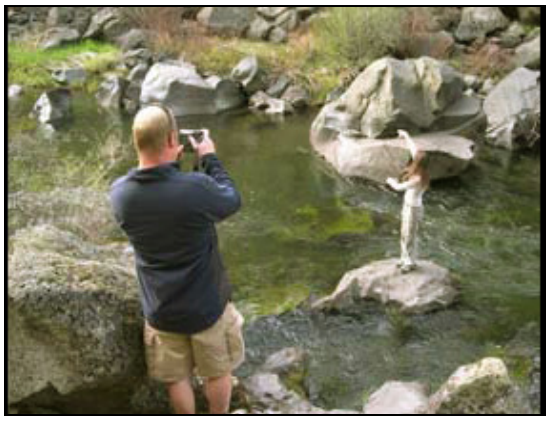
OWEB Guide to Photo Point Monitoring

(Revised July 2007)

By
Courtney Shaff
Jean Reiher
Jessica Campbell



Oregon Watershed Enhancement Board
775 Summer St. NE, Suite 360
Salem, OR 97301-1290
503.986.0178

Cover Photo:

Drexel Barnes and Lesley Jones downstream of Tumalo Creek on the Deschutes River.

(Brendon Jones, Upper Deschutes Watershed Council)

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Introduction

Photo point monitoring can be a useful and inexpensive tool for qualitatively documenting events and changes at a restoration site over time. This type of monitoring allows for comparisons among photographs of a restoration project to determine whether changes have occurred over time. Well-documented photo points can also be used to support conclusions reached through other, more rigorous monitoring techniques.

The Oregon Watershed Enhancement Board (OWEB) requires photo point monitoring of each funded restoration project. Pre- and post-implementation photos, as well as photos documenting restoration actions, help to "tell the story" of the restoration project. How long you will need to continue taking post-implementation photos will vary depending on the type of project. The purpose of this document is to provide guidance to OWEB grantees for using permanent photo points to monitor restoration projects.

The Basics of Photo Point Monitoring

The following types of photos can be used for monitoring restoration projects: **feature**, **landscape**, and **opportunistic** photos. Each of these is described in detail below with examples.

Feature photos document changes resulting from a specific habitat restoration activity such as the placement of rock weirs or large woody debris (LWD), riparian planting, or fencing along riparian areas. For example, photos can be taken across a fenceline or in either direction along the line to show contrast between different land management activities (Figure 1). Changes in a stream profile can be shown through views upstream, downstream, or across the stream (Figure 2). A combination of photos from multiple perspectives often provides the best illustration of the conditions at the site.

