

Fire Restoration in the Northern Region, USDA Forest Service

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Abstract: Restoring native plant communities is a key objective in the maintenance of healthy ecosystems. Opportunities have increased following recent wildfires. This paper describes the policy and history behind the reforestation and restoration programs in the Northern Region (Region 1) of the USDA Forest Service, which focused primarily on meeting the objectives in the National Fire Plan, Key Point 2, Rehabilitation and Restoration. The discussion continues with an overview of the rehabilitation efforts in response to nearly 13 million ac (5.3 million ha) of National Forest Lands that have burned in the Northern Region since 2000. Both conifer regeneration and the development and implementation of the native plants program are discussed, and project examples are provided.

Keywords: native plants, reforestation, fire restoration

Background and Policy

The Northern Region (Region 1) of the USDA Forest Service established policy in 1994 to promote the use of native plant materials, but it remained a fledgling program with little program funding and lacking broad-scale emphasis until recently. At the National level, draft policy was recently prepared to promote the use of all types of native plants within the Forest Service. Native plant materials should be the first choice in most situations where timely regeneration of native plant communities is not likely to occur. This policy is one of the components in the implementation of the Forest Service priorities to combat invasive species and facilitate wildland restoration efforts.

The wildfires of 2000 prompted a movement toward managing the impact of wildfires on communities and the environment with the National Fire Plan. Key Point 2 of the plan, Rehabilitation and Restoration, focuses on recovery after disturbance and provides emphasis and funding for a variety of activities including forest reforestation, watershed restoration, road and trail rehabilitation, replanting and seeding. Since implementation, it has provided a major boost to the native plants program.

In Region 1, the impact of the 2000 fires was significant, being the largest fire year on Forest Service lands in recent history. Over 700,000 ac (283,000 ha) of National Forest land in Region 1 burned in 2000, affecting a variety of forest and rangeland ecosystems (Figure 1). It was followed in 2003 by wildfires that burned nearly 400,000 ac (162,000 ha). This has expanded our opportunity to utilize the National Fire Plan and the more recent Healthy Forest Initiative to develop a stronger restoration and rehabilitation program.

Conifer Regeneration

The regeneration of forest cover has historically been a large part of fire restoration. Most burned areas naturally regenerate. In some cases, this is a long regeneration period, passing through successional stages of grass and shrub stages on dry ponderosa pine (*Pinus ponderosa*) forest types. In other cases, natural regeneration is quick to establish, as in lodgepole pine

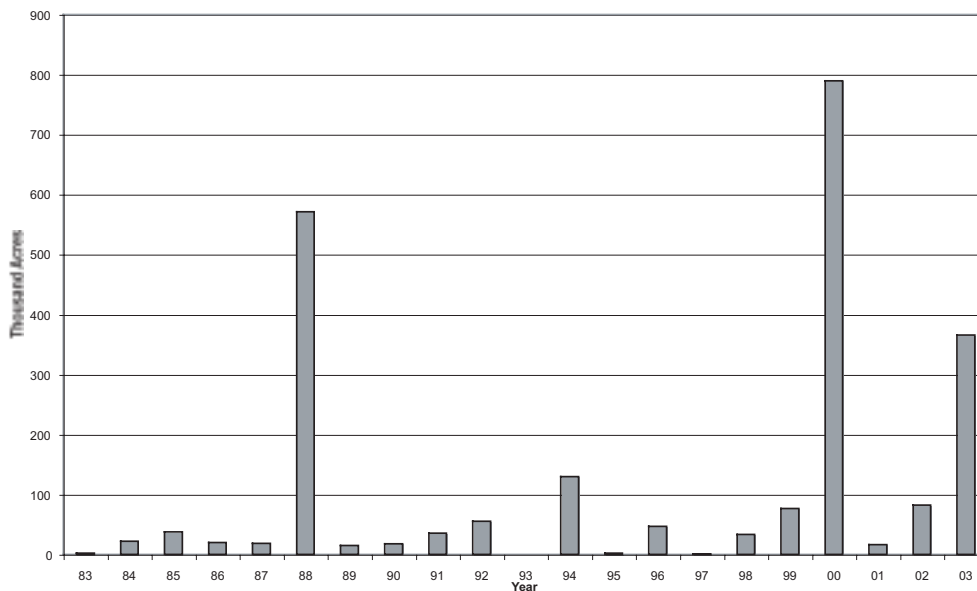


Figure 1—Acres burned by wildfire from 1983 to 2003.

