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Photo Point Monitoring Handbook:

Part A–Field Procedures

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Part A contains pages 1–48

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Abstract

Hall, Frederick C. 2001. Photo point monitoring handbook: part A—field procedures. Gen. Tech. Rep. PNW-GTR-526. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 48 p. 2 parts.

This handbook describes quick, effective methods for documenting change in vegetation and soil through repeat photography. It is published in two parts: field procedures in part A and concepts and office analysis in part B. Topics may be effects of logging, change in wildlife habitat, livestock grazing impacts, or stream channel reaction to land management. Land managers, foresters, ranchers, wildlife biologists, and land owners may find this monitoring system useful. Part A discusses three critical elements: (1) maps to find the sampling location and maps of the photo monitoring layout; (2) documentation of the monitoring system to include purpose, camera and film, weather, season, sampling system, and equipment; and (3) precise replication in the repeat photography.

Keywords: Monitoring, photography.

Preface

This handbook is a synopsis of repeat photography principles and photo point sampling from the publication *Ground Based Photographic Monitoring*, PNW-GTR-503, which is based on 45 years of experience in repeat photography by the author. During those years, many nuances were discovered that bear discussion and emphasis so that new users can avoid the pitfalls I ran into. The terms *should*, *must*, *do not*, and *will* are used to help users avoid problems and are not meant as rules.

Contents

Introduction

Anyone interested in quick and effective documentation of change in vegetation or soil through repeat photography will find this handbook useful. Illustrations cover such topics as streamside changes, riparian willow response to beavers, logging, livestock use, and mountain pine beetle (*Dendroctonus ponderosa*) kill of lodgepole pine (*Pinus contorta* var. *latifolia* Englm.). People, such as foresters, ranchers, wildlife biologists, and nature enthusiasts, interested in natural resources can establish photo point monitoring (discussed here) to appraise changes (see part B) in natural resources. No special skill or training is required other than some knowledge of cameras.

There is one essential criteria if repeat photography is used to document change. Distance from camera to photo point **must** remain the same (part B). For this reason, both the camera location and photo point require permanent markers. The system recommended is use of cheap fenceposts or steel stakes, usually ½ inch (1.2 cm) diameter concrete reinforcing bar.

This field procedure handbook is divided into several parts: basic foundations for photo monitoring, with discussions on objectives, selecting an area, techniques for general photography, procedures for specific topic pictures, shrub profile monitoring, and tree cover sampling. Use of forms in part B are illustrated.

Basics

The primary consideration in photo monitoring is an objective. Ask yourself several questions: What is the topic of this photograph? Why do I want to take this picture? What am I trying to show? What appeals to me? What will the picture demonstrate? (Hedgecoe 1994, Johnson 1991).

Photo Monitoring Objectives

Consider the five basic questions for any inquiry: why, where, what, when, and how (Borman 1995, Nader and others 1995).

Why—"Why" to monitor reveals the question or questions needing to be answered. Implementation monitoring asks **if** we did what we said, effectiveness asks if it **did** what we wanted, and validation asks if it **is** meeting the objectives. The "why" question

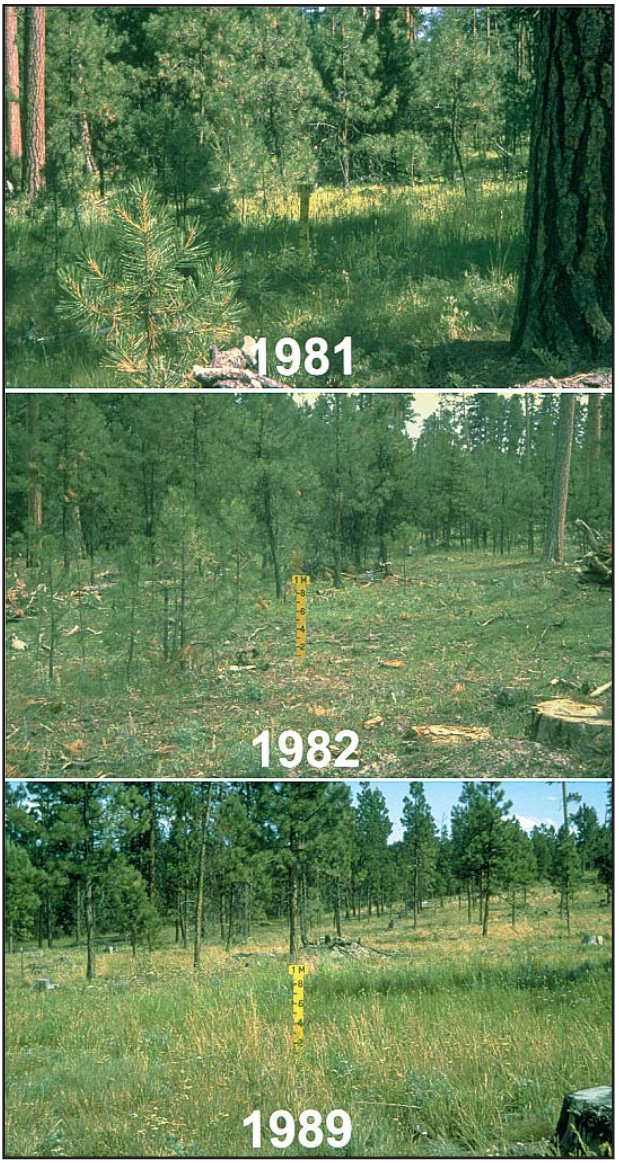

Figure 1—A ponderosa pine stand with pinegrass ground vegetation showing effects of logging: undisturbed in 1981, 1982 after the first selection cut, and in 1989 after the second selection cut and precommercial thinning. These views, with their dramatic differences, emphasize the need for permanent marking of both camera locations and photo points. Exact picture reorientation uses the "1M" of the meter board as the photographic center (also see fig. 18) and for focusing the camera for best depth of field at the meter board.

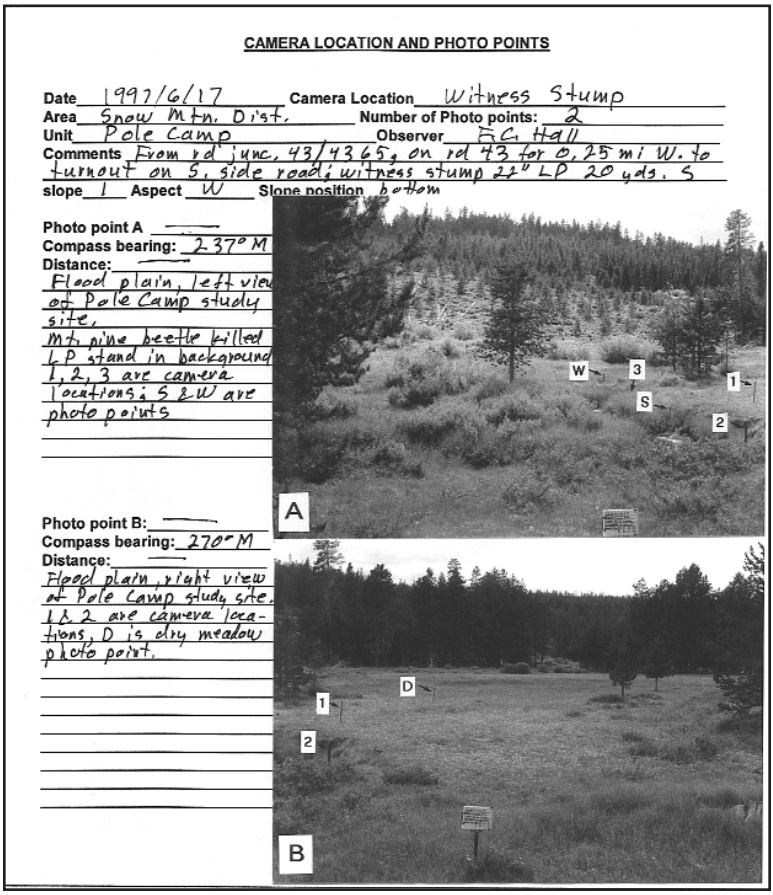

Figure 2—Filing system form “Camera Location and Photo Points” showing general photographs of Pole Camp taken from the witness stump: (**A**) the left landscape, and (**B**) the right landscape diagramed in figure 6. Note repeat of fenceposts 1 and 2 in both pictures. Fenceposts identify camera locations 1, 2 and 3 and photo points “D” for the dry meadow, “W” for the wet meadow, and “S” for the streambank. Photo identification cards similar to figure 10, a form from part B, appendix A, are at the bottom of each picture. The purpose of these photographs is twofold: to illustrate the general sampling area and to show location of the photo monitoring layout. Used in conjunction with the map in figure 6, someone other than the original sampling crew could find and rephotograph this site.

sets the stage for all other discussion. Is a proposed treatment to be monitored (fig. 1)? Is animal distribution to be appraised? Are things changing as a result of management decisions (Borman 1995, Nader and others 1995)?

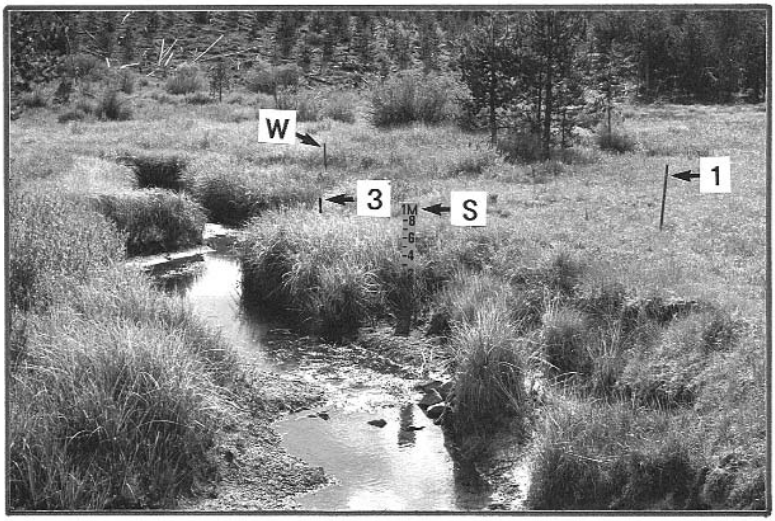

Figure 3—A general photograph taken in 1997 at Pole Camp; the topic is streambank stability. This streambank photo point is taken upstream from camera location 2 (shown in fig. 2 and on the map in fig. 6). Fencepost 1 is camera location 1, fencepost 3 is camera location 3 looking downstream at photo point "S," "S" is the photo point for the streambank, and fencepost "W" is the photo point for the wet meadow.

Where—"Where" to monitor depends on the "why." How does one select representative tracts, animal activity areas, treatment sites, or particular kinds of treatments? How are number, size, and location of activities, such as fire, logging, revegetation, livestock grazing or flood, selected? Ask yourself, "Where is the best location that will answer my questions (fig. 2; Borman 1995, Nader and others 1995)?" Critical documents are a map to locate the site and a site map to document all camera locations and photo points.

What—"What" to monitor means selecting specific items (topics) on the tract to support the "why" questions: vegetation, soil, streambanks (fig. 3), or animals. Ask yourself, "What are the critical few items that must be documented? What is expected to change? What will the picture demonstrate (Borman 1995, Johnson 1991, Nader and others 1995)?" The "what" dictates the sampling layout.

Figure 4—Pole Camp “W” (wet meadow) photo point showing three dates of the same year. June 15 is before scheduled grazing, August 1 is at change in rotation pastures, and October 1 is after grazing. This pasture was rested from June 15 to August 1. October 1 illustrates the degree of livestock use on Kentucky bluegrass at the meter board, on aquatic sedge behind the board, and on willows.

When—"When" to monitor supports the "why" and "what" questions. Does it encompass a year or years? one or more times a year (fig. 4)? specific dates? specific time(s) of day (Borman 1995, Nader and others 1995)? All are important with both animal and site monitoring. Scheduling when to photograph deals with before and after treatment and how often thereafter. Unplanned disturbances, such as fire or flood, pose special problems. A monitoring protocol may have to be developed on the spot during an event to establish photo points and define a followup schedule.

How—"How" to monitor is determined by "what" as influenced by "why" and "when." It may encompass detailed protocols for photographic procedures, which may be to obtain either qualitative data (estimates) or quantitative data (measured in the field or measured from photographs).

A simple question might deal with effects of livestock grazing on a riparian area: (1) Are streambanks being broken down? (2) Are riparian shrubs able to grow in both height and crown spread? (3) Is there enough herbage remaining after grazing to trap sediments from flooding? (4) Is herbaceous vegetation stable, improving, or deteriorating?

These questions require selection of a sampling location, placement of enough photo points to answer each of the four questions, and establishment of camera locations to adequately photograph each photo point. Try to select camera locations that will photograph more than one photo point. Next, time or times of year to do the photography must be specified, such as just prior to animal use of the area, just after they leave, or fall vegetation conditions. Will a riparian site be monitored for high spring runoff? late season low flows? or during floods? Monitoring of stream flows vs. animal use probably will require different scheduling.

