Photo Monitoring Your Range

Dustin Johnson, Harney County Rangeland and Livestock Extension Agent

How often have you heard or even said, "This field looks so much better than it did 20 years ago...there's a lot more grass…the cover of desirable plant species has improved…wildlife habitat is better than it used to be." Generally, range management has improved over the years and I have no doubt that these statements are accurate, but a problem arises when other people are not sure they believe what they're hearing. Even though improvements have been made, potential critics may still see problems and wonder if the range manager is providing a biased description of the observed changes. For those who have not been around to see the improvements, the slow rate at which arid rangelands often change can make it seem as though managers are not doing enough.

So what can you do? You've heard it for years now - MONITOR! Rather than making your life more difficult, a monitoring program can actually greatly simplify it. A monitoring program can 1) help determine the benefits gained from changes in grazing management or investments in range improvements; 2) facilitate a better understanding of rangeland plants and how they interact with each other, the environment and grazing animals; 3) build confidence in the management strategy; and 4) provide stories of success and failure (as the case may be) that can be shared with others as learning opportunities. And because most of us tend to remember only the very best and very worst, our memories often fail us when it comes to recognizing gradual changes over longer periods of time. With monitoring, you can rely on the data that are collected and stored, instead of your memory. Your data can provide you with concrete proof of successes and help you identify management strategies that did or did not work.

There are many monitoring techniques. This article discusses one of the simplest, cheapest and quickest methods -- Repeat Photo Monitoring. A series of photos taken of the same spot over time can accurately demonstrate change on the range. This article provides an introduction to repeat photo monitoring and explains how it can be used as an integral part of a comprehensive range monitoring program.

Much of the following discussion of photo monitoring is written in the context of a public land grazing allotment. However, the practices described and the benefits derived from photo monitoring are directly applicable to private lands as well. Monitoring can be a valuable planning and assessment tool for grazing management regardless of land ownership.

Why use repeat photo monitoring?

Repeat photo monitoring is a simple and quick technique for monitoring rangelands. A properly located photo point allows you to detect changes in important rangeland attributes including plant species composition, total plant cover, litter, spatial pattern of plants, and soil erosion. Changes in these attributes are important for determining how the condition of the range is changing over time in response to your management (e.g., timing, intensity and frequency of livestock grazing, distribution of use, stocking rates, etc.) and factors that are external to your management (i.e., inputs from Mother Nature; e.g., weather, fire, insect infestation, etc.).

Repeat photo monitoring on public land grazing allotments…

If you are a Bureau of Land Management (BLM) or United States Forest Service (USFS) grazing permittee, it's likely that photo points have already been established in key areas (i.e., permanent monitoring sites) on your allotment. Ask your Range Con for a map that shows the location of key areas and the types of monitoring studies that have been conducted at these sites in the past.

Should I establish new photo points? If so, where and how many?

If permanent photo points have not been established on your allotment you can set them up yourself, but it is probably a good idea to involve your Range Con or resource specialist with the agency charged with managing the allotment. They can help you locate photo points in key areas. In range monitoring studies, key areas are chosen as a sample to represent the average response of a pasture or vegetation type to grazing management or factors that are external to management (i.e., inputs from Mother Nature or those factors that are beyond the control of the manager such as weather).

Similar to all forms of rangeland monitoring, repeat photo monitoring requires well-defined management objectives and careful selection of key areas. In most range monitoring studies, the objective is to detect changes in the primary rangeland resources of vegetation (e.g., cover, density, composition, etc.), soil (e.g., stability, erodibility) and water (e.g., quality) due to grazing management, fire, weather, and other environmental variables. An inventory of range sites, vegetation types, and utiliza-

tion patterns helps determine where and how many key areas should be located. One key area is probably adequate to monitor a relatively uniform area such as an irrigated pasture on flat terrain, but a typical eastern Oregon ranch or allotment may need several key areas to adequately represent the different types of country and variation in inputs from grazing management and Mother Nature. Remember, key areas are intended to represent the typical grazing activities for a larger area. Consequently, don't locate key areas where livestock never graze (e.g., more than a mile or two from water, steep slopes, etc.), or where livestock normally congregate (e.g., within 1/4-mile from watering points, fence lines, or at pasture corners).

Misleading conclusions can result if a change occurs in a key area because of local events, such as a fire or insect infestation, but not in the larger area the area was chosen to represent. For this reason, it's generally beneficial to have more than one key area per pasture or vegetation type so that you can be confident a change is general rather than due to local conditions. On the other hand, it is pointless to establish a key area if you don't have time to monitor it. Begin by establishing a few key areas in the highest priority areas of the range, and add more as time and your increasing experience allow. The important thing is to get started!

