

Glacier NP Undertakes Revegetation Monitoring

By Kristin Vanderbilt

Visitor impacts, facility maintenance, and road reconstruction in Glacier National Park present a continuously recurring problem of disturbed lands and the need for effective revegetation procedures. While roadcuts covered with native grasses and forbs point to some of Glacier's successes, areas of high exotic species density or bare slopes suggest that revegetation treatments were inadequate, or that it may be impossible to re-establish a native community on all disturbed sites.

In 1992, Glacier NP began a monitoring program to record the status of revegetated sites in order to evaluate possible sources of failure. Monitors describe target plant communities for project locations, against which overall revegetation success may be measured. Program objectives are to improve the methods and learn the limits of what revegetation can accomplish, so that realistic restoration goals may be established.

The monitoring program includes (1) a pre-disturbance visit to describe the site and establish goals in terms of a reasonable target community, and (2) periodic monitoring of revegetated areas to judge how well the seeded and planted species are faring and how satisfactorily long-term goals are being met.

Site Analysis

Effective revegetation efforts begin with thorough site evaluations. The monitoring program's Site Analysis procedure, loosely based on Forest Service ECODATA (Jensen et al, 1992) ocular plot methodology, provides a systematic framework for recording soils, microclimate, animal use, vegetation structure, and species canopy cover information relevant to revegetation needs.

Data on these characteristics are taken from a representative plot. Based on what vegetation is on the site, what grows nearby, and the management plan for the area, a target community is suggested. For example, a deleted roadside turnout in a lodgepole forest, which will be mowed yearly, may be targeted for the understory lodgepole low shrub and herbaceous community. Two site analyses frequently are conducted, one to describe the disturbed site to be revegetated, the other to describe an undisturbed plot that represents the target community.

Once goals for the area have been set, the site analysis involves making recommendations for plant material use, fertilizer application, mulch, plant salvage, and soil salvage. The site analysis procedure is structured to record current site and plant community conditions, set revegetation goals, and guide efforts to meet those goals.

Various staff members who conducted site analyses during the summer of 1993 have found this a valuable planning tool. The detailed record of species and their abundance in the target community is useful when seed mixes are prepared and nursery stock needs estimated. Soils and microsite information may suggest special planting and watering requirements, which are figured in during the planning process. The value of the site analysis will be realized fully many years down the road, when it will serve as a reference for determining how closely the product of revegetation and succession resembles the target community.

Revegetation Monitoring

Monitoring procedures utilize both microplot and ocular survey methods, and involve recording many of the same plot characteristics that site analysis does: Ground cover, species cover, erosion status, vegetation structure, and disturbance history. In the long-term, these data will allow successional trends to be followed to determine the time-frame in which components of target communities establish, or to reveal that the target community was not a reasonable goal for the area, given our methods. In the short-term, by systematically revisiting monitoring sites and recording, for example, exotic species presence, germination of seeded species, and vigor of planted shrubs, we will be able to identify areas where we need to improve our techniques.

Four monitoring schemes of increasing complexity have been devised, suited to different needs. The intensity of monitoring

required for each area depends on the revegetation measures applied, site location, and likelihood of the site's being problematic due to factors such as continued disturbance, poor soil, or slope.

A backcountry campsite that has been blocked off, seeded, and mulched is appropriate for very basic Level I monitoring. The questions of interest here, rapidity of site recovery and exotic presence, are addressed readily by ocular plot estimates of ground cover and canopy cover of trees, shrubs, herbaceous species, and noxious weeds. No specific data about revegetation species are collected. This rapid site assessment is intended to flag any area that needs remedial action due to exotic encroachment, erosion, or continued disturbance.

Level II monitoring is the backbone of Glacier's program and has been used extensively. In addition to making a general evaluation of soil surface status and total vegetation cover, the monitor makes species lists of at least the dominant exotic and native species present. Mortality, growth, and vigor of planted shrubs and forbs is quantified, as are cover, density, and reproductive status of seeded species. This level addresses success of revegetation measures and may prompt changes in procedure. For example, numerous exotic species were recorded in monitoring plots on imported soil used at a construction site, while salvaged soil in the same area had very low exotic cover. These observations suggest the use of unpasteurized imported topsoil is questionable.

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Rachel Potter, Biological Technician, collects microplot data from a roadside revegetation site.



A Level III monitoring procedure involves establishment of permanent microplot and shrub transects to collect data suitable for statistical analysis. This level has been utilized in deleted turnouts along the Lake McDonald section of Going-to-the-Sun Road, where half of each turnout was seeded and half was not. Data will be analyzed for (1) establishment and growth of seeded species, (2) relationships between native species seeding and exotic species cover, and (3) survival and growth of nursery stock (Potter, 1992).

In some circumstances, a Level IV experiment may be appropriate to evaluate effectiveness of various combinations of revegetation treatments. Two Dog Flats grassland in the St. Mary valley was disturbed by road construction in 1992, and the most effective means for restoring native vegetation along the roadside, while discouraging exotic establishment, was not known. A study presently is underway to evaluate the effects of (1) the slope-stabilizing nurse crop Re-green (a sterile wheat hybrid), (2) herbicide application, and (3) seeding of native species on the establishment of native and exotic vegetation.

This study is a collaborative effort between Dr. Rob Tyser of U/WI-LaCrosse and the park's reveg staff. Level IV monitoring methods are not standardized, but in this case rely on canopy cover data from randomly located microplots. Another Level IV study, investigating various mulches, is anticipated.

Management Implications

Although the monitoring program in Glacier is still in its infancy, the results of the first full season's monitoring efforts are promising. In the past, target communities have not been described in detail for use by park reveg planners. Resource managers' ideas and notes about the success of reveg treatments in various sites have not been recorded systematically.

This monitoring strategy compiles all data about the site, from both site analyses and post-reveg monitoring, into one computer database. Computer programs are being developed to facilitate rapid report generation. Years of records will indicate how long it takes for a revegetated site to begin to resemble the target community, or will reveal that our goals are not realistic. Data review

with respect to reveg practices (species selection, mulch use, topsoil application, time of seeding) may prompt us to change our methods.

Glacier NP is trying to get away from practices that merely "patch up" disturbed areas and make them green again. By adding this dimension to our revegetation program, we hope to learn to fine-tune our methods and thus come closer to approximating the original pre-disturbance community.

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References

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