Recommendation—Write down the specific objectives and protocols for each photo monitoring project. Write them so that someone other than the installer can understand the purpose, can follow the protocols, and can become enthusiastic about the project.

Selecting an Area

Selection of a monitoring area requires a great deal of professional expertise liberally mixed with artistic finesse. The **purpose** for photographic monitoring is the most critical factor in considering where to monitor (Borman 1995, Nader and others 1995): Where in the landscape is my topic of concern, and once at the area, what kind of change do I want to document? In some cases, "where" is straight forward; for example, documentation of logging impacts requires an area being logged (fig. 1), and effects of beavers on a stream requires beaver dams. On the other hand, documentation of impacts from livestock grazing requires understanding livestock distribution plus knowing the location of areas sensitive to grazing and the most critical season of use.

Once in an area, the real decisions must be made. Determine specifically what to monitor for change. Figure 2 shows two general views of Pole Camp in northeast Oregon where some examples of photo monitoring are located. The purpose was to document effects on a riparian area from livestock grazing. Pole Camp was selected because it was preferred by livestock. Specific objectives were to evaluate grazing effects on streambanks (fig. 3); willow (*Salix* spp.) shrub utilization (fig. 3); differences in use between Kentucky bluegrass (*Poa pratensis* L.) by the fencepost on the right (1) and aquatic sedge (*Carex aquatilis* Wahlenb.) at the fencepost in the left background (W). The topic in figure 3 is streambank stability.

Figure 1 is a different situation. The purpose for photo sampling was to document effects of a two-stage overstory removal and subsequent precommercial thinning on stand structure and ground vegetation. The sale area determined the site. Stand conditions of open ponderosa pine (*Pinus ponderosa* Dougl. ex Laws.) and clumped reproduction across an opening were chosen for the photo point. The opening was selected to avoid tree crown encroachment between the camera location and photo point and to appraise logging effects on livestock forage. It was photographed before and after each entry to log.

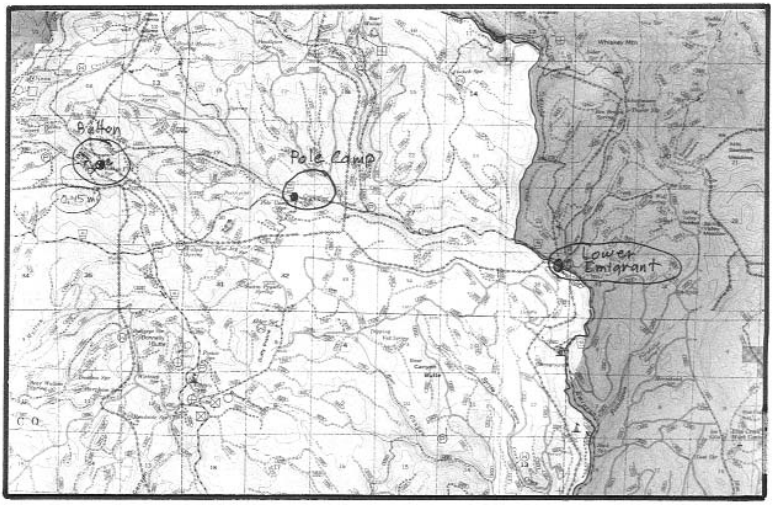

Figure 5—USDA Forest Service ranger district map showing location of the Button Meadow, Pole Camp, and Lower Emigrant riparian study sites. Road numbers, mileage from road junctions, and directions to the witness sites are given on the filing system form “Photographic Site Description and Location” (fig. 6).

After appraising the area, establish the photo monitoring system as discussed below in “General Photography” and “Topic Photography.” The sampling layout must be mapped as described next.

Locating the Monitoring System

Assume that the person installing the monitoring program will **not** be the one to find and rephotograph the area. Provide maps and instructions accordingly. A local map showing roads and the site locates Pole Camp, one of three locations for the Emigrant Creek riparian study (fig. 5).

After laying out the photography system, select a witness site to mark the area. Identify it with a permanent marker, such as an orange aluminum tag, and determine direction and measured distance to camera locations, photo points, or both. Inscribe these on the identification tag. Next map the camera locations and photo points with directions and measured distances on the filing system form “Photographic Site Description and Location” (fig. 6), found in part B, appendix A. Note whether the direction

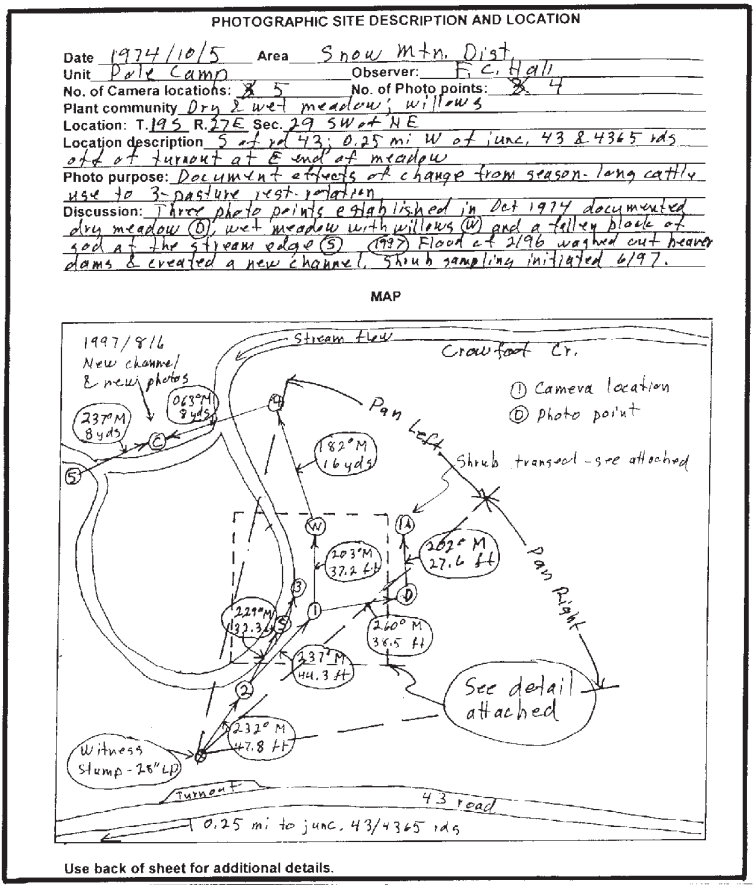

Figure 6—Filing system form “Photographic Site Description and Location” showing the monitoring layout for Pole Camp. In the lower left corner is a reference to the junction of roads 43 and 4365 at 0.25 mile (0.4 km). Immediately opposite the road turnout is a lodgepole pine witness stump 28 inches (71 cm) in diameter. An aluminum tag, orange for visibility, is attached to the stump with directions and distances to camera locations. An additional map, noted by the square labeled “See detail attached,” is shown in figure 17. It documents triangulation of the streambank photo point “S.” Another note, “Shrub transect - see attached,” refers to an installation in 1997, which is shown in figures 22, 23, and 25 dealing with shrub profile photo monitoring.

is taken in magnetic or true degrees by indicating either “M” or “T.” A 21-degree deviation in the Pacific Northwest must be accounted for. Measure distances between the witness site, camera locations, and photo points on the ground. Do not attempt conversion to horizontal distance.

Fenceposts or stakes—Monitoring, by definition, means repeated observation; therefore, all camera locations and photo points must be permanently marked. The recommended method is stamped metal fenceposts shown in figures 2 and 3. In 2000, these cost about $2.75 each for a 5-foot (1.5-m) post. Stamped metal has several advantages over strong T-bar posts: they are flimsy and will bend if driven over by a vehicle or run into by an animal; they will bend flat and remain in the ground to mark the spot; they resist theft because they are just as difficult to pull out as a good fencepost but are not worth the trouble; and they are easy to carry and pound. The primary advantage of flimsy fenceposts is their visibility, as seen in figures 2 and 3. If visibility is not desired, steel rebar stakes are a choice but require a metal detector for relocation (White's Electronics, Inc. 1996).

Steel stakes, preferably concrete reenforcing bar (rebar) have been used and may be required for shallow soils, areas that will be disturbed, or locations where fenceposts may be obtrusive. If disturbance or shallow soils prevents the use of fenceposts, stakes should be driven flush with the ground. If left a few inches above the ground, stakes will damage tires, hooves, or feet. They are always difficult to find. When driven flush with the ground, they require a metal detector for relocation (White's Electronics, Inc. 1996), but even then, the stakes must be of some mass for detection with a simple, $250 machine. Angle iron should be 1 inch (2.5 cm) on the angle and at least 12 inches (30 cm) long. Cement reenforcing bar should be at least ⅜ inch (1 cm) in diameter and at least 12 inches (30 cm) long. Shorter lengths may be needed for shallow soils.

Distance from camera to photo point—One overriding consideration in photo monitoring is to use the same distance between the camera location and photo point for all subsequent photography of that sample. Any analysis of change depicted in the photographs can be made **only** when the distance remains the same (part B). Therefore, always **measure** the distance from camera location to photo point and mark with steel fenceposts or stakes.

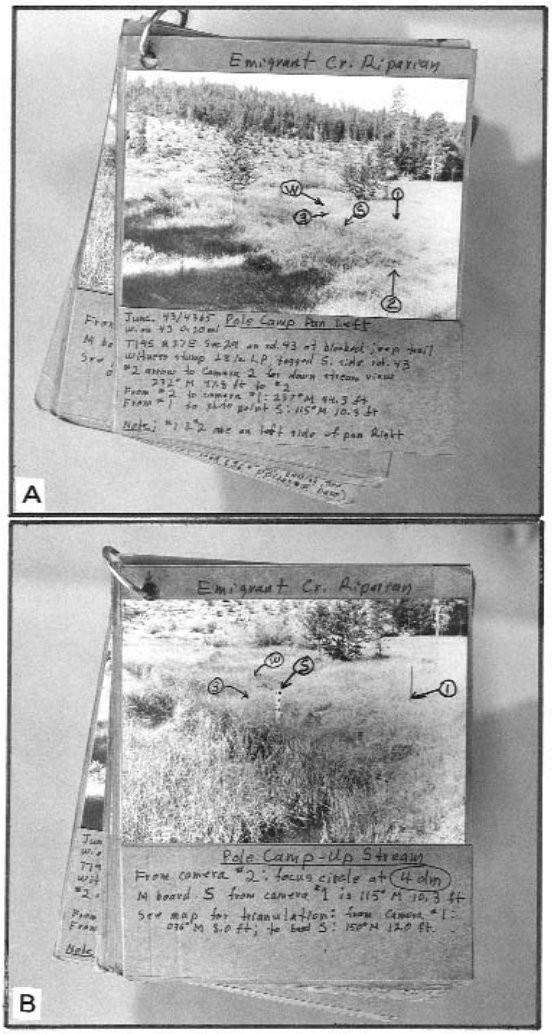

Figure 7—A site locator fieldbook is my system for finding camera locations and photo points. It is a pocket-sized set of photographs and directions mounted on cardboard (file separator thickness). (**A**) The left landscape view of the sampling area at Pole Camp shown in figure 2. (**A**) also locates camera locations 1, 2, and 3. Camera location 1 has two photo points: "D" is Pole Camp dry meadow and "W" is Pole Camp wet meadow (figs. 2 and 6). (**B**) The upstream photo point taken from camera location (2) to "S" (illustrated in fig. 3). A map of this area is shown in figure 6.

A fixed distance for all photo monitoring is not required. It may differ from one photo point to another. Camera format also may change, such as first pictures with a 50mm lens and next pictures with a 35mm lens, but distance must remain the same. It can remain the same in repeat photography only if permanently marked.

Site locator fieldbook—A photo monitoring fieldbook is recommended for carrying the original photos and some intervening photographs into the field (fig. 7). If previous photographs were done by different people, you may discover some disorientation of subsequent views. For that reason, a copy of the original photograph is very important. Rephotograph from the original and not from any misoriented intervening views.

My system for Pole Camp is depicted in figure 7. Figure 7A is a landscape view of the Pole Camp flood plain from the witness site that identifies camera locations and some photo points. It locates the left of two flood-plain scenes, both shown in figure 2 (and mapped in fig. 6). Figure 7B is a view from camera location 2 to photo point “S” on the streambank, the scene in figure 3.

The pocket-size booklet has a picture from each witness site to each camera location and photo point and includes directions from the witness site to camera location and orientation of the photo point.

Once at the area, review the photographs for changes in vegetation. Next, note the number of years since the last photograph, particularly if it was taken more than 3 years previous. The purpose is to evaluate change in the vegetation that might make previous photographs difficult to interpret (fig.1).

