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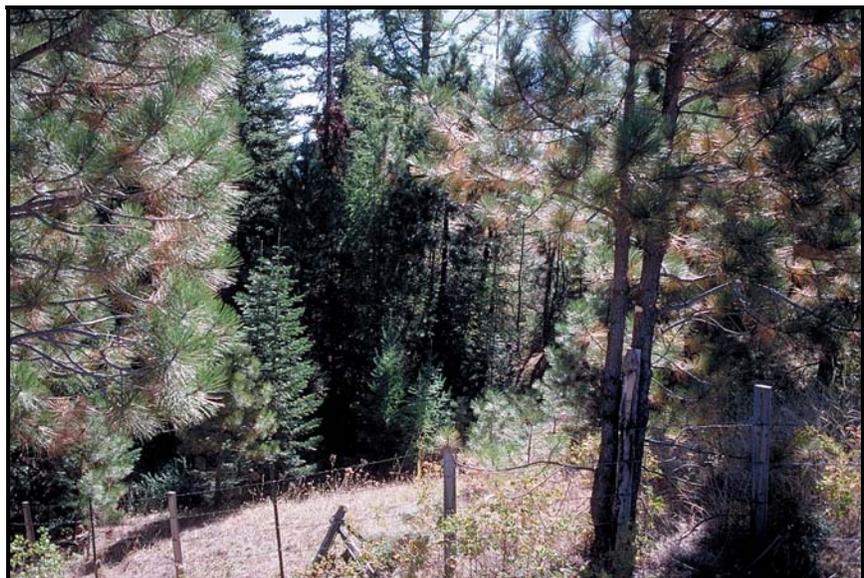
**Umatilla National
Forest**

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Recording the Changes: Field Guide to Establishing and Maintaining Permanent Camera Point Systems

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COVER ILLUSTRATION

Round Prairie Spring on the Pomeroy Ranger District of the Umatilla National Forest. The top image was taken by M.N. Unser on August 2, 1913 in approximately section 12, township 8 north, range 43 east. It shows a livestock watering trough and fence constructed by the Forest Service. The lower image was taken from about the same location by David C. Powell in early September of 1996.

CITATION

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INTRODUCTION

From its earliest days, the United States Forest Service has relied on photographic documentation for telling its story in support of progressive resource management and protection on the national forests.

Gifford Pinchot, the first Chief of the U.S. Forest Service, was also the first American forester to use photography to help describe the effects of land management practices. He saw photography as a valuable public educational tool, an instrument to help evaluate changes in the American landscape and to aid managers in documenting their activities for research and administrative purposes (Bergoffen 1976).

Photographs produced by Pinchot, along with those made by subsequent chiefs such as Richard McArdle and Edward Cliff, are included in the Forest Service's permanent image collection. More than one-half million Forest Service photographs make up that collection.¹

While interesting and valuable historically, the older photographs also document forestland and rangeland changes occurring with time. The old photographs tell this story far more effectively than words can. For example, the Forest Service's extensive photograph collection has provided an invaluable chronicle of federal forestry in the United States (Bergoffen 1976, Fedkiw 1999).

Of particular value are a planned series of photographs on the national forests and grasslands, designed to be made at prescribed intervals from designated places, in the same direction, and with the same field of view. This is camera point photography – a controlled system of photographic documentation through time.

Today's Forest Service men and women share the responsibility for carrying on camera point photography. This responsibility gained renewed emphasis as a result of monitoring requirements established by the National Forest Management Act of 1976 (P.L. 94-588).

Camera points already exist on most national forests and grasslands. The sites only need to be relocated and rephotographed to serve once again as a monitoring tool, while new points should be established to keep pace with contemporary resource monitoring needs.

Administrative authority and authorization for camera point systems is provided by the Forest Service Manual (FSM 1643.04). Occasionally, the Pacific Northwest Region (Region 6) might supplement the national manual or handbook direction to establish regional or local refinements.

This short field guide provides simple direction and policy for camera point photography in the Pacific Northwest Region. Other sources of information and training about camera points are also available for the Pacific Northwest Region (Hall 2001, 2002a, 2002b; Rasmussen and Voth 2001).

The primary objective of this guide is to describe how experienced photographers can use their equipment for long-term monitoring by establishing camera points. An appendix also provides some basic camera tips for natural resource photographers.

¹ Most of the Forest Service photograph collection is now housed at the National Agricultural Library (Beltsville, Maryland), the audio-visual branch of the National Archives and Records Administration (College Park, Maryland), and the Forest History Society (Durham, North Carolina).

History of This Document. The Information Office of the Pacific Northwest Region of the U.S. Forest Service originally prepared this document. John E. (Jack) Todd, former director of timber management for the Region, was its primary author. It was issued in March 1982 as publication R6-10-095-1982.

Although many things have changed since 1982, much of the camera point work in Region 6 must still be aware of the policies established by the 1982 guide, particularly for older camera points where retakes are still being completed.

The 1982 guide is reproduced here in its entirety. The editor made every effort to duplicate the original text in every respect (other than its two-column format). However, it is important to mention that some of the original guide is either obsolete or no longer relevant, and I have attempted to identify these instances with my “editor’s notes.”

Regardless of whether the original material is obsolete, it was retained here to help provide an historical context for Region 6’s camera point program. Many existing camera points were established using the forms and policies contained in the 1982 guide. I believe there is value in maintaining this information if for no other reason than to document the policy and assumptions under which these historical camera points were established.

