

Ecosystem-Based Management at Lower Elevations

Stephen F. Arno

Abstract—Our experience testing ecosystem-based management (EM) treatments in ponderosa pine (*Pinus ponderosa*)/fir (*Abies* spp.) is summarized here. Topics covered include silvicultural treatments, fire application, soils and nutrient considerations, wildlife habitat considerations, associated riparian communities, and treatment of invasive weeds.

The following is a summary of our experience testing ecosystem-based management (EM) treatments in ponderosa pine (*Pinus ponderosa*)/fir (*Pseudotsuga menziesii* and *Abies* spp.) forests and associated riparian communities and montane grasslands. These ecosystems were historically shaped by frequent, low to moderate intensity fires that produced open stands of large fire-resistant pines. They have been greatly altered by exclusion of natural fires for nearly a century and by logging and livestock grazing. They are now being altered in many areas by extensive development of suburban home sites, which greatly complicates application of EM. These ecosystems serve as habitat for a variety of wildlife species and are especially important as winter range because they can provide tree structures for habitat and cover as well as an abundance of forage plants in an environment where snow depths are light to moderate. These ecosystems now serve as critical winter range in many areas due to loss of the historical valley bottom winter range as a result of agricultural and other human developments.

Upland Forests

We have experimented with EM treatments in upland forests ranging from dense ponderosa pine second-growth stands on warm, dry sites to ponderosa pine-western larch (*Larix occidentalis*) stands with understory thickets of Douglas-fir (*Pseudotsuga menziesii*) and grand fir (*Abies grandis*) on moist sites and cool aspects. Some stands were mostly fir thickets although old stumps indicated they were once dominated by ponderosa pine or pine and larch.

The general goal of EM treatments has been to return to some semblance of historical conditions—more open stands dominated by the fire-dependent tree species (ponderosa pine and possibly larch) including large, old trees. In most

cases the long-term objective is to maintain this stand condition in perpetuity by periodic treatments to control tree density and species composition and to encourage establishment of new age classes of pine or larch. Douglas-fir and possibly grand fir will tend to increase in dominance and can be controlled to some extent by cutting and burning at intervals of perhaps 20 to 35 years, depending on site productivity.

The initial restoration treatments are especially difficult because the stands are heavily overstocked and under competitive stress and there is often an unusual accumulation of forest fuel which exposes trees to damage from burning. Once this initial situation has been corrected by carefully conducted treatments, the remaining trees should be able to improve in vigor, and conditions for subsequent treatments should become more favorable.

Selecting Areas for Treatment

Anyone who has had experience in EM treatments soon recognizes that it will not be possible to treat all areas that could benefit from it. As a result of a limited work force, money, opportunities for burning, etc., a large proportion of the ponderosa pine zone cannot be treated. Restoration efforts should probably be concentrated in areas where the following factors rate relatively high: ecological need, feasibility of accomplishment, and acceptability from a social and environmental standpoint. Ecological need is relatively high in the ponderosa pine zone because most stands have been heavily altered as a result of past logging and removing natural fires. Feasibility of accomplishment depends on economics and available technology and skills. For instance, steep sites with dense thickets of small trees might be both technologically difficult and very expensive to treat.

Social and environmental acceptability might be heavily constrained by the level of treatment impacts that people are willing to accept—such as visual changes in the forest, or smoke production from treatments. Acceptability might be heavily constrained by environmental regulations. For example, it might be virtually impossible to restore historical conditions in a riparian area because of regulations against cutting and prescribed burning.

Economic Considerations

Areas where treatments can be self-financed have a clear advantage in times of limited budgets. Often the silvicultural harvest that is appropriate for achieving ecological objectives can generate additional funding to pay for other aspects of the treatment (Fiedler and others 1998). Sometimes matching funds for treatment can be obtained from a

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Stephen F. Arno is a retired Research Forester, Fire Effects Research Work Unit, USDA Forest Service, Rocky Mountain Research Station, Missoula, MT.

wildlife-oriented organization such as the Rocky Mountain Elk Foundation or the Wild Sheep Society. Recently The Nature Conservancy has become a sponsor of EM treatments (Reid 1998).

Reference

Reid, Bruce. 1998. A clearing in the forest: new approaches to managing America's woodlands. *Nature Conservancy*. 48(6): 18-24.