Relocating Photo Points

If camera locations and photo points were not marked, they may be approximated by the following triangulation procedure. Align items in the original photograph as shown in figure 8A. Start in the center of the photograph to orient the direction of the picture and draw line 1 on the photo, the photo point direction. Then, for

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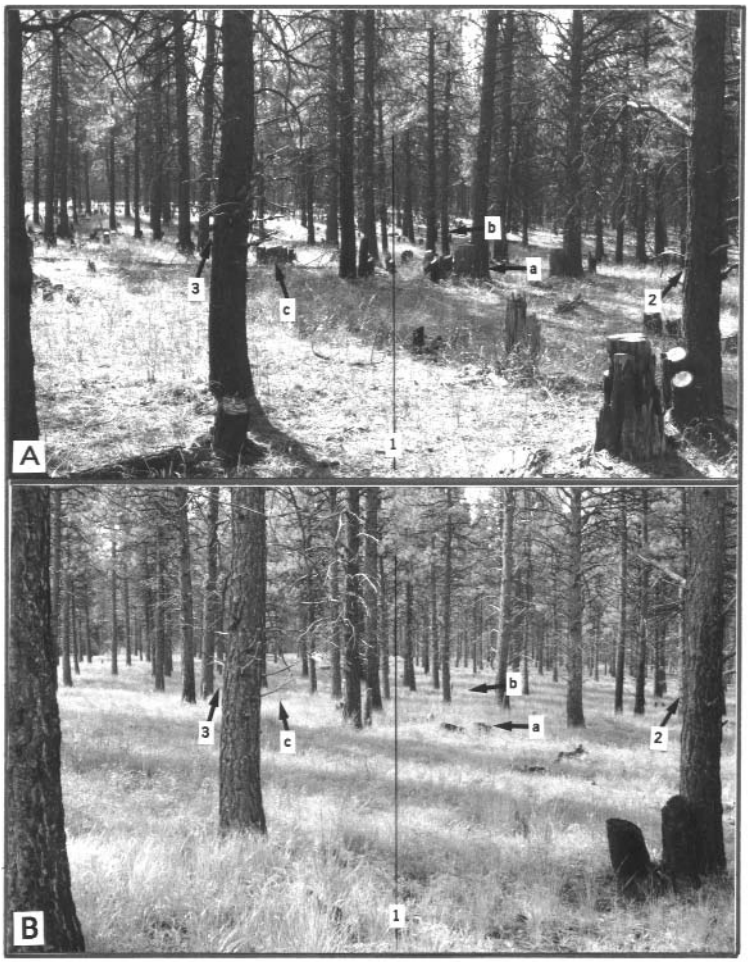

Figure 8—Photograph reorientation uses a black-and-white photo on which a triangulation system is diagramed. A center line (1) is established on the original photograph (**A**) for direction. The center line is identified by position of trees in the background and framing the picture with trees in the foreground. Then positions of items 2 and 3 at the sides of the picture are used to triangulate the camera location. Looking to the right, note the position of trees at arrow 2 while also looking left for tree positions at arrow 3. For (**B**), the photographer moves forward and backward along the center line until items at arrow 2 and arrow 3 are aligned. Try to include some unusual object in the photograph, such as the pair of stumps in the lower right corner. Photograph (**A**) is preunderburn condition and (**B**) is postburn and salvage of killed trees. In (**B**), note the missing trees at arrows “a” and “b,” and a burned-out stump at arrow “c.”

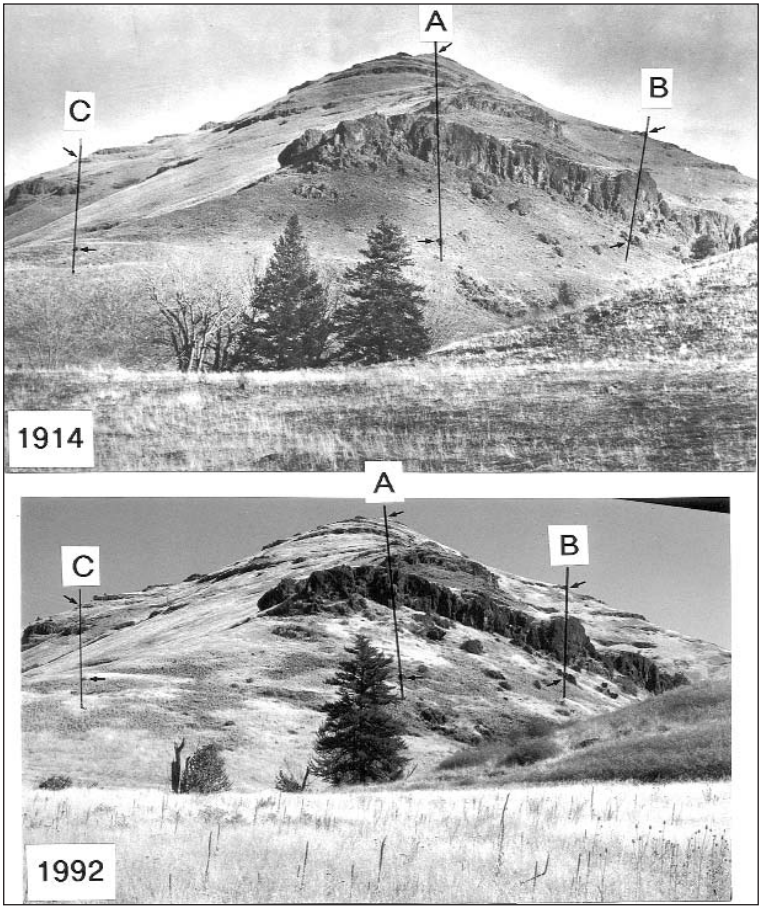

Figure 9—Relocation of a historical photograph taken in 1914 of Branson Creek, Wallowa County, Oregon. Skovlin and Thomas (1995, p. 22-23) took the bottom view in 1992. On a copy of the original (1914) photo, mark orientation lines. “A” identifies the centerline orientation. Then choose objects on the edges of the picture, such as “B” and “C,” to triangulate location of the original camera. Once centered on the original photograph, move forward or backward until the angles of B and C are similar to the original photograph. Slight differences in orientation lines between 1914 and 1992 suggest that in 1992, the camera was a few yards left of the original location. The usefulness of black-and-white photographs is illustrated here by being able to draw triangulation lines directly on a copy of the 1914 picture.

the camera location, find items on the sides of the picture, shown by arrows 2 and 3, to triangulate the location. The items are distances between trees. Move forward or backward along line 1 (fig. 8B) to repeat the distances shown at 2 and 3. This is the camera location and photo point direction. Mark the camera location with a fencepost and add a meter board (photo point) location 25 to 35 feet (8 to 10 m) distant.

Figure 9 applies this triangulation concept to relocation of landscape photographs.

If major vegetation manipulation has occurred as shown in figure 1, relocation may be very difficult.

When to Photograph

When to photograph is usually determined by the activity being monitored. Pole Camp, for example, is part of a study evaluating effects of cattle grazing on a riparian area. Figure 3 illustrates one topic of concern, streambank stability. Photographs have been taken three times per year to correspond with livestock activity: June 15 just before grazing, August 1 as cattle change pastures, and October 1 after animals leave the allotment (fig. 4). This three-season monitoring is repeated every year.

Figure 1 illustrates a very different monitoring schedule. Photographs were planned for the first week in August as an index to appraise vegetation development. They were taken just before logging and in each of the two seasons after cutting to document rapid changes in ground vegetation. Then a 5-year rephotography cycle was established to follow slower changes in both stand structure and ground vegetation. The routine was repeated with the second logging and the precommercial thinning.

If vegetation is a primary topic, consider establishing a fixed date or dates for rephotography. Established dates have several advantages: (1) they set a consistent reference point to evaluate seasonal differences in plant phenological development, (2) they provide a consistent reference for comparing change over several years, and (3) they establish a consistent time interval over which change is documented.

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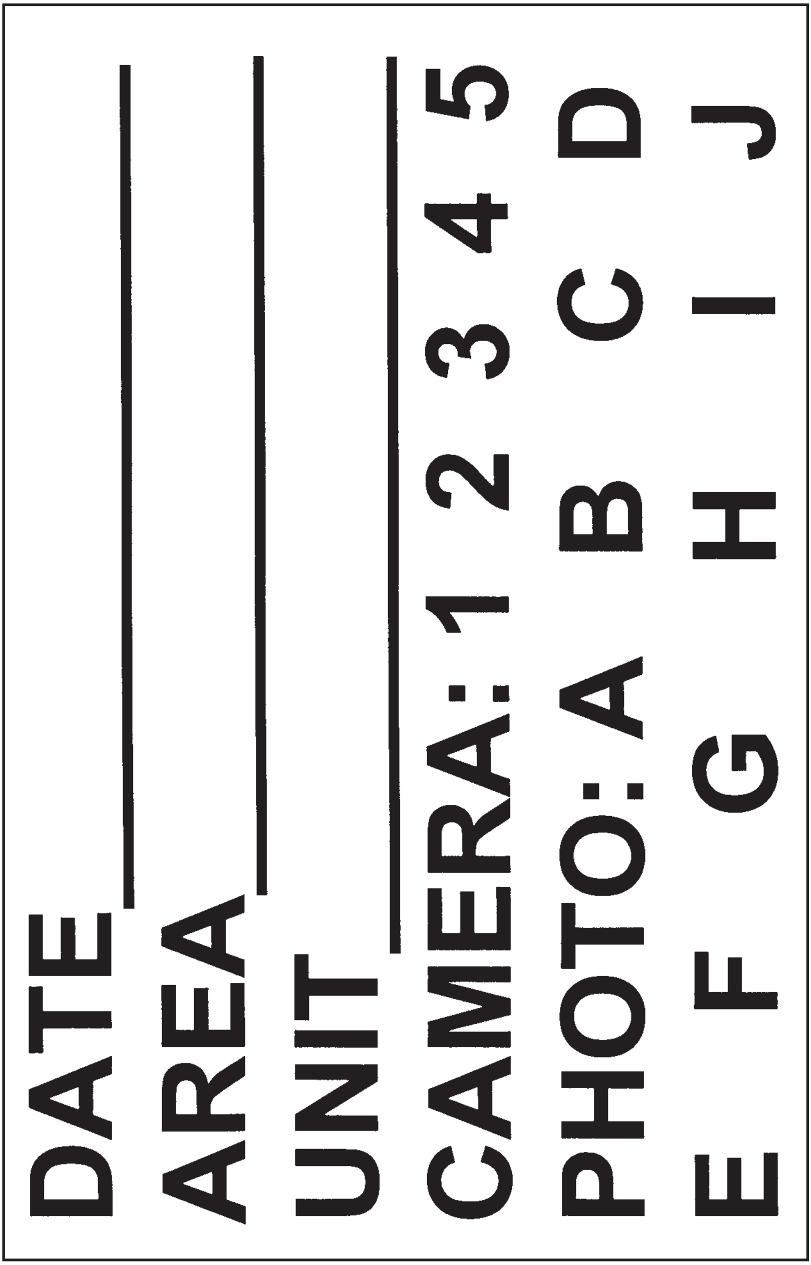


Figure 10—An example of a photograph identification card to be placed in the camera view (fig. 2). This has been reduced to 60 percent of its original size. Part B, appendix A has blank forms that can be reproduced onto dark blue paper. The best paper colors are Hammermill Brite Hue Blue or Georgia Pacific Papers Hots Blue. Light colored paper, common in the office environment, bleaches out under direct sun and should not be used.