(*P. contorta*) forests. Other portions of the fire areas have high mortality, and forb and shrub reestablishment occurs under the standing dead canopy. A small portion of the fire area is planted to provide rapid tree cover.

Restoring Forest Cover with Planting

Historically, an average of only 10 to 15% of a fire area has been planted. Silviculturists carefully select these areas because they are not predicted to regenerate naturally due to lack of seed source, or will not regenerate to desired seral species. In these cases, it can be said that wildfire has created an opportunity to restore species that, under historic fire regimes, would have dominated the landscape. A good example is in ponderosa pine forests, which have lost dominance to the more shade-tolerant Douglas-fir (*Pseudotsuga menziesii*) in some areas of the Rocky Mountains. The complex of fires in the Bitterroot Valley (Montana) in 2000 created this situation. Planting site-adapted ponderosa pine will restore its dominance on the landscape and can be maintained with management. Another opportunity will be planting rust-resistant western white pine (*Pinus monticola*) following large-scale fires in the moist forests in the western portion of the Region. Recently, large scale fires have not burned in these moist forest types, but fire risk is increasing.

Seed Bank

The ability to respond to restoration opportunities is dependent on having an available seed cache. Prior to the fires of 2000, the Bitterroot National Forest did not anticipate the need for large quantities of ponderosa pine seeds to reforest after a large fire event. Neither the Bitterroot nor adjacent Forests within seed transfer zones had sufficient seeds to produce trees for the acres needing planting. Both 2001 and 2002 proved to be good cone crop years, however, and the needed 1,700 bushels were collected.

This prompted a Regional review of the conifer seed bank to assure adequate seeds were available. The Region has moved from seed zones to genetically based breeding zones for most species. These tend to be larger and cross administrative boundaries. By managing available seeds at the breeding zone level, based on the Forest’s projected needs, we feel we are better prepared to respond to large-scale fire planting while not overburdening the bank with excess seeds.

Progress

Overall, about 85,000 ac (34,400 ha) of planting for post-fire reforestation were identified since 2000. Of this, about 35,000 ac (14,200 ha) were older plantations that were destroyed. To date, about 20,000 ac (8,100 ha) have been planted, and additional trees are ordered for outyear planting. Predicted needs for future planting exceed the predicted funding levels; but we are hopeful that we will receive assistance to meet our needs.

Planting after post-fire salvage harvest is the top priority for planting, followed by destroyed plantations, and finally, unmanaged (uncut) lands. The major species being planted include ponderosa pine, Douglas-fir (on some sites), and small levels of lodgepole pine and Engelmann spruce (*Picea engelmannii*). Western white pine and western larch (*Larix occidentalis*) are priority species also, but the moist forests have not experienced large-scale fire in recent years. Silviculturists select the most suitable planting window and stock type. Spring planting of both bareroot and container stock is most prevalent, with lesser amounts of fall and summer planting of container stock. On cool, higher elevation sites, summer planting of actively growing container stock in early July has proved very successful.

Native Plant Restoration

While conifers surely are native plants, they have been addressed separately due to traditional Forest Service

program and budget practices. This section deals with forbs, shrubs, grasses, and non-traditional conifers (that is, whitebark pine [*Pinus albicaulis*]). The emphasis on the native plant program has increased dramatically under the National Fire Plan Key Point 2. Region 1 has received nearly U.S. \$2 million for assessment work at the Regional level to support the USDA Forest Service Coeur d'Alene Nursery, and for local seed collections, plant propagation, and project implementation on the National Forests.

Most of the wildfire areas heal with natural succession. However, in selected areas, planting and seeding native plant material enhances the natural processes to achieve the desired condition more quickly, and, in some cases, to give native plants competitive advantage over invasive species. The overriding objective of the native plant materials program is to replace the use of non-native plant material with the use of native species. The following sections describe various aspects of the native plant materials program that have been developed with the recent program emphasis.

Identification of Priority Species

Region 1 identified 6 “workhorse” species that have widespread use and function based on candidate species specified by the National Forests in the Region. These species were selected because they are common on the landscape, there was experience in cultivation, and program managers felt there was enough knowledge and experience to succeed with these species. Although there is not exclusive use of these species, identifying priority species has allowed development and genetics work to be more focused and to improve progress.

