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Appendix G. Trail Monitoring

Trail projects should be planned, designed, constructed, and managed to meet user expectations while minimizing impacts to natural and cultural resources. Projects may include small or large reroutes, reconstruction, installation of drainage structures, retaining structures, or bridges, or experimenting with new trail construction designs and materials. The purpose of a project might be providing new trail opportunities, addressing poorly performing existing trails, or accommodating a change in use on a trail.

More often than not, trail managers don't evaluate how a project performs over time. Most projects perform as designed directly after completion, but the true test is how they are performing over an extended period of time. Only by instituting a long-term monitoring program can you be certain that trail design, construction, maintenance, and management methods are performing as intended. Information obtained from trail monitoring can then be used to identify trail performance issues and their causes, which can then be used to adapt trail design, construction, management, and/or maintenance methods. This adaptive method is used to correct problems with the current trail(s) being monitored and eliminate similar problems on future trail projects. Ideally this process continues until all sustainability issues are addressed and only cyclical maintenance and replacement of structures exceeding their lifespan are required. Trail monitoring may also be required to meet requirements of the project's associated environmental document and/or permits.

Trail monitoring should document the physical changes that occur to a specific location on a trail over a specified time period. The number of locations to be monitored and the specified time interval between monitoring events will vary based on the monitoring goals and objectives of the project. A baseline point in time is established to start the monitoring process and from which all other future evaluations are compared. A baseline can be established directly after project completion or as appropriate to the monitoring program. The type of monitoring performed (e.g. trail use, trailway performance, trail structure performance) will be project- and goal-specific.

The trail monitoring options described in this appendix are not intended to be applied to the entire trail system, but to specific projects on a trail. Often the easiest way to accomplish long term monitoring is to integrate it into the annual conditions assessment. In other cases, a separate monitoring program needs to be established. This appendix provides a basic framework for trail project monitoring, which can be adapted to meet individual project needs. It contains four monitoring forms, Trail Use, Photo Point, Trailway, and Structures, which can be used individually or in conjunction with each other to meet monitoring goals and objectives.

The goal of the monitoring process outlined in this appendix is to evaluate the environmental sustainability of trail projects and does not include evaluations of social sustainability (e.g. desired user experience) or economic sustainability (e.g. cost of trail maintenance). The monitoring forms in this appendix are intended for field staff to use

in assessing and identifying physical changes to trails. They are not intended to be used in performing rigorous experimental or scientific research where all project variables are accounted for and the collected data is processed using statistical analysis. Monitoring methods for statistical analysis or social and economic sustainability need to be developed, if required.

[Download the Trail Monitoring Form Instructions](#)

G.1. Photo Point Monitoring Form

Photo point monitoring can be one of the simplest ways of documenting change over a period of time through visual analysis. Designate trail locations or features within a trail project to be photographed for the purpose of documenting their condition after construction or other specified baseline date. The photographic process needs to be repeatable, simple, and quick.

Establish photo locations (points) using a steel or wooden stake, a 2 to 5 pound hammer, a compass, and a hand held GPS unit.

The best photo point will be a location that:

1. Captures the entire area to be evaluated.
2. Is easy to find and safe to stand in when photos are taken.
3. Will capture any changes that occur to the trail surface or structure that being monitored.
4. Will provide the best lighting at various times of the year.
5. Allows for a stake to be driven into the ground out of the normal traffic flow.

Once the photo point is located, mark it by driving a stake into the ground. If possible, record a GPS reading of the location. A GPS-enabled camera or cell phone may be used in place of recording a point with a GPS unit. Often these cameras can also record the direction the photo was taken.

If the direction from which the photo is taken is not otherwise recorded, then a compass reading of the direction, from the stake to the photographed element, is taken and recorded on the form. If a prominent feature is observed in the foreground or background of the photo, document and use it as a future reference point. Use a digital camera or cell phone to photograph the trail location or feature that requires monitoring. Capture the entire location or feature in one shot to reduce the number of photographs required and simplify the documentation process. In some cases, multiple photos may be necessary to capture the issues and causes being evaluated. Make sure the same camera and lens setting are used throughout the monitoring period. Establish an electronic folder for photos from each trail location or feature being monitored and document the location of the folder on the form.

A photo description and narrative of changes in condition and potential causes of the change should be noted in the “Photo Description and Comments” portion of the form.

[Download the Photo Point Monitoring Form](#)

G.2. Trail Use Monitoring Form

In most cases, trail use information such as allowed uses (e.g. hike, bike, or equestrian) and quantity of use will be important information to gather for monitoring purposes. The type and amount of use can affect wear and tear on the trail, safety, and user experience. The Trail Use Form can be used to document the types and quantity of use over time.

[Download the Trail Use Monitoring Form](#)

G.3. Trailway Monitoring Form

The Trailway Form can be used when a more detailed evaluation of trail performance is required. Designated locations within the trailway (i.e., the outer limits of the trail, extending 2 feet beyond the top of the cutbank and 2 feet beyond the outboard hinge) are identified and monitored. The form lists a number of trail conditions within the trailway to be evaluated (e.g. trail cross slope, entrenchment depth, berm height) for each monitoring location along the trail. In addition, if changes are noted in these trail conditions, then the possible cause of that change should be documented. If necessary, these trail conditions can be modified, added to, or reduced, or the quantification method can be altered to meet project needs (e.g., instead of a “yes” or “no” answer to cutbank stability it can be quantified as cubic feet of cutbank material deposited on the trailbed).

Photos of the evaluation location can be taken with associated photo numbers documented on the form. Photo numbers can correspond to photos taken in conjunction with the Photo Point Monitoring Form, as needed.

[Download the Trailway Monitoring Form](#)

G.4. Trail Structures Monitoring Form

The Structures Form is used to monitor the condition of trail structures. Some projects may have limited or no trail structures, while others may contain multiple trail structures critical to the long-term stability of the project. This form allows for the input of the structure type being evaluated followed by the anticipated lifespan of the structure and potential causes of observed problems.

The anticipated lifespan category is separated into a “baseline” category and a “current” category. The “baseline” category is an estimated lifespan of the structure evaluated from its initial construction date (if known) or an estimated construction date if no

records exist. The “current” category is an estimate of the remaining lifespan of the structure during the most current evaluation. The lifespan estimate should be conducted by experienced trail professions, engineers, or architects who are familiar with local climate and geologic conditions, have previously evaluated wear and tear of materials in the area, and are knowledgeable in trail structure design and construction. To determine if the trail structure is in accordance with its anticipated lifespan, a simple calculation is performed. The years the structure has been in existence is added to the estimated time it has left based on its current condition. That total is then subtracted from the structure’s baseline life estimate to determine if the structure is meeting, exceeding, or less than the baseline estimated lifespan. If the structure is not meeting its estimated lifespan, the potential cause(s) of this underperformance should be noted.

Photos of the monitoring location can be taken with associated photo numbers documented on the form. These photo numbers can correspond to photos taken in conjunction with the Photo Point Monitoring Form as needed.

[Download the Trail Structures Monitoring Form](#)