

Historic Landscape Restoration: Views From 3 Angles

Editor's Note: The following three "generic" looks: sprang from a November 1987 Arid Vegetation Workshop held at Whitman Mission National Historic Site in Walla

Walla, Wash., and attended by scientists and resource managers from the NPS Pacific Northwest Region.

By L.L. and P.A. Larson

The process of revegetating land is both a science and an art. The role of science in revegetation is to provide technical knowledge that will assist the land manager in the achievement of a specific goal. Art represents the skill with which this knowledge is implemented in the revegetation process. The purpose of this article is to provide a technical perspective of the blend of science and art by the land manager during the development of a revegetation plan, the selection of species for a revegetation project, and the integration of revegetation techniques.

What is a Revegetation Plan?

A revegetation plan represents the framework that the land manager follows during the implementation stage of a revegetation project. It is defined by an interactive process that incorporates three basic steps. First, the plan must have an objective. In the case of most National Historic Sites the objective will be defined in terms of an historic time period, an appearance, and a desired species composition. Secondly the plan must contain a technical assessment of the revegetation potential for the landscape. Landscapes that have been subjected to soil erosion, farming, weed invasion, etc., clearly represent different technical problems than do areas that are in an undisturbed condition. Finally, information derived from steps one and two must be combined, using the technical knowledge and skill of the land manager to form realistic goals with acceptable levels of cost and risk.

Species Selection

The selection of species for the revegetation project has a long-term influence on the success or failure of the project. Ideally the land manager would like to replace the existing vegetation on the park with the native species that occurred at the time of the historic event. However, this may not be an appropriate decision due to ecological as well as logistical limitations.

The ecological condition of a site will determine whether native species should or should not be reintroduced. The land manager must assess the ecological implications of the following questions: 1) Do introduced species currently occupy the historic site? 2) If so, should they be eliminated from the site or are they an important part of the ecosystem? and 3) Can native species compete effectively with the introduced species given the ecological potential and land use of the site?

If introduced species are accepted as part of the ecosystem and are out-competing native species, then species selection for revegetation should emphasize the structure and function of the original plant community rather than restricting the selection to native species. Such a selection will likely result in a mixture of native and introduced species, while maintaining the appearance of the historic vegetation.

The physical and ecological attributes of the selected plant species should be capable of utilizing the resources of the ecosystem to the extent that non-desirable plant species are controlled or eliminated. The species must be suited for the uses that will occur on the land in the future and provide the appearance of the vegetation of the desired time period. The

species must be suited to the climatic extremes of the area as well as the more typical growing conditions. Selecting species for these attributes will emphasize community stability and will minimize the need to maintain the community artificially.

The logistical limitation associated with species selection is reflected in the location and availability of plant materials. Basically, two sources of plant materials are available to a land manager. The first involves harvesting seeds from the native plants in the area and replanting them in the area to be revegetated. This method insures that the seeds are from plants adapted to the site, but the method is labor intensive and expensive. The harvest of native seed is viable only during years of good seed production, which may occur once in five or more years. In addition native seed, even in a good year, typically will have lower quantity and quality yield than seed from commercial seed sources. Consequently the use of locally harvested native seed limits the size of the area that can be revegetated annually and increases the risk of seeding failure.

The second source is commercial plant material. This means you are purchasing a plant species strain that has been developed for commercial seed production. These species are developed through a selection process that improves seed production, seed germination, seedling vigor, site adaptation, and in many cases forage production. However, species availability through this source is dependent upon previous commercial development, which historically has favored introduced species over native plants. The number of native species available through commercial seed sources is increasing, but the volume is limited and the cost is high.

The skill with which the land manager integrates the desire to plant native species, the ecological limitation of the site, logistical limitations of seed sources, and a limited budget is critical to the success of the revegetation project. These decisions influence the short-term risk of seeding failure and the long-term

likelihood of encroachment by undesirable plant species.

Integration of Revegetation Techniques

Given the fact that most revegetation projects are on limited budgets, it becomes important to minimize the likelihood of seeding failure. The most common reason for seeding failure is inadequate seedbed preparation and competition with undesirable vegetation. A number of factors that lead to seeding failure can be reduced, if not totally controlled, through revegetation techniques. The principal drawback of using these techniques is that seedbed control will usually mean the use of drill rows, herbicides, and tillage. However a skilled land manager can mitigate the physical appearance of drill rows and minimize the need for herbicides by establishing a base vegetation first and then modifying its appearance to achieve the desired pattern and structure of the historic vegetation.

Decisions relating to seedbed preparation and weed control require technical knowledge of the seedbed requirements of the selected species and their ability to compete with specific weed species. Short cuts and the failure to apply technical knowledge in a skillful manner is a prescription for seeding failure.

Conclusions

The lesson in the previous sections is that there are no easy solutions to the problem of revegetating a National Historic Site. Indeed every decision taken by a land manager has a cost and risk associated with it, and most decisions will represent a compromise between ideal solutions, technology, and budgetary restrictions.

Perhaps the most important aspect to this problem is the recognition that we are managing an ecosystem and, by definition, this means seeking a balance between its component parts of climate, topography, soil, and the plant and animal populations. When an



Power seeder by John Deere, designed to drill and plant seeds at least 1/4 to one inch underground, is shown here mounted on a flatbed truck. The power seeder, pulled by a tractor, is capable of precise placement of seeds — where you want them and out of the sight of feeding birds.



Dr. Larry Larson describes revegetation strategy to a workshop group of Pacific Northwest Region scientists and resource management specialists.



Reed canary grass, a better competitor than the original rye grass, stands shoulder tall in the reseeded fields of Whitman Mission. While not being the perfect restoration, reed canary grass comes close to establishing the look and feel of the old rye grass meadows that once surrounded Whitman Mission.



Untreated field at Whitman Mission is 80 percent covered by non native species such as pigweed, introduced via hay bales that were used as supplemental feed for cattle. Farming and grazing had occurred over the years on this site.

ecosystem is in a deteriorated condition it may no longer have the potential to support the historic native vegetation. For example, an historic site that contained a wet meadow may not currently be able to support that type of vegetation due to changes in the water table, loss of the upper soil horizons, or the introduction of a highly competitive weed species. Under these conditions the reconstruction of the original ecosystem potential must occur before the historic vegetation can sustain itself over time.

Unfortunately the high cost of ecosystem reconstruction will put ideal solutions beyond the economic reach of many historic sites. In those situations we should strive to achieve a stable ecosystem that has an appearance similar to the historic vegetation. This may mean that the most viable option is to establish introduced species that are ecologically similar to native species. Then, given time, the established vegetation can be modified to include native species and mitigate the aesthetic cost of using revegetation techniques. Revegetation should be viewed as an iterative process whose first objective is to stabilize the ecosystem, subsequent steps are then taken to establish the desired aesthetic qualities of the overall revegetation objective.

L.L. Larson is an Assistant Professor of Rangeland Resources, Oregon State University; P.A. Larson is a Forester at La Grande, Ore.