Reestablishing Fire-Adapted Communities to Riparian Forests in the Ponderosa Pine Zone

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Ecological research has implicated the practice of fire exclusion as a major contributor to forest health problems in the semiarid ponderosa pine (*Pinus ponderosa*) zone of the Inland West (Mutch and others 1993; Sampson and others 1994). Prior to 1900, frequent, low-intensity fires occurred on upland forests in this forest zone at intervals of 5 to 30 years. With fire exclusion, dense understories and thickets of conifers have developed, producing stands that are highly susceptible to a variety of insect and disease epidemics and severe wildfires. These concerns have led to proposals and a few operational programs to reintroduce fire on a large scale to restore these forests (Kilgore and Curtis 1987; Lolo National Forest 1994; Williams 1995).

Many streamside and riparian areas within the ponderosa pine zone have experienced similar, but even more severe, forest health problems as a result of fire exclusion. However, these problems of advanced succession in riparian areas have received little attention, and the policy of excluding fire is still the unquestioned approach to riparian area management.

Riparian ecosystems are probably the single most productive type of wildlife habitat, benefiting the greatest number of species. For example, in the Great Basin of southeastern Oregon, 299 of the 363 known terrestrial species are either directly dependent on riparian areas or use them more than other habitats (Thomas and others 1979). In western Montana 59 percent of the land bird species use riparian areas for breeding, and 36 percent of those breed only in the riparian habitats (Mosconi and Hutto 1982). One of the reasons riparian areas are so important to wildlife is the diversity of plant species found there.

Riparian vegetation is important to water quality because it acts as a filter, trapping excess sediment, pollution, and nutrients. It also reduces the velocity of flood flows, holds streambanks in place, and shades the stream. The soil in riparian zones acts as a sponge taking up water during high flows and releasing it during low flows.

Prior to 1900, many of the riparian areas associated with the ponderosa pine zone experienced low-intensity fires at a rate of 2-5 per century (McCune 1983; Arno and Petersen 1983). These fires burned in a mosaic pattern leaving much of the vegetation and soil only lightly disturbed, and helped maintain a diversity of plant species far exceeding that found in adjacent upland forests. Riparian communities embedded in the semiarid ponderosa pine zone were historically dominated by relatively open stands of very large ponderosa pine and western larch (*Larix occidentalis*) that survived the low- to moderate-intensity fires. Understories consisted of a diverse assemblage of tall fruit-bearing shrubs—such as serviceberry (*Amelanchier alnifolia*), hawthorn (*Crataegus douglasii*), chokecherry (*Prunus virginiana*), bittercherry (*P. emarginata*), mountainash (*Sorbus scopulina*), elderberry (*Sambucus* spp.), and mountain maple (*Acer glabrum*)—and succulent forbs and grasses that are scarce in the extensive upland forests (Lackschewitz 1986).

Today, just as on the uplands, many of the disturbance-dependent species are being replaced by dense understories and thickets of shade-tolerant trees (fig. 1). The overstory trees are dead or dying, and there is a buildup of downed fuels along with a dense conifer understory. In many inland riparian areas there is a virtual monoculture of stunted grand fir (*Abies grandis*) without appreciable undergrowth. These conditions allow modern wildfires to sweep through the entire streamside forest in a high intensity burn, leaving little vegetation to protect streambanks and water quality. Storms can readily degrade stream quality after high-intensity wildfires, which are now common in these ponderosa pine zone riparian areas (White 1995).

I am involved in a cooperative study (University of Montana and Intermountain Research Station) that will test restoration treatments on two small streams in the Lolo and Bitterroot National Forests of western Montana. The management goal is to create conditions that will allow a return of seral vegetation and to reduce the hazards of severe wildfire and insect or disease epidemics. The project will demonstrate two feasible methods for removing most of the dense conifer understory.

Three treatments will be compared at each of the two riparian study sites: mechanical thinning alone, mechanical thinning followed by understory burning, and an untreated control. In the two thinning treatments, most of the small, shade-tolerant understory trees that make up the dense thickets will be cut and removed to reduce competition and open up the site to sunlight and precipitation. In addition, many of the shade-tolerant overstory trees will be removed while the seral ponderosa pine and western larch will be left. To minimize soil impacts, all tree removal will be done with a farm tractor equipped with a harvesting winch over frozen, snow-covered ground. In the burn treatment, a fuel bed of grand fir saplings will be left to allow a high level of control over the prescribed burn. The purpose of the burn is to stimulate herbaceous and shrubby vegetation and to create mineral soil microsites suitable for seedbeds. A systematic survey of overstory and understory trees and understory vegetation, as well as the physical and chemical characteristics of the stream, will be made before treatments and for several years after treatments.

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Figure 1—Fire exclusion in riparian areas has created dense understories and thickets of shade-tolerant species, such as grand fir.

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