RANGELAND MONITORING SERIES Publication 8067

Photo-Monitoring for Better Land Use Planning and Assessment

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The verb *to monitor* means to watch or to check, often for the purpose of detecting change. There are many ways to monitor change on the landscape, but none is simpler than photo-monitoring and recording observations. This publication will help landowners develop a photo-monitoring program for their property. Other aspects of monitoring are covered in other publications (see Additional Reading). Photo monitoring is a valuable tool for documenting your management as well as conditions or events that affect your management. Photo points are easily established. You may already have old family pictures that illustrate how the property, a stream, or facilities looked in the past. New photographs of the scenes in these old photos provide one good way to get started with your photo monitoring program. If you have no old ranch photos, now is a good time to start developing a photographic record for your own benefit and for the benefit of those who follow you as ranch managers or owners.

While photographs cannot tell the entire story about a situation, project, or practice, much information can be gathered by comparing photographs taken of the same scene over a number of years. When you establish a photographic collection to monitor landscape conditions, you do not generate the large amounts of data often associated with agency monitoring projects. Still, photo-monitoring may surpass other forms of monitoring because it is simple, inexpensive, and rapid, and it can portray landscape changes on a large scale to audiences of varying backgrounds.

WHY MONITOR?

Before you begin a photo-monitoring program, you should consider why you are monitoring. Here are some common purposes:

- to describe or document current (normal) conditions *(baseline monitoring)*
- to describe or document abnormal or catastrophic events
- to detect and document change *(trend monitoring)*
- to confirm agency assessments
- to investigate perceived problems
- to document the application or implementation of management practices *(implementation monitoring)*
- to document the effectiveness of management practices *(effectiveness monitoring)*

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MEASURABLE OBJECTIVES

A land manager's reasons for monitoring can in many cases be translated into measurable management objectives. Your statement of measurable objectives should tell you what to monitor and where to monitor. For example, suppose your management objective is to increase stream bank shrub cover by reducing livestock grazing along stream channels. You can document the measurable objective of increasing shrub cover with a series of photographs of the stream bank taken over time. Another measurable objective is to maintain adequate residual dry matter on your rangeland. While you cannot take photographs of everything, the installation of photo points at several locations can help you document residual dry matter from year to year (Figure 1). Non-specific management objectives such as enhancing riparian habitat are more difficult to monitor: they lack a clear statement of which habitat characteristics the manager is trying to change. A statement of measurable objectives is crucial to good monitoring.

WHAT TO MONITOR

There are several kinds of photographs that you can take to document conditions in a watershed or on a farm or ranch, including

- landscape photos
- plot or close-up photos
- photos of riparian, stream, wetland, or other special habitats
- event photos
- practice photos

Landscape photos should give a representative view of the area and feature a distinctive landmark in the background (e.g., a peak, rock outcrop, or ridgeline) to aid in taking follow-up photos in the future (Figure 1). Be sure to include enough horizon in the picture to allow a future photographer to find the same photo point again. You can record large areas of bare soil, erosion, weed and shrub invasions, and burns using landscape photos. *Plot* or *close-up photos* can be used to document ground cover, residual dry matter, erosion, endangered species, and weeds (Figure 2). *Riparian, stream,* or *wetland photos* provide a representative view of the stream channel, bank stability, ground cover, and overstory vegetation (Figure 3).

Representative Area

A representative area is an area or site that serves as a valid representation of a greater area, and so helps you to meet your monitoring objectives. It is not the best area or the worst area within your site, though you may choose to photograph these as well.

Frequency of Monitoring

If the objective of photo monitoring is to document change, you need to schedule photo sessions so that you take photos as frequently as monitored conditions change. With seasonal photos, you can document vegetation changes through the year. Annual photos can document changes in gullies or stream banks. A series of baseline photos that document existing conditions can be used to document change due to an abnormal or catastrophic event. Before-and-after photos can document the effectiveness of specific land-management practices.

Figure 1. Annual landscape photos taken in early March (no photo is available for 1998).

