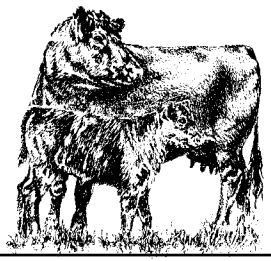

Western Beef Resource Committee *Fourth Edition*

Cattle Producer's Handbook

Range and Pasture Section 520

Photo Monitoring Your Range

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Photo monitoring on rangelands is a vital part of any operation including those on private and public lands. Photo monitoring is one of the easiest and least technical ways to monitor rangelands. Monitoring in general, and photo monitoring in particular, can be valuable planning and assessment tools for grazing management regardless of land ownership.

Photo monitoring is simple, low tech, and, if done properly, provides a good visual perspective of what is happening on the ground. Photo monitoring can be done alone or accompany any other monitoring technique being used. If no other monitoring is being done, photo monitoring should be a minimal effort on any allotment or management unit. Goals and objectives (see below) are essential for all operations and should be explicitly stated for any management unit, public or private.

Different types of goals will have different areas of focus. For example, if a management goal is to increase willow cover in a riparian area, photos would be taken in a different location and purpose than if the management goal was to decrease cheatgrass density in the uplands.

Why Monitor?

We monitor to know what effects our management is having on rangelands. It is difficult to know where you are going if you do not know where you have been. Doubtlessly, photo monitoring requires a commitment and cost. However, what is sometimes not considered is the cost of not monitoring (no data). Photo monitoring is much like an insurance policy. Photos provide objective data if land conditions are questioned. Photos also provide a record of both management and yearly climatic variations.

In recent years, federal (and, to a lesser extent, state) land management agencies have seen severe decreases in allocated budgets. Some of the first things cut when agencies are facing budget decreases are typically temporary and seasonal workers and travel. Although it is not generally recommended to have seasonal and temporary workers conducting monitoring, often this is the only way federal agencies are able to do monitoring. Skilled range management specialists are unable to leave the office because they are responsible for writing the lengthy documents pertaining to compliance with NEPA (National Environmental Policy Act) or ESA (Endangered Species Act).

Additionally, litigation against the federal land management agencies has increased exponentially and range management specialists are required to compose lengthy reports for litigation as well. As documented in recent federal grazing permit renewals, having no monitoring data is sometimes just as, if not more, detrimental than having data.

The following list includes examples of goals for a monitoring program:

- Determine the effectiveness of management practices (must be based on management unit goals and objectives).
- Establish a record of range condition.
- Document the effect of livestock and/or wildlife grazing on key areas.
- Aid in trend detection (done over time).
- Provide justification for maintaining or changing grazing management.

Credibility of Photos

Many ranchers worry about the credibility of their photos as a form of reliable documentation. In decisions about permit renewals, agencies are mandated to consider all data, including photos. These data may include photos taken by special interest groups. Ranchers can increase the credibility of their photos in several

ways. First and foremost, ranchers with federal and state grazing permits should locate any and all files pertaining to their allotments. These may be called "permittee files," "allotment files," and/or "monitoring files." They likely are not all kept in the same location in offices and some offices may use all the names, some of the names, or call files other names.

Data may be kept in different areas (e.g., Range, Wildlife, etc.) within the same office. Archived data (which often includes historic photos) may not be housed on-site and will have to be requested. It can be a time-consuming process to collect data, but worthwhile. One of the best ways to increase credibility of photos is to retake them on previously established photo point plots, and having access to all data will enable producers to make the most efficient use of their time.

In 2006, BLM entered into an agreement with Public Lands Council (PLC) regarding joint cooperative monitoring. In 2009, the U.S. Forest Service (USFS) entered into a similar agreement with PLC. These agreements established provisions for federal land management agencies to accept permittee monitoring data.

To add another layer of credibility, it is highly recommended that all federal and state permittees sign individual agreements called "Cooperative Permittee Monitoring Agreements" with respective agencies. These agreements are specific to each permittee and specify the duties of both the permittee and the agency, what data will be collected, where and when data will be collected, and how data will be stored. Individual Cooperative Permittee Monitoring Agreements provide the highest level of credibility to ranchers.

