

4. Photo Stations

Purpose

Maintaining a standardized photo/video monitoring record of stream barrier removal projects can serve multiple purposes, from tracking the visual changes of a site over time to satisfying grant and regulatory requirements. Photographs used for stream restoration monitoring can capture various physical and biological conditions such as changes in riparian vegetation or changes in channel features. Photographic images of pre-and post-restoration conditions can showcase project successes and can be used to promote future restoration projects. This section describes how to conduct standardized photo monitoring specific to stream barrier removal projects in the Gulf of Maine watershed.

Monitoring Design

A critical component of photo monitoring is ensuring that key landscape features are represented at a scale and resolution that is legible and reproducible. Another critical component and perhaps the most complicated aspect of this relatively simple monitoring procedure is being able to locate each photo station over multiple years and reproduce the same vantage point. Detailed documentation is essential to capturing adequate information for resurveying each photo station.

Sampling Protocol

The length of time required to complete photo monitoring will depend upon the size of the site and the

Minimum Equipment

- ☐ Digital camera (preferred specifications: optical zoom, video function, >3 megapixel resolution)
- ☐ Extra batteries (digital-camera grade)
- ☐ Compass with degrees
- ☐ Site plans, topo maps, aerial photos
- ☐ Timepiece
- ☐ Field notebook or sketch pad
- ☐ Pencils and pens
- ☐ Data sheets (see Appendix E)
- ☐ Tape measure
- ☐ GPS unit (optional)
- ☐ Monumenting material: stakes, rebar, hammer, flagging (optional)
- ☐ Stadia rod (optional)
- ☐ Chalk board/white board (optional)

scale of monitoring efforts. For quality assurance, photo monitoring is best accomplished with two people. A field partner, equipped with a stadia rod and whiteboard can provide scale to a photograph and convey critical site information. Prior to establishing photo stations in the field, you should chart out potential stations on a site plan, topographic plan, or aerial photo. Ideally this plan should include cross-sections and physical features of your site. Before permanent photo

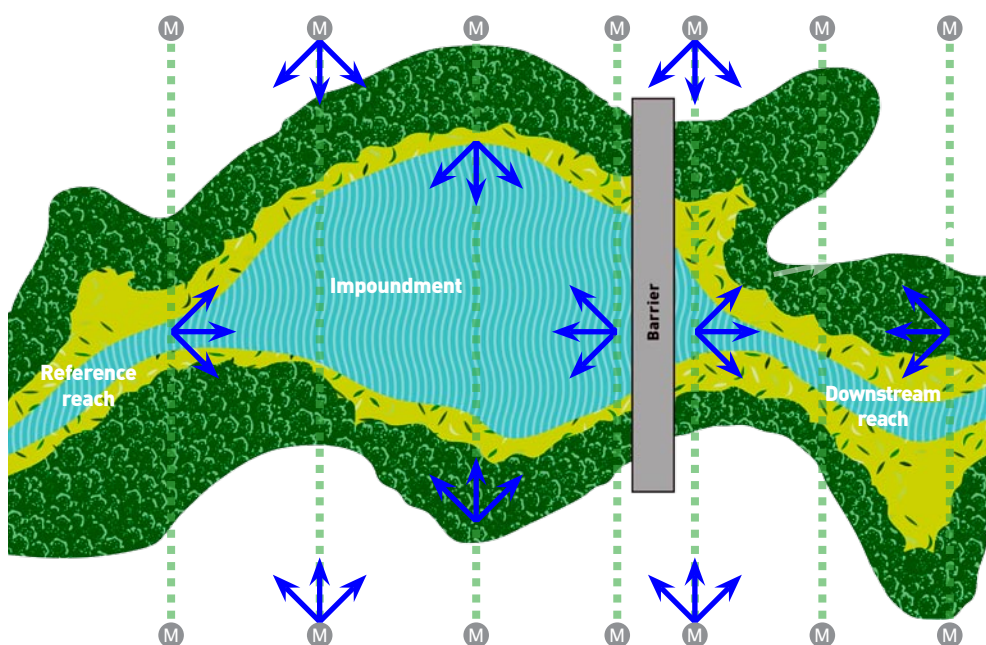


Figure 6.