The workhorse species currently under focused development include: tufted hairgrass (*Deschampsia caespitosa*), blue wildrye (*Elymus glaucus*), Idaho fescue (*Festuca idahoensis*), Sandberg's bluegrass (*Poa secunda*), bluebunch wheatgrass (*Pseudoroegneria spicata*), and yarrow (*Achillea millefolium*).

Plant Development Work

The Region developed an interagency partnership with the Natural Resources Conservation Service (NRCS) Aberdeen Plant Materials Center (PMC) for the development of local seed sources adapted for the Northern Rockies for these workhorse species. Over 50 collections were made from 7 National Forests in Region 1. Field trials at Aberdeen PMC are in progress to evaluate growth characteristics, including performance, seed production, seed yield, germination, and similar qualities. Selected populations will ultimately be used for seed production and made available for district projects.

Regional Grass Seed Cache

The largest use of native plant materials is aerial seeding following wildfires. To encourage the use of native seeds, the Region purchased 14,000 lb (6,350 kg) of native grass seed cultivars from the commercial market. The cache allows the Forests to easily access large quantities of native seeds where previously they would have depended on commercial

mixes. These mixes commonly include non-native species seeds. The 4 cultivars currently available in the seed cache are: mountain brome ‘Garnet’ (*Bromus marginatus*), Idaho fescue ‘Winchester’ (*Festuca idahoensis*), Idaho fescue ‘Nezpurs’ (*Festuca idahoensis*), bluebunch wheatgrass ‘Goldar’ (*Pseudoroegneria spicata*).

This has proved very successful, with most seeds used for emergency rehabilitation after the 2003 wildfires. The Region is making additional purchases to re-supply the cache. The Forest Service is relying on the native seed industry to provide reliable native cultivars to make this program successful. This partnership with the private sector is important because it demonstrates an economic commitment on our part to further the industry through increased demand for products. While seeding with native cultivars in some cases involves using material that is not “local” to the habitats being restored, Region 1 elected to put these cultivars in use as an interim measure while the local sources are being developed, and as a means of promoting a shift from the previous reliance on non-native species.

Forest Service Nursery New Equipment

With National Fire Plan funding, the Forest Service Nursery in Coeur d'Alene purchased equipment particularly necessary for native plant species for seed processing and growing of forbs and shrubs. A new greenhouse was also built. The Nursery can now better process small seeds, conduct more efficient and accurate seed testing, custom mix seeds as per National Forest request, sow, grow, and cut small seed lots of grasses, and grow more greenhouse seedlings.

Whitebark Pine

The National Fire Plan provided a major boost in funding for the initiation of the whitebark pine blister rust resistance program. Whitebark pine typically grows in high-elevation ecosystems where fire exclusion has resulted in advancing succession and a serious decline in whitebark pine. Coupled with the extensive white pine blister rust (*Cronartium ribicola*) infection and mountain pine beetle (*Dendroctonus ponderosae*) mortality, whitebark pine is declining in many areas. This is of particular concern because whitebark pine seeds are a major food source for the endangered grizzly bear, and the species is an important seral component in upper elevation ecosystems.

Current efforts include cone collection from trees expressing rust resistance, and collection of aeciospores to begin the genetic resistance testing. Additional cones have been collected from trees that express resistance, and the seeds grown for restoration outplantings. Although rust resistance is not known, evaluation is an important intermediate step to maintaining this important species in high-elevation forest ecosystems.

Restoration Projects

With the increase in program emphasis, skills, and funding, there is an increasing number of projects to directly restore native plant communities disturbed by recent wildfires. Plant

materials used include grass container plugs, container shrub and herbaceous plants from cuttings and seeds, and bareroot plants (Figure 2). Grass seeds from local collections and from commercially available cultivars appropriate to the site are used for seeding projects. Following are examples of projects implemented to restore native plant communities after wildfires in 2000 through 2003.

Aerial Grass Seeding—The largest restoration activity in terms of acres is aerial grass seeding, which has exceeded 22,000 ac (8,900 ha) since 2000. The emphasis is to shift from the use of non-native species to purely native seed mixes. Seeding is typically part of the emergency burn rehabilitation efforts to provide rapid plant cover for soil stabilization and reduce noxious weed invasion (Figure 3).