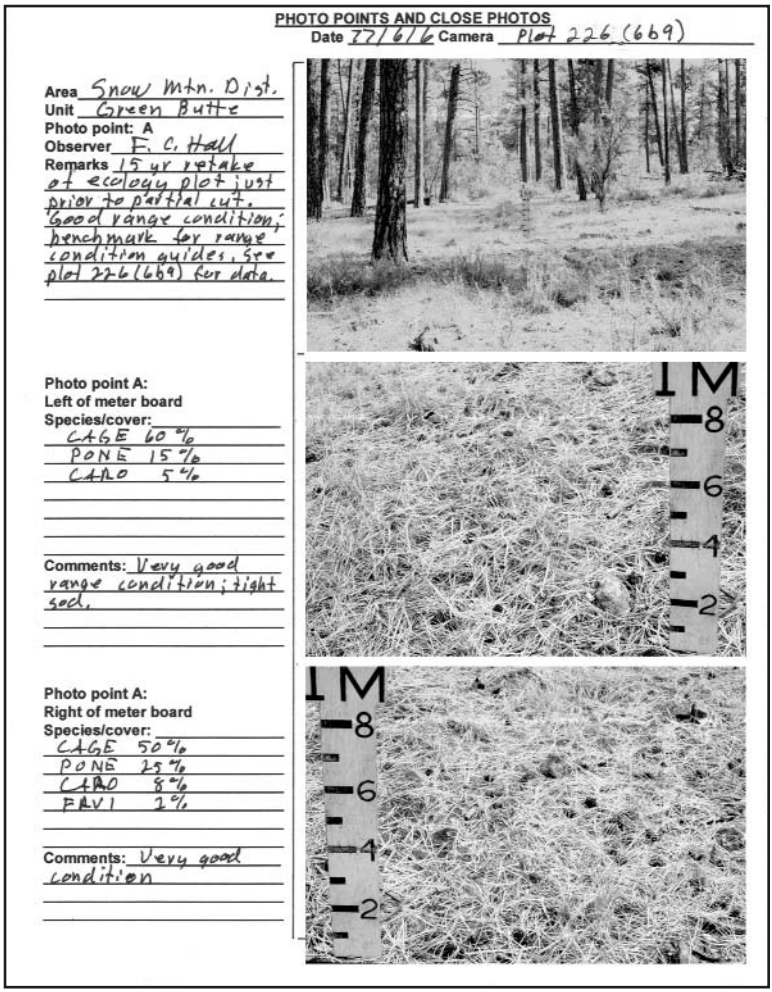


Figure 11—Filing system form “Photo Points and Close Photos” documenting a ponderosa pine/elk sedge community. This area had not been previously logged and had only sporadic sheep use because water was 1.5 miles (2.4 km) distant. The general view is followed by pictures to the left and right of the meter board. The concept is to show both a general view and a pair of closeups to document change. Figure 18 illustrates what happened in this view after logging and 18 years later. Species noted are: CAGE (*Carex geyeri* Boot.), PONE (*Poa nervosa* (Hook.) Vasey), CARO (*Carex rossii* Boot.), and FRVI (*Fragaria virginiana* Duchesne).

Photograph Identification
Each photograph should be identified by site name, photograph number, and date. Figure 10 is an example for use with general or topic photographs (fig. 2). A critical factor is identifying **negatives** for color or black-and-white pictures or digital images. The borders of slides can be written on, but there is no similar place to identify negatives or digital memory card images. Placing a photo identification card in each picture assures a permanent record on the negative or image. This—negative identification—has been one of my biggest problems. Part B, appendix A, contains blank photo identification forms ("Camera-Photo" and "Shrub Photo Sampling"), which can be copied onto medium blue colored paper.

Paper color is the next consideration. Plain white or light colors, common in the office environment, are not suitable because they are too light in color and will bleach out when photographed. The recommended paper color is either Hammermill Brite Hue Blue or Georgia Pacific Papers Hots Blue (part B, app. A). Tests have shown these darker blue hues to be superior to other intense colors such as green and yellow.

Describing the Topic
Describe what is in the photographed scene. Include plant species, ground conditions, disturbances, or any other pertinent item. Part B, appendix A, contains forms having provision for recording these notes. For example, the filing system form "Camera Location and Photo Points" is shown in figure 2 with two views of Pole Camp and brief comments about each photo. And figure 11 is the "Photo Points and Close Photos" form for a general view and two closeup photographs of a ponderosa pine/elk sedge (*Carex geyeri* Boot.) plant community in undisturbed condition. Canopy cover estimates of dominant species are recorded in each closeup photo. Other topic description forms are discussed below in "Shrub Profile Photo Monitoring" and "Tree Cover Sampling." The forms are available in part B, appendix A.

General Photography
General photographs document a scene rather than a specific topic marked by a meter board. They are similar to landscape pictures in that they may not contain a size control board (meter

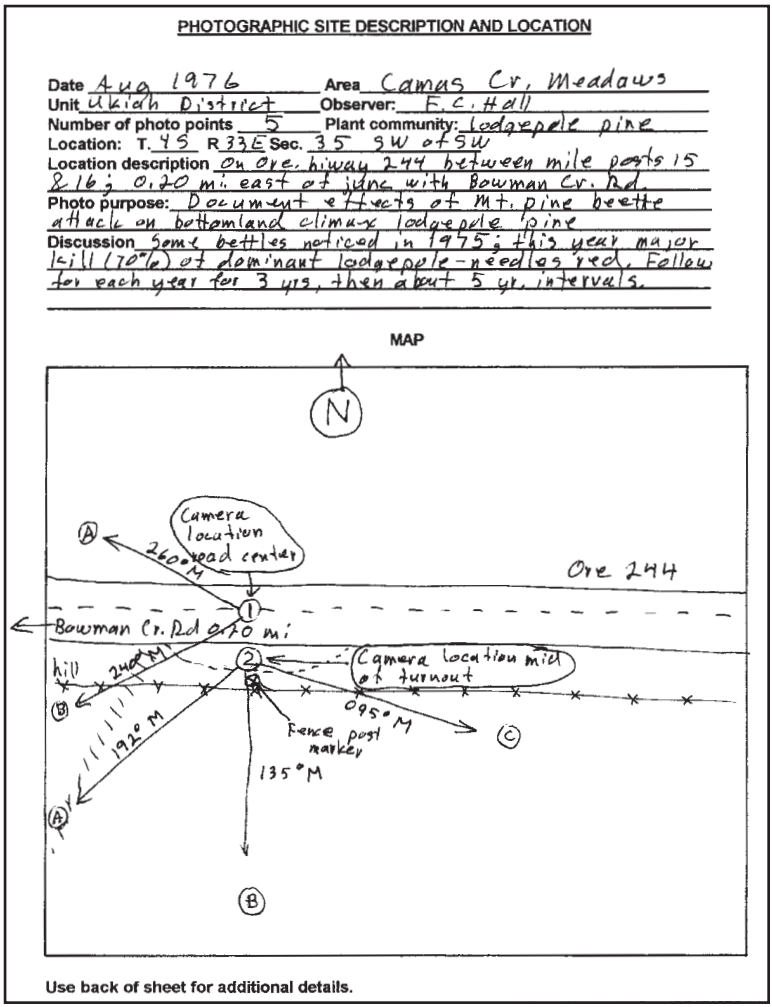


Figure 12—Filing system form “Photographic Site Description and Location” with a map to locate camera locations and photo points to document the affects of mountain pine beetle on lodgepole pine. Two camera locations are shown. Figures 13 to 15 are from camera location 1 and show photo points 1A and 1B.

board) on which to focus the camera and orient subsequent photographs. A photo usually covers an area of 2 to 20 acres (0.8 to 8 ha) and distances of 50 to 200 yards (40 to 180 m) (figs. 12 to 15).

CAMERA LOCATION AND PHOTO POINTS

Date 77/8/2 Camera Location Ore 244, Series 1

Area Camas Cr. Meadow Number of Photo points: 5

Unit Ukiah Dist Observer [illegible]

Comments LP 70% with white needles, many shed; 20% red needles. Stands 90% dead – all larger trees; Mtn. pine beetle

Slope 10 Aspect E Slope position Top

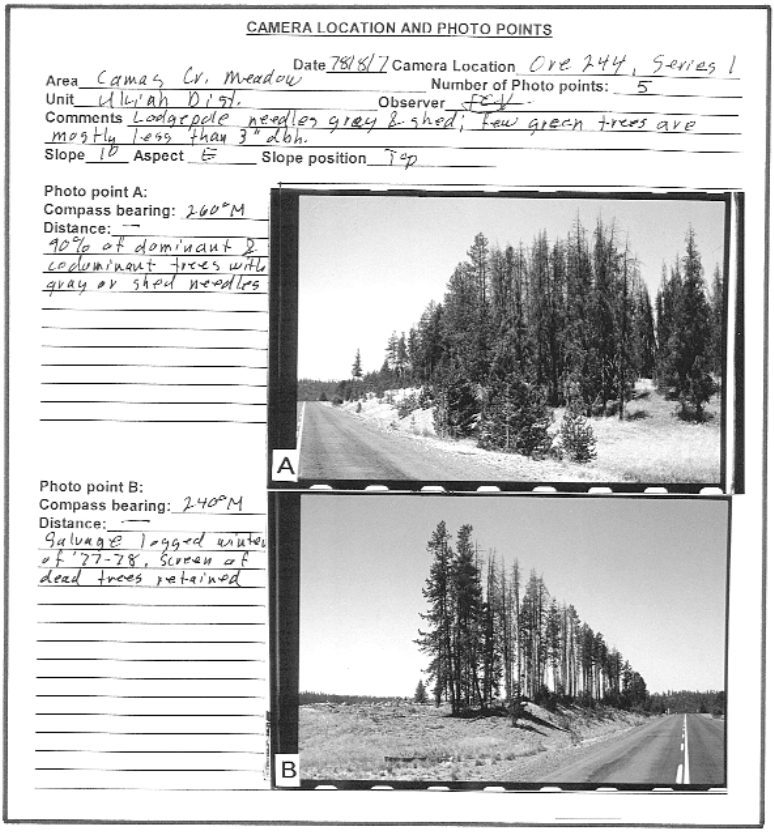
Photo point A:
Compass bearing: 260° M
Distance: —
Camera located on Ore 244 centerline
Massive lodgepole kill

Photo point B:
Compass bearing: 240° M
Distance: —
Camera on Ore 244 centerline

Figure 13—Filing system form “Camera Location and Photo Points” documenting stand conditions in 1977, one year after mountain pine beetle attack on lodgepole pine. The needle color on trees killed in the first year changed from green to dark red (not visible here). Compare to figures 14 and 15. Photo orientation used the road center line.

Concept

In many cases, general photographs document a scene in which a meter board cannot be placed to orient and focus the camera. One use of general photographs is shown in figure 2. Filing system form “Camera Location and Photo Points” is used in two pictures of Pole Camp where fenceposts marking camera locations and photo points may be identified. Another use is illustrated in figures 13 to 15, which document effects of mountain pine beetle attacks on lodgepole pine.


CAMERA LOCATION AND PHOTO POINTS

Date 7818/7 Camera Location Ore 244, Series 1

Area Camas Cr. Meadow Number of Photo points: 5

Unit Ukiah Dist. Observer FEW

Comments Lodgepole needles gray & shed; few green trees are mostly less than 3" dbh.

Slope 10 Aspect E Slope position Top

Photo point A:
Compass bearing: 260°M
Distance: --
90% of dominant & codominant trees with gray or shed needles

Photo point B:
Compass bearing: 240°M
Distance: --
Salvage logged winter of '77-78, Screen of dead trees retained

A

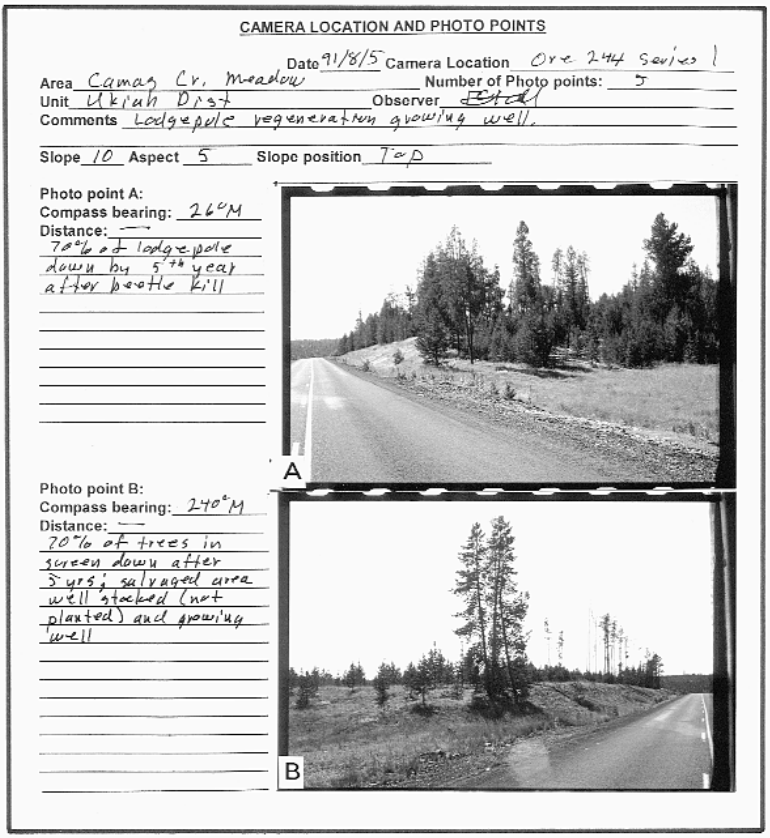
B

Figure 14—Stand conditions in 1978, 2 years after beetle attack in 1976. Photo point “A” has 90 percent kill and massive standing dead fuel. Photo point “B” was salvaged the winter of 1977-78.

Equipment

The following equipment is needed:

1. Camera or cameras for different film, or digital camera.
2. Photograph identification form “Camera-Photo” from part B, appendix A (fig. 10).
3. Clipboard and its support for holding the photo identification sheets (part B, app. B).
4. Compass and 100-foot (30-m) measuring tape.
5. Previous photographs for orientation of the camera.


