
CHAPTER 5

MANAGEMENT TECHNIQUES TO MAINTAIN OR IMPROVE EXISTING BIOLOGICAL SOIL CRUSTS

While total protection from disturbance is often the easiest way to maintain or improve biological soil crusts, this is not often possible or desirable. There are many factors to consider in the management of soil communities, including disturbance type, intensity, timing, frequency, duration, or extent. Research is needed to determine realistic biological soil crust objectives by soil type in most potential vegetation types, but initial estimates can be determined by using “healthy” reference areas as described by the National Research Council (1994). Protection of relic sites as rangeland reference areas is important, as these sites provide baseline comparisons for ecological potential and future scientific research.

5.1 Fire

Proactive management is needed to prevent unnaturally large and/or frequent fires in areas where fuel build-up or annual grass invasions have occurred. Such management actions may include altering grazing regimes to prevent annual plant invasions, prescribing fire to prevent fuel build-up, and/or restricting off-road vehicle use.

5.1.1 Prescribed Fire

Used cautiously, prescribed fire can be a useful tool in some situations for renewing community vigor. However, the site’s ecology and evolutionary history need to be understood, as burning can result in conversion of some sites to exotic vegetation. Thus, even though a community evolved with fire, fire may no longer be desirable because of exotic plant invasions. Prescribed fire is not recommended for such sites unless post-fire restoration treatments are planned. Prescribed fire may be useful on more productive sites with low potential for exotic plant invasion to reduce high woody vegetation densities resulting from overgrazing. Other impacts (such as recreational or domestic livestock use) should be limited following treatment to allow full site recovery.

5.1.2 *Post-fire Management*

Once a site has burned, evaluation is needed to determine whether recovery will occur naturally or if revegetation is needed. Many burned sites, particularly those in the Great Basin and Intermountain regions, require revegetation to stop exotic plant invasion, and most techniques require some soil surface disturbance (Fig. 5.1). This may not appear consistent with recovery of biological crusts. However, failure to treat sites can result in irreversible dominance by annual species (such as cheatgrass), which prevents the return of well-developed biological soil crusts (Fig. 4.2, 4.5, 5.2; Kaltenecker 1997, Kaltenecker et al. 1999a). Once revegetated, protection from grazing and recreational use is often necessary for recovery of the biological soil crust and the vascular plant community. Recovery in these areas can be further facilitated by use of minimal-till or no-till drills or other seeding methods that minimize soil surface and compressional impacts. Emphasis should be placed on restoring the native plant community using local ecotypes, if available.

In the western U.S., revegetation of salt-desert shrub and lower-precipitation Wyoming big sagebrush communities presents some unique problems. West (1994) presents evidence that cheatgrass will remain and potentially increase in these types, as revegetation is difficult because of arid conditions and unpredictability of wet years. He suggests that without livestock consumption of cheatgrass, susceptibility to fire could increase. However, the effective use of livestock in long-term control of cheatgrass has not been demonstrated. In addition, such grazing would occur well into the growing season and thus to the potential detriment of biological crusts and native vascular plants.

Figure 5.1 Soil surface disturbance associated with post-fire revegetation projects. This site was drill-seeded with a rangeland drill.

