



Figure 2. By extracting 15 cm of soil with the target plant community, over 85% of grasses and broadleaf plants native to intermountain prairies can be saved. A 30-cm wide × 30-cm long × 15-cm deep section of sod, as seen above, can contain a range of 4–20 plant species. Photo by G. Thelen

We have heard of other similar businesses dedicated to plant rescue in areas with high rates of development (e.g., Bozeman MT and Portland OR), but there is still much more available to salvage than what these businesses can handle. Our own small business in Missoula has hardly scratched the surface. Even so, we were able to turn the prospect of plant rescue into a viable business plan with virtually no overhead, since contractors let us remove plants at no cost and because we worked with a nursery that stored and sold the sod. In the early days of Native Yards, then, our main costs included time and transport. We were able to use this primary business model as a springboard to expand the company's mission by adding native plant landscaping and design, research, and natural weed control by hand pulling. The latter has proven to be a surprisingly successful niche market with significant potential, but that is a topic for another Restoration Note.

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A Plan for Landscape Fire Restoration in the Southwestern Borderlands

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Fires were prevalent in the Southwestern Borderlands of Arizona and New Mexico prior to the arrival of European-American settlers in the 1880s. The almost total exclusion of fires for more than 100 years has been linked to declines in biological diversity and a loss of productivity associated with the encroachment of woody vegetation into the grasslands and open woodlands. Private and public land managers agreed that reintroducing fire could improve or reverse these landscape changes. The Coronado National Forest developed the Peloncillo Programmatic Fire Plan after intense consultations with federal, state, and county agencies and the ranching community to reintroduce landscape level prescribed and managed fire into the Peloncillo Mountains (Allen 1999). The final plan helped streamline the management decision and approval processes that previously were delayed by long, complicated, and often contentious discussions. The Plan and the consultation process that led to consensus among diverse partners can serve as a model for the development of programmatic fire plans in other areas.

The Peloncillo Mountains, which are part of Madrean Archipelago or Sky Islands Province and straddle the Arizona–New Mexico border, are noted for their exceptional beauty and biological diversity (Figure 1). Much of the ecological decline is related to severe range deterioration linked to drought and late nineteenth-century overgrazing and to aggressive fire suppression on public lands. Climatic fluctuations, especially precipitation timing and amounts, also affect vegetation dynamics. Even if fires are ignited, they generally do not spread because of the lack of continuous ground cover. However, stand-replacing fires are possible under severe weather and fuels conditions.

Ranchers were concerned that the policy of aggressive fire suppression was overlooking the beneficial effects of fire on ecosystem health and was often an unnecessary and unwanted expense to the public. In 1992, ranchers, other landowners, members of the environmental community, individual federal employees, and other interested people from the area formed the nonprofit Malpai Borderlands Group (MBG) with the goal of restoring and maintaining natural processes that create and protect an unfragmented, healthy landscape to support a diverse community of human, plant, and animal life (McDonald 1995). This area of the Borderlands Region contains a 323,750-ha mixture of private and public lands. At about the same time, the



Figure 1. A typical oak savanna in the Southwestern Borderlands. This stand is on the eastern side of the Peloncillo Mountains in New Mexico with the Animas Mountains in the background. Photo courtesy of Daniel Neary

U.S. Forest Service (USFS) and other agencies reached a similar position on the value of reintroducing fire. In 1995, the Coronado National Forest began modifying its fire management plan in the Peloncillo Mountains from a policy of total suppression to fostering natural fire's role (USFS 2005).

The Malpai Borderlands Group recognized that it could more easily achieve its goals if it developed partnerships with like-minded governmental agencies and the environmental community. In addition to the Forest Service, partners include the USDA Natural Resources Conservation Service (NRCS), the USDI Fish and Wildlife Service (FWS), USDI Bureau of Land Management (BLM), land and natural resource agencies of the states of Arizona and New Mexico, The Nature Conservancy, and others. As a result of the cooperation, several joint fire planning activities for public and private lands were developed (Allen 1999).

An interagency, interdisciplinary team led by the Forest Service began work on the Peloncillo Programmatic Fire Plan in 1997 to address fire management issues on approximately 48,565 ha administered by the Coronado National Forest and the BLM, which had delegated its local fire suppression responsibilities to the Forest Service in 1995 (Allen 1999). The plan attempted to address all of the environmental issues related to a program of prescribed burning and managed wildfires on federal lands in one document so that managers would not have to repeat the process for each prescribed burn. The team proposed actions to address each identified issue, including the impacts on vegetation communities, private lands and improvements, livestock management, grassland productivity, biological diversity, soil and water, air quality, and heritage resources. The team also identified six threatened or endangered species that would require FWS consultations before the program could be initiated.