CAMERA LOCATION AND PHOTO POINTS

Date 91/8/5 Camera Location Ore 244 Series 1
Area Camas Cr. meadow Number of Photo points: 5
Unit Ukiah Dist Observer Estell
Comments Lodgepole regeneration growing well.

Slope 10 Aspect S Slope position Top

Photo point A:
Compass bearing: 26°M
Distance: —
70% of lodgepole down by 5th year after beetle kill

Photo point B:
Compass bearing: 240°M
Distance: —
70% of trees in screen down after 5 yrs; salvaged area well stocked (not planted) and growing well

A

B

Figure 15—Stand conditions in 1991, 14 years after beetle attack and 13 growing seasons since figure 13. Photo point "A" shows most dominant trees are down, which creates severe burn conditions at ground level. Photo point "B" illustrates natural regeneration height growth. Orientation of repeat general photography without a meter board requires skill and a set of orientation pictures similar to those in figure 7.

6. Filing system forms "Photographic Site Description and Location" (figs. 6 and 12) and "Camera Location and Photo Points" (figs. 2 and 13-15) from part B, appendix A.
7. Fenceposts and steel stakes sufficient for the number of camera locations desired. Include a pounder.
8. A tripod to use for camera reorientation.

Technique
Select a scene that will meet your monitoring objectives. Describe it, including plant species, ground cover items, disturbance, or whatever the topic of the photograph is by using the filing system form “Camera Location and Photo Points.” Photograph the scene.

Make maps of the location and layout of the scene on the filing system form “Photographic Site Description and Location” (figs. 6 and 12). In figure 6, the two photos from figure 2 are labeled “Pan Left” and “Pan Right.”

Reorientation—Reorientation of subsequent pictures is a major concern due to lack of a meter board. Identification of key items in each view will be needed. In figure 6, for example, the tall tree in the right background of picture (A) is the same tree as in the left background of picture (B). Panoramic views, such as figure 6, always should include about 10 percent overlap between photographs.

Systems used for landscape photo reorientation (discussion at fig. 8) are of major help. On a black-and-white copy of the scene, mark reorientation items as shown in figures 8 and 9. With the camera mounted on a tripod, compare the picture in hand with the scene through the camera. Orient the camera accordingly.

Figure 7 illustrates a site locator fieldbook for rephotographing general views. It has 3- by 5-inch (7.5- by 12.5-cm) photographs mounted on 5- by 5-inch (12.5- by 12.5-cm) cardboard. Instructions are given under each picture for its location and orientation. These fit into a vest pocket for use in the field. Figure 3 is a recent picture of figure 7B.

Example—Figures 13 to 15 illustrate general photography documenting effects of mountain pine beetle on lodgepole pine along highway 244 in the Blue Mountains of eastern Oregon. Figure 12 is filing system form “Photographic Site Description and Location” mapping two camera locations. Camera location 1 has two photo points (figs. 13 to 15) and camera location 2 has three photo points. Monitoring started in 1976 when beetles first attacked the stands.

Figures 13 to 15 show the use of filing system form “Camera Location and Photo Points” to document beetle effects over a 14-year period. Figure 13 depicts second-year effects of beetle attack where trees killed the first year have started to drop their needles. Figure 14 is the third year after attack and shows massive standing fuel (14A) and salvage (14B). Figure 15, 14 years after initial attack and 13 growing seasons after figure 13, illustrates tree fall (15A) and growth of natural regeneration (15B).

Topic Photography

Topic photography narrows the subject from a general view to a specific item of interest. It adds a meter board, or other size control object, to identify the photographic topic (figs. 1, 3, 4, and 11).

Concept

We will assume monitoring objectives have been established as discussed in “Basics.” A meter board, or other size control board, is placed at the selected topic for several reasons: to (1) identify the item being monitored for change; (2) establish a camera orientation reference point for subsequent photography; (3) set up a constant size-reference by which change can be documented, for example by grid analysis; and (4) provide a point on which to focus the camera for optimum depth of field.

Figure 3 illustrates identification of a very specific topic, streambank stability. Figure 1 deals with a general view limited to area around the meter board; the topic is effect of logging and precommercial thinning on stand structure and ground vegetation. Purpose of topic monitoring is the primary factor in selecting a monitoring layout.

The effect of distance from the camera to the meter board to emphasize a topic is shown in figure 16. The topic in 16A is a transect for nested frequency, in 16B it is density of grass and big sagebrush (*Artemisia tridentata* Nutt.), and in 16C it is species density and use (none in this case). Select a camera-to-photopoint distance that best depicts what you want to emphasize. Remember that once the distance is established, it **must** remain fixed.

continued

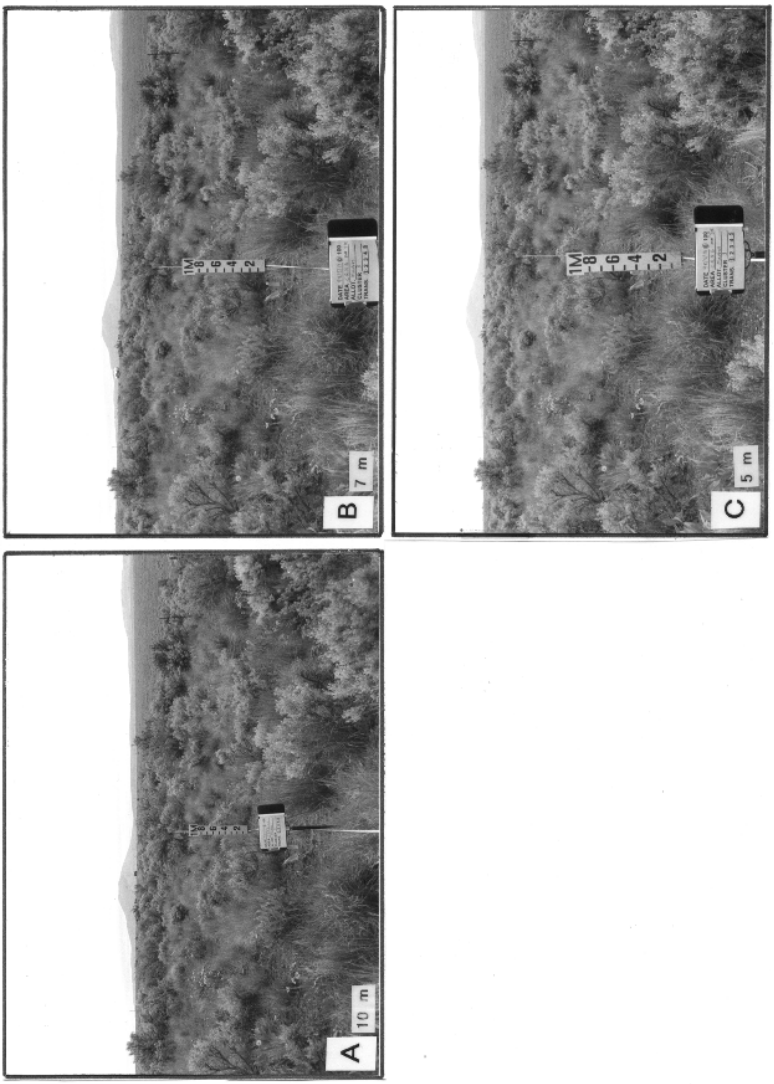


Figure 16—Evaluation of a 35mm lens on a 35mm camera for placement of a meter board to emphasize a topic. This is a transect on the Crooked River National Grassland in eastern Oregon. (**A**) Placement of the meter board 33 feet (10 m) from the camera. It is essentially the same as 46 feet (14 m) distance with a 50mm lens. (**B**) Distance of 23 feet (7 m), essentially similar to 33 feet using a 50mm lens (fig. 31, part B). (**C**) Sixteen feet (5 m) distant, equivalent to 23 feet with a 50mm lens. A consistent distance between camera location and photo point for all photographs is not required. Chose a distance that best documents what you want to show. But, after your choose it, it must remain the same.

Equipment
The following equipment is required for topic photography:

1. Camera or cameras with both color and black and white film or a digital camera.
2. Form “Camera-Photo” from part B, appendix A, printed on medium blue paper.
3. Forms for site identification and photo points from part B, appendix A: “Photographic Site Description and Location” and “Camera Location and Photo Points”
4. Meter board (part B, app. B).
5. Clipboard with its support to hold the photo identification forms (part B, appendix B).
6. Fenceposts and steel stakes sufficient for the number of camera locations and photo points desired. Include a pounder.
7. Compass and 100-foot (30 m) tape for measuring distance.
8. Metal detector for locating stakes.

Technique
Several steps are needed to establish topic photo monitoring. Pole Camp (fig. 2) is used as an example.

Define the topics of interest. At Pole Camp, primary topics were effects of livestock grazing on streambank stability, differential utilization on dry and wet meadows, and impacts on willow shrubs.

Next, define what coverage is desired in the monitoring area. How many streambank sites are desired? How many dry and wet meadows and where? How many shrubs should be monitored and where are they located (see “Shrub Profile Photo Monitoring”)? Notice the distribution of willow shrubs in figure 2A and the pattern of dry to moist to wet meadow in 2B.

Photo points and camera locations—Based on the desired objectives, locate photo points (meter boards) to best document change. Then establish camera locations for optimum coverage of the photo point topic. Coverage might require multiple photo

points from the same camera location or multiple camera locations focusing on the same photo point. Figure 6 maps two photo points (“D” and “W”—dry and wet meadow) from camera location 1 and two camera locations (2 and 3) focusing on photo point “S” (streambank). Figure 2 shows these camera locations and photo points. Advantages are twofold: First, relocation tends to be easier when only one point must be located that will serve two or more views, and second, one point showing several views tends to tie the sampling area together.

Riparian considerations—Riverine riparian settings have two unique photo monitoring characteristics not found in dryland situations: floods and beavers. These characteristics require some special considerations in locating both camera locations and photo points.

Camera locations should not be placed at the stream edge because they cannot be relocated if the edge erodes. Place them 3 to 5 feet (1 to 1.5 m) away from the edge and, if deemed necessary, triangulate their location (fig. 17). They should not be placed in the stream unless exact relocation for both height above the original streambed and position in the stream is assured. At times, camera locations documenting photo points in or at a stream edge may be difficult to establish.

Photo points at the stream edge may be highly desirable (figs. 3 and 17). Consider the following: (1) Use a fencepost to mark the meter board and pound it down to exactly the meter board height. This will help document erosion or deposition (fig. 3) at the base of the fencepost. When the meter board is placed for a repeat photo, measure the distance from the top of the fencepost to the top of the meter board to document the amount of change. (2) Triangulate location of the streambank fencepost (fig. 17) to assure its exact relocation should a flood remove it. If it is removed, replace the fencepost to the current meter board height. Amount of change in the meter board can be documented from an unchanged camera location only by comparing the meter board with adjacent items, such as the streambank.

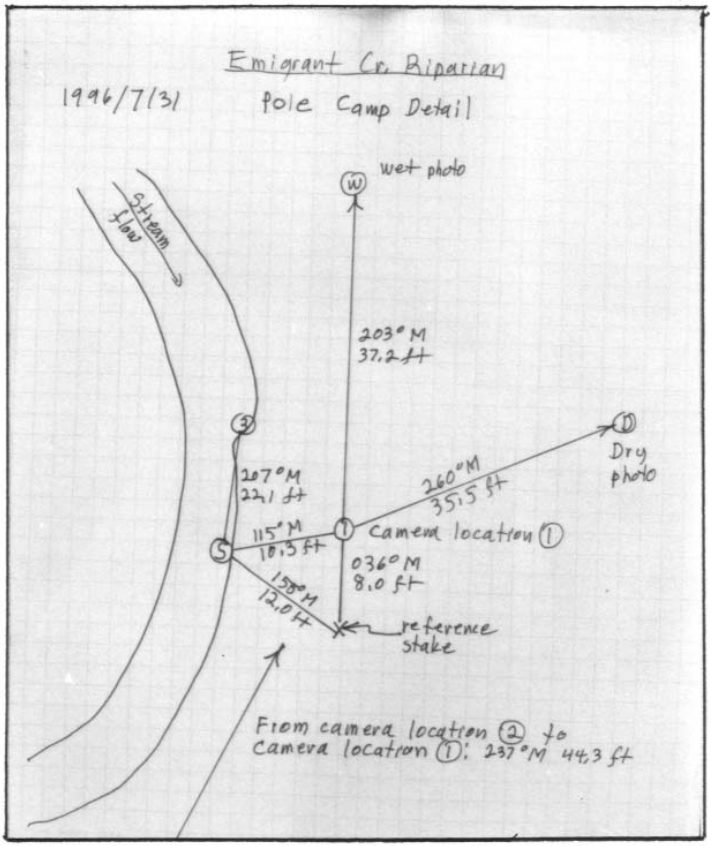


Figure 17—Triangulation location of the meter board in figure 3 to document streambank erosion at Pole Camp. This map is the boxed area shown in figure 6. Any photo point or camera location in a tenuous spot should be referenced by two or more locator stakes.