Much other camera point information has been produced since release of the original guide in 1982. Those sources should also be consulted when planning and conducting a camera point program (for example, see: Hall 2001, Hall 2002a, Hall 2002b).

PERMANENT CAMERA POINTS

This field guide describes the permanent camera point and provides instructions for establishing and maintaining individual camera points and camera point systems. Authority for establishment of camera points is found in Forest Service Manual 1643.04.

Definition. A permanent camera point is an established photographic station from which a long-term photographic record is made, usually at predetermined intervals.

Purpose. Long-term photographic records are made to document changes in the appearance and condition of natural resources over time as a result of management activities and natural succession. Visual records are invaluable supplements to other periodic records such as physical measurements and written descriptions.

Editor’s note: photographic documentation is generally of greatest value for visualizing and understanding vegetation changes (trends) through time. Camera points can also be used as a reproducible data collection process to provide easy and inexpensive assessments for project areas, although it is traditionally not used as much for this purpose. Fuels managers and analysts are often leaders in the use of camera photography as a project-planning tool.

CAMERA POINT SYSTEMS

Systems of camera points are organized to assure that all needs for long-term photographic documentation on the status of renewable resources are met. Camera point systems provide for consistency among administrative units, and minimize duplication of photo documentation. Systems will be maintained at national forest and regional levels.

Camera Point Coordinators. Still photography coordinators at Regional and Forest levels will also serve as camera point coordinators at Regional and Forest levels.

The Director of the Regional Information Office will appoint the Regional Camera Point Coordinator. The Camera Point Coordinator will be responsible for overall coordination of the program, and will be assisted by an advisory group of representatives from Regional Office staff groups.

The National Forest Camera Point Coordinator will be appointed by the Forest Supervisor, and will be assisted by a committee of representatives from Ranger Districts and Supervisor's Office staff groups. The committee should have representatives from all the major resources and uses, including recreation and visuals.

Editor's note: these requirements to establish camera point coordinators and committees are no longer followed.

National Forest Camera Point System. This system consists of points established on the national forests and grasslands, including points needed for response to purely local issues. Certain points will be selected from the National Forest Camera Point System for inclusion in the Regional System.

Regional Camera Point System. This system consists of camera points selected from the National Forest System to provide continuous, Region-wide documentation of significant resource management results and changes from natural occurrences.

Setting Up the System. The total number of permanent camera points needed would vary over time, depending upon changes in management activities, issues, and other conditions. Inevitably, some established points would prove not to be useful, while new points will become necessary for other locations.

Careful planning is essential to minimize wasted effort and to realize the value of permanent camera points as quickly as possible.

List Activities and Events. The first step for National Forest Camera Point System Coordinators and Committees should be listing of activities and events for all resources for which long-term documentation would have value.

Meeting documentation requirements of the National Forest Management Act of 1976 should be given high priority in building the list (Federal Register, Vol. 44, No. 181, page 53987, (K) Monitoring and Evaluation). Camera points meeting research as well as management needs should also receive priority.

Set System Priorities. Subjects are then prioritized to guide order of establishment, and to help set the parameters for the system.

Provide Extra Points. Extra points should be planned for activities of special importance. This ensures adequate coverage if some points are lost because of wildfires or other unanticipated events. Once the beginning scope and composition of the system have been roughed out, the task of selecting potential sites can begin.

Reclaim Old Camera Points. Old camera points established years ago might also be resurrected to provide excellent opportunities for documenting changes occurring with time. It is especially important that all successive photographs from an established camera point be taken with a camera/lens combination that closely matches the perspective of original photographs.

Old Photographs Are Valuable. Besides previously established camera points, many old Forest Service photographs filed at Regional and Forest levels can be valuable for before and after comparisons to show change in the landscape or where management activities have induced desirable changes. This is particularly true if the photographer can locate the place where the original picture was taken, and proceed to set up a camera point for future documentation.

Editor's note: Comparing camera photographs from the early 1900s and today, a process called repeat photography, has been done throughout the western United States (see these sources for examples: Bergoffen 1976; Bradford et al. No date; Bright and Powell 1994; Brock and Brock 1993; Gary and Currie 1977; Gruell 1980a, 1980b, 1983, 2001; Gruell et al. 1982; Kay 2003; Klement et al. 2001; Magill 1989; Manier and Laven 2002; Rhemtulla et al. 2002; Skovlin and Thomas 1995; Skovlin et al. 2001; Smith and Arno 1999; USDA Forest Service 1992; Veblen and Lorenz 1991).

These repeat photography reports have consistently shown that wildland ecosystems of the western United States experienced substantial changes in vegetation composition and structure during the twentieth century (Fedkiw 1999).

FINDING THE RIGHT SITES

Each camera point or group of points should record a specific resource activity or occurrence. Current management plans should be examined to be sure that planned management would not make potential sites unsuitable for the intended purpose. Conversely, established permanent camera points need to be identified in plans and protected to every extent feasible.

Selecting the Specific Camera Point. Once the general site has been selected, the photographer determines where specific camera points will be located. In many cases one point will be sufficient; in others, two or more may be needed.