Note: If your objective is to monitor an "environmentally sensitive area" (e.g., riparian area, endangered species, wildlife habitat), the area monitored is commonly referred to as a critical area rather than a key area. Critical areas are generally treated with special consideration because of inherent site factors, size, location, conditions, values, or significant potential conflicts among uses. Critical areas represent smaller parts of a management unit that are more important to managers, such as critical habitat for wildlife, areas having threatened or endangered species, highly erodible areas, or riparian areas. If management objectives are specific to maintaining and improving a small piece of land such as a riparian area, then it may be appropriate to select a critical area as a monitoring location.

Establishing photo points…

Preferably, take both landscape and close-up photos at each photo point. At a minimum, take a landscape photo of the key. For initial setup, you will need a compass, steel post(s), one 5 ft. long, ¾ in diameter PVC pipe, one ≥ 2ft. long rebar stake, 2 ≥ angle iron stakes if taking a close-up photo, hammer, spray paint and a map and/or Global Positioning System (GPS) unit to record the photo points location.

For repeat photos, you will need the camera, compass, the 5 ft. long, ¾ in diameter PVC pipe, map and/or GPS unit. You may also need the notebook to help locate the photo points. While in the field, the notebook will also be helpful to orient yourself to changes over time, and to prompt you to record useful observations.

Landscape photographs

- Permanent photographs of a landscape are useful for detecting changes in vegetation and for visually documenting changes measured with other monitoring methods.
- If you have historical photographs, new pictures allow you to immediately see changes over time.
- Landscape photos should be taken from the same designated point marked by the rebar stake. Place the PVC pipe over the rebar stake (Fig. 1). Place camera atop the PVC pipe to take the photo. This keeps the camera height and angle consistent.
- Include a distinctive landmark in the background or another steel post so that the photos can be consistent from year to year (framing the same scene consistently will increase your ability to observe and demonstrate change over time).
- Identify the photo with an identification card in the picture (Fig. 2), include the date, photo point identification, location and direction of photo

Write a location description in your notebook so that you can relocate the photo point. Use a witness post (e.g., T-post) or other permanent marker. Record a compass direction and the distance in feet or paces from the witness post to the photo plot. Take photos from the witness post to the plot and vice versa to aid in finding the plot later .

Figure 1. Photographer demonstrating how to take a landscape photo.

Date:

Plot No:

Location:

Direction:

Figure 2. Example of a photo identification card.

Close-up photographs

- Close-up photos of the ground show specific characteristics of an area such as soil surface, ground cover by vegetation, and organic litter. A quantitative analysis of these small plots is not likely to yield useful information, but they can help show specific characteristics.
- Permanent photo plot corners (usually a 3 x 3 foot square) can be marked by the two angle irons stakes (Fig. 3). You may want to spray paint the exposed part of the angle iron to make it easier to find next time. The rebar stake used to mark the location for the landscape photo will also mark where to stand while taking the close-up photo. When taking the photos, use two 6-foot folding rulers or a 3 x 3 foot square made of PVC to accentuate the plot. Place the camera over the center of the plot at a standard height and take the photo.
- Always identify the plot with an ID card in the picture; include date, photo point identification, and location.

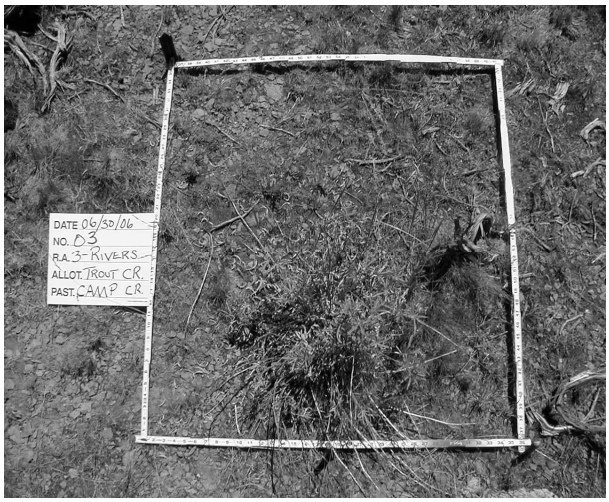

Figure 3. Example of a 3 X 3 foot close up photo.

When to monitor…

Be consistent from year to year. The exact date is often not important (unless monitoring objectives require consistency of date) because seasonal conditions vary from year to year. Examples of when you might want to monitor, might include one or more of the following: 1) stage of growth of a particular plant (e.g. cheat grass heading out, blue bunch wheatgrass in the boot stage of phenology, etc.); 2) just before and after the grazing season (I suggest both); or 3) at the end of the growing season.

Which times to use depends on what you are managing for (objectives) and when to best identify response to your management and Mother Nature. For example, if you are attempting to identify response to a particular grazing management strategy such as early season grazing, you might want to combine #2 and #3 listed earlier. Using #2 will show what you started with and what it looked like just after grazing. However, early season grazing should result in sufficient soil moisture to allow regrowth after grazing and #3 will show that response.

