

Photo Monitoring for Ranchers Technical Guide

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Rangeland management is the stewardship of resources to meet land management goals.

Photo Monitoring Benefits

Why should a rancher monitor rangelands?

- To determine whether your management decisions are meeting your objectives and moving the rangeland toward a desired future condition
- To determine the effects of past management actions
- To prove your management actions are making a positive difference

Photos are valuable monitoring tools because:

- Photo points can be easily established on most rangelands
- They show trends over time to document effects of changes in the environment or effects of management actions
- They require no specialized expertise to take or interpret
- They can stand alone or be supplemented with numerical data

Start by asking “what”? What are you interested in? What are your goals?

Common monitoring goals (not to be confused with management goals) include:

- Describe or document current conditions—*baseline monitoring*
- Document the application of management practices—*implementation monitoring*
- Detect and document change over time—*trend monitoring*
- Document the effectiveness of management practices—*effectiveness monitoring*



- Document abnormal or catastrophic events like drought or wildfire
- Investigate perceived problems or opportunities

Getting Started

First, the photos must exist. Do it! Get started and keep going! One size does not fit all. There is no one best or correct method. Fixed-point, repeat photography, done properly, is very objective and has significant legal value.



Figure 1. Example of a photo identification board with complete information including plot name (site 1), allotment/pasture name (Indian Valley), bearing (N), date, and GPS coordinates.

STEP 1: GATHER YOUR EQUIPMENT

Camera

- **Film or digital**—The most widely available cameras on the market today are digital, but a 35mm film camera works as well. Both formats are effective; each has distinct challenges for data storage and access.
- **Resolution**—Digital cameras with a resolution of 6 megapixels or greater are excellent. But even phone cameras with 2 megapixels resolution have value for monitoring.
- **More options**—Many cameras can display the date on the photo. Some of the more advanced cameras can display the GPS location on the photo. There are also computer programs (e.g., www.geotagphotos.net/en/android.php) that can add geographic coordinates (geotags) to a scanned photo from a film camera or to a photo from a digital camera or smart phone camera.

Photo board

This paper or erasable board must appear in **every** picture (figure 1). Include date, location, or other details such as whether the photo is taken before or after grazing.

Field notebook

This is where you will note where you took photos and any unusual attributes. It could be good, old-fashioned paper and pencil or digital—in a field computer or smart phone.

Map or GPS device

It is important to document the location of the site so you can find it again in the future.

- **Map** such as a ranch or pasture map, topographic map, or aerial photo.
- **GPS unit** available from sporting goods stores or outdoor supply companies. Almost all smart phones contain a standard GPS receiver that works even without cellular service. GPS apps for smart phones are also available.
- A **compass** may be valuable to document the direction in which a photo was taken.

Historic photos

Once you have a set of sites that you monitor, photos taken in the past will help you or someone else find the exact spot and repeat the photo with accuracy.

STEP 2: DECIDE WHEN TO TAKE YOUR PHOTOS

- Take photos as close to the same time of year as possible.
- Consider a date that is easy to remember, like the 4th of July, your anniversary, or a birthday.
- Generally, photos are taken during the growing season when plants are actively growing. The peak of plant growth is a good time unless plants have been grazed by then.
- The best time to take photos can vary depending on what you are trying to document.
- Taking photos before and after a pasture is grazed can be helpful to document utilization levels and grazing impacts.
- Take photos annually at a minimum!

STEP 3: CHOOSE YOUR SITES

If you are taking photos on public land allotments, ask your local agency range conservationist if they have conducted monitoring on the allotment and have photos or data. Most allotments do. Previous data and photos may be found in the allotment files, permittee files, and monitoring files. These files are generally housed at the local federal land-management agency, but may be found in separate departments (e.g., range and wildlife). Older data may be archived off-site and need to be requested.