Camera orientation and focus—Consistent repeat photography requires a reference point to orient subsequent views. The objective is to have the view remain constant as items within the view change. A meter board serves this purpose. Figure 18 shows three repeat photographs of a ponderosa pine/elk sedge community that was selectively cut. Figure 18A illustrates how the camera focus ring is placed over the “1M,” which accomplishes two things: (1) it provides a common orientation point for the first and subsequent photographs, and (2) it provides a

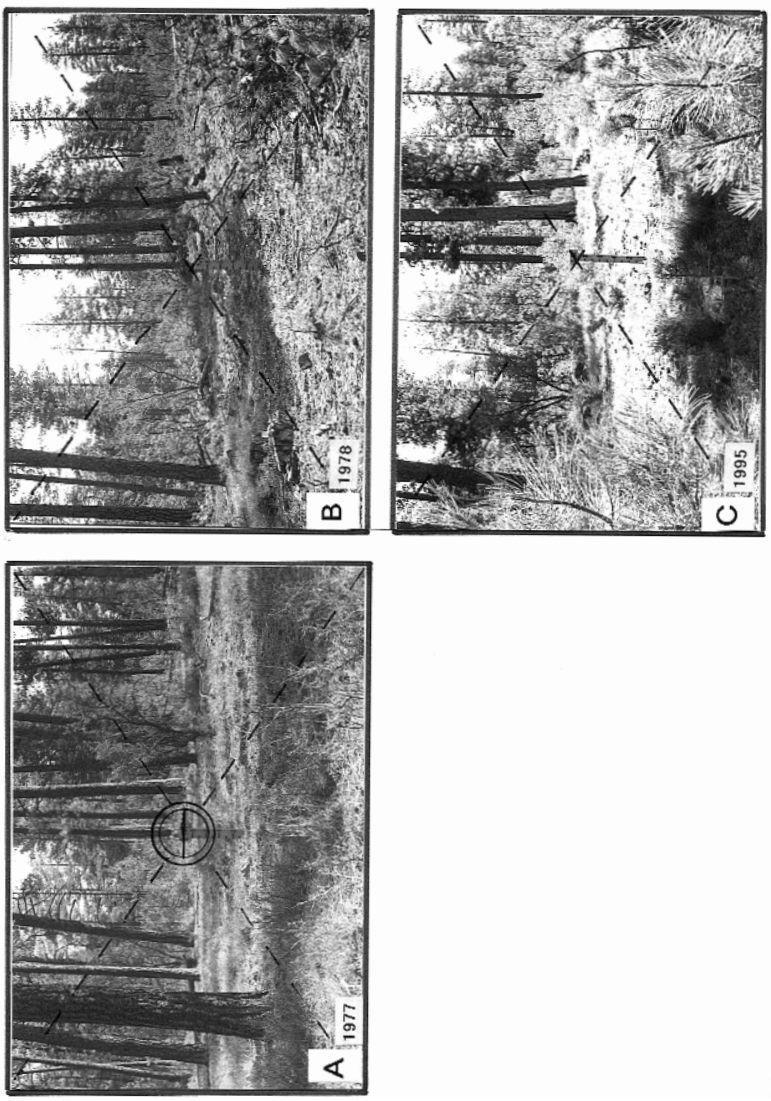


Figure 18—A meter board is used to aim the camera for consistent repeat photography. (**A**) Placement of the camera focus ring on the 1M," which puts the "1M" in the center of the picture (dashed lines). This orientation produces exact replication of repeat photographs as shown in (**B**) and (**C**). Focusing the camera on "1M" provides optimum sharpness and depth of field at the meter board. With an f-stop of 8, everything in the picture will be in focus. This series is part of a study following logging effects on ground vegetation and stand structure (fig. 11). (**A**) 1977 just before a selection cut, (**B**) the summer after the cut (a two-turn skid trail crossed the meter board location), and (**C**) 1995, 18 years later.

locus for focusing the camera for maximum depth of field. With the meter board placed at the topic of interest, the topic should always be in sharp focus.

Other options may be considered with topic photography: close-up pictures of the meter board and overhead photos of tree canopy.

Closeup photos—In many cases, details might be desired that are not accommodated by a meter board 20 to 35 feet (7 to 10 m) distant. Closeup photos, one from each side of the meter board, are recommended (fig. 19). After the general photo is taken, walk up to the meter board and photograph it on each side. With a 50mm lens, stand 7 feet (2 m) away or with a 35mm lens, stand 5 feet (1.5 m) away. Figure 19 illustrates a 50mm lens.

A critical element is to always place the top of the meter board all the way up in a corner of the view (fig. 20). Details on the ground are shown in about a 5- by 5-foot (1.5- by 1.5-m) area on each side of the meter board (figs. 19 and 20). Always take a general photo and two closeup photos to document change (fig. 11).

Figure 11 illustrates use of filing system form “Photo Points and Close Photos” (part B, app. A) for mounting and filing topic photographs. It is the 1977 view of ponderosa pine shown in figure 18.

Overhead canopy—Pictures of the overhead tree canopy may be useful when documenting changes in tree canopy cover. The technique is discussed in “Tree Cover Sampling.” A word of **caution:** camera focal length **must be the same** for all subsequent pictures because there is no size control board by which to adjust different focal length photos to the same size.

An investigator may elect to do all three kinds of photography: topic view, closeups on each side of the meter board, and an overhead view for maximum documentation of treatment effects.

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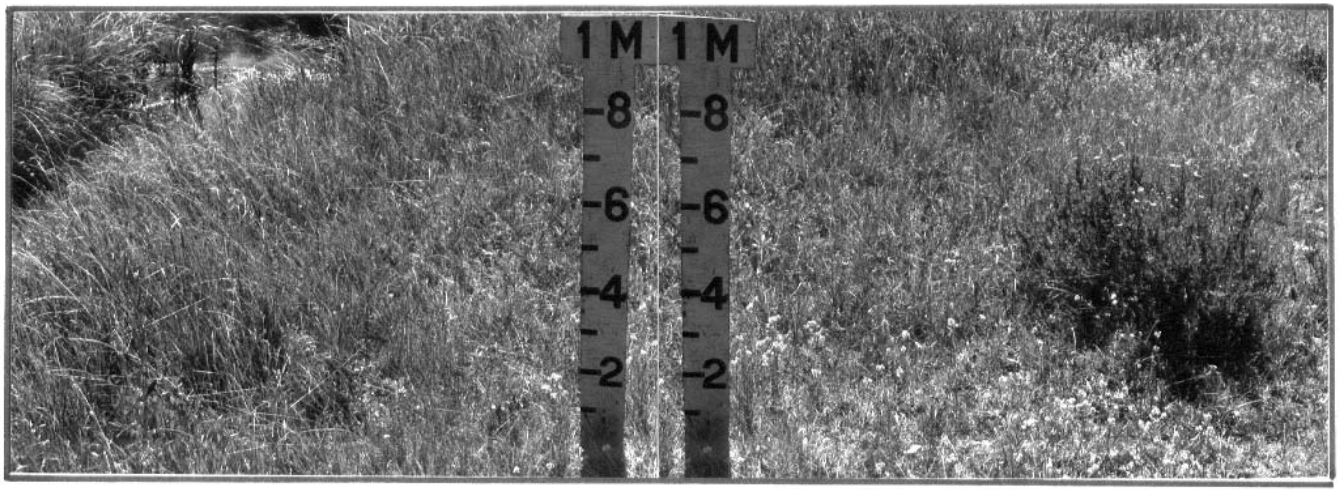
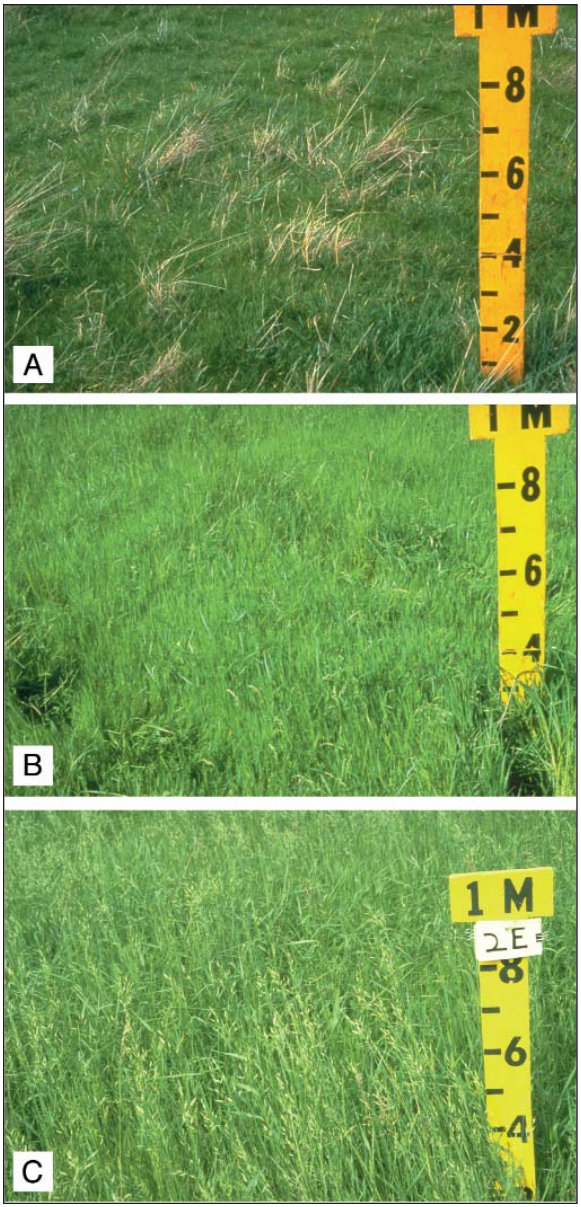


Figure 19—Technique for documenting ground vegetation by using the meter board. Take one picture to the left and one to the right with the meter board at the corresponding edges of the photographs. Stand 7 feet (2 m) away from the board. Tilt the camera slightly off horizontal to make the meter board parallel with the side of the photograph. Place the “1M” of the board in the upper corner of the view. The 7-foot distance, along with a 50mm lens on a 35mm camera, will place the bottom of the board in the lower corner of the picture (fig. 20). Set the camera to 3 meters (9 ft), which allows the vegetation to be in focus from bottom of the meter board to at least 7 feet (2 m) beyond the board. These are closeup views of figure 4, June 15. If pictures are mounted in this fashion, I overlap the meter boards so that only one is showing.


A
1 M
8
6
4
2
B
1 M
8
6
4
C
1 M
2E
8
6
4

Analysis of Change

The meter board also is used as a constant size reference point for analyzing changes. The recommended system is grid analysis (discussed in part B). In a nutshell, a clear plastic form with site identification information is taped to the photo and topics of interest outlined. Then an analysis grid is adjusted to exactly match the size of the meter board in the outline and is printed on white paper. The outline form is taped to the grid, and grid intersects within the outlines are counted and recorded. Amount of change between photos can then be determined.

Topic Description

Describe the setting and topic to be photographed each time photos are taken**.** Figures 13 to 15 show mountain pine beetle effects on lodgepole pine. New conditions are recorded for each repeat photograph. Figure 11 illustrates a general photo and two closeup pictures of ground conditions. Plant species and their estimated canopy cover are recorded for the closeup pictures each time they are taken. The "Photo Points and Close Photos" form provides space for these notes.

◀ Figure 20—Orientation for closeup photos of a meter board in dense vegetation. In photograph (**A**) with 4 inches (1 dm) of stubble height, the meter board bottom can be visually estimated. In (**B**) and (**C**) it cannot. Exact reorientation of the photograph is essential: (1) the "1M" must be in the top corner of the view, (2) the bottom of the board must be in the lower corner, (3) the photograph must be taken from 7 feet (2 m) away with a 50mm lens on a 35mm camera, and (4) the camera must be tilted slightly off horizontal to make the board parallel with the side of the view frame. In photograph (**B**), just 3 months later, grass is over 16 inches (4 dm) tall effectively hiding the bottom of the meter board. Problems with tall vegetation and exact photograph reorientation are shown in (**C**). The "1M" was not placed in the top corner of the view frame. Instead it is about 8 inches (2 dm) below the corner meaning the bottom of the board is about 8 inches (2 dm) below the bottom of the picture, an unacceptable repeat photograph. Photo (**C**) also demonstrates a problem photographing plot frames because a frame would not be visible.

Shrub Profile Photo Monitoring

Change in shrub profile area can mean either shrub use or shrub growth. It may be documented through repeat photography with grid analysis and horizontal camera orientation. Permanent camera locations and photo points, marked by steel fenceposts or stakes, are required. Season of photography is a key factor in documenting change and causes of change in shrub profiles.