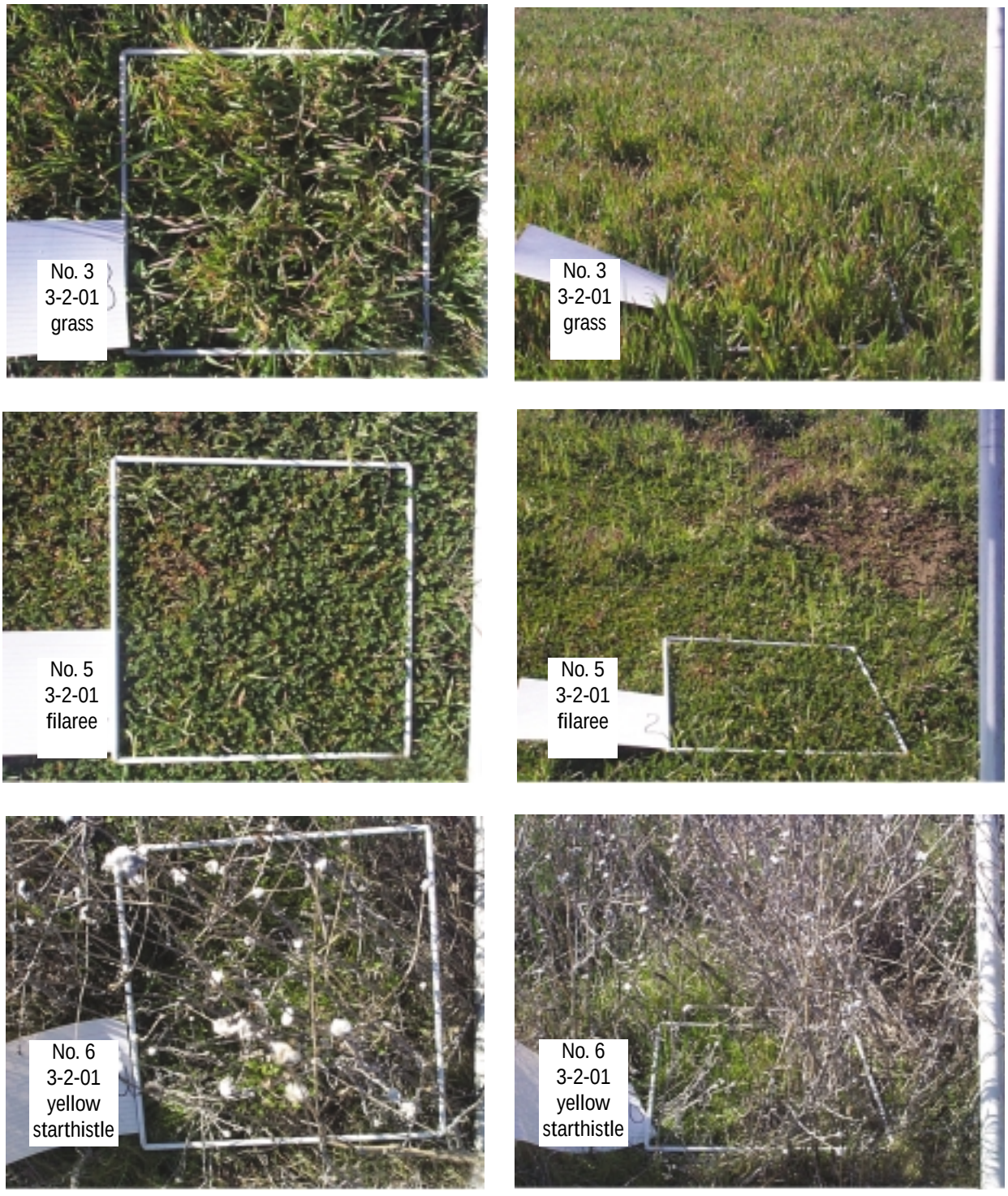

Figure 2. Close-ups of 1-square-foot plots.

Figure 3. Riparian area photographed before and after installation of a fence.

Event photos can be used to document unplanned or unusual events such as fires, floods, erosion, wildlife damage, and vandalism (Figure 4), and *practice photos* can be used to document management practices (Figure 5). You can use "before and after" photos to document the implementation and effectiveness of practices, the effects of fire and post-fire recovery, the invasion and control of weeds and shrubs, and other long-term changes.

Figure 4. Photos taken to document events (gully formation and rooting by feral pigs).

Figure 5. "Before and after" photographs to show the effect of a practice.