- Select sites that will reflect what is happening on the management area (pasture, allotment) as a whole.
- Don't be afraid to put photo plots in areas that aren't in perfect shape (especially those visible to the public); these areas have a high potential to show change as a result of management over time.
- Select sites that will be easy for you to find again.
- If you are interested in the effects of grazing plans, avoid areas where animals congregate (e.g., watering points) or areas that livestock seldom access.
- Select enough sites to represent distinct ecological sites and land/soil types in your management area.
- A few sites are better than none. In fact, extensive photo monitoring is probably superior to intensive ground sampling methods with a very few sites.
- As a general rule, select three sites in the uplands and three in riparian areas.
- *Be realistic about how many sites you can handle over time.*

STEP 4: MARK YOUR LOCATIONS

On a map

- Mark photo points clearly and include written instructions on how to get back to the site. This step is critical for ensuring photo monitoring continues in the future, especially if it isn't you who is taking the photos.

In the field

The extra effort to permanently mark photo points can improve the comparison of photos over the years. It is also recommended to record the location with a GPS unit. If your photo is more than 25 feet from a road or trail, which is strongly suggested, use a witness post (T-post) to mark where to stop. Many permanent marker options exist:

- **Rebar or angle iron** are options frequently utilized by land-management agencies.
- **Metal markers** made of nails, washers, and rebar can be fabricated and pounded to ground level for finding with a metal detector (figure 2). Some ranchers use a potato digger cut in half.
- **Flat rocks** or cement patio stones can be painted orange or white and piled at the photo point.
- **Steel posts** (T-posts) are easy to spot and find again. Remember posts tend to attract wildlife and livestock. Therefore, take photos a consistent number of feet or paces away from a post.
- *Be careful in using materials such as plastic (like PVC pipe) or wood as they tend to degrade after time.*



Figure 2. Example of a welded stake. Discs on top are metal washers and are welded to a piece of rebar cut at an angle. Discs were painted with orange implement paint, which doesn't degrade as quickly as other types of paints.

