

Photo Point Monitoring

i STRENGTHS

Photo point monitoring:

- Uses readily available equipment.
- Is an effective communication tool for public education.
- Is a method of providing landscape context for a study area.
- Is a standardized evaluation procedure for comparing multiple locations.
- Is a method to document rates of change.

i LIMITATIONS

- Only limited quantitative data can be obtained.
- Bias in photo point placement may occur.
- It may be difficult to use in dense vegetation.
- Photo points can be lost or obscured over time.
- Some weeds may be difficult to distinguish from the surrounding vegetation.



IMPORTANT

Clearly document objectives and the monitoring protocol because the person who establishes the photo points often is not the person who does the repeat photography.

AUTHOR

Randy M. Hamilton
Remote Sensing
Applications Center
Salt Lake City, UT

Summary

Photo point monitoring is an easy and inexpensive, yet effective, method of monitoring vegetation and ecosystem change (figure 1). It consists of repeat photography of an area of interest over a period of time, with photographs taken from the same location and with the same field of view as the original photo. With appropriate site marking and documentation, photos can be precisely replicated by different people many years apart.

Major Steps

1. Define the objective.
2. Select and establish photo and camera points.
3. Photograph the scene or subject.
4. Organize and file the data.

Define the Objective

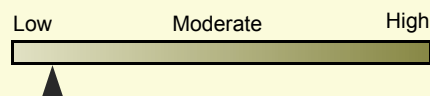
A well defined objective is key to successful photo point monitoring. Photo points may be established for a variety of reasons such as evaluating the efficacy of management activities, assessing the ecological impact of a weed infestation, or determining whether management objectives are being met. Different objectives will generally require different photo points. Therefore, to obtain relevant and accurate information, the objective for monitoring must be carefully considered and defined before establishing photo points.

QUICK LOOK

Objective:

This document outlines how to use photo point monitoring in weed management. For a more detailed discussion of methodology, analysis techniques, and other applications of photo point monitoring, refer to the *Photo Point Monitoring Handbook* (Hall 2002).

Cost:



Expertise:

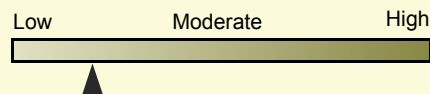


Figure 1—Photo point monitoring of a leafy spurge infestation before (A) and after (B) the introduction of copper leafy spurge flea beetles. (Photos adapted from Norman E. Rees, USDA ARS, www.forestryimages.org)



Select and Establish Photo and Camera Points

A photo point is an established location that defines the orientation of a camera located at a camera point (figure 2). Care should be taken when establishing photo and camera points to ensure that the points chosen address the objectives. The following steps outline items for consideration and procedures for establishing photo points in areas selected for monitoring.



CAUTION

Once a photo point is established, it cannot be changed — use care in choosing locations and subjects for monitoring.



TIP—CAMERA PTS.

Select camera points from which multiple photo points can be photographed.



CAUTION

If a particular photo point is photographed from more than one camera point, the distance between the photo point and all camera points must be the same.



TIP

If photo and camera points are close together, place the camera point to the north of the photo point to avoid shadowing while photographing the photo point.

1. **Identify photo points.** Within selected monitoring areas, identify elements in the landscape that are most critical to document in order to achieve the project objectives. General photography can be used to document a whole scene. Topic photography, on the other hand, narrows the target from a scene to specific elements (subjects) in the landscape. Ensure that enough photo points are established to adequately document changes that are expected to occur.
2. **Establish camera points.** Based on the project objective, establish camera points for each photo point. Pay particular attention to the distance between the photo and camera points to ensure that the photographs will adequately document the scene or subject and the expected changes.
3. **Mark photo and camera points.** Photo and camera points should be permanently marked so they can be relocated in the future. Metal fenceposts work well for this purpose. However, if fenceposts are obtrusive or otherwise undesirable, steel rebar driven flush with the ground can be used instead. A metal detector may be needed to relocate rebar markers. Measure the distance and direction from camera points to photo points. Obtaining coordinates of