Establish photo stations along monumented channel cross sections. Photo stations should be described as distances from monumented cross-section endpoints or other permanent landmarks. A compass bearing of the direction of each photo should also be recorded. The number and location of photo stations will depend on site-specific conditions. Figure not to scale.

Monument **M**
 Cross-section 
 Photo view 

stations are established, a brief reconnaissance of the site should be conducted to confirm the suitability of predetermined sites.

Locations of photo stations should be described as distances and/or bearings from other known points such as cross-section endpoints or other permanent landmarks. Geographic context of each photo should, at minimum, include: left bank, right bank, upstream, downstream (left and right bank determinations are made facing downstream). Photo station locations should be selected to take advantage of complimentary light, include long-term reference points (buildings or permanent landscape features), and be easily accessible for post-restoration monitoring. Once permanent stations are decided upon, these locations should be monumented with staking, if possible. Flagging can also be used but should be considered a temporary means to mark a photo station. Date-stamping digital photographs can be helpful, but it can be problematic if the date stamp obscures important parts of the image.

The following views are recommended:

- Upstream and downstream view of the barrier.
- Upstream and downstream view from the barrier.
- Across the barrier from left bank to right bank and vice versa.
- Across and along monumented cross-sections from both cross-sectional end points, including floodplain and riparian wetlands.
- Along the longitudinal profile.

Special emphasis should be paid to the following:

- Ecosystem features such as wetland plant communities, floodplains, riparian vegetation, streambanks, meanders, depositional/erosional features, flow-diverting structures, riffles, pools, and large woody debris.
- Events such as barrier removal, high-water conditions, low-flow conditions, and any other noteworthy natural or anthropogenic events.

Sampling Frequency

At a minimum, pre-and post-project photo monitoring is needed to create a valuable image record. The best

time to take pre-restoration photos or videos is during leaf-out so landscape features and physical structures are clearly visible, unless the goal of the photo and video record is to document vegetation changes. In that case, specific emphasis should be on the flowering periods of signature riparian plants. We recommend that pre-restoration photo monitoring include both leaf out and full vegetation in the year preceding restoration. Post-restoration photo monitoring is recommended for 1, 2, and 5 years after the restoration project (Table 4). Photo monitoring during construction is equally important as pre-and post-restoration monitoring and can be used to capture short-term changes in ecosystem conditions; inform the efficacy of implementation techniques; confirm implementation success; and support as-built design plans.

Site-specific Considerations

The scale of the project will dictate how photo monitoring is done. For example, it may be difficult to portray adequately a large impoundment with normal photography, in which case aerial photography should be considered. Aerial photography can be used to determine landscape feature changes such as large-scale changes in impoundment area, stream-course narrowing, thalweg configuration, and large-scale vegetation changes. Historical aerial photographs can illuminate important landscape changes, which is particularly useful for informing pre-restoration decisions.

Analysis and Calculations

Appropriate documentation and organization is necessary to store and properly manage digital photos. The photo log form should be filled out if any photos are taken (see Appendix E). Each photo station should be marked on a plan or sketch with arrows indicating direction or compass bearing of the photo (Figure 6). Once uploaded, picture files should be properly labeled and stored in appropriate folders labeled by site name and date. Metadata should be stored with pictures.

Additional Information

These methods for photo monitoring of stream barrier removal monitoring projects were informed by Collins (2003), Landry (2002), and Hall (2002).

Table 4. Recommended photo-monitoring timeline for stream barrier removal projects.

Project phase	Pre-restoration		Restoration	Post-restoration					
Year	-1		0	1		2		5	
Timing of photo monitoring	Full vegetation	Leaf out	Multiple times throughout	Full vegetation	Leaf out	Full vegetation	Leaf out	Full vegetation	Leaf out