1. Points should have sufficient elevation so that growing vegetation will not obscure the view, at least in the near future. One exception, however, may be where the objective is to record retention or partial retention of visual quality as perceived from the highway, road or trail. In those cases, camera points from the level of the travel route should be established.
2. If at all possible, camera point views should include an identifiable object such as a rock outcrop or road bend.
3. Valuable guidance on selection of camera points is contained in a USDA Forest Service research paper, *Landscape control points – a procedure for predicting and monitoring visual impacts* (Litton 1973). The publication, PSW-91, should be on file with forest landscape architects, or may be obtained through the Regional Office Landscape Architect Group.

Guard Against Future Damage to the Camera Point. The point should be located to protect it and the monument from future physical damage. For example, a point should not be located on a road shoulder, turnout, or skid trail unless absolutely necessary, and then only if log or rock barriers can be placed to protect the marker.

Locating the points so that markers and location posters will be inconspicuous will help to minimize vandalism.

TAKING THE PHOTOGRAPHS

Make the initial photographs as soon as the light conditions are satisfactory for producing good results. A sunny day is preferred, although a high and bright overcast is also good.

Should the light become unsatisfactory during the time available, record an estimate of the time of day when light is likely to be best, as a guide for scheduling a return visit.

Set up the tripod so that the camera is directly over the location stake. Take the time to select the best view(s). Keep vital picture elements well inside the area visible through the camera viewing system, particularly if the camera does not have through-the lens viewing. Use the meter to determine exposure.

If there is a great deal of contrast in the scene (very light to very dark), bracket the indicated exposure by also taking photographs at one f-stop less than indicated, and one f-stop more. Then select the best exposure(s) and destroy the other negatives. Make sure the corresponding exposure is shown on the Record Form (exhibit 1).

Enough additional film should be exposed so as to provide original negatives for filing in the Regional System for those views so selected.

Record the time, camera, lens and film used, focus distance, and any filter used, in the appropriate places on the record form (exhibit 1). Also measure and record on the form: the height of the camera above the ground, the compass bearing, and the vertical angle from horizontal on which the camera is aligned.

Editor's note: although this section begins by stating that "a sunny day is preferred," experience has shown that a slightly overcast day tends to provide the most consistent light environment and often the best camera point results. Sunny days lead to a lot of contrast between exposed and shadow areas, and often interfere with transect photographs by casting the photographer's shadow into the field of view.

MARKING AND RECORDING CAMERA POINTS

At each point, drive a metal stake into the ground directly under the camera position. Capped aluminum stakes similar to survey monuments (fig. 1) are recommended for this purpose and may be obtained from Berntsen International, Inc., P.O. Box 8670, Madison, Wisconsin, 53708-8670 (phone: 800-356-7388; www.berntsen.com).

Stamp or otherwise permanently mark the camera point number on the location monument, according to numbering system described on page 7.

Editor's note: aluminum camera point stakes, such as those illustrated in figures 1 and 2, are ideal in many respects, but they are expensive and bulky to pack around in backcountry situations. Angle iron stakes and rebar stakes are also used and they tend to be less expensive. Any of these three options would have acceptable longevity and can be relocated using a metal detector.

Tap-on Cap

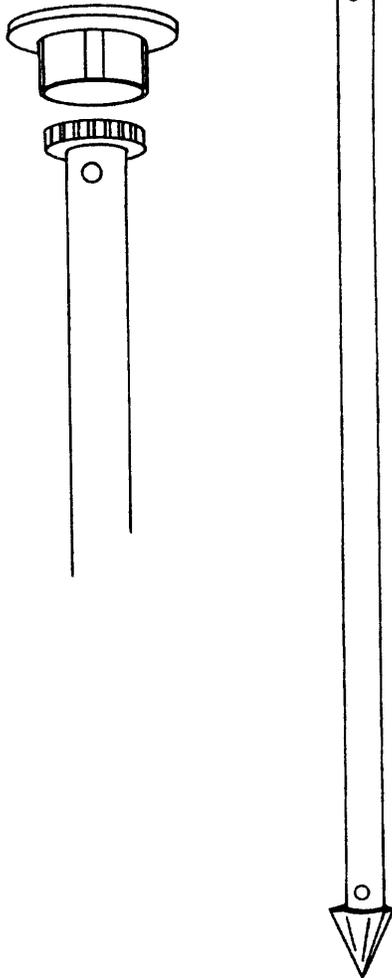


Figure 1: Aluminum stake and cap often used as a marker for camera points. These stakes are available from Berntsen International, Inc. in Madison, Wisconsin. The stake can be ordered in different lengths, with 36 inches often preferred for deep, ashy soils and 24 inches for shallower soils. The stake is installed in such a way that the cap is flush with the ground surface after it is tapped on, which results in less risk of large equipment damaging the stake than if a piece of angle iron or rebar is left protruding above the ground surface. This aluminum alloy stake is referred to as the "G130 drive-in piston monument" in Berntsen's catalog. It consists of a small diameter pipe topped with a driving head cap and a cast aluminum base point. The driving cap (secured to the top of the tube with aluminum rivets and having serrations around its edge to help lock the tap-on cap to the monument stake) includes a permanent ceramic magnet to assist with future location of the monument. The driving cap and base point are secured to the pipe with solid aluminum rivets. A urethane-faced, dead-blow sledge hammer is recommended for installing the stake. The optional cap is tapped onto the pipe after the piston monument has been driven into the ground. This tap-on cap is purchased with specific wording stamped into its surface designating it as a Forest Service camera point (fig. 2). Space is available on the cap to scribe in the camera point number or designation.