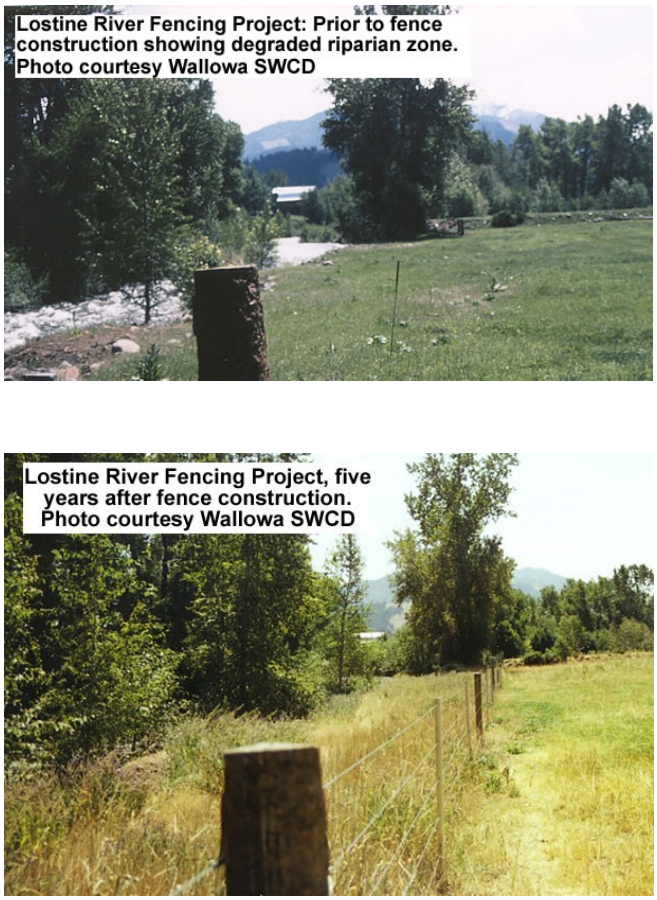

Figure 1. Sample feature photos taken along a fenceline (Wallowa SWCD).

Figure 2. Sample feature photos of channel development at years 1 and 3. Pictures taken during the same season and from the same location show the changes in the stream channel over the 2-year period (Siuslaw National Forest).

Landscape photos can capture restoration activities undertaken at a broader scale such as forest stand treatment or valley bottom stream restoration. These photos provide an overview of the area where restoration actions are implemented (Figure 3). A landscape photo can also be taken from a nearby hill, showing from a distance the same section of the landscape where the **feature photo** was taken and thus providing context for the **feature photo**.

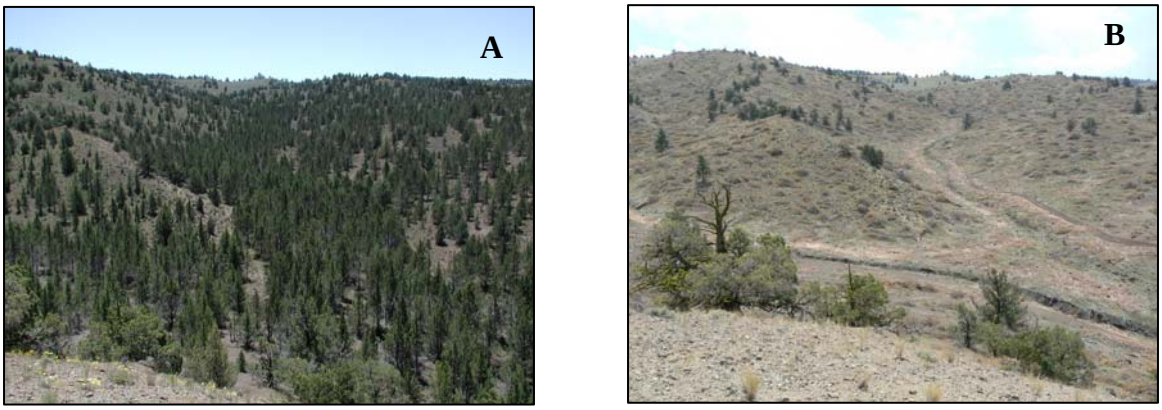

Figure 3. Sample landscape photos of an area (A) pre- and (B) post-juniper treatment (Tim Deboodt, Camp Creek Paired Watershed Study).

Opportunistic photos are not taken from a permanently marked location and are not intended to be formally repeated. However, they do provide valuable information about a restoration action, particularly when taken during construction activities. Examples of good subjects for opportunistic photos include a site during construction (Figure 4a) and the condition of a site after a significant event such as high water (Figure 4b) or human impact (Gerstein and Kocher 2005).

Figure 4a. Sample opportunistic photo documenting the installation of a new culvert providing upstream fish passage (Scappoose Watershed Council).

Figure 4b. Sample opportunistic photo documenting Buck Hollow Creek entering the Deschutes River after a significant rain event (Wasco SWCD).

General Guidelines for All Sites

For any type of project, consider five basic questions to help set up the appropriate photo points (Hall 2001, Borman 1995, Nader and others 1995):

Why monitor

What are your objectives or reasons for monitoring? The answers can determine whether the project was implemented correctly and whether the restoration action effectively met the project objectives. Identify the expectations for visual monitoring before you make a commitment of time and effort.