Concept

The concept of documenting change in shrub profile area is to photograph a shrub on two sides with the camera location moved for a 90-degree difference between views (Reynolds 1999). This photographs all profiles of a shrub. Camera locations and photo points must be marked with steel fenceposts or stakes to assure the same distance from camera to meter board for all future photographs. The same distance need not be used, however, for all camera locations. Adjust distance to suit the topic being photographed. Tall shrubs, where double meter boards are used (fig. 21), require a much greater distance than short shrubs (fig. 25, below).

Once photographs have been taken, use the photo grid analysis procedure (in part B) to document changes in shrub profile area and shape.

Guidelines

All basic photo monitoring requirements for relocating the monitoring area and for maintaining the same distance from camera to meter board must be met. Some guidelines follow.

The primary objective in monitoring change in shrub profile area or shape is to document usage (reduction in area, Reynolds 1999) or growth (increase in area). Thus, season of photography is of critical concern. If effect of animal browsing is the topic of interest, photography both before and after this use may be necessary. This requires selection of two seasons to photograph, such as just before livestock grazing and immediately after. If livestock graze at different seasons in the same pasture over a period of years (such as rest-rotation systems), three dates may

Figure 21—Use of a folding 2-meter board to document height and growth of tall shrubs. This board is hinged in the middle and held upright by a barrel bolt. When folded together (fig. 54, part B), it is a 1-meter board and unfolded it is 2 meters.

be required to document grazing effects over several years. Other dates, established by local knowledge, probably will be required for wild animals.

If growth in shrub profile area is the topic of interest, then photography after termination of growth would be desirable. Dryland shrubs usually have a definite termination of growth and are called determinate shrubs. Some riparian shrubs, such as many willows, continue to grow until environmental conditions, such as frost, cause growth to stop. These are indeterminate shrubs. Season to photograph must thus be based on the physiological development of the shrub species under study.

Procedures

1. Establish a monitoring objective at the same time as the area and species of shrub to evaluate are selected. Determine photography date(s).

2. Make a map to find the monitoring area (fig. 5) and a map of the transect layout (figs. 22 and 23). The transect layout must include direction and distance from the witness mark to the first shrub photo point and then its two camera locations, and from there the direction and distance to the next shrub photo point and its camera locations (fig. 23). All shrub photo points must be tied together for ease in future location. The transect layout need not, probably will not, be a straight line (fig. 23).

3. Placement of the meter board is critical because it will be used to document changes in shrub profile. There are three concerns**:** (1) Placing the meter board far enough to the side of the shrub to allow the shrub to grow in crown diameter (figs. 24 and 25). Consider a distance that is half the current shrub crown diameter (fig. 24). (2) Placing the bottom of the meter board far enough toward the camera to assure the lowest line of the grid will be **below** the bottom of the shrub if it grows. Consider placing the 2-decimeter line opposite the current bottom of the shrub (fig. 25). (3) Placing the board in one location and moving the camera for a 90-degree change in view (figs. 24 and 25).

4. Select a camera-to-photo-point distance that will permit the shrub to grow in both height and diameter. Consider a distance where the current shrub is about 50 percent of the camera view height and 70 percent of the camera view width (fig. 25, A and B).

5. Try to select a single shrub or several shrubs separated from other shrubs in the camera view. If shrubs increase in area of profile, their outer crown periphery may become difficult to separate from adjacent shrubs (fig. 25). Color photographs greatly aid in shrub profile delineation.

6. Aim the camera so that the meter board is at the extreme left or right of the view (fig. 25). The “Shrub Analysis Grid” (part B, app. A) shows the meter board at the sides (fig. 25). Next,

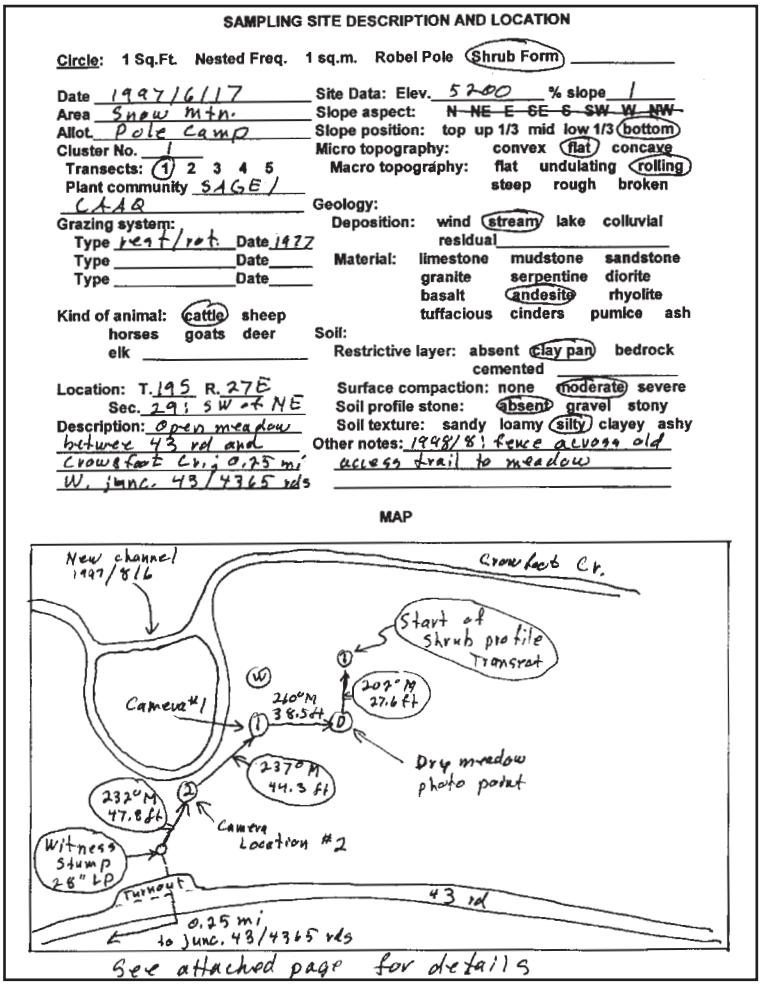


Figure 22—The filing system form “Sampling Site Description and Location” identifies the Pole Camp shrub profile monitoring system. On the first line of the form, circle the monitoring system used, in this case “Shrub Form.” Information about the area is entered, and a map is drawn to locate the monitoring system. This shrub profile transect is one of several photo monitoring installations at Pole Camp; figure 6 diagrams five camera locations and four photo points. A note at the bottom of this map says that an attached page has details. This is shown in figure 23.

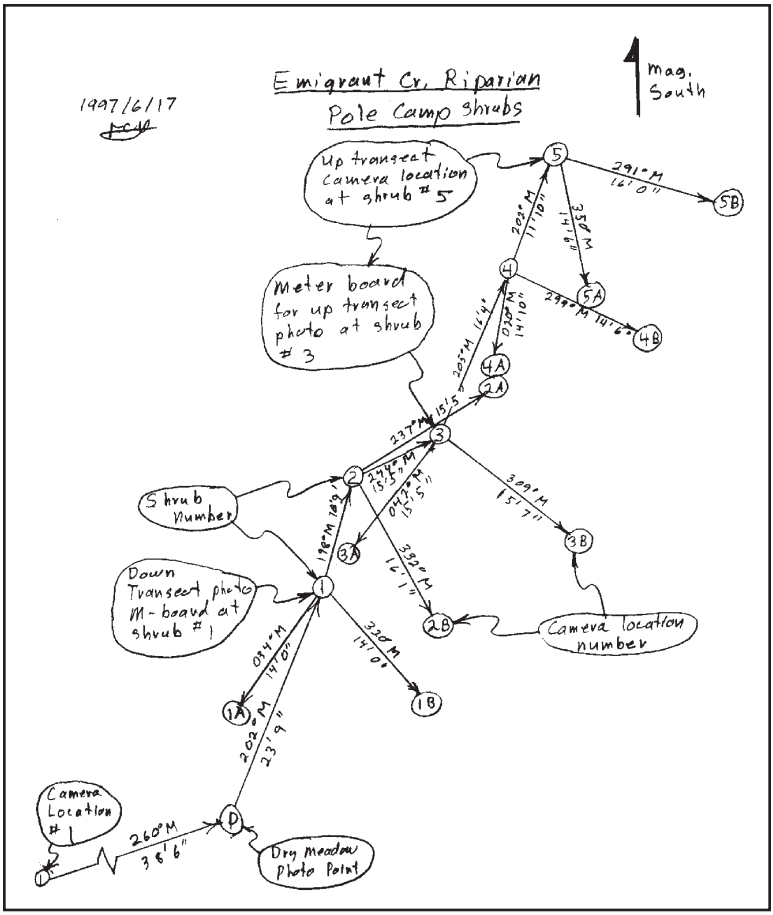


Figure 23—Details of the Pole Camp shrub profile transect (an attachment to the form shown in fig. 22). Instructions begin at camera location 1. The dry meadow photo point has been used as a camera location for a view down the transect (see fig. 25). Directions to five shrubs are shown in magnetic degrees and distance. Because a shrub is the point of reference, the two camera locations take direction and measured distance **from** the shrub to facilitate relocation.

orient the camera so that the bottom of the meter board is just **above** the bottom of the camera view (fig. 25). Thus, a maximum amount of photo is allocated to current and future crown area development of the shrub.

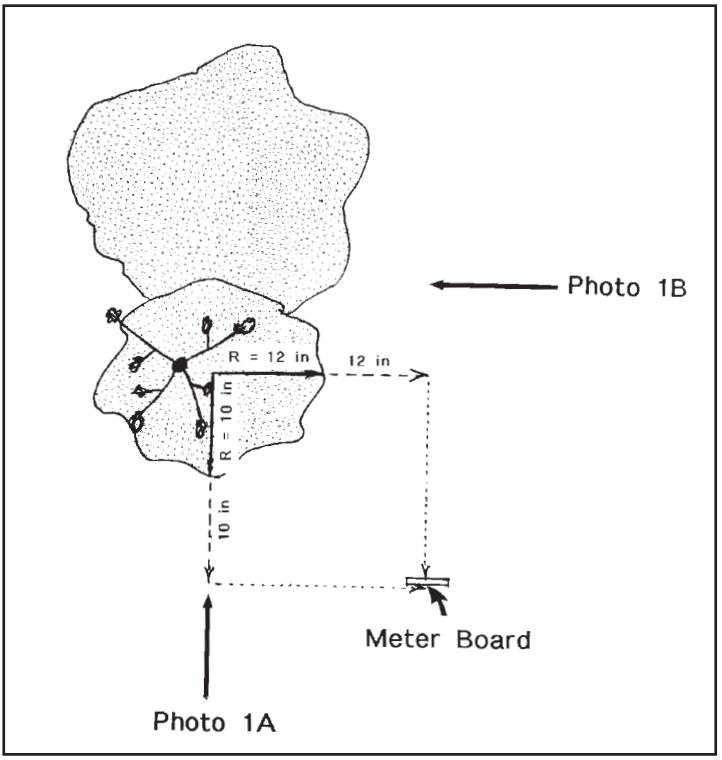


Figure 24—System for locating a meter board when photographing shrub profiles. Measure the shrub radius in two directions, at 90 degrees from each other to correspond to the direction of photographs (12 inches [30 cm] and 10 inches [25 cm]). Move out from the shrub the same distances (12 inches and 10 inches), and locate the meter board at the intersection of the distances. This will place the meter board far enough to the side and front of the shrub so that the shrub can grow and still be covered by a grid. These two views correspond to figure 25, 1A and 1B.

Note the relation between placement of the meter board bottom about 8 inches (2 dm) below the bottom of the shrub and orientation of the camera at the bottom of the meter board. The objective is to document change in shrub profile both upward and outward.

When tall shrubs require double meter boards, such as in figure 21, the boards may be placed in front and the “Analysis Grid-2-Meter” form (part B, app. A) used.