Figure 2: Aluminum cap used with the camera point marker described in figure 1. This figure shows the standard wording supplied with the aluminum tap-on camera point cap. It allows space on the bottom half (just above "FOREST SERVICE" and to the right of "NO.") to scribe your actual camera point number in the field. The sharp tip of a nail or another scribing tool can be used to add the camera point designation (e.g., "T-96-1" as shown in exhibits 2 and 4) to this portion of the cap.

Establish Reference Points. Establish one, and preferably three, reference points within 200 feet of the camera point monument. If possible, select live trees that can be expected to last for the life of the camera point.

When live trees are not available, iron stakes, large stumps or boulders may be used as an alternative reference point.

Record Compass Bearings. Carefully measure the distance and determine the true compass bearing between each reference point and the location point.

Scribe Location Posters. Record each reference point with the distance and bearing to the camera point monument by scribing the information on the special location poster illustrated in figure 3. The posters can be ordered through the Regional Information Office. Posters are placed facing the camera point.

Editor's note: since the camera point program is no longer administered by the Regional Office (if such a thing can be said to exist any longer), supplies of location posters are not available from the Regional Office. Umatilla NF camera point users can contact me for a supply of the metal location posters for as long as supplies remain available.

Complete the Record Form. Record a description of each reference point with its bearing and distance in the appropriate blanks in the vicinity sketch on the record form (exhibit 1). Try to describe the point so thoroughly that it can be reestablished even if the camera point stake and all reference posters are destroyed.

The preferred practice is to complete the marking and referencing before taking photographs. When it is necessary to take the photographs first, such as to take advantage of favorable light conditions, be especially careful to place the camera point stake before moving the tripod.

Pinpoint Locations On Maps and Aerial Photographs. After the camera point monument and reference posters are in place, accurately mark and label the point location on the aerial photograph and vicinity map. (Good photocopies of aerial photographs may be used in place of original prints.)

Photograph the Point With Background Setting. Before leaving the site, take one or more photographs of the camera point monument and the vicinity with, if possible, one of the references in the background.

Editor's note: I cannot emphasize enough the importance of this section for any camera points that are truly perceived to have long-term value. Many photographers will not take the extra time to acquire vicinity images for their camera point locations, but they are critically important when trying to relocate camera points after several decades of ecosystem change.

NUMBERING PERMANENT CAMERA POINTS

Each permanent camera point is marked with a five-digit number that identifies the national forest and camera point number.

The point number is assigned by the Forest Camera Point Coordinator in chronological order of establishment beginning with number one on each national forest.

FOREST SERVICE
CAMERA POINT LOCATION POSTER

T. R. S.

TACK INDICATES LOCATION OF POSTER

DISTANCE TO CAMERA PT.

BEARING

DATE BY

16 - 1



Figure 3: Camera point location poster. The top half shows the poster and its wording. Use the sharp tip of a nail or another scribing tool to fill in the legal description information (township, range, section) on the top of the poster, and the distance, bearing, camera point number, date, and establisher information on the bottom. The bottom half shows a typical installation where a poster was placed on a burned tree near one of the Tower fire camera points. Note that if possible, it is always preferable to choose a more durable location for a camera point poster than a dead tree.

The suffix “R” is Regional System. Thus the number 07001R would identify Ochoco National Forest (07), camera point number 1 (001), with “R” indicating that the point has been included in the Regional System.

Editor’s note: this section discusses a process for assigning camera point numbers using a consistent numbering scheme at the National Forest (not Ranger District) level. This process is no longer followed; camera points should be numbered in such a way as to track them at a local level (such as a Ranger District) and the number should be carefully linked to a GIS coverage.

PERMANENT CAMERA POINT RECORD FORMS

As soon as the camera point location has been selected, complete the top portion of the Initial Take – Permanent Camera Point Record Form (exhibit 1), using care to describe the travel route accurately. Complete the balance of the form as explained in subsequent paragraphs. Check the form for completeness before leaving the camera point.

The Retake – Permanent Camera Point Record Form (exhibit 3) is completed in a similar manner each time new photographs are made from the point.

CAMERA POINT DOCUMENTATION

Documentation for the camera point system consists of individual camera point records, national forest maps and aerial photographs showing camera point locations, and summary listings of camera points by national forest.

An action plan should be developed so that photographs are taken when they should be, and accountability for their maintenance is established.

Forms, Maps and Aerial Photographs. At the time of establishment, the individual camera point record is started on form R6-1600 (Initial Take – Permanent Camera Point Record, exhibit 1). This form will carry information on point location, date, time, and weather conditions when pictures were made, and some technical photograph data.

Similar information is recorded on form R6-1600 (Retake – Permanent Camera Point Record, exhibit 3) each time new photographs are taken.

Each permanent camera point established on a national forest or grassland is recorded by its number (see page 7) on a visitor’s map (planimetric base; 1/2” = 1 mile) maintained by each Supervisor’s Office as its camera point index map.² Location information may also be pin pricked on aerial photographs.

Summary information concerning each camera point is entered on Form R6-1600 (National Forest Camera Point Summary; note that this form is no longer used).

Annual Reports. Copies of the updated national forest index map and Camera Point Summary form will be submitted annually by the Forest Camera Point Coordinator to the Regional Coordinator. This material will be accompanied by one copy of each Initial Take/Retake – Permanent Camera Point Record for photography accomplished during the year.