Where to monitor

Selection of photo point locations depends on local topography, accessibility, site-specific restoration work, availability of reference points in the landscape, and the specific objectives of monitoring. A project map is helpful in choosing the appropriate photo point locations.

What to monitor

The sampling setup should reflect the objectives of monitoring. Focus on visible changes.

When to monitor

The answers to the previous three questions determine which photo interval (seasonal, annual, or biennial) is appropriate. It is critical to take photos at approximately the same time of year when making statements about changes from one year to the next.

How to monitor

The choice of detailed feature photos or broader landscape photos depends on the answers to the previous four questions. Determine the best way to emphasize the visual changes occurring through time as a result of the project.

Setting Up Permanent Photo Points

Prepare all equipment (Appendix A) before going to the project site. To choose the locations of the permanent photo points, consider the following site characteristics:

1. Will changes be visible at the desired scale?
2. Is there adequate light to take the photo?
3. Will the photo capture the "area of influence?" This includes not only the work area but also areas likely to show the effects of that work (Gerstein and Kocher 2005).
4. Will the location of the permanent photo point marker need to change? For instance, is it placed too close to an erosion-prone stream bank or an area where growing vegetation will become too dense?
5. Can this location be reached conveniently and consistently?

For suggested locations based on specific types of projects, see Appendix B.

To capture your permanent photo point locations, consider the following steps:

1. After choosing the locations of your permanent photo points, carefully record the locations. Do not assume that the person who set up the photo points will be available to take photos in the future.
2. Mark the project location on a detailed map, such as a USGS quad map, and record clear directions. If using a GPS, record the coordinates. For examples of record data sheets, see Appendix C.
3. Mark the location of each photo point on a less detailed map, landscape photo, or aerial photo along with arrows showing the directions in which to point the camera. Record detailed directions for locating the photo points from a witness point such as a bridge or a road intersection.
4. Mark each photo point location with a stake, flagging, or other identifying marks. If your photo points are in riparian areas, set the locations 5-10 meters (roughly 15-30 feet) back from the stream bank edge to avoid complications resulting from bank erosion or high water.
5. Record GPS coordinates for each permanent photo point location.
6. If possible, place a second stake or post in the center of the photo area, perhaps 5-10 meters (15-30 feet) from the photo point. Here, place a one-meter board (Figure 5) to give scale to the photo. This narrow board, which measures one meter in ten decimeter increments, shows scale in photos taken over time. (Also see Hall 2002 Part B Appendix for instructions for making a one-meter board.)

Figure 5. An example of a photo point with a one-meter board and photo label in view (Hugh Barrett).

Taking Initial Photos

It is best to take photos early in the morning, late in the afternoon, or on slightly overcast days when the sun is less intense. This eliminates dark shadows and harsh glare in the photos. Avoid taking photos when visibility is poor (due to low light, fog, or heavy rain, for example) or when snow on the ground obscures the habitat changes. Take photos with the sun at your back.

1. Choose camera settings that give the greatest depth of field. If the camera has interchangeable lenses, select the lens that will best capture what you are monitoring.
2. Document the type of camera and lens you use and whether you hold the camera vertically or horizontally.
3. Fill out a photo identification label (Appendix D) and place it on a clipboard in an upright position so that it appears in either corner of the photo's foreground. Make sure the photo label is in the field of view before taking the photo.
4. Hold the camera at eye level, positioning it so that the one-meter board is centered in the middle of the photo. Try to include some skyline in the photo to help establish the scale of the area being photographed (Figure 5).
5. Measure the height of the camera, the compass direction of the photo, and the distance from the camera to the one-meter board or center of the photo area.
6. Record this information on the data sheet.

Taking Subsequent Photos

Usually, subsequent photos should be taken during the same season or month as the initial photos taken at the time of project implementation. Depending on the project, however, that time of year may not be the best for subsequent monitoring photos. Consider what time of year allows you to demonstrate the focus of your monitoring. If you decide to change the season, begin taking monitoring photos in the appropriate season of the first year and maintain the new schedule for the remainder of the monitoring period.