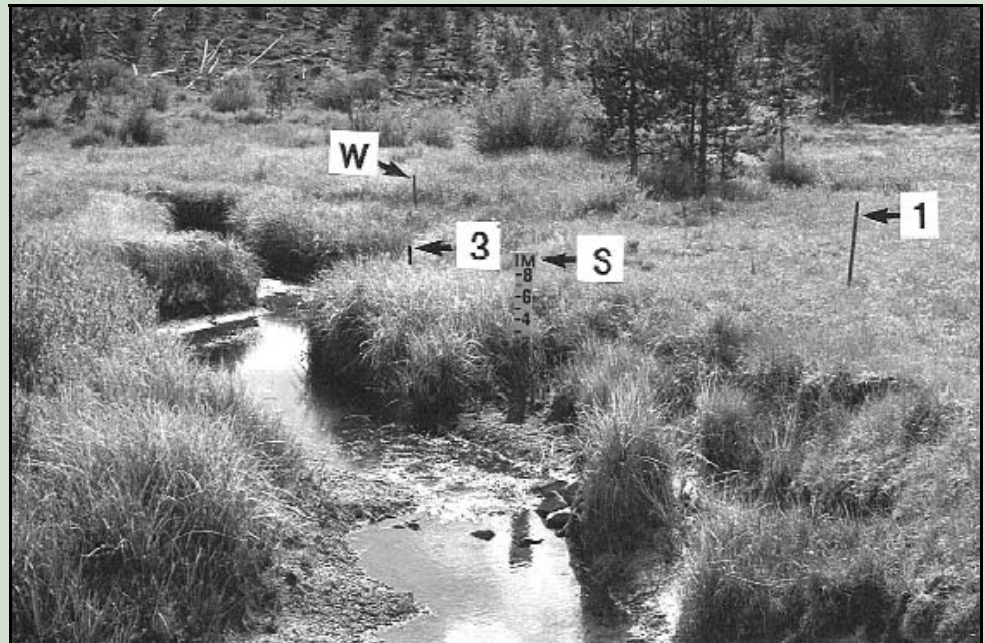


Figure 2—Photo point monitoring site showing photo points (S and W), and camera points (1 and 3), marked by fenceposts. (Adapted from Hall 2002.)

Photo Point Monitoring



IMPORTANT

When recording directions, indicate whether they are magnetic or true degrees.



TIP

Photo points can be established along a transect to obtain more quantitative information. See the Photo Point Monitoring Handbook (Hall 2002), or Ground Based Photographic Monitoring (Hall 2001) for additional information.

the points using a global positioning system (GPS) unit can aid in relocating them in the future.

4. **Identify a witness site.** A witness site is (preferably) an immovable object in the monitoring area that can be easily identified when returning to the area. It serves as a reference to quickly locate the monitoring area and also as a reference point from which the camera and photo points can be located. Measure the distance and direction from the witness site to the camera points, photo points, or both. It is helpful to attach a permanent identification tag to the witness site with the distance and direction to the photo and/or camera points inscribed on the tag.
5. **Assign identification numbers.** Assign identification numbers to all photo and camera points.
6. **Record pertinent site information.** Record pertinent information about the monitoring site on a map, aerial photograph, and/or site description form. A sample “Photographic Site Description and Location” form, developed by Hall (2002), is provided in *A Weed Manager’s Guide to Remote Sensing and GIS* for reference. Information such as date, observer, location, site description, objectives, identification numbers, and locations of witness site, photo points, and camera points, including distances and directions between points, should be recorded.
7. **Determine when to photograph.** Determine how frequently the photo points should be photographed, the duration of monitoring, as well as the time of year at which photographs should be taken. For example, if the efficacy of a treatment is to be monitored, photographs might be taken immediately before the treatment and two months after the treatment. If weed spread is to be monitored, then the photos might be collected once per year at the time when the weeds are most visible (e.g., during peak flowering).
8. **Create a site locator field book.** It is recommended that a pocket-size site locator field book be created to aid in locating the monitoring location and witness, camera, and photo points during subsequent visits to the area. The field book should contain copies of the original photo point photographs and directions from the witness sites to each camera location and orientation of the photo point.

Equipment Checklist

- Camera
 - Memory cards
 - Extra batteries
 - Film
- Tripod
- GPS
- Forms
 - Site description and location
 - Camera location and photo points
 - Photo ID cards
- Clipboard
- Compass
- 100 ft measuring tape
- Copies of original photos (site locator field book)
- Fenceposts
- Steel stakes
- Hammer
- Meter board
- Metal detector
- Spray paint

NOTE: An editable equipment checklist is available for download in *A Weed Manager’s Guide to Remote Sensing and GIS*.