² At the present time, monumented camera points are included in a GIS theme called “permanent ecology plots.” See the Blue Mountain Province Data Dictionary for more information about this theme.

One 5" x 7" black and white photo print from each initial take or retake, together with extra original negatives if available, will also be submitted. This material should reach the Regional Coordinator no later than November 15 of each year.

Adding to the Regional System. From information submitted annually by the Forests, the Regional Camera Point Coordinator and advisory group will choose points for inclusion in the Regional System. Regional camera points will be representative of the Region's widespread variances in climate, topography, timber, and other vegetative types.

The Regional Coordinator will integrate Regional Camera Point System photographs into the Region's photo filing and retrieval system.

Feedback to the Field. Annually, national forests and Regional Office staff units will be furnished summaries of national forest camera points making up the regional system.

Editor's note: the reporting and feedback requirements described in this section are no longer followed. To my knowledge, for example, a Regional Camera Point Coordinator does not exist, and it makes no sense to submit a camera point report to the Regional Office.

MAINTENANCE OF POINTS AND REPHOTOGRAPHY

Before an Initial Take Record Form is filed, the next retake date is posted on a list of such dates maintained by the Forest Camera Point Coordinator.

A "promise card" is made out if the national forest uses such a system. The coordinator uses this list of dates to plan and budget for the retake work.

Retakes are scheduled for the month in which the original photographs were taken. The photographer should strive to take the photographs at about the same time of day and in similar weather conditions.

Match Original Procedure. Prior to leaving for the field, the photographer should assemble equipment and materials (as listed on page 14) together with the camera point case file; leave the negatives at the office.

1. Use the camera and lens that produced the original photograph, if possible. Otherwise, duplicate the equipment as closely as possible. Also, duplicate the original film and filters as closely as possible.
2. Locate the point by following the directions recorded on the Initial Take Record Form. A metal detector might be useful for locating the monument. Examine the camera point stake, cap, and reference posters. It might be necessary to maintain or replace them. Note on the Record Form the condition in which the monument and references were found, and any reestablishment work performed.
3. Set the tripod with the camera directly over the location stake, and at the original height above ground. Align the camera on the original compass bearing and vertical angle, and check to see that the resulting view coincides with that in the original photograph. If it doesn't, take a photograph at the original alignment and one at the alignment that seems to best duplicate the original view.
4. Record the bearing and vertical angle for the retake photograph. After films are developed and prints made, retain the ones that best replicate the original view and destroy the others.

Note the proper bearing and angle on the form and explain if different from the original. Check to see that the Record Form is complete before leaving the point.

5. After films are developed and prints are made, retain the ones which best replicate the original view, and destroy the others. Set aside copies of prints, duplicate negatives, and retake information for the annual report to the Regional Camera Point Coordinator.

CAMERA POINT DURATION AND REPHOTOGRAPHY

The expected camera point life and frequency of rephotography are prescribed at the time of establishment. Either may be changed if circumstances dictate.

Duration May Vary. The planned life of a permanent camera point may vary from a few to many years depending upon the activity involved and the length of time needed to illustrate the effects of management or natural progression.

Growth of screening vegetation planted in a campground, or range revegetation, may be shown in a few years, for example. On the other hand, camera points designed to record changes in landscape appearance due to timber harvest might endure for a century or more.

Proper Intervals Are Important. Photography at five-year intervals will be satisfactory in most resource situations. Photography at more frequent intervals, perhaps as often as several times a year, may be useful in some cases, particularly for short-lived points, or those in key visual resource areas where it would be desirable to show seasonal variations.

In cases where natural change is especially slow, longer intervals of up to 10 years may be satisfactory. If there is doubt about the proper interval, it is better to err on the side of shorter rather than longer intervals.

INACTIVE AND ABANDONED CAMERA POINTS

Camera point coordinators must also be concerned with inactive and abandoned camera points.

Inactive Camera Points. An inactive camera point is one that has met the purpose for which it was originally established, but is to be retained in the system for possible future use.

Although no photography may be scheduled for inactive points, they should be visited periodically to keep the camera point marker and location posters in good repair. Case files for inactive points should remain in the open files.

Abandoned Camera Points. An abandoned camera point is one that is considered to have no further use, and is eliminated from the system. Generally, camera points will be abandoned only when the Forest Camera Point Committee has determined that the point is unsuitable for the intended purpose, and no new use can be anticipated.

1. Unsuitability will result most often from site alteration by road construction, reservoir flooding, etc., but may result from poor initial location.
2. When a decision to abandon is made, the camera point monument and location posters are removed. Disposition of case files will be decided on a case-by-case basis, and will depend upon the value of any photographs taken before abandonment.
3. The Forest Camera Point Coordinator's annual report to the Regional Camera Point Coordinator will list points deemed inactive or abandoned during the year.

4. Establishment of a new camera point on an alternative site should always be considered when a camera point is abandoned.

RECOMMENDED CAMERA EQUIPMENT AND FILM

To provide good detail, a medium or large format camera should be used. While a 4" x 5" inch camera is recommended, various formats utilizing 120 or 620 film are acceptable, provided that care is observed in developing and negative handling.

The 35mm format is too small for good camera point photography, and should only be used as a last resort.

Editor's notes: this section recommends using a 4" x 5" format camera. This recommendation is considered inappropriate except for situations where views taken previously in this format are being rephotographed.