What and Where to Monitor

Photo point monitoring sites should represent major types of vegetation (e.g., riparian areas, upland areas with native species, areas with weed concerns, burns, restoration areas, etc.). Pastures or allotments that are more homogeneous (similar plant communities, topography, precipitation, soils, etc.) will require fewer photo points than those that are heterogeneous (many types of plant communities, varying topography, etc.).

Areas of concern requiring special management strategies [e.g., riparian areas, areas likely to be considered in allotment or ranch management planning, areas with listed (or potentially listed) threatened and/or endangered species, etc.] can be possible monitoring sites. There is no hard and fast rule about how many sites. The number of sites will differ greatly by management goals, number of acres, and heterogeneity of pastures and allotments. Pick enough sites that will show change, but not so many they are overwhelming. A general suggestion is three upland sites and three riparian sites.

"Key areas" are locations that represent some portion of the landscape. BLM formally calls some of their monitoring areas "Key Areas." Selection of "key areas" should be tied directly to land use, coordinated resource management, and/or activity plan objectives. "Key areas" should be representative of the areas of concern likely to be impacted by management. For example, a "key area" in the upland could represent hundreds of acres, while a "key area" in a riparian area may only represent a few acres.

Livestock producers with leased ground (e.g., USFS, BLM) should coordinate with the allotment's range management specialist on site selection. At least use the "key areas" already established and add others if needed.

Consider accessibility when selecting sites, but don't put the plots too close to a road or trail (100 or 200 yards off will help avoid road effects). If plots are difficult to see from roads or trails, use a "witness" post, tree or rock pile to help you remember where to stop.

How to Photo Monitor

Preferably take both landscape and ground plot photos at each photo point. At a minimum, take landscape photos. Permanently mark photo plot locations. Many land management agencies use rebar and/or angle iron. Some managers have used rock piles. Steel t-posts should not be used for marking photo points as they tend to serve as animal (both domestic and wildlife) attractants, which cause undue influence.

Some managers have used PVC pipes and wooden stakes, but both materials have a tendency to biodegrade over time in arid and semiarid environments. Modified steel stakes that have a circle of steel welded to a piece of rebar cut at an angle and painted with orange implement paint have been popular with ranchers (Fig. 1). Also, record plot location with a GPS unit or note coordinates.

Fig. 1. Metal washers or steel discs can be welded to rebar stakes cut at an angle to create a permanent marker. It is highly recommended to paint the discs with implement paint (such as Kubota® orange pictured here) as it tends to endure the elements better than standard paint. Discs can be pounded into the ground and are level with the soil surface at the photo point.

Other aspects to remember about proper photo monitoring:

- Document change over time.
- If you have historical photographs, new pictures allow you to immediately see changes over time.
- Should be taken from the same designated point (marked by a permanent marker).
- 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).
- Always use an identification card or photo board (readable) in the picture, include date, photo point identification, direction or compass bearing and location (GPS or legal description).
- Try to make the photo one-quarter sky and three-quarters landscape. The photo board should take up no more than one-sixth of a corner of the photo (not the middle) (Fig. 2).
- If skyline is not visible, such as in narrow canyons, try taking a second photo facing the opposite direction so the photo point is easier to find again.
- Be aware of time of day. Photo boards (particularly white ones) can be washed out in bright sunlight. Also, shadows can significantly affect the quality of the photo (especially in forested or riparian systems).

Fig. 2. A quality photo will have a readable photo ID card that is no more than one-sixth (1/6) of the image and is placed in a lower corner, one quarter (1/4) sky and three quarters (3/4) landscape, include a permanent, distinct landscape feature. This one also includes GPS coordinates to locate the plot again.