DATE	_____
AREA	_____
UNIT	_____
CAMERA:	1 2 3 4 5
PHOTO:	A B C D
	E F G H I J

Site identification card—
Identification cards (11" x 8.5") such as this one, placed within the camera's field of view, provide permanent identification information for the photograph.



CAUTION

Be careful not to trample the vegetation when locating photo points.



IMPORTANT

Repeat photographs should be taken using the same format camera (and film, if applicable) as used for the original photograph. If a different format camera is used, adjustments must be made to ensure that the view through the camera matches the original photograph.

Photograph the Scene or Subject

The following steps outline basic considerations and procedures for photographing the scene or subject of photo points.

- 1. Create photo identification cards.** It is recommended that a photo identification card be placed within the camera's field of view each time a photo point is photographed to embed pertinent information about the site into the picture (figure 3). The card should contain the site name, photo point number, camera point identification, and date. Other information such as the photograph number, time of day, and the photographer's initials may also be included. A sample identification card developed by Hall (2002) is available in *A Weed Manager's Guide to Remote Sensing and GIS*. Hall recommends copying the identification card onto blue paper for best visibility. Laminated cards can be reused by writing pertinent information with dry erase markers. Small chalk boards can also be used as photo identification markers.
- 2. Locate photo and camera points.** Using site location information (e.g., information found on a "Photographic Site Description and Location" form) and a site locator field book and/or a GPS unit, locate the photo and camera points.
- 3. Photograph the scene/subject.** It is recommended that original and repeat photographs be taken using a tripod at a designated height. For repeat photography, point the camera toward the photo point and compare the view through the camera to a copy of the original photograph. Adjust the camera until the view through the camera is the same as the original photograph. You may want to record the aperture, shutter speed, focal length of the lens, and film speed (if not using a digital camera).

Figure 3—Photo point monitoring site showing a photo identification card and a meter board. (Adapted from Hall 2002.)



Photo Point Monitoring

For topic photography, it may be desirable to place a meter board or other size control object at the photo point or near the subject of interest. A meter board provides a consistent point for camera orientation, a point on which to focus the camera, and a size reference that can be used to quantify change. Directions for constructing a meter board are provided in *A Weed Manager's Guide to Remote Sensing and GIS*. Meter boards are typically not used in general photography of scenes.

4. **Describe the scene/subject.** For each photograph, describe the scene or subject. For example, you might record weed density, condition of desired vegetation, and environmental factors (e.g., drought, hot or cool temperatures) affecting the overall health of the weeds and desired vegetation. A sample form for recording this type of information, "Camera Location and Photo Points," developed by Hall (2002), is provided in *A Weed Manager's Guide to Remote Sensing and GIS*.

Organize and File the Data

A well-organized, easily accessible filing system is required for photo point monitoring. This may consist of a series of expandable folders (one for each monitoring area), each containing maps, directions, a site locator field book, site descriptions, other descriptive data, prints, slides, negatives, and/or CDs or DVDs containing digital photographs.

If digital cameras are used for photo point monitoring, a computer database may be the ideal system for organizing and filing the data. Databases to organize and archive pictures are available commercially. A simple hypertext markup language (HTML) database can also be developed and used to organize and file the photo point monitoring data. An HTML database allows easy access and updating capabilities using a web browser. In addition to archiving pictures on a database, maps can be scanned and entered into the database. Descriptive information can also be scanned or entered directly into the database. Regardless of the filing system used, a backup archive is recommended in the event that documents or pictures are unintentionally destroyed or databases become corrupted. Ideally, this archive should be kept in a separate location from the original data.

Sources Cited

- Hall, Frederick C. 2001. Ground-based photographic monitoring. Gen. Tech. Rep. PNW-GTR-503. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 340 p.
- Hall, Frederick C. 2001. Photo point monitoring handbook. Gen. Tech. Rep. PNW-GTR-526. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 134 p.

ASSISTANCE?

For more information or assistance, please contact

USDA Forest Service
Remote Sensing
Applications Center
(RSAC)

2222 S. 2300 W.
Salt Lake City, UT 84119
(801) 975-3750

RSAC Intranet
<http://fsweb.rsac.fs.fed.us>
RSAC Internet
<http://www.fs.fed.us/eng/rsac>