Although use of the 35mm format is discouraged in the original text, it is ironic that it quickly became the default format by the late 1980s, and the default lens typically included with most 35mm single-lens reflex camera outfits (a 50mm lens) was eventually recommended as the primary lens size for use with 35mm camera points.

Now that 35mm film cameras are fading from use to be replaced with digital cameras, there are not yet any firm guidelines for how this new technology should be used in conjunction with camera point photography. Single-lens reflex digital cameras are now available (fig. 4) and their resolution, as expressed in megapixels, approaches or exceeds the quality of scanned 35mm slide film.

An obvious advantage of digital cameras is their capability to display images on an LCD screen, allowing image quality to be reviewed before leaving the site, and anyone who has picked up film with unusable images from a lab or processor will immediately recognize the advantages of this feature.

Note: computer software also exists for linking a digital camera and a portable global positioning system receiver. Software such as GPS-Photo Link® can accomplish this linkage without requiring a cable between the camera and GPS unit. This type of software allows camera point locations to be stored as GPS waypoints and then downloaded into a GIS layer after returning to the office.

Choose The Right Lens. A so-called normal lens having a focal length in the range shown below should be used.

Film Format, Inches	Normal Lens Focal Length (mm)
5 x 7	200-225
4 x 5	135-165
2 ¼ x 3 ¼	95-110
2 ¼ x 2 ¼	75-85
35mm	50-55

Black and White Film Is Preferred. Black and white film should be used primarily, as presently available color photo materials cannot be relied upon to be permanent under normal storage conditions.



Figure 4: A single-lens reflex (SLR) digital camera. When digital cameras were first produced, they only came with a fixed lens. Now, Canon, Pentax, Minolta and other manufacturers offer an SLR camera in their digital line. An SLR version means that lenses are interchangeable and that a wide angle lens (28mm for example) could be used for landscape images and then replaced with a different lens for another purpose (such as using a macro lens for close-up images of insects, wildflowers or tree damage). This particular camera has an 8 megapixel resolution, which meets or exceeds the maximum detail obtained from high-resolution scans of 35mm slide film.

Tri-X black and white will produce acceptable results if fine-grain developing is available. Otherwise, the slower but finer-grained Plus-X is a better choice. Supplemental color photographs, either color negative or positive transparency, should also be taken.

Color film is particularly important in key visual and recreation resource areas to show color contrast from loss of vegetation, changes in soil color, increase or decrease in species diversity, and fall and spring color changes.

Editor's notes: another change occurring during the late 1980s was an aggressive move away from black-and-white film and subsequent adoption of 35mm color slide film. Kodak Ektachrome or Kodachrome slide film eventually became the most popular choices.

Kodachrome 64 slide film was recommended as "most desirable" by the Forest Service Manual (FSM 1643.04). Kodachrome 64 is particularly well suited for open slopes and sites with relatively good light conditions. Areas with dense forest canopy and other poor light conditions might be better handled with Ektachrome 200.

Color film was also found to be ideal for documenting certain types of vegetation change that is not depicted clearly when using black-and-white film (such as tree mortality caused by insect outbreaks; see Powell 1994).

Tripod Is a Must. A tripod must be used to provide rigid support. The tripod must be capable of elevating the camera five feet or more above ground level. Use of a cable release reduces the chance of camera movement when the exposure is made.

Editor's note: in a perfect world, a tripod would always be used for camera point photography. In backcountry situations and for many other circumstances, a tripod is impossible, impractical or inconvenient, and it was found that satisfactory results are easily obtained from a handheld camera.

NECESSARY EQUIPMENT CHECKLIST

After the camera point locations have been selected (or before, if selection is to be done on the same trip as establishment), the photographer should collect equipment and supplies as follows:

1. Permanent Camera Point Record forms (exhibits 1, 3).
2. Camera point monument stakes and caps (figures 1, 2).
3. Small sledge for installing aluminum monument stakes.
4. Steel numbering stamps or other device for permanently numbering camera point monument (see page 7; not needed if stake or cap is pre-numbered).
5. Metal location posters (figure 3), scribe, aluminum nails.
6. 100' steel surveying tape.
7. Compass.
8. Abney level or clinometer.
9. Hatchet or small axe.
10. Ruler-protractor (12").
11. Field stereoscope.
12. Vicinity map showing township, range, section, and meridian of photo point (primary base series, 2.64" = 1 mile if available; otherwise, planimetric base, 2" = 1 mile).
13. Aerial photographs (stereo pair) covering selected site.
14. Clipboard or tatum.
15. Camera(s) with lens(es) (see page 12).
16. Film (see page 12).
17. Exposure meter.
18. Tripod.
19. Cable release.
20. Cases, backpacks, etc., as needed for carrying equipment.