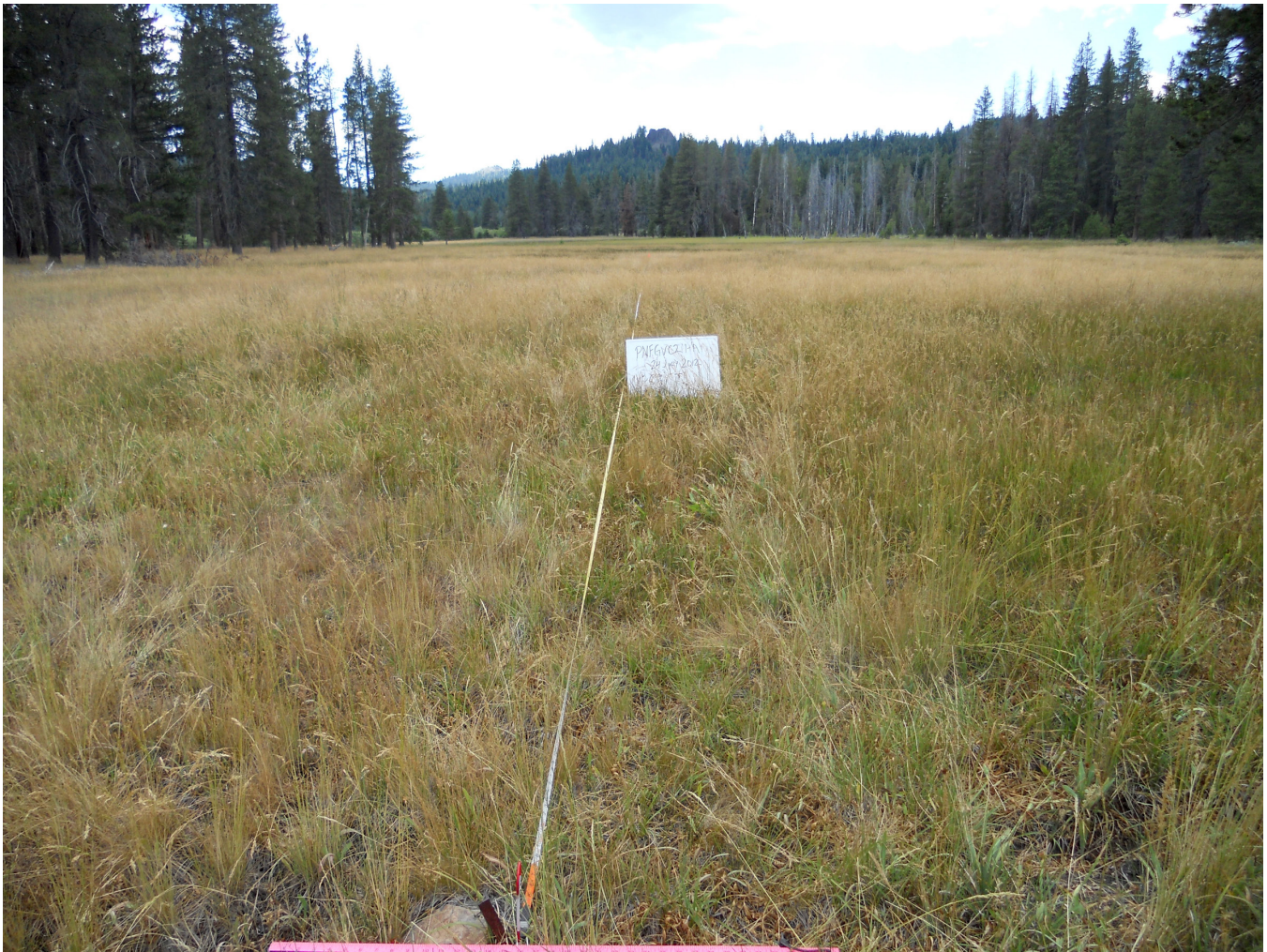


Figure 3. Example of a recreated historical photo with the correct sky: landscape ratio (one-quarter sky and three-quarters landscape) and a permanent, distinct landscape feature.

STEP 5: LOCATE DISTINCT LANDSCAPE FEATURES

Use distinct landscape features to help you find your sites again and to help line up the photos each time they are taken. Distinct landscape features are features that are unlikely to change dramatically over time and can include rock formations, mountains, and distinct topography (e.g., hills, swales, saddles) (figure 3).

STEP 6: TAKE THE PHOTOS

Use a photo board

Always use a photo board with the date, plot name, bearing, and GPS coordinates or legal description (township, range, section, quarter) (figure 1). The photo board must be legible, take up no more than one-sixth of the photo, and be placed in a corner of the frame (not the middle, unless you are deliberately recreating historical photos such as the one in figure 3).

Take two photos at each site

- **Landscape photo.** One-quarter of the photo should be sky and three-quarters of the photo should be landscape (figure 3). If this ratio is not possible to achieve (such as in narrow canyons), try turning around and taking a photo that will include these ratios looking in the opposite direction.

Consider putting your views in perspective. If a photo point already exists at a stream crossing, retake that photo, then step back and take a photo of the whole stream reach.

- **Ground photo.** Ground-view photos have significant value. Selecting sites on the ground that can be found again easily takes extra effort, but allows a much more accurate level of interpretation about what is causing change on the site.

Use yard sticks, folding rulers, or a grid frame to take a 3 foot x 3 foot photo of the ground (figure 4).

Permanently mark two diagonal corners and where the photographer should stand. This is a critical step