SUPPLIES AND EQUIPMENT

A good quality, pocket-sized, single-lens 35 mm camera is adequate for photo-monitoring. To maintain consistency in the photos over time, you should use only one lens of a fixed focal length. A multi-lens camera is unnecessary. For more information on lens sizes, refer to *Measuring and Monitoring Plant Populations* under Additional Reading. We generally recommend the use of color slide film because its dyes are more stable so the photos retain true colors longer. You can make quality prints from slides. Prints are useful because you can use them in later photo-monitoring sessions to ensure that repeat photos depict the same scene, especially if different people do the photo-monitoring. Any camera with appropriate film, used carefully, will produce useful photos. Digital cameras provide the opportunity to maintain photo records on a personal computer and to delete photographs in the field until just the right scene is captured.

Other supply and equipment needs include note cards or a notebook, a steel post, and a compass. In the notebook you will describe each photo point. Good records that describe the location, time of year, time of day, management activities, and comments on vegetation and other conditions make it easier to re-photograph photo points and to evaluate change. A map showing photo point locations should be included with the notes. You can also use a global positioning system (GPS) receiver to document the photo point location. Good record keeping is crucial to successful photo monitoring. Figure 6 is a sample form that you can copy onto 3 × 5 cards and use to document each photo point.

Photo point name or number	**Date photo point established**
Location description	**Compass bearing**
Photograph date and time	**Name of photographer**
Notes	

Figure 6. Sample record card for photo point descriptions (copy onto 3 × 5 cards).

It is crucial that you mark the photo points well so that you will be able to locate them for future photographs. You can use a steel post to mark each photo point, but any other permanent feature, such as a pile of rocks, will do just as well. Trees do not make good photo point markers because they grow and change their shape over time. Take a compass bearing from the photo point to the center of focus for all photos. By establishing permanent photo points with compass bearings, you ensure that monitoring photos will be taken consistently from the same point and in the same direction over time. Time-of-day and time-of-year of photo monitoring should also be consistent over time. If you are monitoring vegetation it is important that you are consistent in the stage of plant growth or maturity that you photograph. Plot photos or close-ups should be taken some distance from marking posts, since the posts may attract livestock whose feeding and traffic will be uncharacteristically heavy in those areas.

Take as many photos as necessary to adequately document landscape conditions. For example, you may need to take upstream, downstream, and across-stream photos in order to thoroughly document riparian conditions along a stretch of a stream. Within each picture, include a photo ID card to record the date and photo point number. Be sure the writing is large and legible. An 8.5×11 inch sheet of paper with large, thick writing from a felt-tip pen should be adequate. Some cameras are equipped with a date stamp, which simplifies record keeping. To provide scale in photographs, especially close-ups, you may want to include a profile board (Figure 7) or other object of a known size in the picture. Any object with delineated measurements that will be visible in a photograph is adequate. If you place another permanent marker such as a steel post or a length of rebar where the profile board appears, it will be easier for you to put the profile board in the same position the next time you take pictures. Alternatively, you could place the profile board a known distance in a known direction from the photo point.

Figure 7. You can use a profile board to indicate scale in a photograph.

Once you have taken the photos and assembled a complete set of notes, you should store them in a safe, dry place. An envelope provides adequate protection for photos and notes, but transparent photo sleeves available in most office product or photography stores are convenient for storing photographs in a three-ringed binder. Identify each photo either on the back of the print or on the slide mount. You can judge the success of your storage method by observing how easily you can retrieve the records.

ADDITIONAL READING

Elzinga, C. L., D. W. Salzer, and J. W. Willoughby. 1998. Measuring and monitoring plant populations. BLM Tech. Ref. 1730–1731.

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Peters, A., and T. Deboodt. Using photos to monitor riparian areas *In:* Riparian restoration and monitoring workshop. April 30 to May 3, 1996, La Grande, Oregon.

United States Environmental Protection Agency. 1993. Monitoring protocols to evaluate water quality effects of grazing management on western rangeland streams. EPA 910/R–93–017.

FOR MORE INFORMATION

You'll find detailed information on many aspects of water and land use in these titles and in other publications, slide sets, videos, and CD-ROMs from UC ANR:

California Range Brushlands and Browse Plants, publication 4010
Determining the Value of Leases for Annual Rangeland, publication 21456
Estimating the Cost of Replacing Forage Losses on Annual Rangeland, publication 21494

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