Appendix: Tips For Natural Resource Photographers

- 1.** Become thoroughly familiar with your camera. Read the instruction manual carefully so you'll be comfortable making adjustments under a variety of conditions. Take some practice rolls before you shoot the serious photos.
- 2.** Make sure your automatic or manual camera is adjusted to give the correct exposure. If your pictures are too dark or too light, check the camera manual and the film instructions. Remember to set the film speed (ISO), shutter and aperture if your camera requires it. Automatic cameras set themselves, but if you want best control over results, use the manual settings.
- 3.** Move close to your subject. Whether your subject is a mountain, a building or a pine beetle, get close enough so that you see only the most important elements in your camera's viewfinder. Failure to observe this single guideline accounts for more unsuccessful pictures than any other mistake.
- 4.** Carefully observe both background and foreground in your viewfinder before you take the picture. Clutter or confusing elements will dilute the strength of what your subject is communicating. Keep your pictures as simple as possible.
- 5.** Correctly exposed flash pictures must be made within the flash-to-subject distance range. Pictures taken outside of a given range will be too dark or too light. A flash is also used outdoors to help fill in shadows.
- 6.** Hold your camera steady. Shaky hands or punching the shutter release button (rather than pushing it) reduce image sharpness. Hold the camera with both hands against its body, or use a rest or a tripod.
- 7.** Set your subject slightly off-center. When shown dead-center in a picture, your subject might appear static and dull. Experiment to see where different subjects look best. Take a mix of vertical and horizontal orientations.
- 8.** Watch the direction of the light. Light from the side or from behind your subject may be more effective than light from the front. Taking pictures in shade or on an overcast day is often better than in full sunlight, and a flash or reflector can be used to fill in shadows.
- 9.** Take plenty of pictures. Every professional photographer knows that the potential for success rises with the number of pictures taken. Compared with some of the rare scenes you'll encounter, film is far less expensive than the prospect of a missed photo opportunity.
- 10.** Keep your film cool before and after it is exposed. Don't let your film or camera sit in a hot vehicle. Heat will disturb the film emulsion, thereby giving you blurry or off-color photos. Get the film developed as soon as possible.
- 11.** Don't use unexposed film that is older than its expiration date.
- 12.** Don't use a cheap camera or lens. Cheap equipment often results in poor quality.
- 13.** File and store slides, prints and negatives in a cool, low-humidity environment. Use protective, archival-quality sleeves such as those produced by Vue-All, Inc. of Ocala, Florida.

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Exhibit 1. Camera Point Record: Initial Take

Point Number:	National Forest:	Ranger District:
Retake Frequency:	Due Dates:	
Subject & Purpose:		
Access		
Description:		
GPS Coordinates: North	East	Corrected?
Legal Description: Town	Range	Section
	Qtr	Qtr
Air Photo Number:	Map Identifier:	Ecoclass:
Photographer:	Elevation:	Aspect:
		Slope %:
Camera:	Film:	ASA:
Date:	Time:	Weather:
VIEW 1	VIEW 2	VIEW 3
Camera Height:	Camera Height:	Camera Height:
Camera Angle:	Camera Angle:	Camera Angle:
Azimuth: °	Azimuth: °	Azimuth: °
Lens: Filter:	Lens: Filter:	Lens: Filter:
F-stop: Speed:	F-stop: Speed:	F-stop: Speed:
Focal Distance:	Focal Distance:	Focal Distance:
Exposure Number:	Exposure Number:	Exposure Number:
VIEW 4	VIEW 5	VIEW 6
Camera Height:	Camera Height:	Camera Height:
Camera Angle:	Camera Angle:	Camera Angle:
Azimuth: °	Azimuth: °	Azimuth: °
Lens: Filter:	Lens: Filter:	Lens: Filter:
F-stop: Speed:	F-stop: Speed:	F-stop: Speed:
Focal Distance:	Focal Distance:	Focal Distance:
Exposure Number:	Exposure Number:	Exposure Number:
REFERENCE POINT 1		
Description:		
Marking:		
Azimuth: ° Feet:		
REFERENCE POINT 2		
Description:		
Marking:		
Azimuth: ° Feet:		
REFERENCE POINT 3		
Description:		
Marking:		
Azimuth: ° Feet:		

Exhibit 2. Camera Point Record: Initial Take (Completed Example)

Point Number: T-96-1 National Forest: Umatilla Ranger District: North Fork John Day Retake Frequency: Annual; then 5 years Due Dates: Fall of 1997, 1998, 1999, 2000, 2001; 2006 Subject & Purpose: Monitor long-term effects of the Tower wildfire (burned August-September 1996) Access Point is approximately 78 feet below edge of asphalt off Road 52, about 0.95 miles east of Description: the junction of roads 52 and 5226.		
GPS Coordinates: North 4984893 East 374688 Corrected? Yes Legal Description: Town 6S Range 34E Section 35 Qtr NW Qtr Air Photo Number: Map Identifier: Ecoclass: CLS417 Photographer: Earle Rother Elevation: 5,377 feet Aspect: 342° Slope %: 25 Camera: Minolta SRT101 Film: Kodachrome Slide ASA: 64 Date: 10/4/1996 Time: 10:00 AM Weather: High overcast		
VIEW 1 Camera Height: 6' standing Camera Angle: Horizontal Azimuth: 320° Lens: 50 mm Filter: None F-stop: 11 Speed: 1/60 Focal Distance: Infinity Exposure Number: 1	VIEW 2 Camera Height: 6' standing Camera Angle: Horizontal Azimuth: 7° Lens: 50 mm Filter: None F-stop: 11 Speed: 1/60 Focal Distance: Infinity Exposure Number: 2	VIEW 3 Camera Height: Camera Angle: Azimuth: ° Lens: Filter: F-stop: Speed: Focal Distance: Exposure Number:
VIEW 4 Camera Height: Camera Angle: Azimuth: ° Lens: Filter: F-stop: Speed: Focal Distance: Exposure Number:	VIEW 5 Camera Height: Camera Angle: Azimuth: ° Lens: Filter: F-stop: Speed: Focal Distance: Exposure Number:	VIEW 6 Camera Height: Camera Angle: Azimuth: ° Lens: Filter: F-stop: Speed: Focal Distance: Exposure Number:
REFERENCE POINT 1 Description: 10.4" DBH PICO Marking: Orange poster Azimuth: 347° Feet: 3		REFERENCE POINT 2 Description: 14.8" DBH LAOC Marking: Orange poster Azimuth: 238° Feet: 40
REFERENCE POINT 3 Description: Marking: Azimuth: Feet:		