The interdisciplinary team recognized 91 species of plants and animals that could be affected by the fire program. The main concerns were the threatened New Mexico ridge-nosed rattlesnake (*Crotalus willardi obscurus*), which is rare in the Peloncillo Mountains, and the Palmer agave (*Agave palmeri*), which provides nectar for the endangered lesser long-nosed bat (*Leptonycteris curasoae*). Holycross and his associates (1999) found that a prescribed burn did not result in a statistically significant reduction in the snake population. However, there was concern that prescribed fires in wooded canyons, which are preferred snake habitats and often contain high fuel accumulations, would adversely affect the limited snake population. Research by Slauson and her associates (1999) indicated that a prescribed fire did not result in differences in agave fruit set and overall resources for bats between burned and unburned sites. Discussions with representatives of the NRCS, FWS, USFS Rocky Mountain Research Station, the Arizona Game and Fish Department, and the New Mexico Game and Fish Department resulted in recommendations to conduct cooler burns in critical snake habitats, limit ignitions after rains (when the snakes are most active), and develop protocols on handling snakes found during burning operations. An allowable level of mortality was established for agave that would not negatively impact the bats.

A scoping report was prepared and distributed to 54 individuals and organizations for public comment in 1998; approximately 50 percent responded. In addition, Interdisciplinary Team Leader Larry Allen personally visited each ranch in the planning area and met with each grazing permittee/landowner to discuss plan alternatives. The Hidalgo County New Mexico Planning Group and the MBG also were consulted. While most local ranchers favored allowing an increase in fire frequency in the region, coupled with appropriate controlled burning, there were some who saw fire as a threat to forage availability. Hidalgo County wanted closer collaboration with local landowners and governments. Overall, several new issues emerged and resulted in the development of four alternatives. The final decision consisted of a blend of fire suppression, prescribed burning, and supervised/monitored wildfire as considered appropriate to maximize resource benefits and reduce management costs (USFS 2005). Prescribed fire would be used to augment the natural fire regime and encourage desired vegetation conditions, protect and enhance critical habitats, and protect resources or improvements from natural ignitions. The plan addressed many of the concerns raised by Hidalgo County, including assurances that landowners and local governments would be consulted in suppression decisions. The Peloncillo Fire Management Plan was merged into the Coronado National Forest Land and Resource Management Plan (LRMP) in 2005. This document has been modified since then, but many aspects of the Peloncillo Plan are included in the current LRMP (USFS 2007).

Public and private partners have conducted four landscape-scale prescribed fires. The fires were designed to begin ecological restoration in the southern Peloncillo Mountains by reducing the density of woody species and improving herbaceous cover, restoring wildlife habitats and historic biological diversity, improving watershed stability and hydrological function, and creating a fuels mosaic that would allow fire to resume a more natural role in the ecosystem (Helbing 1995). The project areas are generally at elevations above 1,525 m that support mixtures of oak (*Quercus*), juniper (*Juniperus*), shrub, and herbaceous species. The objectives for the series of landscape fires included burning about 65% of the area, reducing the population of smaller mesquite and juniper by 40% to 50%, and protecting larger oak trees and riparian areas. The first prescribed burn occurred in 1995 on 2,430 ha in Baker Canyon near the U.S./Mexico border; the second burn was the 1997 Maverick Burn. This was followed by the Baker II Burn in 2003, which was planned to cover about 19,285 ha of federal, state, and private lands. The landowner compensated the government for treating approximately 4,330 ha of private lands that were within the burn boundary. The final surveys indicated that about 14,365 ha actually burned. Baker II was considered, at that time, to be the largest successful prescribed fire conducted in the United States. In 2007, a fourth landscape burn covered 2,185 ha in the adjacent Cottonwood Canyon.

Planning and implementation of large landscape burns require close coordination among many partners to meet objectives and to ensure safety. The Baker II Burn, for example, was conducted by personnel from the Coronado National Forest, other national forests, BLM, FWS, National Park Service, and the Animas Foundation, which operates the Diamond A Ranch. The Rocky Mountain Research Station and NRCS assisted with planning, and the Mexican government sent observers. The four prescribed burns generally have been successful in achieving the landscape restoration objectives of reducing the densities of woody species and fuel accumulations and creating mosaics of open grass and tree-covered areas.

Monitoring was conducted on the ground using transects, permanent or temporary plots, and strategically located photo points and remotely by using aerial observations or satellite imagery. Several research studies were initiated to answer questions raised in the development of the Peloncillo Plan about fire management and fire effects (Gottfried and Edminster 2005).

The Peloncillo Programmatic Fire Plan is a successful proactive model for restoring landscape-scale fire. The plan was developed by the Coronado National Forest with consideration of the views of the other federal and state agencies and the local ranching communities. The consultations with the U.S. Fish and Wildlife Service and state game and fish departments were critical to the acceptance

of the plan and set the framework for future consultations on the Coronado National Forest. Documentation and consultations are still necessary before a prescribed fire is ignited. However, the programmatic plan allows land management agencies to implement prescribed fires or to manage wildfires in the Peloncillo Mountains without the previous need for intense, complicated, and time-consuming procedures.

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