring program to coincide with your grazing management plan.

- Define monitoring objectives.
- Assemble background information (maps, photos).
- Select **key areas** you would like to monitor.
- Select monitoring strategies and indicators (riparian assessment, photo points, stubble height, browse utilization, key plant species etc.).
- Describe each monitoring site's management and current conditions (Fill out form on last page).
- Establish permanent transects and begin monitoring.

Further Information

To learn more about this topic please refer to the following documents:



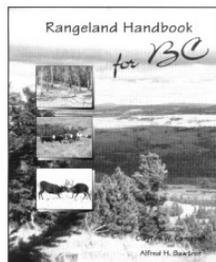
1. Riparian Health Assessment for Streams & Small Rivers Field Workbook (Landowner's Guide to Riparian Health). Available online: <http://www.cowsandfish.org/tools.html>



2. For more information on photo point monitoring, see the USFS Photo Point Monitoring Handbook. Available online: www.fs.fed.us/pnw/pubs/gtr526/



3. Applying best stubble heights on rangelands: Rangeland Health Brochure 6. Available online: <http://www.for.gov.bc.ca/hfd/pubs/Docs/Bro/Bro77.htm>



4. Rangeland Handbook for BC. Available online: <http://www.cattlemen.bc.ca/handbook.htm>

References:

Herrick, J.E., J.W. Van Zee, K.M. Havstad and W.G. Whitford. Monitoring manual for grassland, shrubland and savanna ecosystems (Draft) Volume 1: quick start. 40 p.

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Monitoring Data Form and Annual Use Record for Grazing Management

(Use one form for each monitoring location – you will not necessarily use all columns. After Herrick et al. (2003))

Pasture: _____ Location: _____

Precipitation (inches): _____ Length of pace (if pace transect used:) _____ cm/inches.

Date	Number and class of livestock	Livestock Date in	Date out	Photo (Y or N), (date & time)	Average stubble height ¹ (cm/in.)	Average ungrazed plant height ¹ (cm/in.)	Grazed % height ² or relative use score ³ (circle one)	% browse utilization (described above)	Production score ⁴	Remarks (include any other management information and observations on weeds, wildlife use, fires, etc.)

¹ **Average stubble height.** Measure at least 10 plants. Measure tallest height of the plant (or longest leaf/seedhead). Be sure to measure same species for grazed and ungrazed pastures.

² **Grazed % height.** Divide “Average grazed plant height (stubble height)” by “Average ungrazed plant height” (two previous columns) and multiply by 100.

³ **Relative use score.** 1. None-Slight (no visible use of key forage species). 2. Light (only preferred areas and key forage species grazed). 3. Moderate (key areas grazed uniformly, especially key species). 4. Heavy (key species closely grazed and low forage value plants moderately grazed). 5. Severe (pasture appears mowed, including low-value species). If temporary exclosures are used to estimate utilization, be sure to mark control plots when the exclosures are installed.

⁴ **Production score.** 1. Extreme Drought (no growth this year). 2. Below Average. 3. Average. 4. Above Average. 5. Extremely High (maximum potential).