The restoration objectives and subsequent photo point monitoring goals of some projects need to be captured by annual photos, while other monitoring objectives are met through photo points taken during more than one season. Vegetation growth, for example, should be demonstrated through photos taken during the same season each year. To show the cause and impact of high water events on a streambank, photos should be taken during two different seasons to show both the cause of the problem (high winter flows) and the resulting impact on the streambank which would be most visible during low summer flows. It is important to always align your restoration and monitoring objectives prior to initiating a photo point monitoring schedule, to ensure that all your objectives are being met.

Thorough documentation of photo point locations at the time of initial setup makes them easy to find upon returning to the project site to take repeat photos. Before returning to the field, copy all photo point information, including maps, data sheets, and previous photos. Take this material on each visit to the project site (Hall 2002, Gerstein and Kocher 2005). The maps and directions on the data sheets will help you locate the permanent photo point sites. The previous photos can frame the new photos. Match the framing closely so that the new photos will be as similar to the earlier photos as possible. With a digital camera, it is useful to view the previous photo on the LCD screen to help frame the new photo (Gerstein and Kocher 2005). Remember to use the same lens as the one used in the initial photo. In addition, the distance from the camera to the center of the photo area must be the same as in the initial photo.

Labeling Photos

It is important to clearly label photos immediately after returning from the field. Label all photos with the project name, date, time, and photo point number (Appendix D). Use a fine Sharpie marker to write the information as legibly as possible on the back of the photo or on the mount of the slide. Digital photos should be saved with file names providing the same information.

Submitting Photos to OWEB

OWEB requires a sampling of photos from permanent photo points in the Project Completion Report and in subsequent Post-implementation Status Reports. Submit photos in color via hard copy (as part of the reports) and in digital form on a CD. Be sure to label all photos, and only submit photos that are relevant.

Conclusion

Photo point monitoring is an effective tool for measuring qualitative visual change resulting from restoration projects. Properly establishing and marking the permanent photo points requires time and effort, but keeping detailed initial records and following protocol with each monitoring site visit will make subsequent visits easier.

For more information or help with photo point monitoring, please consult the referenced articles or contact either your local OWEB Regional Program Representative or the OWEB Monitoring and Reporting Section.

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Appendices

Appendix A. Equipment List

- ☐ Maps
    - USGS quad showing Township-Range-Section of project location and surrounding area
    - Close-up, detailed topo map to show photo point locations
- ☐ Aerial photographs (optional)
- ☐ Photo identification labels
- ☐ Data sheets:
    - Photo Point Monitoring Record
    - Photo Point Site Description and Location
- ☐ Clipboard
- ☐ Compass
- ☐ Camera case
- ☐ Camera, 35 mm or digital
- ☐ If using film camera, color film
- ☐ Camera tripod
- ☐ Stakes (2 for each photo point), 3 to 4 feet high
- ☐ Hammer or post driver
- ☐ One-meter board
- ☐ Measuring tape
- ☐ GPS (optional)

Appendix B. Guidelines for Specific Types of Photo Point Monitoring

Riparian Habitat Improvement Projects		
Restoration Action	**Photo Type**	**What to Photograph**
Livestock fencing	Feature	Pre-project photos should capture representative streambank profiles prior to fencing. Post-project photos should show fencing, changes in vegetation, and streambank erosion.
Riparian planting	Feature	Pre-project photos should capture future planting location before site preparation. After planting, take photos showing changes in vegetation structure.
Non-native plant management	Landscape	Pre-project, photograph area to be treated. Make sure to capture enough in the photos so that you will be able to detect changes in the vegetation in the post-project photos.