Ground Plot Photographs

- Show specific characteristics of an area such as soil surface, ground cover by vegetation, and organic litter.
- Permanent photo plot corners (usually a 3x3 feet square) can be marked by angle iron. You may want to spray paint the exposed part of the angle iron to make it easier to find next time. Where to stand to take the photo should be marked by rebar, angle iron, welded stake, or rock pile.
- Write the location description in your notebook so that you can find it again. Use a witness post or other permanent marker as your base. 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 from the plot to the witness post to aid in finding the plot later.
- When taking the photos, use a tape measure along one or more sides, or two 6-foot folding rulers, or a 3x3 foot square made of wire, metal dowels, or PVC to give a size reference for the plot (Fig. 3).
- Always identify the plot with an identification card in EVERY picture; include date, photo point identification, compass bearing, and location.

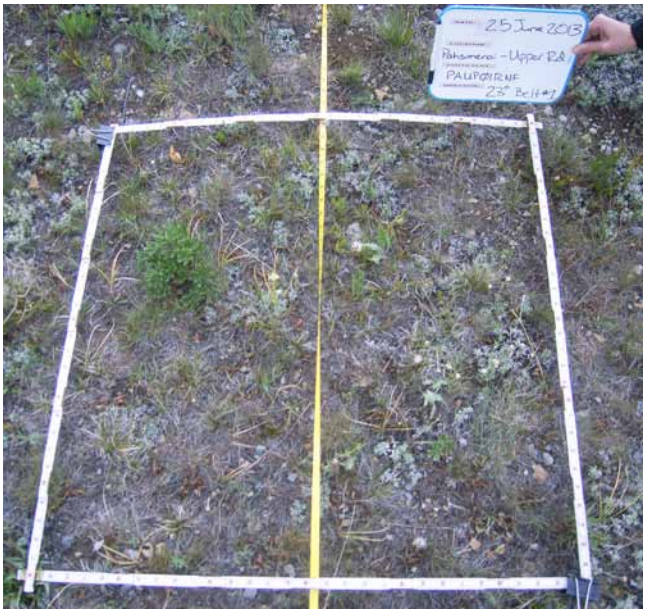

Fig. 3. Two 6-foot folding carpenter rulers can be used to create the 3x3 ground photo. Both rulers are bent at 90 degrees at the 3-foot mark. A photo board is placed above or to the side of the frame. Be sure to stand where your shadow will not obscure any part of the frame.

When to Monitor

It is highly recommended to take two sets of photos; one before grazing and one after grazing. Photos can be taken on turnout and removal days. If you only take one set of photos, take them during the active growing season. Because seasonal conditions vary from year to year, take your pictures at the same time every year to document this variation. Pick a date you will easily remember (e.g., 4th of July).

Equipment Needed

Camera

- A pocket size camera is more convenient than the larger cameras with multiple lens options. The most widely available cameras on the market today are digital, but a 35-mm film camera works just as well. Both formats work and will hold up in court if needed. Film can be difficult to procure, and even more difficult to get developed. The operative word is **consistency**. Use the same lens size every time at any given site.
- Most mobile phones include a camera that will take high quality pictures. Additionally, if the location services are set to be used with the camera, the photo will be geotagged (have GPS coordinates associated with the metadata of the photo). There are a number of free and low cost applications for mobile smartphones and tablets that will directly stamp time, date, coordinate bearings, and other information onto each photo (e.g., GeoCam®, Solocator®).
- Many cameras can display the date on the photo, which is useful for monitoring. Special cameras can display the GPS coordinates on the photo. Dates of pictures are critical, and this feature assures you a date even if your identification card does not show well.
- Archive photographs, store on a CD or other format and keep them with your other monitoring files. Prints are convenient to show changes to others while in the field, to use to locate plots while in the field, and to use in hearings or other legal forums. You should create a hard copy for ease of storage, and usefulness in presentations before larger audiences. Prints can be useful for field work and for lawyers to use in legal situations.
- Use nonwhite identification cards or photo boards to record date, location (allotment or pasture name, GPS coordinates, legal description), bearing, 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 or it is useless.

Notebooks

Back up, back up, back up! If you drop your phone or camera it is possible to lose all your photos, even off of a secure digital (SD) card. Create a file on your computer and store photos by year, location, and pasture. The better organized your photos are, the easier they will be to access again.

