

# MONITORING VEGETATION COVER

By Sheila Barry<sup>1</sup>

The plants that grow on your rangeland not only provide feed for livestock and wildlife, but also hold the soil in place, increase water infiltration, and promote the availability of soil minerals. The health and productivity of your rangeland ultimately depends on the condition of the soil surface. Measuring the vegetation cover is a useful tool for monitoring the condition of the soil surface and the health of your rangeland.

You do not need expensive scientific tools, satellite photos, etc. to document the vegetation cover on your rangeland soils. First and foremost, get out and walk on the land. Look around. Do you see bare ground, acres of yellow starthistle or tarweed, or do you see plants desirable to livestock? Look closely at the soil surface. Get down and look between plants at their bases. Is the soil bare or covered with fallen plant material? This is the first step in monitoring vegetation cover. This chapter describes methods to accurately and appropriately monitor vegetation cover.

## **What You Will Learn from Monitoring Vegetation Cover**

Monitoring vegetation cover and recording your observations is an excellent method to document the long-term health of your range sites. This method is not appropriate for determining annual range utilization or production. The observations you record will be most valuable when you compare the results from year to year. For example, over time your recorded observations may reveal that the percentage of bare ground is decreasing. This monitoring method can also help you document a change (from year to year) in abundance of desirable plants such as perennial grasses or clovers, or in undesirable plants (i.e. tarweed, juniper, medusa head).

## **Estimating Vegetation Cover**

A tool to help you estimate the amount of vegetation cover is a reference frame. A reference frame is a ring, usually in the shape of a square or circle, placed on the ground. The reference frame allows you to focus on a small area (1 to 3 square feet, depending on the size of the frame) and estimate vegetation cover versus bare ground.

The number of spots you sample with the reference frame will depend on the variability of the rangeland vegetation and your desired degree of accuracy. In general, averaging the results from a minimum of 30 sampling spots will give you a reasonable estimate of vegetation cover on a rangeland site.

**BEWARE!** You will find that monitoring the vegetation cover will increase your powers of observation and your ability to make management decisions that affect your rangeland.

There are numerous other methods that allow you to document vegetation cover on rangeland. While appropriate for scientific research, many of these methods are tedious, time consuming, and require

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technical expertise. You should consult a professional with knowledge of these methods and the ecology of your rangeland site if you wish to use them.

### **Choosing a Reference Frame**

The size of your reference frame will depend on the type of vegetation on the site. Within the appropriate size reference frame at least some vegetation should be present each time the frame is placed. For example:

In open grasslands and meadows use a one-foot square or round frame for estimating cover. (This may be the same frame you use for other monitoring activities, i.e. utilization, residual dry matter determinations.)

On rangeland sites with woody plants, trees, rocky soils, and/or lots of bare ground use a three foot square or round frame for estimating cover. (This may be the same frame you use for your photo plots.)

### **Building a Reference Frame**

How to make your own reference frame:

- Weld four pieces of 1' or 3' pipe or steel rod together
- Connect PVC pipe with four PVC elbows (For easy storage, do not glue). Mark the PVC in 1 inch increments for reference.
- Form a square from two folding carpenter's rulers
- Borrow your child's Hula Hoop (large frame)
- Form a circle with a piece of cable ( i.e. brake line cable).
  - A length of cable 37  $\frac{3}{4}$  inches will form a circle with a 1 foot diameter.
  - A length of cable 75 **2** inches will form a circle with a 3-foot diameter.

When monitoring on a range site with woody plants or big rocks, it is helpful to use a reference frame, which can be taken apart so it can be placed around rocks or woody vegetation.

### **When to Monitor with Your Reference Frame**

The time of year relative to plant growth and/or utilization will affect your estimates of vegetation cover. The following table (Table 1) describes the advantages and disadvantages associated with the time of year you choose to monitor. No matter when you chose to monitor, you should be consistent from year to year. As indicated by the table, the exact day is not as important as the stage of plant growth because seasons vary from year to year.