Upland Habitat Improvement Projects		
Restoration Action	**Photo Type**	**What to Photograph**
Juniper management	Landscape	Pre-project photos should capture areas where juniper treatment will occur. Include ground so that vegetation reestablishment and reduction of sediment loss can be captured in post-project photos.
Non-native plant management	Landscape	Pre-project, photograph area to be treated. Make sure to capture enough in the pre-project photos so that you will be able to detect changes in the post-project photos.
Grazing management	Landscape	Photograph area prior to change in use and implementation of grazing management, and photograph again in following years.

Road Projects		
Restoration Action	**Photo Type**	**What to Photograph**
Road decommissioning	Landscape	Pre- and post-project photos should capture the area of road to be decommissioned and the surrounding area to be restored.
Road reconstruction	Landscape	Pre- and post-project photos should capture the area of road to be upgraded and the surrounding damaged habitat.

Water Management Projects		
Restoration Action	**Photo Type**	**What to Photograph**
Irrigation system improvement	Feature	Pre-project, photograph old structures and intended location of new structures. Post-project, take photos showing restoration and demonstrating that structures are still operational.
Instream flow protection	Feature	Photograph stream reach before project implementation. Take monitoring photos at weirs or other specific points.

Wetland Habitat Projects		
Restoration Action	**Photo Type**	**What to Photograph**
Non-native plant management	Landscape	Photograph area to be treated. Make sure to capture enough in the photos so that you will be able to detect changes in the post-project photos.
Planting	Feature	Pre-project photos should capture the future planting location before site preparation. After planting, take photos that show changes in the vegetation structure.
Reestablishment of wetland hydrology	Landscape	Photograph area where hydrology will be restored. Make sure to take post-project photos during the appropriate season so changes will be visible.

Instream Habitat Projects		
Restoration Action	**Photo Type**	**What to Photograph**
Bank stabilization	Feature	Take pre- and post-project photos from the opposite bank and from mid-channel, looking across stream to future treatment location.
Boulder/LWD placement	Feature	Take pre- and post-project photos from mid-channel looking upstream and downstream from each structure location. Take more photos from either bank looking down on structure.
Weirs/grade control	Feature	Take pre- and post-project photos from mid-channel looking upstream and downstream from each structure location. Take more photos from either bank looking down on structure.

Fish Passage Improvement Projects		
Restoration Action	**Photo Type**	**What to Photograph**
Installation of fish passage structure	Feature	Pre-project, photograph area where structure will be installed. After implementation, photograph the functioning structure.
Culvert removal/ replacement	Feature	Take pre- and post-project photos directly upstream and downstream of culvert showing either existing impassable culvert or location of new culvert. Take more photos from either bank looking down on structure.
Stream crossing removal	Feature	Take pre- and post-project photos showing the crossing to be removed from upstream, downstream, and above.
Push-up dam removal	Feature	Pre-project, photograph the structure blocking fish passage and the available habitat above the barrier. Post-project, take photos showing that the area now passes fish.

Appendix C. Sample Photo Point Monitoring Record Data Sheets

Monitoring Site Location (indicate on map):_____

	Compass Heading	GPS Location	Location Description
Witness Point			
Photo Point 1			
Photo Point 2			
Photo Point 3			

Witness and Photo Point Map

Photograph Record

Date/ Time	Photographer	Photo point #	Camera/Lens/ Film speed	Roll #/ Frame #	Camera Height	Observations

(after Lewis, Tate, and Harper 2000)

Photo Point Site Description and Location

Date (MM/DD/YY)_____ Time_____ Observers_____
Project Name_____ Project ID #_____
USGS Quad Map_____
Location: T_____ R_____ Sec_____
Drainage_____ Stream / Road_____
Location Description_____
_____
No. of Camera Locations_____ No. of Photo Points_____
Photo Purpose_____
_____

Map

(after Hall 2001)

Appendix D. Sample Photo Identification Label

DATE _____

TIME _____

PHOTO POINT # _____

PROJECT # _____

PROJECT NAME _____

REPORT # _____

PHOTOGRAPHER _____

VIEW (E,W,N,S) _____

AZIMUTH-COMPASS READING_____

Create a label with this information on it. The label should be large enough to be readable in the photograph.