Jammer Road Obliteration—Jammer roads resulted from the short line, high-lead logging systems of the 1950s through the 1970s. Fire restoration has provided an opportunity to obliterate these old jammer roads to restore hydrologic function and plant cover. One example is the road rehabilitation on the Bitterroot National Forest (Figure 4). Snowberry (*Symphoricarpos albus*) container seedlings were among the species planted on the roads; the seedlings were cultivated from cuttings collected locally (Figure 2). Ponderosa pine is planted in the harvest area. The entire area was aeri-ally seeded with thickspike wheatgrass (*Elymus*



Figure 2—Handcutting snowberry (*Symphoricarpos albus*) to produce rooted cuttings, Bitterroot NF (photo by Linda Pietarinen).



Figure 3—Aerial seeding native grass species on the Black Mountain Fire, Lolo NF (photo by Andy Kulla).

macrourus) and slender wheatgrass (*Elymus trachycaulus*), which are both native.

Rehabilitation of Access Roads—Much like jammer roads, access roads and skid trails after fire and salvage harvest are being revegetated. On the Bitterroot National Forest, snowberry, bluebunch wheatgrass, kinnickinnick (*Arctostaphylos uva-ursi*), white spirea (*Spiraea betulifolia*), rose (*Rosa* spp.), and ninebark (*Physocarpus malvaceus*) container plants were outplanted (Figure 5). Erosion matting was laid down to hold the soil and plants in place until establishment.

Seeding Along Wilderness Trails—Selected trails in the Bob Marshall Wilderness, on the Flathead National Forest in northwest Montana, were hand-seeded to reduce



Figure 4—Jammer road rehabilitation, Bitterroot NF (photo by Craig Odegard).



Figure 5—Revegetation of access roads, Bitterroot NF (photo by Craig Odegard).

erosion where trail sloughing was anticipated and to reduce noxious weed invasion after the wildfires in 2000 (Figure 6). On a portion of the trail within the Helen/Lewis II Fire area, blue wildrye (*Elymus glaucus*) was hand-seeded; the seed source was about 20 mi (32 km) from the seeding project. Mountain brome (*Bromus marginatus*) was also used on other trails. Monitoring will continue to determine success of seed germination, native plant recolonization, and effectiveness in reducing erosion and invasion by noxious weeds.

Restoration of Helicopter Landings—Helicopter landings and similar created openings are being planted and seeded as part of the emergency rehabilitation efforts. Rabbitbrush (*Chrysothamnus* spp.) grown in containers

was among the desirable species used on the Bitterroot NF due to its suitability on dry harsh sites.

Future Fire Restoration Projects—The work is never done. Six additional projects have been approved for funding for implementation in 2005 and 2006. These include continuation of the whitebark pine blister rust resistance program, restoration of riparian systems, sagebrush communities, grass and forb communities, and additional grass seeding of wilderness trails on Forests throughout Region 1. Depending on the project, the activities may include genetics and development work, seed collection, propagation of small lots, and implementation.

Other Native Plant Restoration Projects—In addition to fire restoration, National Forests have initiated projects for revegetating ski runs, streams impacted by mining, decommissioned roads, steep cut slopes, and many others. As the program develops we expect to see more and larger projects that restore native plant communities. Restoration projects should reach across all resource areas, including road rehabilitation, watershed stabilization, fisheries and wildlife habitat improvement, range restoration, and involvement with the Western Federal Highway Division to establish native plant communities along roadways. The success of the program is dependent on collaboration with government agencies as well as private growers and producers of native plant materials.

Conclusion

The National Forests in Region 1 are responding to the challenge of restoring and reforesting critical plant communities. The increased use of native plant materials, as well as the continued practice of using site-adapted conifers, will enhance the naturally regenerating ecosystems. It is with partners among government agencies and the restoration business that progress is being made toward a more highly developed and proactive native plant materials program. The Forest Service recognizes there must be a long-term commitment to research, development, education, and technology transfer to expand efforts to make native plant materials available. We face challenges, but there is an increased momentum; with the enthusiasm of botanists, ecologists, rangeland management specialists, and foresters, we expect the program to continue and increase.

A



B



C



Figure 6—Grass establishment following seeding of native species in 2000 (A—2000, B—2001, C—2002) in the Bob Marshall Wilderness, Flathead NF (photos by Beth Hodder).