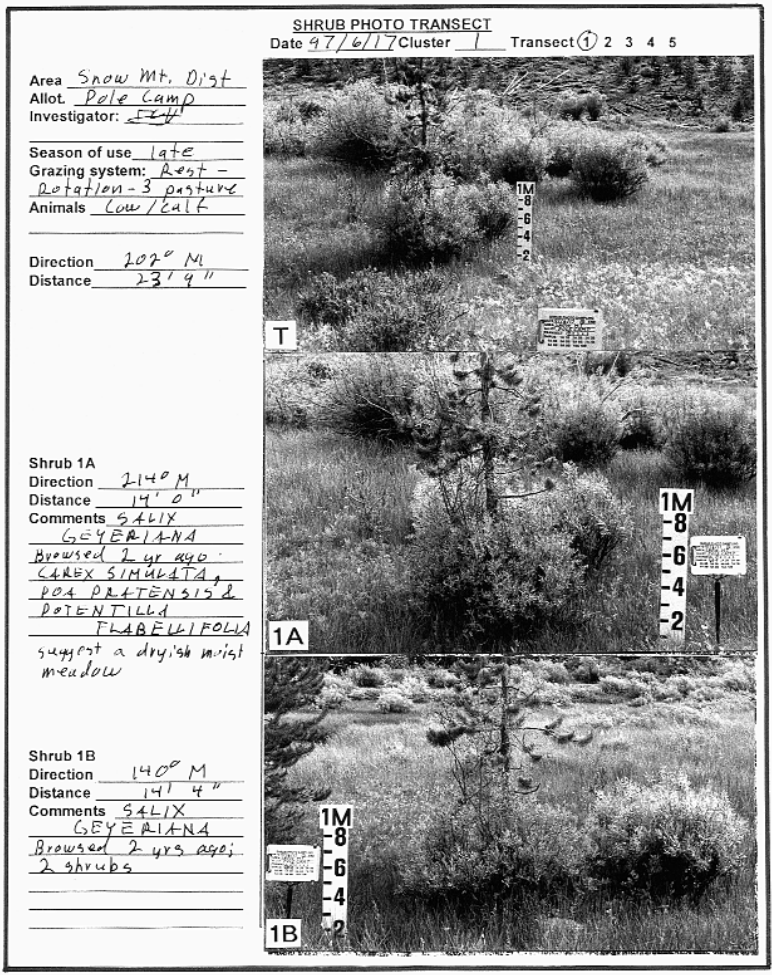


Figure 25—The filing system form “Shrub Photo Transect” (part B, app. A) shows Pole Camp willow transect 1 and both views of shrub number 1. Notes about the vegetation and item photographed are made opposite each photograph. Direction shown is from the **camera** location to the shrub—a reciprocal of the map direction. The form provides for two views each of 10 shrubs with views down the transect from each end. The top photograph (T = transect) is down the transect under which are photo points 1A and 1B. Species are *Salix geyeriana* Anderss., *Carex simulata* Mackenzie, *Poa pratensis* L., and *Potentilla flabellifolia* Hook. ex Torr. & Gray.

Equipment
The following equipment is required for shrub profile sampling:

1. Camera or cameras with both color and black-and-white film, or a digital camera.
2. Forms from part B, appendix A: for transect and shrub identification, “Shrub Photo Sampling” printed on medium blue paper, and data/photo mounting form “Shrub Photo Transect” printed on medium yellow paper.
3. Meter board (part B, app. B).
4. Clipboard with its support for holding the photo identification forms (part B, app. B).
5. Fenceposts and iron stakes sufficient for the number of shrubs desired: 1 fencepost and 2 iron stakes per shrub. Include a pounder.
6. Compass and 100-foot (30-m) tape.
7. Metal detector for locating transect stakes.

Technique
The technique for shrub profile monitoring combines a transect system with principles discussed in “Topic Photography,” above, and in part B, “Photo Grid Analysis.” A primary objective is to monitor **change** in shrub profile area and not to measure canopy cover of shrubs or shrub profile area per acre (hectare). Shrubs, therefore, are objectively selected for photography. The following technique emphasizes this objectivity.

1. Locate the area of consideration. Walk the area to select shrubs to be monitored. In many cases, shrub distribution does not lend itself to straight line transects, particularly in riparian areas with winding streams. Ask, “Why am I concerned with change in shrub profile area? Is it to appraise usage, assess vigor, or document change in profile area? Is the location of shrubs important, such as creating shade along streams? Each shrub is a topic and becomes the key mapping and photo orientation object.

2. Mark each shrub to be photographed with steel fenceposts or a combination of posts and stakes: a fencepost to mark the meter board and two more posts or stakes to mark camera locations that view the shrub at 90 degrees (two different sides). Whenever possible, select a single meter board position that will accommodate the two camera locations (figs. 24 and 25).

3. After marking all the desired shrubs, diagram the transect layout (fig. 23). Take a direction and measured distance from the witness marker to the meter board position for the first shrub. Diagram the two camera locations with direction and distance **from** the shrub. This aids repeat photography. Find the shrub fencepost or stake, take direction, and measure distance to the camera locations. Fenceposts are easy to find. Stakes require a metal detector, which is greatly facilitated by this location system. The distance and direction should locate a 0.5-meter diameter area in which to find the stake.

   Then take direction and measured distance from the meter board for the first shrub to the second shrub, again documenting direction and distance to the camera locations. Continue to the end of the transect (fig. 23). Remember to indicate magnetic or true direction.

4. When ready to photograph, fill out the filing system form "Shrub Photo Sampling" for photograph identification as seen in the three parts of figure 25.

5. Take a general picture of the transect by setting the meter board at shrub number one as shown in figure 25T. Stand 20 to 30 feet (7 to 10 m) from the board and put the "Shrub Photo Sampling" form in view (fig. 25T). Stake the camera location and add the location to the sampling layout diagram.

6. For each shrub, place the "Shrub Photo Sampling" photograph identification form next to the meter board (fig. 25, 1A and 1B). The form has a shrub number and letter for camera

locations for 10 shrubs. Match the shrub number and letter on the form with the transect diagram and circle the number, in figure 25-1A, 1A is circled for camera location “A.” To photograph the shrub, focus the camera on the meter board to assure greatest depth of field for the shrub. Then swing the camera either left or right to place the meter board at the side of the frame.

Move to the second camera location (1B), turn the meter board and the photo identification form to face the camera, cross out the last shrub number on the form and circle the current one. In figure 25-1B, 1A is crossed out and 1B is circled representing shrub 1, camera location “B.”

Make notes of what is in each photo on the “Shrub Photo Transect” form printed on yellow paper (fig. 25) from part B, appendix A. Identify the shrub, list herbaceous vegetation, and note anything of interest such as browsing and by what.

7. Move to the next shrub and repeat the process until completed.

8. Mount the photographs, as shown in figure 25. The filing system form “Shrub Photo Transect” is designed for 3- by 4½-inch (7.5- by 11.2-cm) photos.

9. Conduct grid analysis of the pictures as discussed in part B (fig. 26).

Tree Cover Sampling

Forest stand density, represented by canopy cover, has direct influences on ground vegetation species through root competition and by casting shade. Trend in density and composition of ground vegetation is often as much influenced by this competition as by grazing or light disturbance. Any photo point placed in a forested setting should consider tree cover photography.

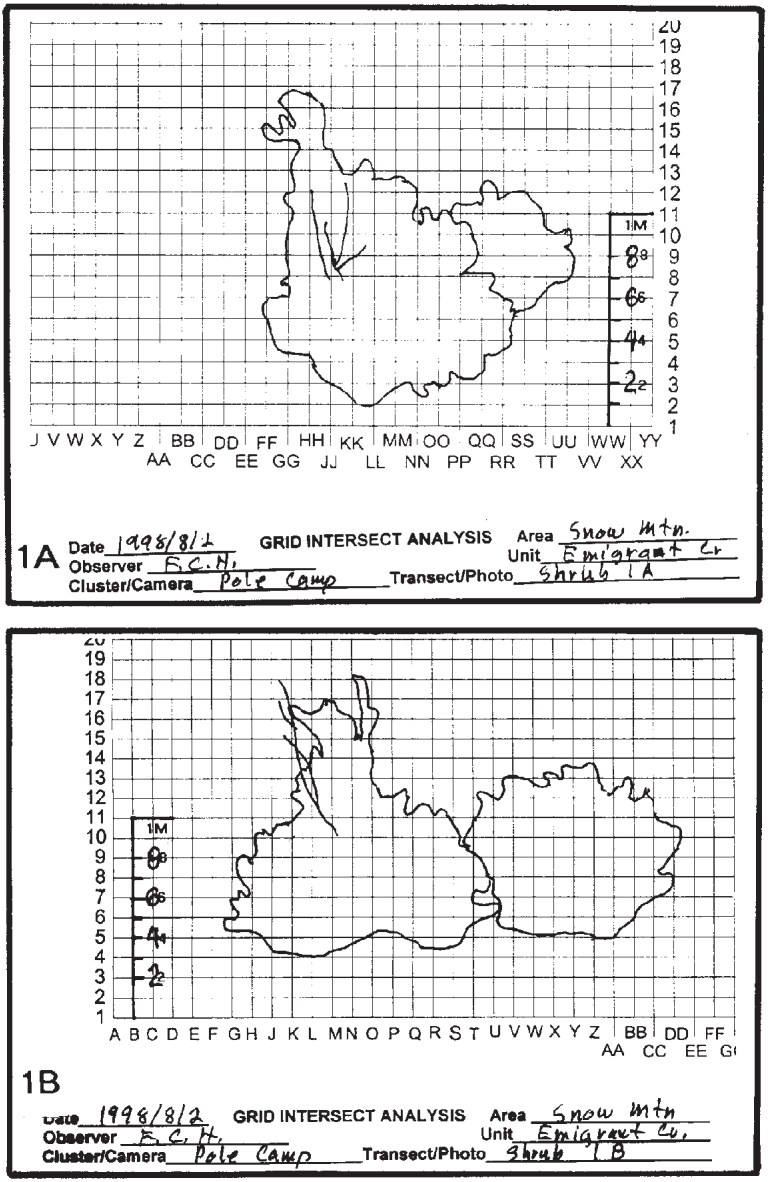


Figure 26—Grid outlines for shrub 1, views (**1A**) and (**1B**) on the Pole Camp shrub profile transect. Grids have been adjusted for size by the outlined meter board. Outlines are then taped to the grid. Count grid intersects and record on the filing system form “Photo Grid Summary” (fig. 49, part B).

Figure 27–System to photograph tree canopy cover. The photo point meter board will be crosswise of the view. Place the camera level board on top of the meter board and the camera on the level board. First, center the cross-view level by moving the meter board sideways. Then tilt the camera level board so that the down-the-view level is centered, move your head out of the camera view, and photograph.

Concept

Tree canopies are photographed perpendicular to the ground by using a camera leveling board to assure vertical orientation of the camera. Figure 27 illustrates a 35mm camera with 50mm lens in the correct position.

Whatever focal length is used to begin, the **same focal length** must be used for subsequent photos. There is no measured distance to a meter board or other size control used in the over-head view, therefore pictures **cannot** be adjusted to a common camera focal length to compare canopy cover.

Equipment

The following equipment is required for tree cover sampling:

1. Camera or cameras with both color and black-and-white film, or a digital camera.

2. A camera leveling board (part B, app. B).
3. Form from part B, appendix A, for data and photo mounting, “Photo Points with Overhead Views” (fig. 28)
4. Meter board (part B, app. B) on which to set the leveling board and camera and thus maintain a constant camera height.
5. A compass and 100-foot (30-m) tape.
6. Fenceposts or steel stakes with pounder.
7. Metal detector for locating stakes.

Technique
Position the meter board at the topic of interest following guidelines in “Topic Photography” (above). Hold the camera leveling board on top of the meter board, set the camera on the leveling board with the long axis crosswise to the scene (landscape orientation) and the viewfinder toward the camera location (fig. 27). The easy way to remember this is to view the photo point with the camera in landscape orientation (fig. 28, top view), then move to the meter board and rotate the camera to look up at the canopy (fig. 28, bottom view).

Move the meter board sideways to level the camera board across the view. Then level the camera board down the view, bend down to take your head out of the picture, and photograph (fig. 28, bottom view).

Important criteria—There is neither a size control (meter board) nor photo identification sheet in these pictures. Therefore three procedures **must** be followed:

1. The same focal length lens must be used for all subsequent photographs so that images can be compared.

2. The camera must be the same height aboveground. Use the meter board for consistent heights. Figures 31 and 32 in part B illustrate the effect of change in distance on size and location of objects.

PHOTO POINTS WITH OVERHEAD VIEWS

Date 96/8/5 Camera Wide Thin #3
Area Prairie City Dist Number of Photo points: 1
Unit Cold Cr. Observer F.C. Ball
Comments 25 yrs since pct; clearcut about 1950

Slope 5 Aspect W Slope position mid Topography undulating

Photo Point A
Compass bearing: 178° M
Distance 32.0 ft
Photo comments:
No cow use, trees now growing at 2.2" per dec.

Overhead of Photo Point A
Photo comments:
Ponderosa pine in fairly good vigor. 100 ft line transect showed 47% covey

Figure 28—Filing system form “Photo Points with Overhead Views” documenting current tree canopy cover. The form is in part B, appendix A. Remember to make notes on what is in each photo.

3. Make sure that the camera is oriented crosswise to the view with the viewfinder toward the camera location (fig. 27). Remember this by viewing the photo point through the camera, then rotating it 90 degrees upward to view the canopy.

Canopy cover also may be determined by using the photo grid analysis technique discussed in part B.

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