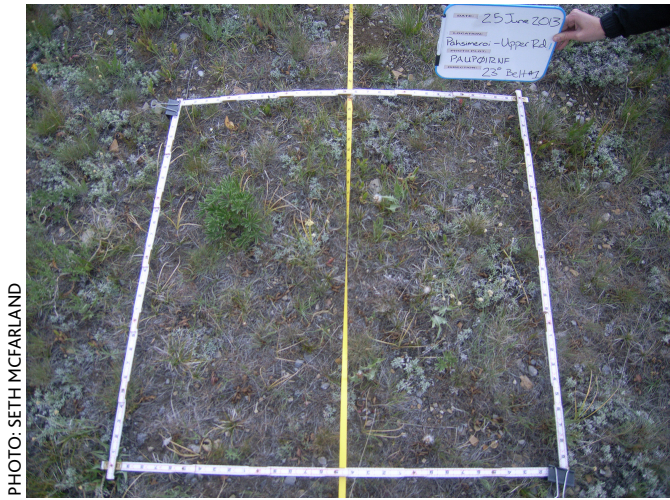


PHOTO: SETH MCFARLAND

Figure 4. Example of a 3 foot x 3 foot photo grid using two folding rulers (each is 6 feet long and bent at 90° at the 3-foot mark). Use the tape running through the center of the frame to note where the photographer should stand.



PHOTO: BLM, BURLEY, ID

Figure 5. A permanent grid frame such as those used by federal land-management agencies. Each square is 1 foot x 1 foot. Diagonal corners are painted different colors so the photographer knows where to stand.

to ensure repeatability over time. Federal agencies use permanent grid frames (figure 5).

STEP 7: MAKE FIELD NOTES

Be sure to make notes about the photo, site, and pasture:

- Details on the specific location where the photo was taken and the compass bearing of photo
- Weather events (such as drought, high temperatures, or exceptional rains)
- Information about grazing (could be grazing that has occurred historically, actual, livestock, wildlife, or planned in the future)
- Disturbances such as weeds (e.g., new weeds, weeds in the area but not yet onsite, or a reduction in weeds), rodent activity (e.g., ground squirrels, badgers, rabbits), wildlife (e.g., elk, deer, antelope, moose), or insect (e.g., grasshoppers, Mormon crickets) herbivory and use
- Wildfire (e.g., historic, recent, nearby, or restoration efforts)
- Major plants that you recognize in the area
- Any other relevant information such as new or planned range improvements or management changes

The more notes you take, the more complete the story of what is happening out on the land. Oftentimes, notes are a critical clue when paired with historical photos.

STEP 8: STORE YOUR PHOTOS

Download your electronic photos, including photos on your phone, as soon as possible. If something happens to your camera, and you don't have a backup, you've just wasted a lot of time and effort.

Printed photographs

Place photos in a photo album such as a three-ring notebook with photo sheets. Even better, create two notebooks and store one in a different location. Include notes or interpretations you have of the site, such as changes you see in trends or specific unusual events that have occurred. Refer to the notes you took in the field.

Electronic images

- **Electronic photo album.** Many electronic photo album programs exist. Just make sure the program you choose allows the inclusion of notes on location, date, and field information.
- **PowerPoint or Word file.** Consider importing photos into a PowerPoint presentation or Word document to create files of photos. With this approach, photo sheets can be printed and taken to the field.
- **Electronic map.** If the GPS location is known, photos can also be stored in an electronic map program such as Google Earth.

Keep more than one copy of your photos, preferably in separate locations. If something happens to one copy, you will have another.

Using a Reference Pole or Rod

Most agency photo monitoring guidelines suggest the use of a pole, post, or rod to serve as a size reference in each photo (figure 6). Although this is an optional practice, it is a good idea for making year-to-year or season-to-season comparisons easier. The pole, post, or rod should:

- Be a little taller than the average height of vegetation
- Have markings or alternating color blocks of known increments (e.g., 1 inch, 6 inches)
- Be readable from a distance

If you use a T-post, be cautious as livestock tend to use them as scratching posts and will disturb the area around them.

Put the reference pole a consistent distance from the camera and record it in your field notebook.



Figure 6. Although this photo lacks a photo identification board, the reference pole (marked in decimeters) clearly indicates the height of vegetation.

The most important photo is the first one you take, so start today!

Just remember. . .

- Keep it simple!
- There is no single best method.
- No fancy equipment is needed.
- Be consistent.
- Just get started and keep going.

Ask for help

- Extension educators in your county
- Natural Resources Conservation Service
- Federal (BLM, Forest Service) and state (Department of Agriculture, Department of Lands) land-management agencies
- Private consultants

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