Exhibit 3. Camera Point Record: Retake

Point Number:	National Forest:	Ranger District:
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Retake Number:		Photographer:	
Camera:		Film:	ASA:
Condition of Point Monument and References:			
Date:		Time:	Weather:
VIEW 1		VIEW 2	
Camera Height:		Camera Height:	
Camera Angle:		Camera Angle:	
Azimuth: °		Azimuth: °	
Lens:	Filter:	Lens:	Filter:
F-stop:	Speed:	F-stop:	Speed:
Focal Distance:		Focal Distance:	
Exposure Number:		Exposure Number:	
VIEW 4		VIEW 5	
Camera Height:		Camera Height:	
Camera Angle:		Camera Angle:	
Azimuth: °		Azimuth: °	
Lens:	Filter:	Lens:	Filter:
F-stop:	Speed:	F-stop:	Speed:
Focal Distance:		Focal Distance:	
Exposure Number:		Exposure Number:	

Retake Number:		Photographer:	
Camera:		Film:	ASA:
Condition of Point Monument and References:			
Date:		Time:	Weather:
VIEW 1		VIEW 2	
Camera Height:		Camera Height:	
Camera Angle:		Camera Angle:	
Azimuth: °		Azimuth: °	
Lens:	Filter:	Lens:	Filter:
F-stop:	Speed:	F-stop:	Speed:
Focal Distance:		Focal Distance:	
Exposure Number:		Exposure Number:	
VIEW 4		VIEW 5	
Camera Height:		Camera Height:	
Camera Angle:		Camera Angle:	
Azimuth: °		Azimuth: °	
Lens:	Filter:	Lens:	Filter:
F-stop:	Speed:	F-stop:	Speed:
Focal Distance:		Focal Distance:	
Exposure Number:		Exposure Number:	

Exhibit 4. Camera Point Record: Retake (Completed Example)

Point Number: T-96-1	National Forest: Umatilla	Ranger District: North Fork John Day
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Retake Number: 1		Photographer: Dave Powell	
Camera: Minolta X-700		Film: Kodachrome Slide	ASA: 64
Condition of Point Monument and References: Good			
Date: 6/20/1997		Time: 10:00 AM	Weather: Clear, sunny
VIEW 1		VIEW 2	
Camera Height: 6' standing	Camera Angle: Horizontal	Camera Height: 6' standing	Camera Angle: Horizontal
Azimuth: 320°		Azimuth: 7°	
Lens: 28 mm	Filter: None	Lens: 28 mm	Filter: None
F-stop: 22	Speed: 1/250	F-stop: 22	Speed: 1/250
Focal Distance: Infinity		Focal Distance: Infinity	
Exposure Number: 13		Exposure Number: 14, 15	
VIEW 4		VIEW 5	
Camera Height:	Camera Angle:	Camera Height:	Camera Angle:
Azimuth: °		Azimuth: °	
Lens:	Filter:	Lens:	Filter:
F-stop:	Speed:	F-stop:	Speed:
Focal Distance:		Focal Distance:	
Exposure Number:		Exposure Number:	
VIEW 3		VIEW 6	
Camera Height:	Camera Angle:	Camera Height:	Camera Angle:
Azimuth: °		Azimuth: °	
Lens:	Filter:	Lens:	Filter:
F-stop:	Speed:	F-stop:	Speed:
Focal Distance:		Focal Distance:	
Exposure Number:		Exposure Number:	

Retake Number: 2		Photographer: Earle Rother	
Camera: Minolta Maxxum 7000		Film: Kodachrome Slide	ASA: 64
Condition of Point Monument and References: Good			
Date: 10/8/1997		Time: 9:30 AM	Weather: Partly cloudy
VIEW 1		VIEW 2	
Camera Height: 6' standing	Camera Angle: Horizontal	Camera Height: 6' standing	Camera Angle: Horizontal
Azimuth: 320°		Azimuth: 7°	
Lens: 50/28mm	Filter: None	Lens: 50/28mm	Filter: None
F-stop: 6.7	Speed: 1/100	F-stop: 6.7	Speed: 1/100
Focal Distance: Infinity		Focal Distance: Infinity	
Exposure Number: 1, 2		Exposure Number: 3, 4	
VIEW 4		VIEW 5	
Camera Height:	Camera Angle:	Camera Height:	Camera Angle:
Azimuth: °		Azimuth: °	
Lens:	Filter:	Lens:	Filter:
F-stop:	Speed:	F-stop:	Speed:
Focal Distance:		Focal Distance:	
Exposure Number:		Exposure Number:	
VIEW 3		VIEW 6	
Camera Height:	Camera Angle:	Camera Height:	Camera Angle:
Azimuth: °		Azimuth: °	
Lens:	Filter:	Lens:	Filter:
F-stop:	Speed:	F-stop:	Speed:
Focal Distance:		Focal Distance:	
Exposure Number:		Exposure Number:	