**Table 1. When to Monitor Vegetation Cover**

<b>Monitoring Time of Year</b>	<b>Advantages</b>	<b>Disadvantage</b>
Period of peak plant growth	<ol style="list-style-type: none"> <li>1. The greatest diversity of plants can be identified.</li> <li>2. Consistent data on vegetation species composition can be collected from year to year.</li> </ol>	<ol style="list-style-type: none"> <li>1. May underestimate the presence of some earlier or later maturing plants.</li> <li>2. May underestimate litter cover relative to live vegetation cover.</li> <li>3. May be difficult to distinguish perennial grasses from annual grasses.</li> <li>4. May underestimate plants that have been grazed.</li> </ol>
Specific stage of a plant's growth (i.e. heading out of medusa head, flowering of ceanothus)	<ol style="list-style-type: none"> <li>1. Relatively easy to identify a specific, consistent time of year to monitor.</li> <li>2. Consistent data on species composition can be collected from year to year.</li> </ol>	<ol style="list-style-type: none"> <li>1. May underestimate the presence of some earlier or later maturing plants.</li> <li>2. May underestimate litter cover relative to live vegetation cover.</li> </ol>
End of grazing season (i.e. Amove off@date)	<ol style="list-style-type: none"> <li>1. If the grazing season is generally concluded at the same time each year, estimates of bared versus covered ground should be fairly consistent.</li> <li>2. Identification of undesirable plants may be easier.</li> </ol>	<ol style="list-style-type: none"> <li>1. May not provide consistent data on species composition because the end of grazing is not usually consistent with a stage of plant growth.</li> <li>2. May underestimate presence of desirable plants.</li> <li>3. Not a specific time under a year around grazing regime.</li> </ol>
End of growing season (i.e. brown off or frost date)	<ol style="list-style-type: none"> <li>1. Easy to estimate cover of perennial grasses.</li> <li>2. In annual grassland community, consistent data on bare versus covered ground can be collected from year to year.</li> </ol>	<ol style="list-style-type: none"> <li>1. May underestimate the presence of early maturing plants and/or plants that were grazed.</li> <li>2. May overestimate the presence of later maturing and/or undesirable plants.</li> </ol>
Beginning of the grazing season (i.e. Aturn on@date)	<ol style="list-style-type: none"> <li>1. May be easy to estimate the cover of perennial grasses and plants.</li> </ol>	<ol style="list-style-type: none"> <li>1. May not provide consistent data on species composition.</li> <li>2. Difficult to identify desirable versus undesirable plants.</li> <li>3. May be difficult to determine bare ground on annual grassland because of large amounts of standing litter or dead grass.</li> <li>4. Difficult to identify late growing plants.</li> </ol>

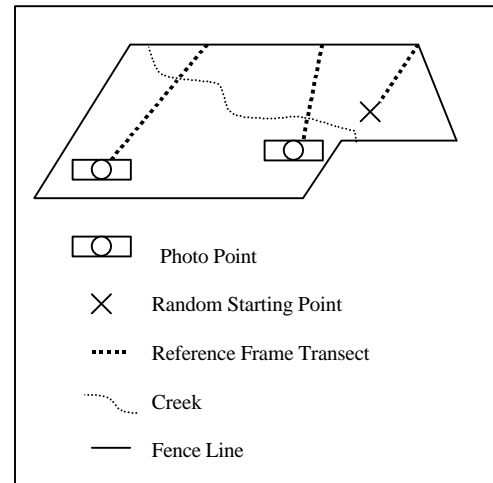
## Where to Monitor - Choosing a Starting Point

A transect is an imaginary line across a monitoring site. Locate a permanent starting point for each monitoring transect. Use a permanent marker such as an inverted and labeled T-post or rock pile to identify the starting point. Record the locations of your transects on a ranch map. For more information on selecting monitoring sites see the chapter: "Why, Where and What to Monitor".

Sampling with the reference frame along three transects for each range site should allow you to collect representative estimates. A transect often consists of 100 paces. On most range sites, three transects will provide adequate information. The more transects you monitor, the more reliable the information will be. You will have to decide, based on your available time and desire for information, how many transects are adequate.

## Placing the Reference Frame Along the Transect

After you have selected a starting point, you are ready to use the reference frame. To collect the minimum suggested 30 samples, the reference frame should be placed at intervals of 10 paces along three 100 pace transects. Each year you should begin your monitoring from the same starting point and collect your data along the same transect. However, you do not need to monitor the same exact spot on the transect from year to year. Be consistent with your placement of the frame so that you obtain an unbiased sample spot. For example, place the right-hand lower corner of the frame at the tip of your right boot after every 10 paces.