Print out all photos! Store CDs, prints, and keep any notes taken while in the field that will help explain what the pictures are telling you. Using photo sheets that fit in a three-ring binder will enable you to either hole punch your field notebook and add it to photos or use 4x6 notecards next to each photo to record notes about the camera used, conditions observed, management objectives, etc.

- Place CDs and 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.
- For CDs (or other archival mediums), use a permanent, waterproof, fine-point, felt-tip pen to record the same information on the face of the CD. A separate page with identification information would also be good insurance.
- Get your photographs printed as soon as possible after taking the pictures and label the prints/CDs as soon as you can after getting them processed. Your memory will be fresher, and this will keep the job small and easy to do.
- Expand on your written observations with any additional interpretation or information that will be necessary later. Memory, again, will be much better closer to the initial data collection.

Other Observations

Keep a small notebook or diary with you to record observations on vegetation, riparian areas, soil characteristics (movement, crusts, cracks, etc.), wildlife observed (what, when, where), livestock performance, precipitation events and distribution, recreational use, gates found open that should be closed, fences cut, etc. This kind of information can help clarify other monitoring efforts, including photos. Oftentimes, the only notes that will accompany your photos are the ones you take. The more you can document with photos and supplement with field notes, the stronger your insurance policy will be.

While out monitoring, have your monitoring field notebook with you and record in it any relevant observations. You can file those notes directly with the photos once they have been printed and make photocopies for your field notebook. Previous notes of observations will help trigger your memory for making and recording relevant observations. Additionally, notebooks can record the rationale behind the site selection so that you (later) and those who follow you understand why the site was selected as a "key area."

The following examples of observations to record have been adapted from the "'How To' Monitor Rangeland Resources" notebook (see Additional Resources below):

Resource	Observation
Climate	Precipitation and how it fits into recent seasonal and annual trends
	Temperature and how it fits into recent seasonal and annual trends
Vegetation	Presence of sensitive plants
	Heading or flowering dates
	Age classes of vegetation and vigor
	Physical disturbance (wildlife, livestock, recreation, erosion, landslides, etc.)
	Poisonous plants
	Utilization of vegetation • What has been eaten? • What hasn't been eaten? • Was it livestock or wildlife usage?
	Insect damage
	Juniper invasion
	Sagebrush invasion (especially riparian)
	Abundance and kinds of weeds
Riparian	Pruning or browsing of willows or aspens
	Presence of vegetation on streambanks
	Amount of woody and herbaceous vegetation
	Presence of beaver dams
	Dry-up dates of springs/stock water
	Headcuts
	Bank stability or sloughing
Water	Turbidity (muddiness)
	Algae or other aquatic weed growth
	Temperature
Soil	Amount of bare ground
	Soil crusting
	Organic matter decomposition
	Compaction
	Soil textures
	Erosion
Wildlife	Wildlife tracks, droppings, etc.
	Wildlife sightings
	Hunting or fishing results
Other	Archeological sites (arrowheads, etc.)
	Recreation impacts
	Weather events (floods, storms, etc.)
	Down or cut fences
	Open gates
	Livestock on-off dates, weights

Just remember…

- Keep it simple!
- There is no single best method.
- No fancy equipment needed.
- Be consistent.
- Just get started and keep going.
- Ask for help:
  - County extension educators
  - Natural Resource Conservation Service
  - Federal (BLM, USFS) and state (Department of Agriculture, Department of Lands) land management agencies
  - Private consultants
  - The most important photo or piece of data is the first one, so start today!

Additional Resources

How To Monitor Rangeland Resources. 1994. Univ. of California, Cooperative Extension, Division of Agriculture and Natural Resources, Intermountain Workgroup Publication 2. Contact Rhonda Gildersleeve, UCCE Inyo-Mono Counties, 207 W. South St., Bishop, CA 93514.

Photo Plots. 1993. Governor's Watershed Enhancement Board. Contact GWEB, 158 12th St. N.E., Salem, OR 97310-0210. 1-800-624-3199.

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