

PRESCRIBED BURNING REDUCES COMPETITION AND IMPROVES GERMINATION OF TWO RARE PLANTS IN WASHINGTON

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ABSTRACT

We compared the effects of prescribed burning in spring and fall on longsepal wild hollyhock (*Iliamna longisepala*) and Thompson's clover (*Trifolium thompsonii*), two rare native forbs of north-central Washington State. These species occur in dry, scattered ponderosa pine (*Pinus ponderosa*) forests or grasslands where prescribed fire is currently used as one of several tools for forest restoration. We used field experiments conducted over 3 y to explore several aspects of species' response to timing of burning: plant survival, changes in plant size and morphology (including allocation to flowering stems), and changes in population size structure. Fall and spring burns were of comparable severity (proportion of ground surface blackened), but intensity (flame length and maximum temperature) was greater in the fall. Nonetheless, survival of mature *Iliamna* plants was high (82–100%) and did not differ among treatments. In contrast, first-year survival of germinants stimulated by fire was low. Mature *Trifolium* displayed moderate rates of dormancy (3–19%), making determination of survival impossible; however, post-treatment densities were comparable to initial densities, suggesting high survivorship. For both species, plant size (height and crown width), morphology (number of stems and leaves), and reproduction (number of flowering stems) were generally unaffected by burn treatment. Instead, we observed considerable variation in these traits within and among sites and from year to year, suggesting strong controls of local environment and weather on plant performance. For both species, densities of major life stages (seedling, vegetative, and flowering) were also largely unaffected by treatment. However, at one site, fall burning stimulated significantly greater germination of *Iliamna* than did spring burning (although subsequent mortality was high in both treatments). Our results suggest that prescribed fire can have neutral or potentially positive effects on populations of *Iliamna* and *Trifolium*. Timing of burning has little effect on the performance of extant plants, but fall burning can lead to increases in plant density in *Iliamna* by stimulating germination of buried viable seed. For *Trifolium*, frequent or more intense fire may be necessary to reduce competition and maintain suitable habitat conditions for long-term maintenance of populations.

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