## Estimating Vegetation Cover in the Reference Frame

Table 2 should help you train your eye to make visual estimates of percent cover. The following text describes how to record your estimates on the Vegetation Cover Form (Table 3).

I. Look down over your reference frame.

A. What percent of the ground within the frame is bare soil, rock, gravel, moss, or wood?

Definitions:

Bare Soil	< 1/4 inch diameter soil particle
Gravel	1/4 to 3 inch diameter rock pieces
Rock	> 3 inch diameter rock
Moss	moss or lichen covering the ground
Wood	wood; downed wood that is greater than 1/4 inch diameter

ADD percent bare soil, gravel, rock, moss and wood at each sampling location (total the row) to determine total percent bare ground (%TBG).

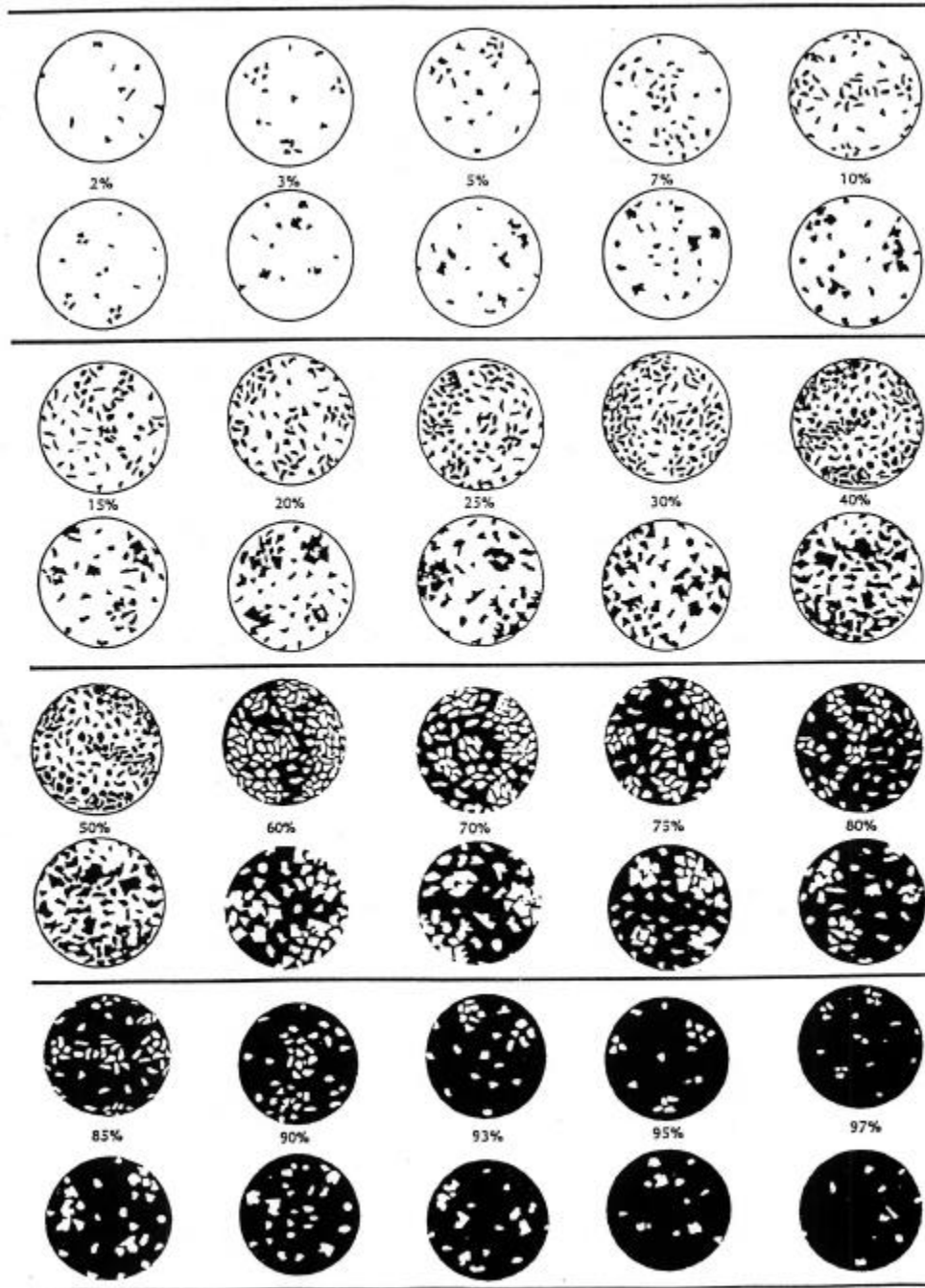
Note: Since total percent bare ground and total percent covered ground should add up to 100%, you can SUBTRACT total percent bare ground from 100 to determine total percent covered ground (%TCG).