Equipment needed…

35mm or Digital Camera

- A pocket size camera is more convenient than the larger cameras with multiple lens options. If your camera supports multiple lenses, you'll want to keep the lens size consistent for repeat monitoring. Wider angle lenses (28 or 35mm) will provide a better landscape perspective. If the photo is intended to show a more closely defined area, a 50mm lens might be more effective. If you take digital photos, be sure to print and store photos in plastic photo storage sheets. Storing photos digitally on a computer is tenuous at best. They have been known to gobble up Master's theses, PhD dissertations and other works representing hundreds of hours of drudgery; please print your photos and if you insist on storing them digitally, back them up often.
- Use nonwhite photo description cards to record date, location (allotment or pasture name), and photo point number to include in each picture. Write with a broad felt tip pen in bold letters on the photo description card. Writing must be bold enough to show up and be legible in the picture.

Notebooks:

Store prints and any field notes together in a notebook. You might want to keep a notebook foe each pasture or allotment at home with all prints and notes.

Maintaining a second field notebook for prints and photocopies of notes is a good idea to help locate photo points and other observations. The field notebook is likely to take a beating.

- Place the slides or prints in storage sheets that are non-pvc and non-acidic to protect them from deterioration. If using print film, store the negatives in a separate, labeled envelope for each roll of film.
- Use a sticky label on the back to identify the print. Include photo plot number, location, date, type of film used (e.g. Kodak ASA 100), and other relevant information (e.g. cattle just off, end of growing season, etc.).
- Get your film processed or digital photos printed and label the prints as soon as possible after taking the pictures. Your memory will be fresher and this will keep the job small and easy to do.

Other observations…

While out monitoring, have your monitoring field notebook with you and record any relevant observations. You can do this not only when you are monitoring, but also while out performing other activities such as checking on or moving livestock. These observations will help explain the changes you're seeing with your monitoring program. You can file those notes directly with the photos once they have been developed and make photocopies for your field notebook. Previous notes will help trigger your memory for making and recording relevant observations. The following examples of observations to record:

Weather

- Precipitation and how it compares to seasonal, annual, and long-term trends.
- Temperature and how it compares to seasonal, annual and long-term trends.

Vegetation

- Flowering of seed setting dates
- Recruitment (seedlings) of desirable plant species – presence/absence, abundance
- Physical disturbance
- Poisonous plants – presence/absence; location
- Utilization of vegetation
  - Which plants were grazed?
  - Which plants were not grazed?
  - Distribution of livestock utilization.
- Insect damage
- Juniper encroachment
- Sagebrush encroachment (especially riparian)
- Abundance and kinds of weeds

Riparian

- Browsing of willows or aspens
- Presence/absence of streambank vegetation
- Amount of woody and herbaceous vegetation
- Dry-up dates of springs/stock water
- Headcuts[1]
- Bank stability[2]/water turbidity[3]

Soil

- Amount of bare ground
- Soil crusting[4] - Presence/Absence
- Surface soil litter[5] - Amount and distribution
- Soil compaction[6] - Presence and extent
- Soil texture[7]
- Erosion[8] - evidence of soil or surface litter movement, rills, gullies, etc.

Wildlife

- Wildlife sightings
- Wildlife use

Other

- Archeological sites (arrowheads, etc.)
- Recreation impacts
- Weather events (floods, storms, etc.)
- Open gates, down or cut fences, etc.
- Livestock on-off dates, weights, body condition, etc.

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[1]The development and upstream movement of a vertical or near vertical change in bed slope of a stream, generally evident as falls or rapids. Headcuts are often an indication of major disturbances in a stream system or watershed.

[2]The properties of a stream bank that counteract erosion, for example, soil type, and vegetation cover.

[3]Turbidity is a measure of the murkiness of water, reflecting the amount of sediment in the water.

[4]Soil crusting results from rains breaking down soil aggregates into particles that cement into hard layers at the soil surface when drying occurs rapidly.

[5]The uppermost layer of the soil, made up of freshly fallen or slightly decomposed organic (usually plant) materials.

[6] Soil compaction is the changing the nature of the soil such that there is a decrease in the volume of voids between soil particles or aggregates; it is manifest as an increase in bulk density and a severely compacted soil can become effectively impermeable.

[7]Numerical proportion (% by wt.) of sand, silt and clay in a soil. Texture can be coarse (sand particles predominate), medium (silt particles predominate), or fine (clay particles predominate).

[8]The wearing away of the land surface by water, wind, ice, gravity or other natural or human forces that detach and remove soil particles or rock material from one point for deposition elsewhere.