B. What percent of the ground within the frame is covered by litter or the basal area of non-

woody or woody plants?

# COVER ESTIMATOR

(PERCENTAGE OF DARK AREA)



**Table 3 (Appendix V) Vegetation Cover Form**

Date: \_\_\_\_\_

Range Site: \_\_\_\_\_

Transect: \_\_\_\_\_

Sample Spot	I. Look Down Over Reference Frame										II. Look Above the Frame for Canopy								
	A. Bare Ground What percent of the ground within the frame is bare soil, gravel, rock, moss or wood?					B. Covered Ground What percent of the ground within the frame is covered by litter or the base of a non-woody or woody plant?					C. Optional Plants of Interest Check or count number of plants of interest or concern present in the frame, I.e., clover, perennial grass, star-thistle, oak seedling, etc.			A. Canopy Are there canopies of woody plants (brush or trees) directly over the frame. You may list by specific type or species if interested.					
	% Bare Ground					% Covered Ground					Presence of Plants of Interest			% Bush			% Trees		
	% Bare Soil	% Gravel	% Rock	% Moss	Total % Bare Ground (TBG)	% Litter	% Non-Woody	% Woody	Total % Covered Ground (TCG)	Total % TBG + % TCG	1	2	3	1	2	3	1	2	3
1									100										
2									100										
3									100										
4									100										
5									100										
6									100										
7									100										
8									100										
9									100										
10									100										
Total																			
Ave. % (Total +10)																			

Definitions:

Litter and duff	litter and duff; litter includes; dead grass, freshly fallen leaves, needles, twigs, bark, and fruits, duff includes humus and manure
Non-woody plant	all non-woody living, standing vegetation; includes grasses and forbs
Woody plant	trees or shrubs; include only the base of these plants in the estimate of covered ground

C. Optional—Plants of Interest. Are you interested in documenting the change in abundance of desirable or undesirable plants, for example, perennial grasses, annual clovers, yellow starthistle? You may simply record whether or not the plant is present within the frame. If individual plants are easily identified, you may count the total number of the species of interest present in the frame.

II. Look above the frame for tree or shrub canopies.

Are there any trees or shrubs shading the frame? Record the percent tree and percent shrub canopy. If you want to be more specific, you can record the percent canopy of specific species of brush or trees. You may want to use this section to document the change in abundance of desirable or undesirable shrub species, for example, manzanita or juniper.

Definitions:

Tree Canopy	the percent of the reference frame directly under the branches or leaves of a tree. Do not count overlap with other trees. Consider the location of the tree's drip line.
Shrub Canopy	the percent of the reference frame directly under the branches or leaves of shrubs. Do not count overlap with other shrubs.

III. Place the Reference Frame, again...

Select the next spot for placing the reference frame by walking 10 more paces or whatever interval you are using. Try to record at least 10 sampling areas per transect.

Your data can be summarized in Tables 4 and 5. Using Table 5 to compare data from year to year should give you an idea if the amount of bare ground is increasing or decreasing, and if plants of interest are increasing or decreasing in density.

**Table 4 (Appendix VI) Vegetation Cover** (To calculate annual average vegetation cover for a range site)

Annual Summary

Date/Year: \_\_\_\_\_

Range Site: \_\_\_\_\_

No. of Transect: \_\_\_\_\_

Transect Averages %s	% Bare Ground					% Covered Ground				Total % TBG + % TCG	Presence of Plants of Interest			% Brush			% Trees		
	% Bare Soil	% Gravel	% Rock	% Moss	Total % Bare Ground (TBG)	% Litter	% Non- Woody	% Woody	Total % Covered Ground (TCG)		1	2	3	1	2	3	1	2	3
	1											100							
2										100									
3										100									
4										100									
5										100									
Total Average (TA)																			
Average for Site (TA / no. of transects)																			

